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# Weather Effect on Army Operations

WEATHER IN WORLD WAR II  
Volume I

AD #4676

Accompanying

FINAL TECHNICAL REPORT

15 July 1954 through 15 September 1956

*Chapters I-III*

Signal Corps Contract Number DA-36-039 SC-63206

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WEATHER EFFECT ON ARMY OPERATIONS

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WEATHER IN WORLD WAR II

Volume One

Chapters I through XI, & Index

Accompanying

FINAL TECHNICAL REPORT

15 July 1954 through 15 September 1956

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The object of this study is to summarize the effect of weather on Army operations during and since World War II so that the Signal Corps may plan its research and development program in meteorology toward enabling the army more effectively and efficiently to accomplish its various missions.

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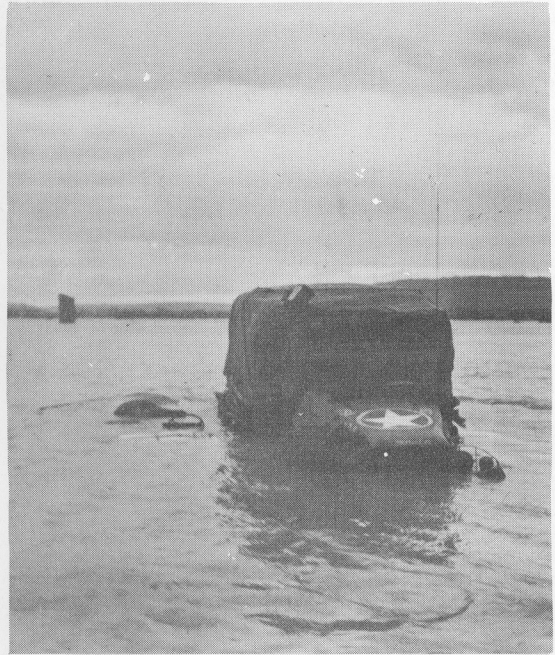
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Upper Left: Flood waters of the Moselle River, highest in 30 years, flow through main streets of Pont-A-Mousson, France. Jeep of III Corps Commander had to be towed. 9 November 1944.

Upper Right: This truck was caught in flood waters of the Moselle in France. 11 November 1944.

Lower: Flood waters grounded these artillery observation aircraft in Rambervillers area, France. A week of showers reached a climax in a 24-hour downpour. 8 November 1944.



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ERRATA

World War II, Vol. One

First line on pages III-11 through III-16  
should read "References, 'Tunis by New Years'--  
The Winter Campaign" instead of ". . . --  
The Western Campaign".

## Chapter I

### BLITZKRIEG ENCOUNTERS WEATHER

Nazi mobile armies lunged rapidly eastward until halted by mud and a mounting Russian resistance in the fall of 1941. By December they had reached the farthest eastward points along most of the line. Subsequently they lost ground along all the northern sectors as the severe Russian winter inflicted hardships on personnel and immobilized the mechanized armies.

#### Nazis Launch Attack on Former Allies

1. The attack launched on 22 June 1941 was expected to be a textbook example of Blitzkrieg. Manpower and firepower were massed and maneuvered in three main prongs with the intention of destroying the Red armies quickly. The center prong commanded by von Boch aimed at Moscow. The northern army group under von Leeb initially moved toward Leningrad. The southern armies under von Rundstedt moved in the general direction of Stalingrad. Initial progress was swift as tanks and motorized troops moved the front eastward at 40 miles a day. However, delays occurred during the siege and reduction of certain main cities. In other cases

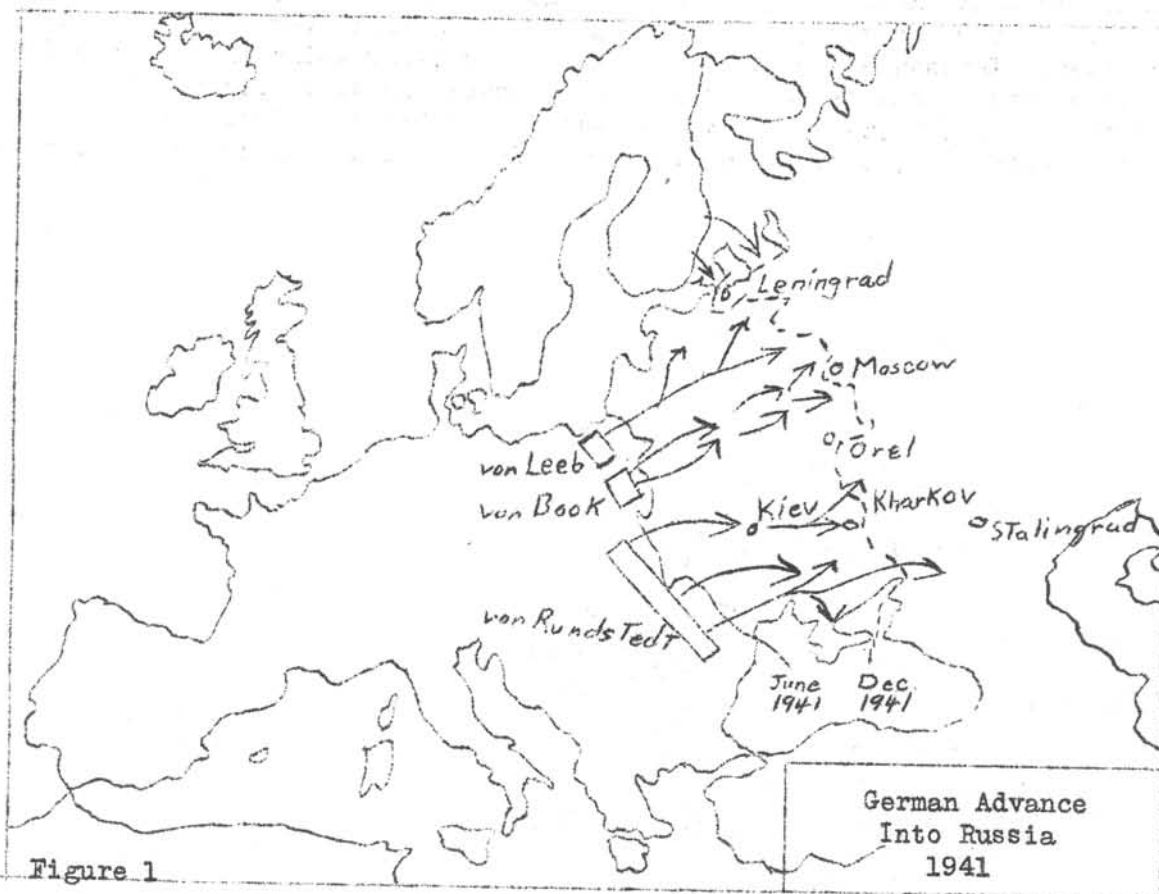


Figure 1

as at Leningrad sieges were begun but never completed at points which marked the high tide of Nazi conquest. High tide of the advance reached a general north-south line through Moscow, but the capital did not fall. During the early months of 1942 the Russians, aided by a severe winter, pushed the Germans back in northern sectors. In the southeast the invaders advanced in 1942 but failed to take besieged Stalingrad. Eventually the Reds wiped out even these gains as the war on the Russian front ground into 1944 along more or less static lines.

### Rains, Mud, and Tactical Stagnation

2. Not until early September did the German armies encounter appreciable interference from the weather. Then a period of fall rains slowed the advance to a snail's pace and eliminated the advantages enjoyed by the mechanized invaders over the less modern defenders. Fair weather periods such as occurred in early October had to be used for movement to firm ground, not for pursuit of the Russians. Hence, many Reds made good their escape over the marshy terrain and were able eventually to regroup and hold the Nazis in 1942. Former German generals after the war reviewed the effect of the weather on the Russian campaign of 1941 and concluded:

"Climate is a dynamic force in the Russian expanse.....  
In 1941 the Wehrmacht did not recognize this force and was not prepared to withstand its effects..... The German Army never recovered from the first hard blow."<sup>1</sup>

### Summer Showers

3. Summer showers hampered operations in several critical cases. By 16 July torrential local showers began to frustrate the German drive. Von Bock attempted to encircle the Russians at Slonim, Minsk, and Smolensk, but in each case the withdrawing Russians eluded him. Mud, the great equalizer, reduced the German armored striking power. The Russians, on the other hand, regrouped and offered such stern resistance that it took three weeks of fighting to take Smolensk on 7 August.<sup>2</sup> Showers also forced the 3rd Panzer Group to stay on main arterial roads, a restriction not expected by the fully trucked combat and supply vehicles.<sup>3</sup> On 25 July 1st Panzer Division, located southeast of Kiev, had been ordered to approach Cherkassy on the Dnieper River via Moshny. The immediate objective was to assist a German tactical group attempting to eliminate a bridgehead near Cherkassy held by the Russians on the west bank of the Dnieper River. When a tank unit reached Moshny about 20 miles northeast of the objective, they were advised that the bridge east of town was destroyed. A ford could not be used because recent heavy thundershowers had rendered these roads muddy and impassable. It was necessary therefore to reverse the column to approach the objective over an alternate route. This caused still further delay on the new route as a result of another demolished bridge and the necessity for finding a suitable ford. The commitment of the division to battle was thus delayed by a full day.<sup>4</sup>

### September Rains Stall Nazis in Dnieper Basin

4. The first fall rains found Panzer armies operating in the Dnieper basin. The marshy terrain lacked rapid drainage and had no dense network of improved roads, so passage quickly became difficult when the rains came. A Nazi panzer commander, Gen. Heinz Guderian, gives this description of conditions on the evening of 3 September 1941: "It began to rain and the roads were soon turned into mire. Two-thirds of SS Das Reich which was moving forward was stuck fast." Despite the fact that it was a brief fall of rain, the ground and roads permitted him to make only 10 miles per hour average progress the next day as he visited units under his command. On 6 September, still in the area of Korop about 130 miles northeast of Kiev, he reports that the bad roads delayed assembly of the panzer division SS Das Reich, which had been scheduled to attack a railroad bridge over the Desna river in the vicinity of Makoshino. Other units in the vicinity were similarly affected, and cavalry and SS units were moving on foot because of the bad road conditions. Continued rains during September further deteriorated the roads. German troops straggled out along the roads, and numerous vehicles were observed stuck in the mud. Supply trucks had to be towed out by prime movers from artillery units. After a night of drenching rain on 10 September the German panzer commander reports that even cross country vehicles with fourwheel drives had difficulty in negotiating the muddy roads and that average speeds did not exceed six miles per hour.<sup>5</sup>

### Luftwaffe Hampered

5. Continued early fall storms made German air reconnaissance and ground reconnaissance virtually impossible around 10-15 September. Air reconnaissance was affected by the low clouds and poor visibility, whereas ground reconnaissance was stuck in the mud. German airfields became unusable because of the mud.<sup>6</sup> During the latter part of September the German Armies were converging upon Kharkov. During September the Russian forces counterattacked and were almost successful in an attempt to recover Smolensk. Heavy tanks had been used by the Russians, and bad weather is reported to have grounded German dive-bombers<sup>7</sup> desperately needed to fend off a counterattack by Russian tanks against the XXIV Panzer Corps east flank.

### Blocking High Gives Germans Good Weather

6. A week of dry weather came in late September and early October. The Second Panzer Army then raced toward firm ground near Orel while a "blocking high" held off further fall rains. The Germans hoped to gain the use of the railroad running southward from Moscow through Orel to Karkov. This eastward Panzer offensive succeeded initially with capture





Figure 2

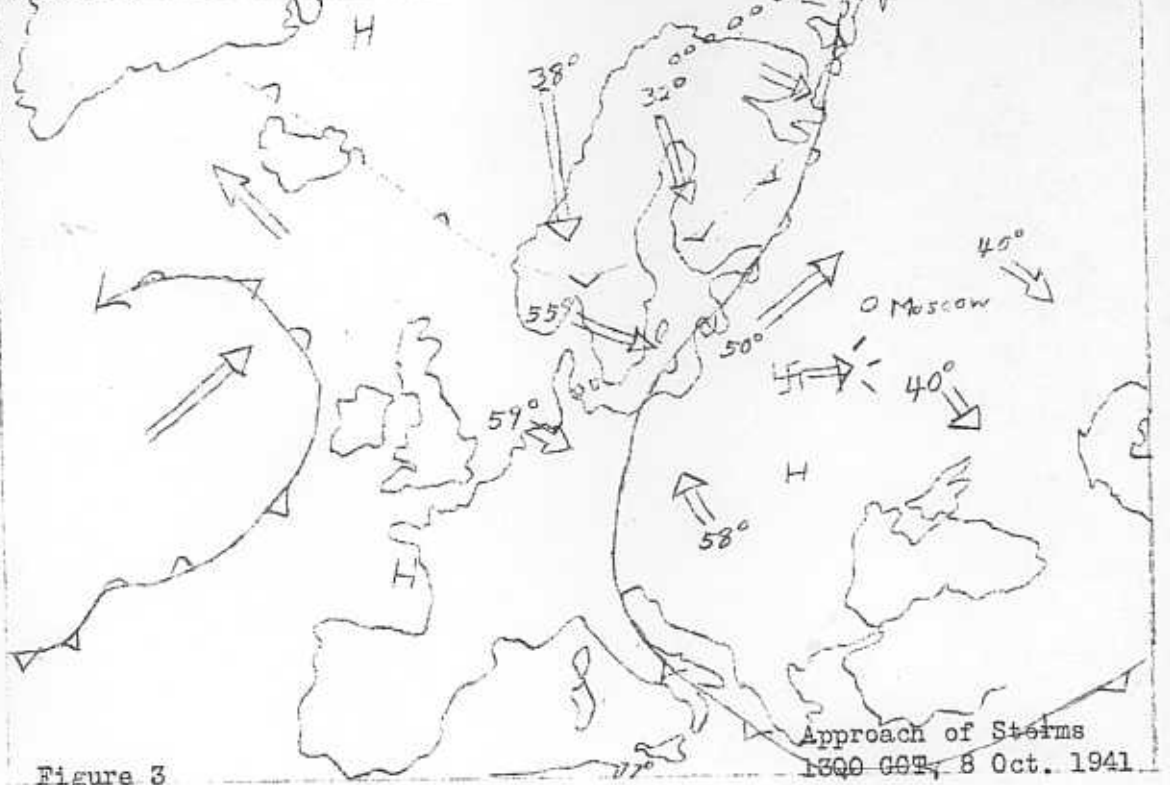


Figure 3

## PREFACE

"Weather affected military operations in many different ways during the global operations of World War II. The wind determined the success of the great amphibious attacks in North Africa, Sicily, Normandy, and the Pacific. Mud due to rain or thaw reduced mobility of armies in every area from Russia to Okinawa. Floods due to rain and thaw halted movement in Italy and France. Rain itself drenched troops and concealed movement. Snow, clouds, and fog limited all kinds of observation and air tactical support, sometimes to the great disadvantage of the Allied forces, as in the Ardennes. Extreme heat and cold diverted the attention of the fighting men from the human enemy to the natural enemy."

This book presents the stories of some of the campaigns of World War II in which weather played an important, if not decisive, role in warfare. It includes a "weather log" chronologically listing the various weather-related military events of the war in the Pacific.

Northern Hemisphere weather maps prepared by the Washington analysis center and European charts prepared by the Deutsche Seewarte in Berlin provided the basic analyses accepted by the writers of this text.

Many excellent cases remain to be developed for narration in the manner of this text. However, the incidents described here give a reasonably full coverage of the spectrum of weather affects during World War II. Tacticians and strategists will find in these anecdotes the stories of weather exploited to advantage by attackers, weather used to reduce a disadvantage, weather surprises striking the unwary, and weather warnings heeded to avoid disaster.

We acknowledge with gratitude the assistance of the Physical Sciences Branch, Office of the Chief Signal Officer, for providing maps and much helpful coordination, the Army Pictorial Service for photographs, the Adjutant General for microfilm records, the Kansas City AGO Records Center for use of records, Office of Chief of Military History for manuscripts and consultation, Headquarters Air Weather Service for records and Northern Hemisphere synoptic maps, U.S. Weather Bureau Library for German synoptic maps, Dr. Robert D. Campbell of George Washington University for use of data cards from the historical records project (Contract DA 22-079-eng-141).

We also express our thanks to Col. Ernest C. Knapp, Col. LeRoy G. Heston, and Capt. Daniel B. Miller, commandants respectively of the Army, Air Force, and Naval R.O.T.C. units at Oregon State College, for the helpful consultation they and members of their staffs have given.

To Brig. Gen. Paul V. Kane, USA-Ret., we are especially indebted for his encouragement and professional consultation.

Corvallis, Oregon  
15 July 1956

of Karachev on 7 October and Bryansk on 8 October. However, the first of a series of occluded fronts overtook them on 9 October. The resulting rain within a few hours rendered the roads once more impassable. Movement of wheel vehicles became extremely difficult. River valleys and forests became filled with water, and there was no satisfactory solution available in the use of alternative routes. Tracked vehicles were used to tow the panzers from the swamps eastward to the firm land nearer Orel. Both armies were equally affected by the mud, which hampered all movement for the next four weeks. Pockets of Russian troops at Bryansk and Trubchevsk were unable to escape.<sup>8</sup>

#### Snow-melt Bogs Tanks

7. During the night of 6-7 October some panzer units had encountered the first snow of the year southwest of Orel at Dmitriev when a cold front advanced southward along the eastern periphery of the blocking anticyclone. This snow quickly melted, and a German commander described the roads as "canals of bottomless mud". An observer who flew over the roads west and south of Orel on 8 October found that wherever the road had not been rendered impassable by collection of rainwater it had been bombed and hence difficult to maneuver.<sup>9</sup> At the expense of numerous mired vehicles the northward moving panzer units managed to encircle Russian defenders in the Bryansk area. By the time this encirclement had been completed General Guderian describes the condition of a panzer corps as being "stuck in the mud and immobilized". The mud swamp seemed to surround his Dmitrovsk headquarters.

#### Supply Critical

8. Numerous special problems arose in connection with the supplies for the panzer army. Wheeled vehicles had to be towed by tracked vehicles, resulting in unusually rapid wear on the latter. Moreover, special supplies of chain and incidental couplings were needed for towing operations. Supply was generally interrupted. Winter clothing had not been supplied. Antifreeze was not on hand for the vehicles. Emergency measures had to be adopted to provide all these items by air lift and air drop.<sup>10</sup>

#### Atlantic Air Masses Deluge Nazi Tanks.

9. To the south vigorous Russian resistance was being encountered by German armies advancing upon Kharkov. Apparently Russians were attempting to evacuate the industrial plant equipment from this important industrial city and required additional time. The 2nd Panzer Division located in a rest area about 100 miles west of Kharkov was ordered to move up to the front on the evening of 15 October to take position about 25 miles southwest of Kharkov. Rains had begun on 13 October with the approach of an occluding wave cyclone from the Baltic. The intensifying Icelandic low pressure system hurled repeated surges of moist air into Central Europe. A fine drizzle fell during the night of 15-16 October as

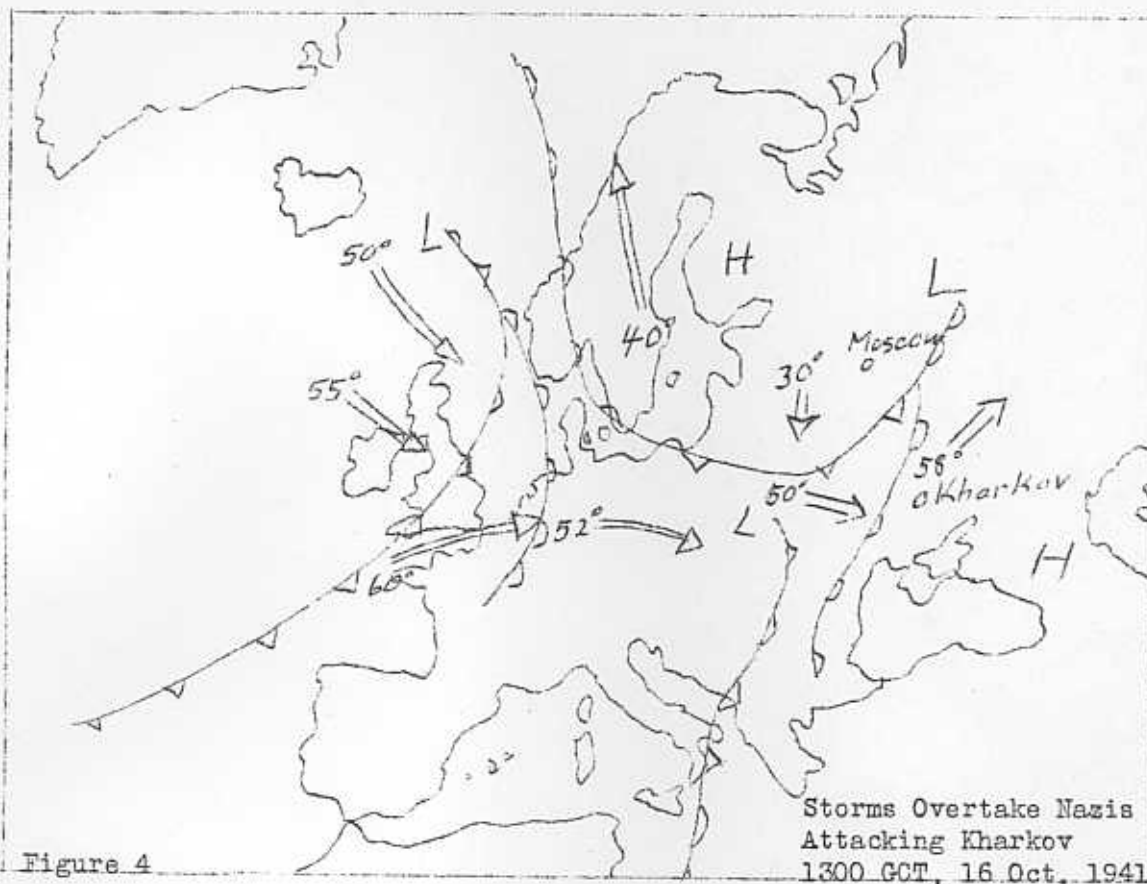


Figure 4

a warm front advanced from Western Europe. The leading units had been on the road about two hours and had advanced about 20 miles at 1000 on 16 October when it became apparent that the road was covered with deep mud and was impassable for long distances. Vehicles had been abandoned by other units which had been using this route as a main supply road. Drivers of the disabled vehicles reported that similar conditions existed for at least another 20 miles up the road. The division headquarters received permission to re-route the entire column along an alternate route. Engineers and recovery groups with prime movers for towing stalled vehicles and for removal of disabled vehicles abandoned by other units had to be provided for the worst section of this alternate route. Military personnel with the assistance of local civilian labor had to improve and maintain the road. Even on the alternate route numerous delays occurred, so the last unit did not reach the assembly area until the morning of 17 October. Personnel and equipment losses totalled about 25% on this march. This reduction in strength sapped the striking power of the division and prevented taking the city as early as intended, thus permitting the Russians to effect a more complete evacuation.<sup>11</sup>

#### Stuck in The Mud

10. The fall rains continued as successive occluded fronts swept inland. Second Panzer Army sent fast moving units to capture bridges

across the Oka River, about 50 miles south of Moscow, on 28 October. However, by this time the hard surface road from Orel northward through Tula to these bridges had disintegrated into a mud canal where only occasionally could top speed of 12 miles per hour be achieved. An army corps advancing along the Orel-Tula road found it impossible to move all of its motorized vehicles and heavy artillery along with it. The road itself had become so badly damaged that no attempt was made to move supply vehicles over the road, but instead supply was accomplished by air.<sup>12</sup> Troops moved on foot, and animals often replaced trucks.

### Reds Prepare For Winter

11. In November the German blitzkrieg was slowed by a combination of determined Russian resistance and adverse weather with its rain and bottomless mud, while the Soviet forces were quietly preparing for the bitter winter they knew was in the offing. Early in November the supply of winter equipment began to the Russian troops in the area around Moscow. Heavy sheepskin or wool overcoats, fur or sheepskin hats, and felt boots replaced the lighter summer clothing. The Russians applied white camouflage paint to their guns moving toward the front lines. They equipped certain types of aircraft with skis and winterized all types of other equipment to keep them in operation during the extreme cold weather. The Russians recruited labor battalions to keep the runways of the airfields and the highways free from snow. These people later worked at excruciating temperatures as cold as -40°F; it was necessary for the workers to cover their noses and mouths with strips of cloth so that the moisture from their breath would not congeal on their faces.<sup>13</sup> The 16 November issue of Pravda reveals that the Russians were aware and were preparing for the winter.

"It is necessary to take as much advantage as possible of winter conditions to destroy the German invaders and their mechanized equipment. Ski troops offer excellent methods for assaults on enemy bases, staffs, and communication lines, for crushing blows against his flanks and reserves. Mobile units can occupy and hold important points in the enemy rear, cut off his retreat, and prevent him from bringing up reserves."<sup>14</sup>

### Arctic Blasts Penetrate Nazi Forces

12. While the Russian forces were adapting themselves to the coming winter weather, the Germans discovered that their troops, equipment, and tactics were not adequate to meet the situation and that they could not adapt themselves to the cold quickly enough. In the vicinity of Chern, about 160 miles south of Moscow, General Guderian encountered a temperature of -8°F while inspecting his troops on 13 November. His tanks could not move on ice-covered fields because of lack of the required calks. Fuel and lubricating oil thickened. Individual regiments suffered as high as 500 casualties resulting from frostbite. Machine guns failed in the extreme cold, and available anti-tank guns proved inadequate to cope with

the large Russian armor. Worst of all, they lacked adequate supplies of woolen trousers, underclothing, snow shirts, and boot grease on the front. Supplies in the rear were inadequate and were slow. Transportation difficulties made it almost impossible to get such supplies as they had to the front.<sup>15</sup>

#### Freeze Affects Both Forces

13. Although more nearly prepared for winter fighting, the Russians also found the transition from the mud and rain of the fall to the extreme cold and deep snow of the winter not a smooth one. On 15 November near Rzhev, approximately 100 miles northwest of Moscow, Russian troops desiring to take advantage of the heavy snowfall for a surprise attack went into action without adequate winter clothing. Although the temperature was a relatively warm 16°F, the shivering Russian sentries were not alert to the German counterattack which immediately followed an initial Russian success. Russian forces in the area were being given liquor rations as a "stimulant" to counteract the extreme cold. This measure backfired, for the men felt the cold even more acutely after the dulling effects of the alcohol wore off.<sup>16</sup>

#### Rain Halts Drive on Moscow ★

14. In December, the Germans on the central front were preparing for a breakthrough intended to carry them to the city of Moscow. These plans, however, failed when rain fell on roads covered with ice and snow. According to the report, the thaw caused the roads to become impassible, and mechanized operations bogged down in a vast quagmire. According to a Nazi broadcaster,

"The whole country is frightening. The road to Moscow resembles one vast soaked sponge along which men, horses, and lorries slog painfully and strenuously. Slowly they move, dragging themselves step by step. Time after time they are bogged down. This is Russia."<sup>17</sup>

#### Nazis Desperate For Winter Clothing

15. The failure of the German army to provide adequate winter clothing cannot be stressed too highly as a factor in the collapse of the blitzkrieg on the Russian front. In this desperate situation hastily established sewing workrooms near the front used blankets and rags as material for fashioning winter clothing. In some cases the German soldiers seized warm fur garments and felt boots from the natives in the vicinity. The German home-front provided the most important source of winter clothing. Clothing of every description came from all parts of the country to alleviate some of the front-line suffering until arrival of the regular issue of winter equipment in the spring of 1942. However, troops suffered much hardship until this clothing did reach the front.<sup>18</sup>

Because of this critical situation, General Guderian asked Field Marshall von Boch to change his operation plans 150 miles south of Moscow on 23 November because his men seemed unable to carry out the orders. He cited the shattered supply system, which could not overcome a shortage of tanks and guns, his right flank exposed to Russian attack, and worst of all the lack of shelter and winter clothing to overcome the suffering of the exhausted troops. Bitter winds, deep snow, and reinforcement of the Russian armies by fully equipped, warmly clad, Siberian troops made the situation seem utterly hopeless.<sup>19</sup>

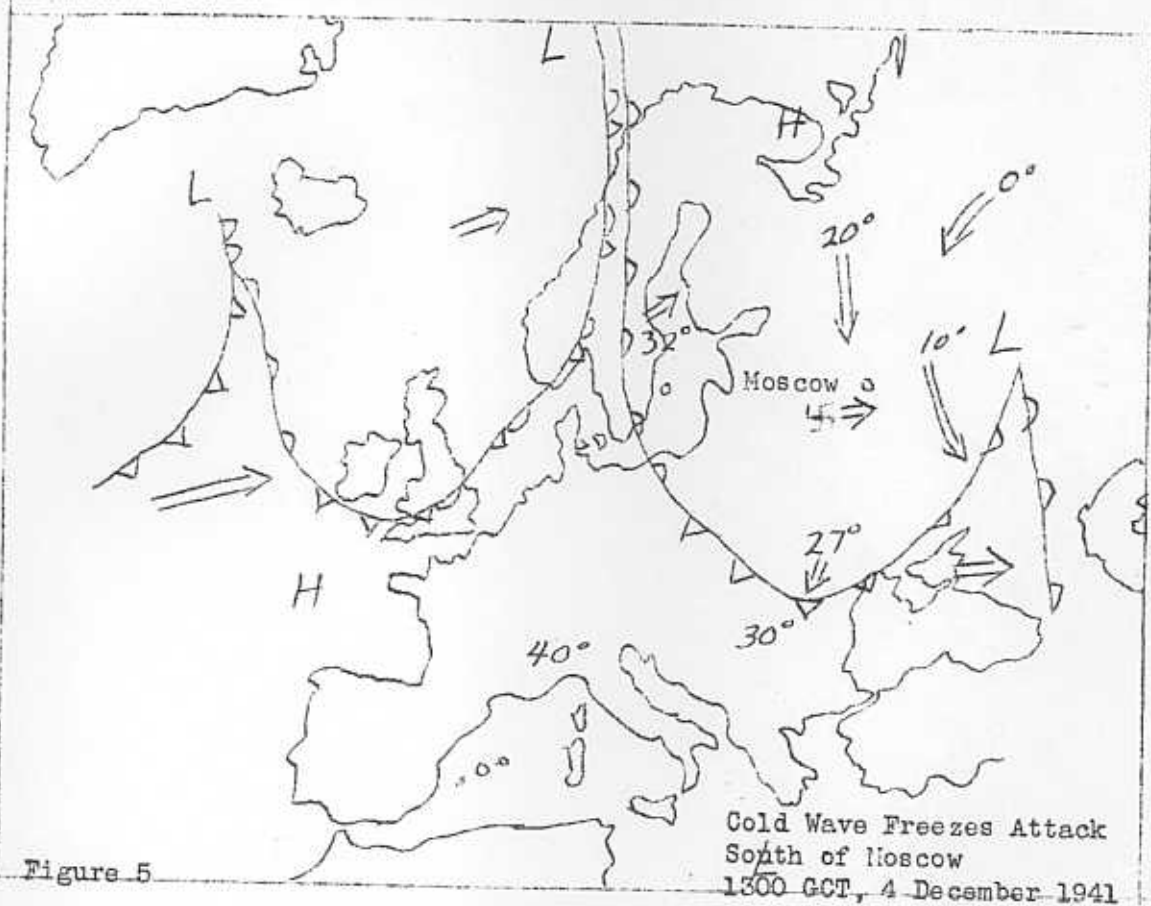


Figure 5

#### Germans Give Up Attack on Moscow

16. When on 15 November 1941, the German armies before Moscow launched their offensive, they were already probably a month behind schedule. The German time-table for the rapid subjugation of European Russia by blitzkrieg tactics had been largely upset by the valiant defense of Timoshenko's armies at Smolensk. This battle took over three weeks, whereas other victorious Nazi campaigns, particularly in the Ukraine, had only required five to ten days. Further, they attacked a numerically superior force entrenched in strong, prepared positions, a force with high morale, fighting for their capital, the symbol of their homeland.

After initial important successes by the Germans, the Russian winter took a hand in nullifying the German tank superiority, hence aiding the defenders of Moscow. Fog, mist and swirling snow, cut visibility to yards. Tanks finally became merely "an assistance-of-infantry weapon". Climatic averages indicate that the average December temperature in Moscow is only 17°F, 15° below freezing. During December there are also, on the average 18 days with snow and 3 days with fog. Early winter in Russia is obviously an undesirable time for blitzkrieg. It appears that in this case, the German High Command gambled on the weakness of the Russian forces, not the weather, and that the attack was launched regardless of the weather, in the hope of achieving a quick knockout. After having reached heavy artillery range of Moscow's suburbs, the Germans broke off the attack on December 7, concluding their first campaign, in Russia.

### Russians Take Advantage of Snow

17. On 5 December, with the temperature at -32°F, General Guderian, for reasons already cited, decided to break off the attack against the Russian forces just one day before the general Soviet counter-offensive along all fronts.<sup>20,21</sup> With the launching of the great counter-offensive by the Russian forces, the logic of their training, tactics, and preparation became extremely obvious. The Russians used ski-troops, snow plows, and any other equipment that could be adapted for swift movement through deep snow. In addition, the Russians were quick to take advantage of blizzard conditions or darkness to launch surprise attacks against the enemy.<sup>22</sup> A good example of Russian tactics occurred in the attack on Klin, 50 miles northwest of Moscow. On 14 December, at about 1600, a fierce snowstorm began in the area as a Scandinavian high fed polar air into a low centered near Moscow. At 2300 the Russians started to attack Klin. Working in small, independent groups, under cover of the storm, they managed to capture the railroad station by the next morning and complete the occupation of Klin by 16 December.<sup>23</sup>

### Blizzards

18. Although the German forces were now on the defensive, their greatest difficulties and casualties were not the result of the Russian offensive. The blizzard of 14-15 December came with passage of a "cold wave" as cold air surged from an anticyclone in northern Russia. A wave cyclone formed in Western Europe on 16 December, but its warm front did not produce precipitation on the Russian front until the night of 16 December. During the day's respite between storms German snow removal teams some 50 miles south of Kharkov cleared roads for traffic on 16 December. However that night deep snow drifts again accumulated and rendered the roads impassable. With continued snowfall and temperature of -22°F numerous technical difficulties developed. Near Barvenkovo one route of travel had to be abandoned when the road became impassable. During a movement of 230 miles in this area 30% of the German vehicles either broke down completely or needed repair.<sup>24</sup> German light tanks could not move when snow was deeper than 12 inches, and medium tanks halted in snow deeper than 18 inches.<sup>25</sup> Massed German tanks became



actually more a liability than an asset in the winter fighting. In many instances they were abandoned by the retreating armies.<sup>26</sup> The severe Russian winter inflicted severe disadvantages on the XLVII Panzer Corps operating in the area between Orel and Moscow. Troops suffered more casualties from the cold than from enemy action. Troops forced to withdraw could no longer dig new positions in the frozen ground.<sup>27</sup> In mid-December, General Guderian wrote,

"My soldiers will not have protection against the weather and the Russians until they reach Susha-Oka line and the fortified positions that were built there during the autumn. I beg you to remember that it is not the enemy that is causing us our bloody losses: We are suffering twice as many casualties from the cold as from the fire of the Russians. Any man who has seen the hospitals filled with frostbite must realize what this means."<sup>28</sup>

#### Worse Weather to Come

19. At this point the armies fighting in Russia had only begun to feel the effects of the Russian winter. During the Christmas week of 1941 terrific snowstorms and extreme cold struck in the area near Moscow. During the month of January, temperatures dropped to -30°F, and by the end of that month it was as cold as -50°F with strong easterly winds piling snow to a depth of 3 feet. This was to be the coldest winter in European Russia in 100 years.<sup>29,30</sup> In order to keep mechanized equipment operating in these very cold temperatures special measures had to be taken by both the Russians and the Germans. In spite of the best the Germans could do, however, the Russians claimed air superiority during December through early February because they were able more properly to winterize their aircraft than were the Germans.<sup>31</sup> In extremely cold temperatures it is always difficult to keep automatic weapons operating properly. The Russians used sunflower oil, a lubricant which they claimed guaranteed proper functioning of their weapons in the extreme cold. The Germans, on the other hand, resorted to the use of improvised types of stoves to keep their equipment warm and in operational condition.<sup>32</sup> A blanket of deep snow which covered almost the entire Russian front throughout the winter was at the same time a help and a hindrance to military operations. For example, in some instances machine guns had to be mounted on anti-aircraft tripods in order to insure a complete field of fire above the level of the snow.<sup>33</sup>

#### Russians Use Snow Tactically

20. The Russians sometimes used the deep blanket of snow to their advantage. On 26 January near Khristishche, about 90 miles southeast of Kharkov, Russian troops attempted to approach German positions under concealment afforded when they burrowed into the deep snow. Remarkably, the Russians remained motionless in the snow for 10 hours without moving their bodies or suffering frostbite. According to a subsequent report:

"The Russian troops employed in this sector seemed to be particularly immune to extreme cold. Individual snipers hid in the deep snow throughout the day and night, even at temperatures as low as a  $-50^{\circ}\text{F}$ . Temperatures of  $-40^{\circ}\text{F}$  and below, the German machine guns often failed to function, and below  $-60^{\circ}\text{F}$  some of the rifles failed to fire. In these temperatures, the oil or grease congealed, jamming the bolt mechanism."<sup>34</sup>

### Personnel Versus Cold

21. The extent of the suffering and hardships endured by the troops in the siege of Moscow cannot be adequately described. For prolonged periods during the winter an anticyclone would stand over the northern Baltic and send frigid air southward into the fighting zone. Such a high pressure cell appeared about 10 January and slowly crept eastward during the next three weeks. On 20 January a Russian tank officer reported that in the temperatures of that area, which ranged from  $-20^{\circ}\text{F}$  to  $-40^{\circ}\text{F}$ , wounded men would die in 10 to 15 minutes unless reached by stretcher-bearers with heavy blankets and a drink of vodka containing morphine. The same officer reported that wounds literally froze up.<sup>35</sup> In many cases the soldiers who had not become battle casualties suffered as greatly as did those who were wounded. The Russian prisoners captured by the Germans on the Moscow front reported that units of their army which were without shelter had to spend the nights in the open in the bitter cold. To avoid freezing, a company of men would line up along a long rope, the rope would then be wound up like a skein of yarn, pressing the men closely together, giving them the advantage of each other's bodily heat. In this position the men were able to sleep on their feet for about one hour. Then the rope would be unwound and rewound with those on the outside moved to the relatively warm center. This process would be continued throughout the night, giving a small measure of comfort to the Russian troops.<sup>36</sup> The bitter cold was causing the Germans even greater difficulties. After several days of north winds a 3 January report of the 6th Panzer Division operating near Vyazama had stated that frostbite casualties were up to 800 per day. No shelter was available, and it became necessary to dig positions into the frozen ground. Because of the difficulty in digging under these conditions, Germans used 10,000 pound explosive charges to blast the underground positions. While the blasting and construction work was going on, the engineer battalions suffered 40% frostbite casualties. The results were well worth the effort however, since daily casualties in the 6th Panzer Division immediately dropped from 800 to 4 cases.<sup>37</sup>

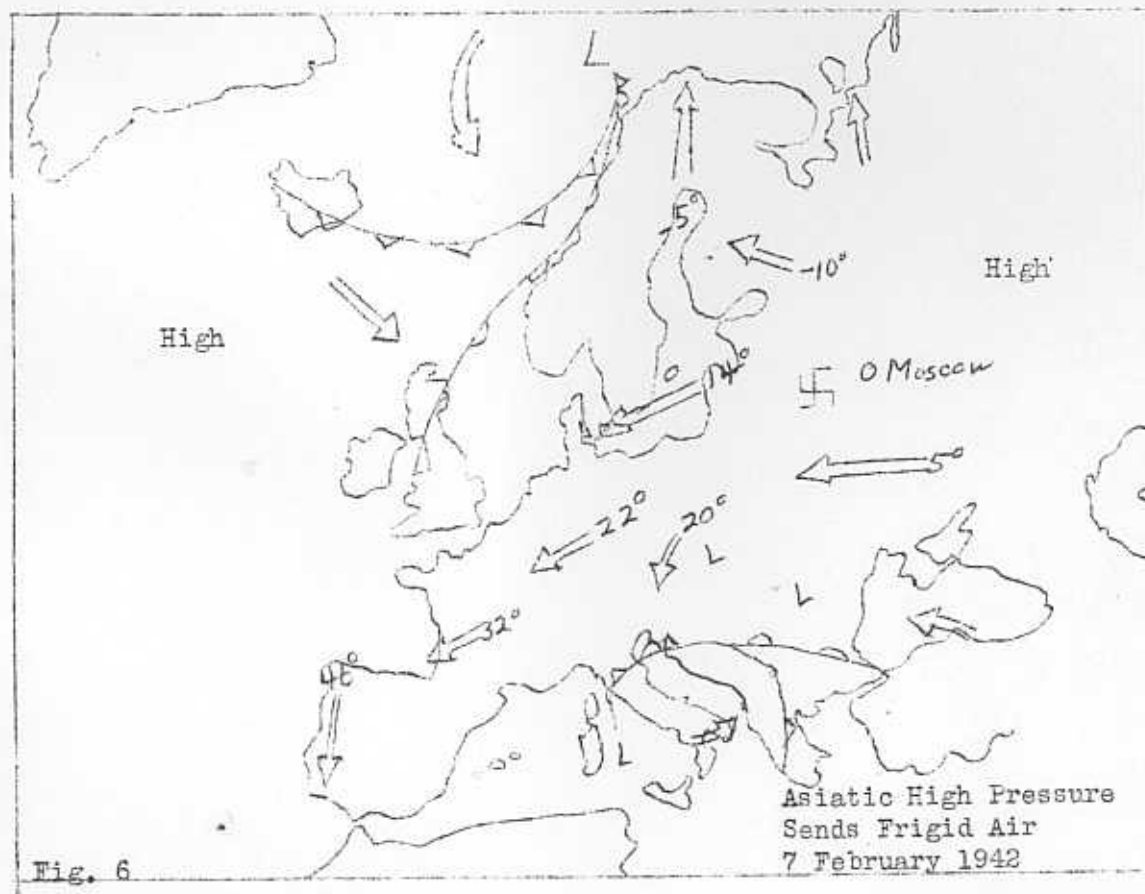
### Russians Use Cold As Ally

22. Throughout the winter, the Russians continued to use the adverse weather to their advantage. At Vorontsovo, a town about 300 miles south of Moscow, the Russians attacked during a driving snowstorm. German precautionary measures were inadequate so the attack achieved complete surprise.<sup>38</sup> At Khristishche a Russian patrol approached German positions

about 0130, 24 January 1942. An icy east wind drove the falling snow and reduced visibility to about 60 feet. The Russian patrol therefore approached German positions close enough to throw hand grenades and shoot German sentries before they could give the alarm.<sup>39</sup>

### Waterways Freeze Solid

23. A feature of the Russian terrain which becomes important in the winter fighting is the fact that the country is well covered with natural waterways and lakes. During the cold weather, these water bodies freeze solidly enough to support traffic of all types. To the far north Germans laid siege to Leningrad, but Russians supplies the city by means of a road across the ice of Lake Ladoga.<sup>40</sup> During the winter of 1941-42 even the Baltic Sea froze over, and for several weeks the Germans could not move supplies in that area by ship. After ice breakers partially opened sea lanes, supplies had to be unloaded awkwardly over boardwalks layed on the ice. Although ice hampered surface navigation, the ice made an ideal landing surface for air-lift operations of all types.<sup>41</sup> During the winter the frozen rivers became roadways for motor vehicles. The Volga River commonly becomes a major traffic artery during the winter months.<sup>42</sup>



### Winter Tarries Long

24. The remainder of the winter of 1941-42 in Russia was characterized by the presence of extreme cold and deep snow. A continental high pressure cell centered on the Urals fed the cold air westward into the German positions. In early February the temperature averaged  $-22^{\circ}\text{F}$ . In the area of Vyazma a two-foot blanket of snow covered the ground, and the earth was frozen to a depth of 3 feet. The conditions persisted through February and most of March. Even as late as 25 March 1942 extreme winter conditions forced the German 464th Infantry Regiment, located 130 miles west-northwest of Moscow, to construct positions in the snow above the ground because the men could not excavate the frozen soil. On that date the temperature was  $-44^{\circ}\text{F}$ , and three feet of snow covered the ground. In action that day German machine guns again failed to function, so the Russians succeeded in over-running the German positions.<sup>43</sup>

### Russians Use Animals

25. The winter fighting was further characterized by the failure of the heavy German equipment to operate efficiently in the deep snows and extreme cold and by the success of the lighter Russian equipment, which was moved by horses and by sheer man-power. During the course of the winter, the Germans slowly adapted themselves to fighting under the extreme weather conditions.<sup>44</sup>

### Spring At Last

26. The transition from the period of cold, snowy weather to that of the mud and rain of the spring thaw involved important tactical difficulties. For example, late in March 1942 temperatures in the Lake Ladoga region during the day rose as high as  $41^{\circ}\text{F}$ . However the sharp temperature drop at night froze moist clothing stiff and froze feet and toes. One German company reported loss of 65 of its 93 men as a result of a sudden severe cold wave one night. The price paid by the German forces in Russia is graphically demonstrated by the casualties Fourth Army report for 1 January through 31 March 1942 that there were 96,536 casualties including 14,236 frostbite cases.<sup>45</sup>

27. The winter fighting on the Russian front in 1941-42 was not only a struggle between two great armies; it was also a struggle of each individual soldier to stay alive in the terrible Russian winter. An army prepared to fight under such conditions might win important advantages, but the German Army lost its offensive drive in the fall mud and a large part of its defensive strength in the bitter cold. ★

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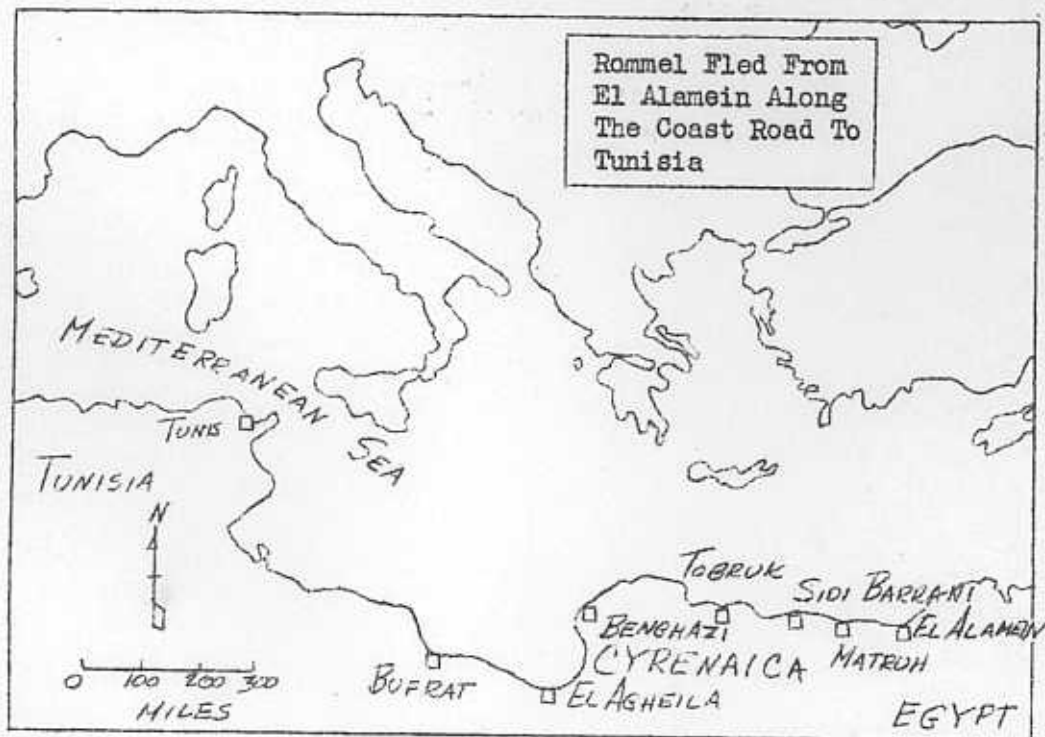
## Chapter II

### THE GREAT RETREAT FROM EL ALAMEIN

During the last two months of 1942 and the first two months of 1943 Montgomery's forces chased the remnant of Rommel's Afrika Korps from western Egypt into eastern Tunisia. Intermittent heavy rains dictated use of the hard-surfaced coastal road since the desert tracks became too soft to support tanks and other vehicles. Neither enemy or ally had a distinct advantage as a result of the weather which it experienced.

#### The Setting

1. After the decisive defeat suffered at El Alamein, Rommel's remaining force was scarcely a whole division. As compared to 600 British tanks, he had only 80. Very early in November it became evident that Rommel's major concern was to escape with the remains of his armor. Had it not been for Hitler's "stand and fight" order it is probable that the retreat would have begun even earlier. The most crucial stage occurred as early as 4 November. The prospect for escape





on that day was grim indeed due to the proximity of the British tanks. The opportunity to seal off the escape route was lost by exercise of too much caution on the part of Montgomery's forces induced in part by Rommel's reputation for "table-turning ripostes."<sup>1</sup>

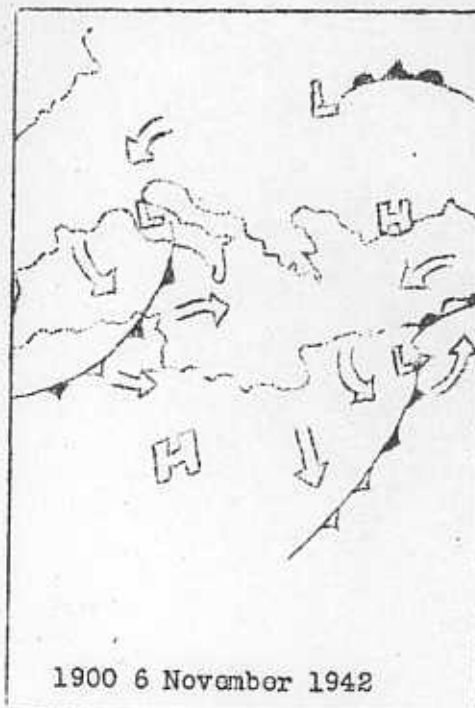
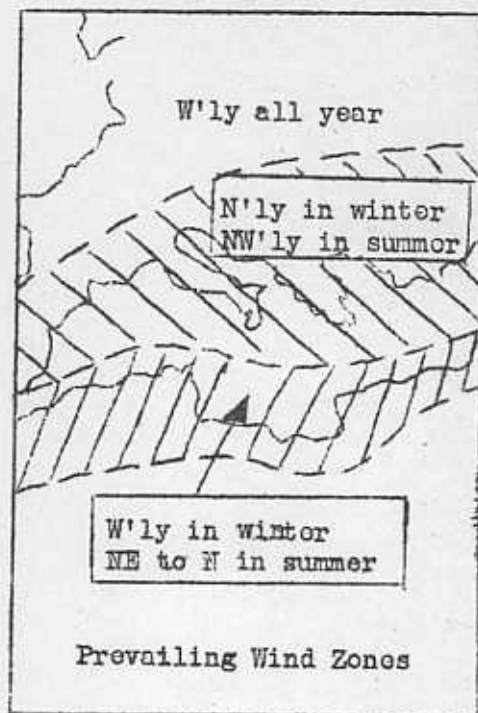
### The Climatology

2. The influence of the Azores High on the circulation pattern along the central North African coast diminishes in the late fall months. This is a transition period prior to the development of strong continental Highs over Siberia and northwest Africa. In the winter the Mediterranean becomes a source of relatively warm and moist air, and therefore a region favorable to the genesis of wave cyclones. Winds gradually shift from predominantly northerly to westerly during the fall along the coast of Libya and Egypt. In this region rains begin in the Fall along a narrow coastal strip of 50-100 miles in width. Amounts do not exceed - on the average - two inches per month even in winter. Intensities may be very heavy in localized areas.

### The Weather and Military Action

3. On 6 November one of these heavy rains suddenly began to fall in the vicinity of Mersah Matruh as a consequence of a localized low pressure center in northwest Egypt. These continued through the next day. The rains caused the area west of Alam Minagi (near 31°N, 27°E) to become very soggy. The retreating 21st Panzer Division crossed this area with great difficulty and the loss of a considerable number of vehicles.<sup>2,3</sup> British outflanking moves through the desert were brought to a halt as the desert routes became a morass of mud.

Forward units were held up, not only because of mud, but also because petrol supplies were exhausted.<sup>4,5,6</sup> The hard-surfaced coastal road was the only artery carrying traffic during this period.

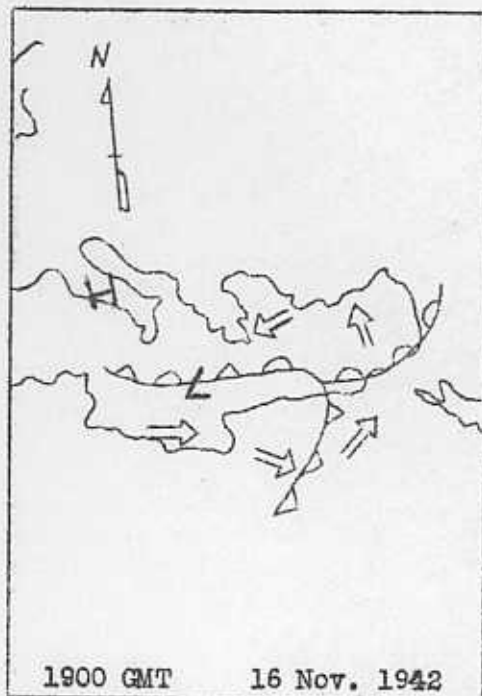


4. The weather finally cleared on 8 November, but by this time the enemy had made good use of the respite to gather together his troops and transport. The long pursuit to the El Aghella position far to the west began.

5. The next period of rain began on 14-15 November as a frontal system paralleling the coast line became active. The resultant rainfall was a hindrance to Rommel's forces as it softened the tracks he intended to use to ease the load on the main road and slowed him down at a time when speed was essential.<sup>7</sup> The delay was exasperating to Rommel but comforting in the realization that the British were equally delayed.

6. Heavy rain continued to fall on the morning of the 16th. The 21st Panzers had stopped in Barca, Libya during the night. Because of the rain, the division was unable to move ahead toward Sidi Cidalla because the ground had become too soft.<sup>8,9</sup> The 15th Panzer Group departed late from Regima, Libya at 1000 on 17 November due to renewed rain but made slow progress because of the soft ground.<sup>10</sup>

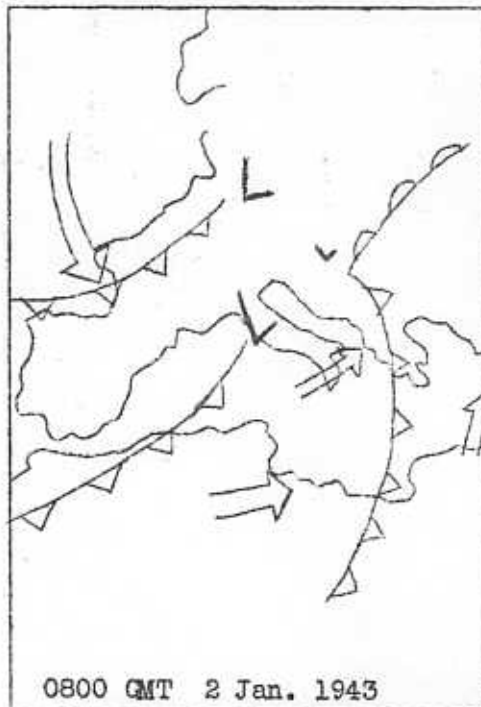
7. Aerial reconnaissance by the Luftwaffe indicated that a British out-flanking column at Msus was held up by flooding caused by the very heavy rains. This was fortunate for Rommel because at this time petrol supplies had become very short.<sup>11</sup> This period of rains caused so many delays that Rommel had enough time to organize his withdrawal from Benghazi.<sup>12</sup> Benghazi itself was not captured until 20 November.



8. The chase continued. By the end of December Rommel's line had been established at Buerat. This was nearly a thousand miles west of El Alamein where the retreat started somewhat more than two months previously.

9. Supply was a tremendous problem both to the Germans and the British. Attacking forward units were continually outrunning their supply units' ability to keep up. Supply vehicles were hampered by the effects of enemy demolitions to say nothing of the effect of bad weather. In one instance a New Zealand division got so far ahead of their water supplies that they had to sit down and wait. Fortunately, in this case a heavy rainstorm left enough drinking water in surface puddles to keep them alive until the water carts arrived.<sup>13</sup>

10. Major ports were activated as soon as possible to shorten supply lines. Shortly after the capture of Benghazi it was receiving a regular stream of supplies. The Allied effort suffered a setback on 2 January 1943 when a severe storm broke in the vicinity of Benghazi. This storm consisted of a wave cyclone developing on an active frontal system lying NNE/SSW through the central Mediterranean. The heavy weather persisted through 4 January. The seas were so high that the outer mole was breached and the protecting wall was carried away. Ships were torn from their moorings. Three ships were grounded inside the harbor and two of them became a total loss. After the storm passed the port engineers worked feverishly to remove the wrecks, repair the docks, and repair other damage done to the harbor. During this period only a fraction of the normal supply tonnage could be put ashore.<sup>14,15</sup>



11. By this time the scene of the fighting had shifted to eastern Tunisia. On 12 January the remnant of the Afrika Korps could move without detection under cover of a sandstorm--something of a change from the frequent rains of the past month.<sup>16</sup> This was only a temporary change. By mid-February the 21st Panzer Division was brought to a halt by water-logged roads northwest of Gabes, Tunisia. Though the bad weather was a hindrance to Rommel, it was in another way even more of a help in that the Allied air force was grounded.<sup>17</sup>

12. An offensive opened up by the Fifth Panzer Army late in February looked promising but was blunted shortly by strong Allied counterattacks. Wet weather was unfavorable to movement of heavy weapons of both enemy and Ally.<sup>18,19</sup>

13. In conclusion, it appears that the two days of heavy rain on 6-7 November 1942 provided Rommel with an initial advantage which was sufficient to enable him to keep just out of the grasp of the pursuing British forces. This delayed capture until the general collapse of the Axis forces in Africa in the spring of 1943.

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## Chapter III

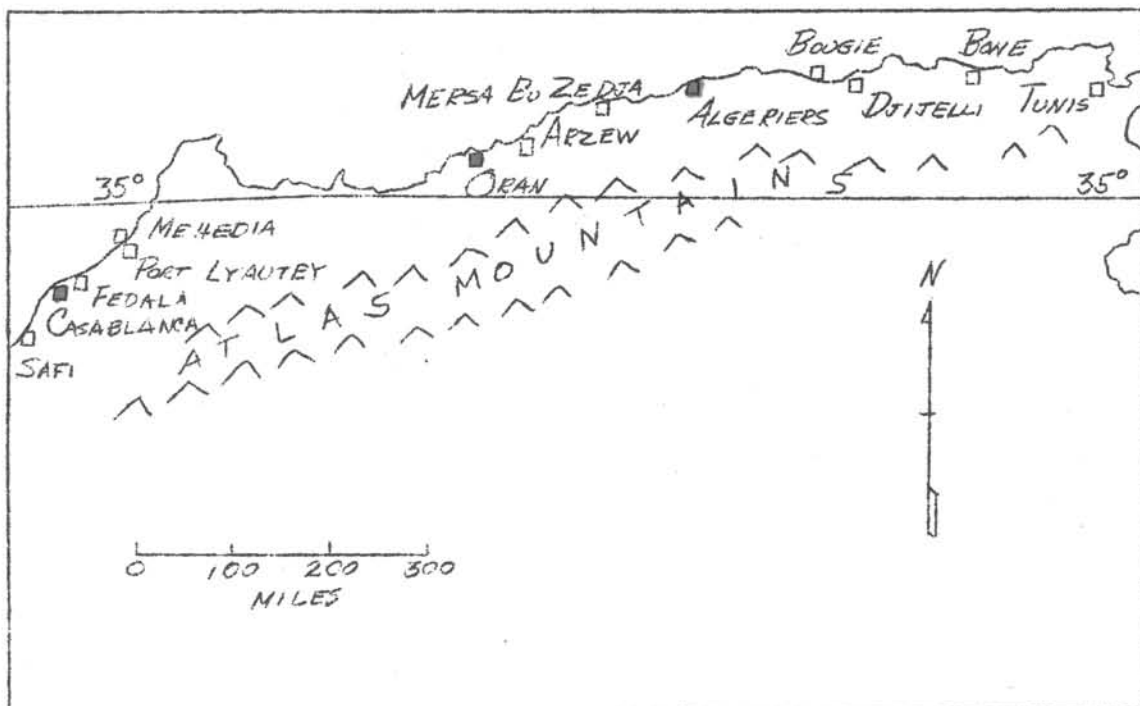
### "TUNIS BY NEW YEARS" --THE WINTER CAMPAIGN

Allied military action in November and December 1942 in French Morocco, Algeria, and Tunisia, North Africa, bogged down in mud caused by the early winter rains. Wet weather provided disadvantages the Allies could not overcome in time to accomplish their initial objective.

#### The Setting

1. The battle for North Africa was featured by three major events as of the end of October 1942. First, the Battle of El Alemain had just been concluded. As a result, Rommel and his Afrika Korps were in full retreat westward along the coast with Montgomery's forces in hot pursuit. Second, there were several thousand German troops in the Tunis area and this number was being continuously increased by means of airlift from Italy. Third, the Allies were in the final stages of perfecting Operation TORCH which was to result in amphibious landings on the shores of French Morocco and Algeria by early November.

2. The capture of Tunis before the first of the year -1943- would represent a brilliant strategic victory for the Allies in view of the key role which that city occupied in Axis operations. Therefore Eisenhower and his staff at Gibraltar chose to gamble that green, battle-inexper

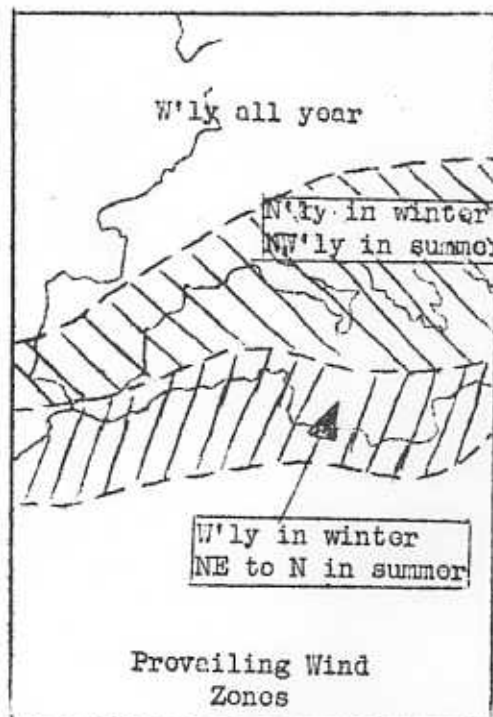


enced forces could cover the 560 truck miles from Algiers to Tunis before the onset of the winter rains in December.<sup>1</sup>

3. This bold venture did not succeed. After having come 95 per cent of the way from several disembarkation ports, the attack bogged down in the mud, practically within sight of the objective. The final phase of the Tunis campaign actually was not concluded until early in May. The story of the failure is essentially a story of the inhibiting effect of rainfall on trafficability of armored forces, particularly those on the offensive. Whether this effect was foreseen adequately in the planning stages of the North African campaign is not clear.

#### The Climatology

4. As winter approaches, the sub-tropical Azores High weakens and its center recedes to the south and west. At the same time a continental High builds up over northwest Africa. This reorientation in the position of the circulation control centers brings about a marked change in the climatology of coastal Morocco, Algeria and Tunisia. Frontal systems are allowed to move south so they affect the area. The prevailing winds shift from northeasterly to westerly. The rainfall increases sharply to an average of three to four inches per month (in January).



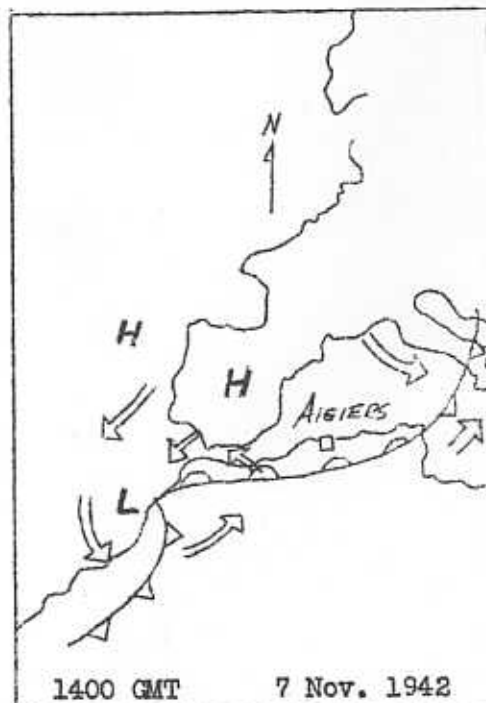
#### The Weather and Related Military Action

5. The Allies' amphibious assault on the coast of North Africa was an extremely hazardous venture. Operation TORCH envisaged simultaneous landings at three widely dispersed, yet highly strategic, points. Two of these were on the north coast of Algeria near the cities of Oran and Algiers. The other was on the northwest coast of Africa, in French Morocco. D-Day was set for the morning of 8 November 1942. The landing in Morocco involved more than the usual operational hazard to small boat operations because of the heavy swells resulting from the Atlantic storms. The climatology of the region indicated that beach conditions were out of the question on four out of five days on the average during the autumn, even in good weather.<sup>2</sup> Even fewer favorable days could be expected with the approach of winter. The order of the day was for Task Force 34, charged with assaulting the beaches near Casablanca to divert to Gibraltar should the weather produce impossible landing conditions.

6. On 4 November the task force was some 500 miles west of Casablanca and the weather trend was unfavorable. An increasing north-westerly wind was building up a sea which made one of the minelayers roll as much as 42°, and one of the battleships feared losing some of her boats and the 20mm guns mounted on her forecastle.<sup>3</sup> Admiral Hewitt, Task Force Commander, received gloomy weather forecasts from Washington and the Admiralty calling for surf 15 feet high on the morning of 6 November on the Moroccan coast. The Task Force aerologist, on the other hand, predicted that the current storm was moving rapidly and forecast locally moderating weather for the coast. At midnight on 6-7 November, the Admiral chose to go along with the original plans. Fortunately, that night the sea did commence to moderate, confirming the aerologist's forecast. On the 7th the wind had turned to light northeasterly, the sea was calm, and there was a moderate ground swell.<sup>4</sup> After several feints, the large convoy arrived in its planned positions as follows: a northern attack group off Mehedia at 2400 hours, a southern group off Safi at 2345, and the center group in Fedhala Roads at 2353.<sup>5</sup> The northern attack group was to take possession of Port Lyautey with its airport, the southern attack group was to come ashore at Fedhala about 15 miles from Casablanca.<sup>6</sup>

7. Eisenhower and his staff at Gibraltar felt so much concern about the success of the landings that photo-reconnaissance planes were dispatched on 6-7 November to photograph the surf along "The Iron Coast," and French Morocco. These photographs showed turbulent breakers which would have turned any landing into a disaster.<sup>7</sup> Eisenhower confessed that he seldom felt more relieved than he did when he received word that the Casablanca landings were proceeding according to plan.<sup>8</sup>

8. H-Hour was 0400, 8 November. This meant that the landings would have to be effected on an ebbing tide. Admiral Hewitt had asked for a delay of one week because of this, but had been overruled because of the over-all logistics of the situation.<sup>9</sup> The various transports in the convoy began to hoist out to boats shortly after midnight under cover of a drizzling rain.<sup>10,11</sup> The sea was calm with a moderate ground



swell, and there was a light off-shore wind.<sup>12</sup> Numerous delays in embarking the troops off the transports caused H-Hour to be delayed until 0500. This might have been a costly delay had the enemy not been surprised.<sup>13</sup> By daybreak the rain had stopped and the hills could be seen dimly through the haze.<sup>14</sup>

9. There was approximately 10 feet between high and low tide on the beach at Fedala. As a result of landings being made on ebb tide, numerous casualties occurred in landing craft when they struck submerged reefs.<sup>15-20</sup>

10. During the early morning hours, the surf at the beach began to rise as a result of the ocean swell.<sup>21-23</sup> Some boats swamped or kept afloat only by continuous bailing.<sup>24,25</sup> Others were breached and torn apart by the high surf.<sup>26</sup> Many troops were spilled out into the water. All men were thoroughly drenched before the beach was reached.<sup>27-29</sup>

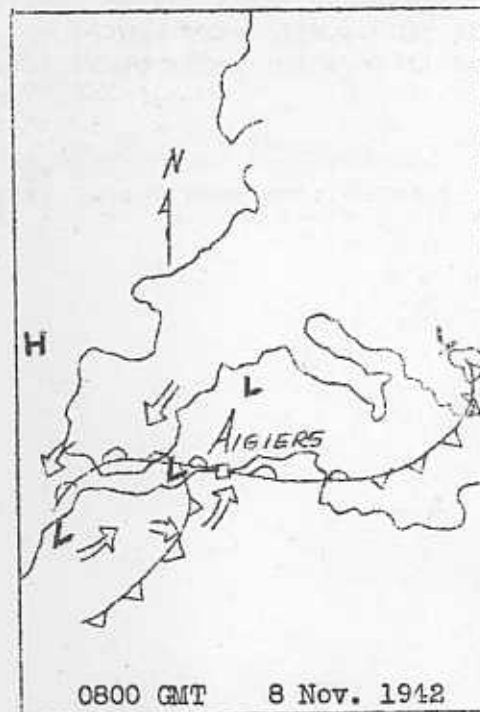
11. Though little damage was suffered by the ships standing offshore the rate of attrition to landing craft was very high. Only 136 out of 378 landing craft were still serviceable after the operations. This represented a loss of 64 per cent.<sup>30,31</sup>

12. Even though seas ran high, especially near the beaches, surface winds remained quite light. This caused some considerable difficulty for the Suwannee, the carrier assigned to maintain combat and antisubmarine air patrol for the center group. Frequently she had to look for areas of sufficient wind to launch and recover her planes.<sup>32</sup>

13. The landings at Safi were accomplished with a minimum of loss despite the roll of the sea and the heavy surf at the beach. Similar conditions were encountered by the Northern Landing Group as they came ashore at the mouth of the Wadi Sebou near Mehedia.<sup>36-39</sup>

14. The Central and Eastern Task Forces steamed through the Straits of Gibraltar on the night of 5-6 November 1942.<sup>40</sup> The mission of the Central Force was Oran. The Eastern Force was to capture Algiers. Both Task Forces stood off their respective landing beaches near midnight on 7-8 November in readiness for H-Hour of 0100, 8 November.

15. Central Task Force accomplished its mission by making independent landings on three beaches in addition to a frontal assault on Oran harbor itself. The transports launched their landing craft under



Tide affects



conditions of light to moderate wind and moderate swell. Smoke screens provided some concealment for assault boats.<sup>41</sup> Smoke which was to conceal the efforts of HMS Hartland and Walney to force an entrance to Oran harbor.<sup>42</sup> However the low center to the west produced an off-shore wind which blew the smoke away.

16. Surf bothered landing craft at the beaches near Arzew.<sup>43-45</sup> Despite some losses the situation was well in hand by 0840. Ships soon were landing inside the Arzew harbor. This was fortunate, for a rising wind and sea combined to make beach landings more and more hazardous. Sixteen hours after the initial landings the beaches had to be closed down.<sup>47</sup>

17. In the east at 0100 8 November landing craft set out for three beaches on either side of the important city of Algiers. The weather offshore was generally favorable with a light breeze and a swell measuring two feet from trough to crest.<sup>48</sup> Smoke screens provided concealment of two kinds: of the landing craft from the shore batteries, and of the landing beaches from the inexperienced coxswains of the landing craft.<sup>49</sup> During the early morning hours, the weather began to deteriorate. Boats which were too heavily loaded began to ship water, others were lost in the surf, some swamped and sank offshore because ramps were lowered too soon.<sup>50-53</sup> Further landings ceased about 1800 due to the high surf. Fortunately the French resistance had ended by then and the ships could use Algiers harbor.<sup>54</sup>

18. The action on 8 November brought an ambitious and daring enterprise to successful completion. By mid-day the Allies had firmly established themselves on the beaches of North Africa. It was their good fortune that the weather moderated at the opportune moment for the accomplishment of the initial landings, though it had been unfavorable before and unfavorable again immediately afterward.<sup>55-64</sup> \*

19. The USS Thomas Stone incident deserves special mention. The Stone was a member of the Eastern Task Force and had the misfortune of being torpedoed at daybreak on 7 November 150 miles from Algiers. The damage was not sufficient to sink the ship, and there were only a few casualties. Since the sea was smooth and the wind was light north-west, the commander decided to launch the landing craft and let them proceed to Algiers under their own power. Accordingly, 24 boats loaded with 800 troops set off about 1900, 7 November. This gallant effort was frustrated by the weather which started to deteriorate shortly thereafter.

20. A wave cyclone was centered near Casablanca at 1400, 7 November. By 0800, 8 November this center had moved into the western Mediterranean and its frontal system was influencing the area in which the Stone action occurred. (See weather maps for 7 and 8 November) The retreat eastward of this center was the factor which gave rise to the light northeasterly breezes along the French Moroccan beaches at H-Hour.

21. As a consequence of the seas produced by the increasing winds, by 0600 many breakdowns had occurred, boats had shipped water, gear and equipment were soaked, and men were seasick. To avert disaster the troops were taken aboard other escort vessels and were finally landed at the main passenger quay at Algiers some twenty hours behind the original schedule.<sup>65,66</sup>

22. As always, an immediate aftermath of landing an army unit is to land supplies as expeditiously as possible. This operation was hindered at the ports of Arzew, Mersa Bu Zedja, and Algiers by continued heavy surf. The delay in landing service vehicles made it impossible to move supplies by truck to the Forward Depot on D-Day. At the same beach the 1st Battalion, 591st Engineer Boat Regiment, experienced difficulty loading into the landing craft due to the heavy swells. F Company, 2nd Battalion, at Mersa Bu Zedja, had difficulty with its boats stranding and had to have them shoved off by angledozers. In the east at Algiers, conditions worsened on 9 November; and at 0800 a northeast-by-east wind of 18-25 miles per hour forced discontinuation of unloading.<sup>67</sup>

23. In addition to the seaborne assault, paratroopers were flown into Morocco. Men of the 503rd Parachute Regiment fresh from the temperate climate of England had difficulty in making adjustment to the semi-desert heat. They were equipped with heavy underwear which was to be worn as a protection against the severe cold of the North African nights. During the day this added to their suffering as they treked across the dry inland wastes. At times rising columns of dust could be seen which identified the presence of other vehicles; sometimes it was just some Arab's flock of sheep.<sup>68</sup> Though everyone was issued a dust mask and goggles, these items were not needed at the outset. A common ailment soon experienced by many of the new arrivals was called "sundown throat." This seemed to be caused by the invisible dust in the air and the rapid drop in temperature at sundown. Many throats became so sore the men could hardly swallow, yet the pain seemed to go away the next morning. Nothing came of this ailment if the general health was good.<sup>69</sup>

24. The first nights ashore on the Moroccan coast were discouraging. There was considerable rain, a cold wind blew, and there was a lack of warm equipment which had not arrived yet from the boats. Life preservers proved to be valuable equipment on which to sleep.<sup>70-73</sup> Communications were poor because of equipment which had become wet with salt water in the landings.<sup>74</sup>

25. Time was of the essence in the effort to achieve the primary objective: Tunis. A small force pushing rapidly ahead reached a point only 16 miles from Tunis on 10 November. Then bad weather and superior enemy forces combined to make the column withdraw.

26. Additional forces were landed at the following points along the North African coast: at Bougie on 11 November and at Djidjelli on 13 November. Airborne landings were made also at Bone on 12 November.<sup>78</sup>

These involved hazardous flight conditions due to the increasingly unsettled state of the weather, the mountainous terrain over which some of the flights were conducted, and the lack of reporting weather stations. Some of the airborne operations were even halted because of bad weather and the success of others was imperiled.<sup>79,80</sup>

27. The weather improved again by 20 November as the frontal trough moved south and east; the clear, warm days and cold nights were once more favorable for the efforts of the Allies, despite snow in the inland heights.<sup>81,82</sup> By 28 November the spearhead units had driven to Mateur and Djedeida, less than 25 miles from Bizerte and Tunis respectively.<sup>83,84</sup> The prize was nearly within grasp.

28. It was at this point that the ominous threat of the winter rains became a stark reality. The Atlantic Azores high weakened. The North African continental high began to intensify. Frontal systems showed an increased tendency to stagnate along the coast line. Heavy downpours started late in November and quickly turned the dry ground into deep, gooey, clinging African mud. Mud was everywhere. Armored vehicles sank to unbelievable depths. The three airfields at Bone, Souk el Kemis, and Souk el Arba were immobilized for days at a time. Since these lay primarily on the floors of valleys the rain drained down from the hills and made the airfields, except for the hard-surface strips, a morass of mud. It was not uncommon to see dozens of C-47's and fighters parked off the runways with their landing wheels sunk deep in clinging mud.<sup>85-88</sup>

29. On the other hand the Germans did not encounter this disadvantage since their airfields at Tunis and Bizerte were based on the more porous sand near the coast. This contrast enabled the enemy to increase his strength in the air while the Allies' strength was diminishing.<sup>89,90</sup>

30. A potentially serious situation had been shaping up. Due to the intensive pace of the battle, combat forces outran the ability of supply to keep up with them. Ammunition supplies ran short. However when the weather turned bad both sides bogged down and neither could mount a serious attack. This enabled the strengthening of supply lines and soon critical shortages had been overcome.<sup>91</sup>

31. Somewhat farther to the south, American paratroopers at Youks les Bains had come to the realization that winter in North Africa was somewhat cooler than they had been led to expect. One morning a light snowfall greeted the eyes of the men as they looked out from their slit trenches. Proper tentage and shelters were not available initially. Until these were flown in, the picture of the men wrapped in blankets huddled around fires was reminiscent of the soldiers at Valley Forge. At such times the men rued the day they gave away their heavy underwear to begging Arabs on the Sebokra.<sup>92,93</sup>

32. On the night of 7 December the winter rain started in earnest in northern Tunisia and continued to fall for two days. The Allied command had become painfully aware that more than 18 hours' rain trans-

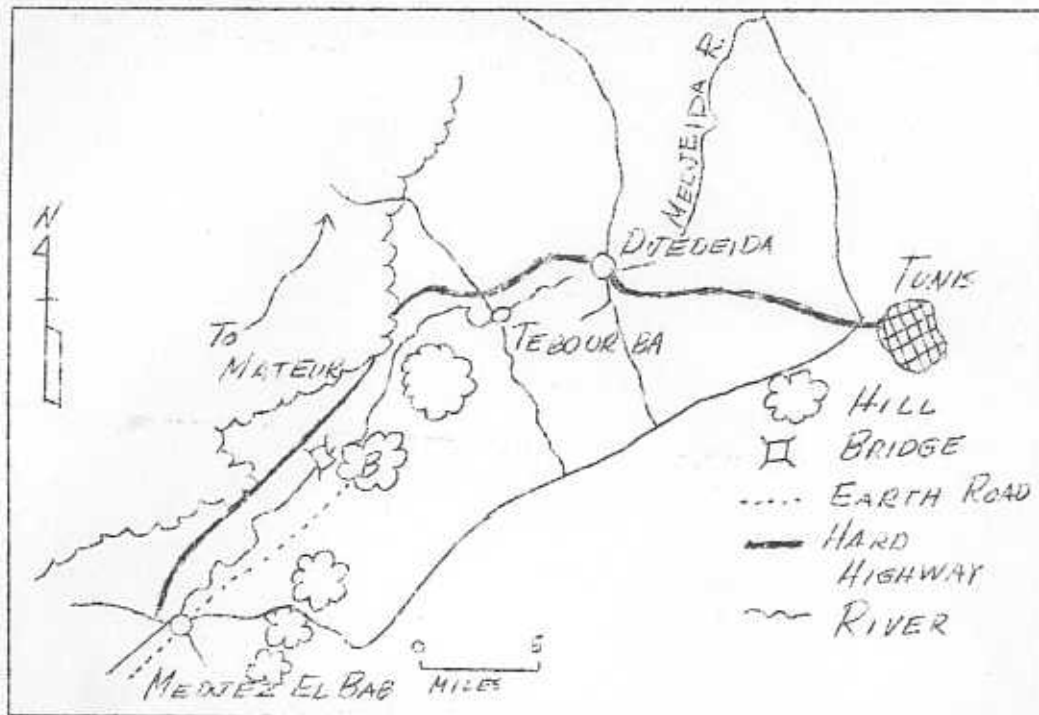
formed all terrain except the hardest roads into a vast sea of mud. Therefore a new defense line in the vicinity of Medjez El Bab was established which was to be held at all cost.<sup>94</sup> After one delay due to rain on 7 December, various units were scheduled to pull back to this line on the nights of 10-11 and 11-12 December.

33. It was in this setting that one of the most dramatic as well as disastrous effects of weather on Army operations in North Africa took place. American tanks, mobile artillery, and tank destroying units of the First Armored Division which had reached the front had been formed into Combat Command B (CCB). Active German Panzer and air units had made it imperative that CCB be withdrawn for vehicle repair and rest for the men. The following excerpt gives a first-hand description of the event:

The detailed orders for withdrawal at dusk were issued by General Robinett and amplified by Colonel Cairns while General Oliver was attending this conference, and the movement was starting as he got back to his command post. In command was the Senior Battalion Commander Lieutenant Colonel McGinness. Two platoons of his unit, with D Company, 13th Armored Regiment, crossed the bridge at about 1745 to guarantee the security of the bridgehead. The remainder of the force, consisting of McGinness's infantry battalion; the 1st and 2nd Battalions, 13th Armored Regiment, C Company, 701st Tank Destroyer Battalion, and Battery B, 27th Armored Field Artillery Battalion, extricated themselves from the mud and pulled onto the transverse road which led to the bridge. Soon the vehicles were closely bunched along this narrow strip of firm earth between areas of soft muck on either side.

The bridge was under enemy artillery fire which came in at intervals while Cocke's D Company crossed and sought vainly for signs of British protecting force. They turned northeastward toward the roadblock and railroad station and soon were engaged in a light action with a small enemy force. Behind them, as artillery and mortar fire dropped close to the bridge, a rumor started that the enemy held the area, and that the bridge could not be crossed. The situation appeared to be critical, forcing upon McGinness a difficult decision which he made hurriedly without waiting to reconnoiter or to verify the report. He directed the column to reverse at once and take the dirt road which had been used by Kern's vehicles a few hours earlier. They would cross the bridge at Medjez el Bab instead of that at Bordj Toum.

This error in judgment prevailed over all advice against it. Soon scores of vehicles which had been brought thousands of miles to Africa and across northwest Africa to Tunisia from Oran were digging their own graves. As they bogged down and wore themselves out, the order was issued to abandon them and walk into Medjez el Bab.<sup>95</sup> (Refer to map.)



34. Nearly 200 vehicles including many precious mobile 105mm guns were lost in this action.<sup>96-107</sup> This incident was a humiliating conclusion to the effort on the part of Combat Command B and the 1st Armored Division to capture Tunis and resist the German's counterattack.<sup>108</sup>

35. A new offensive was scheduled for 20 December but because of attendant difficulties, not the least of which was the continued rain, the date was postponed for several more days. On Christmas eve of 1942 General Eisenhower and General Anderson visited the headquarters of British V Corps at Souk el Khemis. The Commander-in-Chief had come by car since the weather had been too bad to fly. While carrying out a reconnaissance inspection in a drenching rain the sight of four men attempting to retrieve a motorcycle from the grasp of the omnipresent mud was said to have convinced Eisenhower of the hopelessness of the effort. With great reluctance the decision was made to abandon the attack to seize Tunis until spring.<sup>109-115</sup>

36. The story of the "Lost Battalion" was never broadcast to the outside world. At one time H-Hour for the new attack had been set for Christmas Eve. An infantry battalion was assigned the task of slipping through German lines north of Medjez el Bab and attacking from the rear just before the time of the main assault. This unit departed on its mission on the night of 23-24 December before the decision to cancel was made. It was impossible to make radio contact with the unit. Rain and low cloud resulting from a weak low centered near Tunis on 24 December held all planes on the ground. Headquarters gave the unit up for lost.

To everyone's surprise the "Lost Battalion" wandered back to the Allies' front lines on the day after Christmas. The explanation for the communications, blackout was that the mule carrying their radio equipment had slipped and fallen into a ravine and the set had smashed.<sup>116</sup>

37. There is little doubt but that the main ally of the Germans during this period was mud. Mud was a hindrance to the Allies in many ways, but primarily in terms of trafficability of all kinds of vehicles. Mud was everywhere, even in the M-1 rifles. It took time, but the men learned the necessity of keeping the guns clean.<sup>117</sup> In addition to the discomfort of living in the cold mud, some camp areas produced high incidence of malaria.<sup>118</sup> Mud was an ally to the Allies in only one reported instance: when German mortar shells landed as close as four feet from the men without causing injury because the fragmentation stayed in the muddy ground.<sup>119</sup>

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## Chapter IV

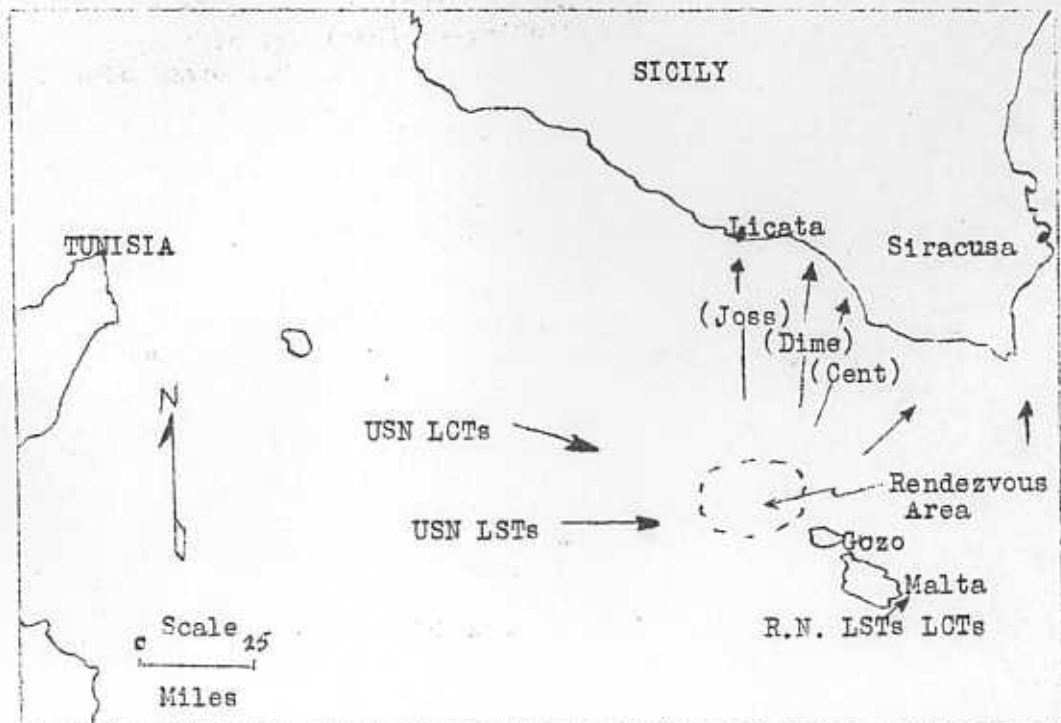
### THE INVASION OF SICILY

The amphibious and airborne invasion of Sicily in July 1943 coincided with a severe storm which reached its climax on 9 July as the seaborne forces approached the rendezvous off Malta. Winds moderated rapidly as forecast on the morning of 10 July, and the assault was successfully completed despite rough water. The success of the airlift was minimized by the strong winds. These caused serious navigational errors and caused large misses in the troop drops. Despite these factors the element of surprise resulting from mounting the assault in the storm was advantageous to the Allies.

#### The Military Setting

1. The Mediterranean is usually a placid sea in comparison with its mighty sister to the west. However, even the good-natured child occasionally has his outburst of temper. The men of the U.S. Seventh Army and the British Eighth Army who invaded the island of Sicily will vividly recall the outburst of extremely unseasonable weather which came so close to upsetting the plans for the invasion of Sicily.<sup>1</sup>

2. D-Day was set for 10 July 1943. The phase of the moon on this date would enable the spearheading paratroops to drop by moonlight and the ground forces could secure their beachhead in the dark just before dawn. Lessons learned in the landings in North Africa dictated the choices of the assault beaches.



3. Throughout 8-9 July 1943 a vast convoy of ships coming from many ports in the Mediterranean converged on the rendezvous point off the island of Malta.<sup>2</sup>

#### The Weather and Related Military Action

4. As early as 8 July, the weather was a concern. Clouds began to thicken. A northerly breeze sprang up during the morning of 9 July as a migratory anticyclone from the Atlantic pushed vigorously inland behind a weak cold front. Velocities rose until white water began to appear.<sup>3,4</sup> This change contained an ominous portent which was felt by the men who crowded the rails of the ships. "Why should the calm Mediterranean choose this of all moments to act up?" they asked themselves as they watched the seas become rougher by the hour. There was ample reason for concern, for the landing craft which were carrying 60,000 or more soldiers into battle had never been tested before under such conditions.<sup>5</sup>

5. As 9 July wore on, these flat-bottomed, broad-nosed landing craft plowed forward through rising seas which by this time had waves of 20-30 feet from trough to crest. Because of the water condition the LCT's (landing craft tank) reduced speed to three miles per hour as a precautionary measure. This in itself was a matter of grave concern, for even at their best speed there was doubt that they could reach the assault area on schedule. Admiral Connelly's decision was that they should change course direct for the objective area.<sup>5</sup>

6. A rapid check was taken during the afternoon of the 9th to see how the personnel of the convoy were enduring the rough ride. It was to be expected that some would be affected adversely, but it was appalling to discover that nearly 30 per cent of the men including naval personnel were deathly seasick.<sup>1,6-11</sup>

7. Barrage balloons were carried by many of the ships to discourage strafing attacks. Scores of them tore loose from their cables as the ships would suddenly drop into a trough. These balloons soared into the sky and eventually burst. By the end of the day only three balloons were left in the whole fleet.<sup>1</sup>

8. As the huge convoy moved slowly ahead through the heaving, pounding sea this same afternoon, the success of the whole operation seemed highly dubious. The time of decision was approaching. In their headquarters on the island of Malta, General Eisenhower and Admiral Cunningham were deciding whether the entire operation should be delayed or allowed to go ahead. As this decision was in large measure dependent on the development of the storm, they remained in constant consultation with the staff meteorologists.

9. The weather bulletin and forecast sent out from USS Ancon read as follows:

"9 July 1943  
2130 B

"From: USS ANCON  
at: sea

"The wedge of high pressure from the Azores is pushing eastward into western Mediterranean. This coupled with the deepening of the low in the Adriatic is giving a strong NW'ly gradient from southern France across Sicily. Algiers predicted filling of the Adriatic low. This plus easterly movement of the wedge and decrease in gustiness after sunset will result in moderation of the wind. Swell as a result of the winds will be four to five feet with surf on the beaches of five feet.

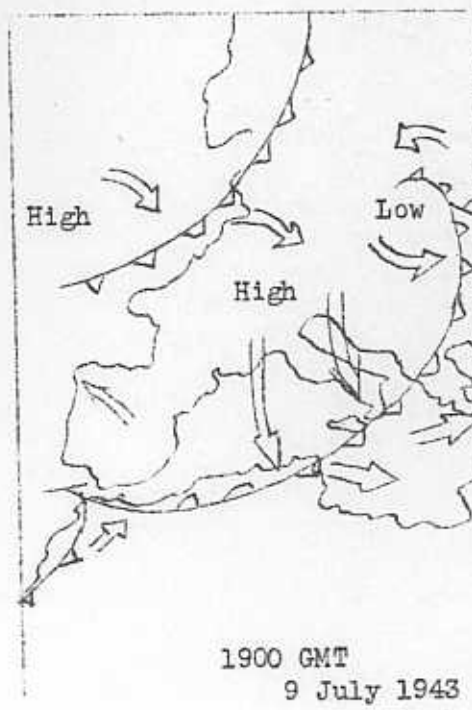
"FORECAST FOR TONIGHT (1800-0600)

"Mostly clear skies with scattered middle and low clouds. Ceiling unlimited. Visibility eight miles (sea haze) remaining above six miles. Surface winds NW 25 to 30 knots gusting to 32 decreasing by midnight to 15 to 20 knots. Aloft NW 30 knots.

"FORECAST FOR TOMORROW (0600-1800) (10 July)

"Mostly clear skies with scattered low clouds and middle clouds dissipating after sunrise. Ceiling unlimited. Visibility eight miles improving to 12. Surface winds NW 15 to 20 knots becoming 25 knots with the sea-breeze about 1100. Aloft NW 25 to 30 knots."<sup>12</sup>

10. During the evening despite the forecasts for improvement in the weather, the wind velocity itself continued to increase, approaching 40 miles per hour.<sup>13</sup> Since the landings were going to be made both on the southern and eastern beaches of Sicily, and since the wind was backing toward westerly, it appeared that the landing forces should certainly be able to get ashore on the easterly beaches even if a portion of the invasion forces should have to delay the assault on the southern beaches.<sup>13</sup> A delay would increase the chance of discovery and heavy enemy attack. On the basis of this reasoning, bolstered by the forecast of moderation in the storm, General Eisenhower decided to proceed with



the invasion. H-Hour was therefore announced late in the evening for 0245 on 10 July.<sup>14</sup>

11. An apocryphal story is told of a conversation between Seventh Army Commander Patton and his meteorological officer as follows:

"Patton: 'How long will the storm last?' Meteorological officer: 'It will calm down by D-Day.' Patton: 'It had better!'"<sup>15</sup>

12. Various transports assembled in their assigned positions a few thousand yards offshore shortly before midnight on 9 July. The Neville had landing craft stowed athwartships. However, the combination of swell and roll gave her a small-amplitude snapping pitch which caused the boats to swing violently fore and aft when hoisted from the skids. The Galvert and the Nightingale had attempted to hoist boats to the rail during the approach but gave up as damage to propellers and rudders resulted. Even after anchoring, several of the transports lost one or more boats in the process of lowering. The Leonard Wood had particular trouble in launching the tank lighters, for when the transport rolled the lighters threatened to take over. In addition the roll and pitch of the boats alongside the Leonard Wood made it especially difficult to load vehicles. Efforts put forth to form a lee were not successful.<sup>16</sup>

13. The raiders made ready to leave the ship at 2320. The small boats heaved and pitched and pounded into the sides of the larger mother ships; some of the men solved the problem of getting aboard by lowering their two-men rubber life rafts into the boat; then, in pitch darkness they jumped--a distance which varied with the rise and fall of the waves from 15 to 40 feet.<sup>17</sup> The troops from the 26th and 16th Regimental Combat Teams landed precisely at H-Hour, 0245, 10 July 1943, after a harrowing trip from ship to beach.

### The Seaborne Assault

14. At 0425, 10 July, the first assault troops of the 45th Division hit the beach.<sup>18,19</sup> Conditions seemed chaotic to the individual soldier. Tired, wet, seasick, miserable men vomited, cursed, and prayed for nothing better than a solid beach on which to set foot. Some boats, twisted by the surf, struck the sandy beach at an angle and became broached and useless on the beach. Some coxswains, too eager to get their troops unloaded, lowered the ramps before the boats hit sand. This forced the men to jump into water and wade ashore. Units were split up. The strong winds had produced an increased set along the beaches, resulting in platoons, companies, and even battalions landing on beaches of adjacent units.<sup>20</sup>

15. As had been forecast the wind did abate during the early morning hours of 10 July; and the sea gradually subsided, though it was undoubtedly much rougher than optimum. Despite the rough water troops poured ashore on beaches near Licata, San Croce, and Gela. In this instance the loss of life and equipment which occurred was due primarily to weather and not enemy action.<sup>21-40</sup> Despite the confusion of that night the morning light saw the invasion successfully launched.



### The Airborne Assault

16. The second major phase of the Sicilian invasion was the airborne assault. This was an intricate operation whereby a tricky overwater course would be flown from North Africa, at night, to the Sicilian drop zone. The purpose was to provide visual check-points and avoid radio detection. This phase of the invasion was perhaps more seriously upset by the unexpected storm than the seaborne assault.<sup>41</sup>

17. Late on 9 July over 200 C-47's of the 82nd Airborne Division left airfields in Tunisia, even though reports had come in showing a 35-mile-per-hour wind over the target area.<sup>42</sup> Malta was a major navigational check-point along the route, but many planes never saw Malta at all. They were blown off course by cross-winds of gale force. There was no interplane communication enroute and navigation became highly confused. Confusion was compounded when aircraft were fired on by Allied ships. The 2700 paratroopers of the 82nd Division were supposed to jump near Gela in order to grab the high ground behind the southern beaches. Instead they were scattered along a 60-mile strip, the full length of the invasion corner. For more than a week after the drop stray paratroopers were crossing over into the Allied lines from the villages and fields into which they had jumped, far beyond the drop zone.<sup>41</sup> There were certain bright spots in this disaster, however, for the wide dispersion of the men and the result of confusion tended to convince the Axis forces that the Allied airborne operation was more extensive than it really was.<sup>41,43-45</sup>

18. The British airborne drop fared more disastrously than the American. 1600 troops of the 1st Airborne Division had been crowded into 133 gliders. Only 12 of these gliders reached their objective: the bridge over the canal south of Syracuse. Nearly 50 others pancaked into the sea and the remainder were widely scattered inland. As reports of this operation came into headquarters early in the morning of 10 July, a heavy loss of life was feared. Though statistics later showed that casualties were less than anticipated the disaster that struck the airborne assault was still a tragic incident.<sup>13,46-48</sup> In retrospect, the airborne operation seems to have been too intricate for the inadequately trained C-47 crews. There were too few markers along the route to guide the inexperienced navigators, and the strong cross-course wind component introduced serious and unexpected navigational errors.

19. On the other hand, the seaborne assault was an outstanding success, mainly because of the skillful maneuvering of naval forces in landing the assault troops under poor conditions. It must be recognized that the landing was greatly facilitated by the relaxed vigilance of the enemy, a condition which was attributable to the storm. Though the convoys had been spotted on 9 July the enemy air force offered no serious opposition. As a result of the tactical surprise achieved by the first waves of our assault the enemy's confusion and disorganization made it impossible for him to offer serious resistance on the ground.<sup>49</sup>

20. General weather conditions improved throughout 10 July. This trend is seen in the outlook sent from USS Ancon and the corresponding weather map.<sup>50</sup>

"USS ANCON

PRELIMINARY WEATHER FORECAST

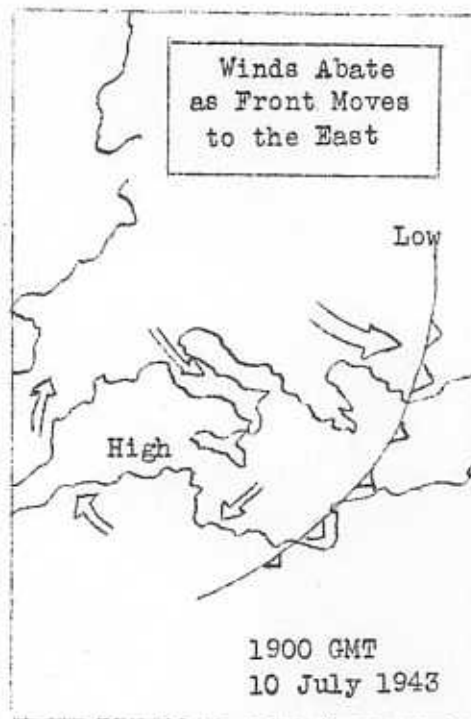
10 July 1943

"THE DEEP ANTICYCLONIC CIRCULATION OVER THE WESTERN ATLANTIC HAS BEEN RAPIDLY INVADING THE WESTERN AND CENTRAL MEDITERRANEAN FOR THE PAST 24 HOURS. TODAY THE OPPOSING SEABREEZE EFFECT WILL TEND TO OFFSET THE FRESH NW'LY GRADIENT PREVAILING.

"MOSTLY CLEAR SKIES DURING THE MORNING WITH SCATTERED FAIR WEATHER CUMULUS AT 3000 FEET IN AFTERNOON. CEILING UNLIMITED. VISIBILITY 8 TO 10 MILES. SURFACE WIND NW 8 TO 12 KNOTS BACKING TO W'LY 15-20 KNOTS AFTER 1100, BECOMING GENTLE AFTER 1700. ALOFT N 15-20 KNOTS TO 5000 FEET ABOVE 5000 FEET NW 25 TO 40 KNOTS. FLYING CONDITIONS AVERAGE.

"J. CORRY, LIEUT COMDR. USN.  
AEROLOGICAL OFFICER

FORECAST PREPARED BY:  
L. P. HALLORAN, CAERM"



21. By 11 July the situation was well enough in hand to warrant the following communique to the Commanding General of the Seventh Army:

"TO: CG 7th ARMY. ALLIED FORCES COMMAND POST. FRESH COMMUNIQUE NO. 2. PERIOD ENDING 1600 HOURS 11th JULY. PART 1. NAVAL. NEW DETAILS ARE AVAILABLE ABOUT THE WORK OF THE NAVY DURING THE PAST 24 HOURS. TASK OF DISEMBARKING TROOPS AND THEIR SUPPLIES ON ALL BEACHES CONTINUE ACCORDING TO PLAN. ON THE WHOLE, WEATHER CONDITIONS HAVE IMPROVED THOUGH ENEMY INTERFERENCE FROM THE AIR HAS BEEN ON A SLIGHTLY INCREASED SCALE. DEFENDED AREAS NEAR THE COAST TOWN PADDALO . . . PART 2. GROUND FORCES. OUR GROUND FORCES HAVE CONTINUED TO MAKE GOOD PROGRESS DURING THE COURSE OF THE DAY. 7 ENEMY COUNTER-ATTACKS WHICH WERE BEING MADE WITH TANKS HAVE BEEN REPULSED AND AT LEAST 2000 PRISONERS HAVE BEEN TAKEN. IT CAN NOW BE STATED THE FOLLOWING MAJOR PORTS AND TOWNS HAVE BEEN CAPTURED BY OUR FORCES: SYRACUSA, AVOLK, PAESTINO . . . THE ADVANCE CONTINUED. SIGNED,

FORCE 141  
TAC HQ.  
121234B" (550) 51

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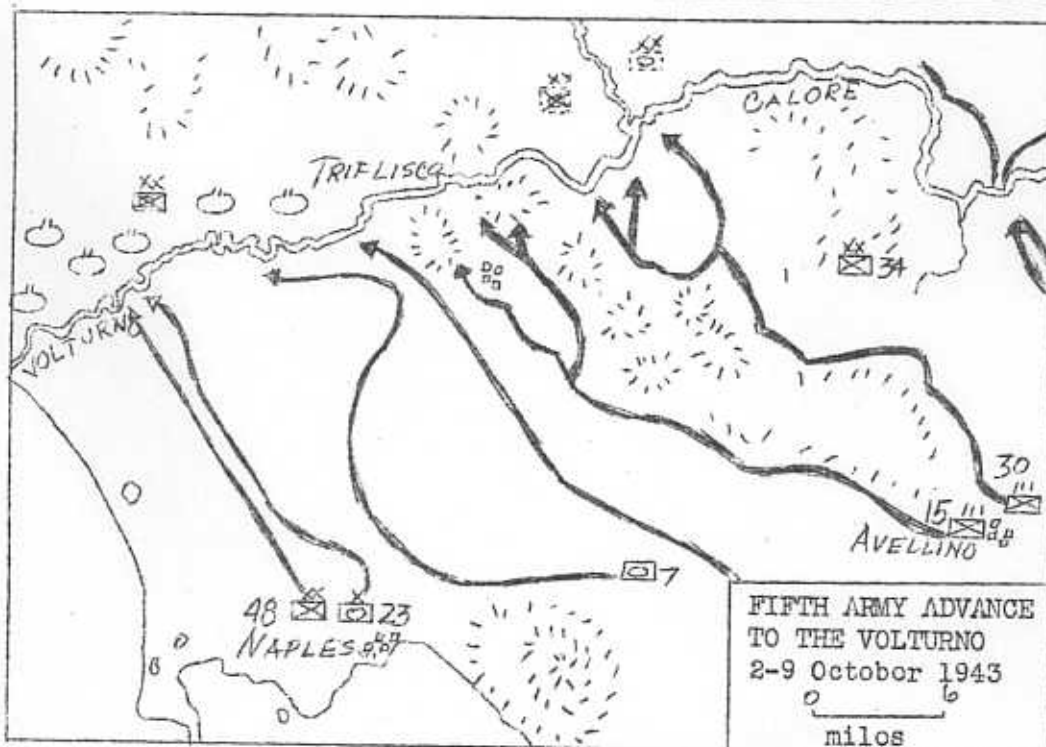
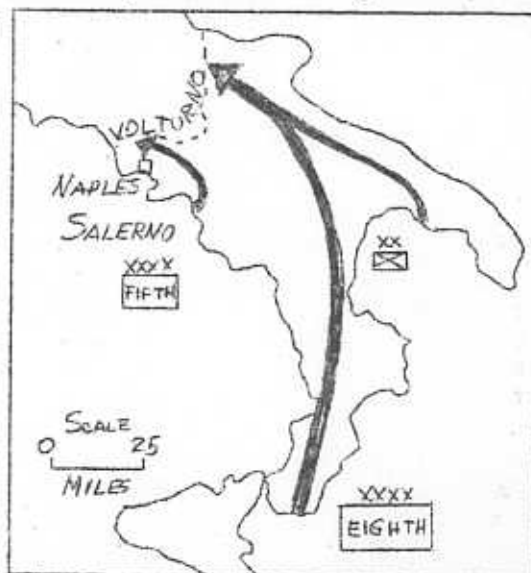
## Chapter V

### FIFTH ARMY'S ADVANCE TO THE WINTER LINE

The controversial assault on the continent of Europe up the Italian peninsula started in September 1943. As the warm, dry weather in early September soon gave way to the fall rains, the Fifth Army struggled to overcome the numerous disadvantages which wet, cold weather posed to the attacker.

#### The Setting

1. Having defeated the enemy in Africa by May 1943, and in Sicily by August, the Allies then prepared to follow him up the boot of Italy. Consequently, on 3 September the British Eighth Army crossed the Strait at Messina and drove up the Calabrian Peninsula; it was followed on 9 September by British First Airborne Division landings at Taranto and a seaborne assault by the U.S. Fifth Army at Salerno.

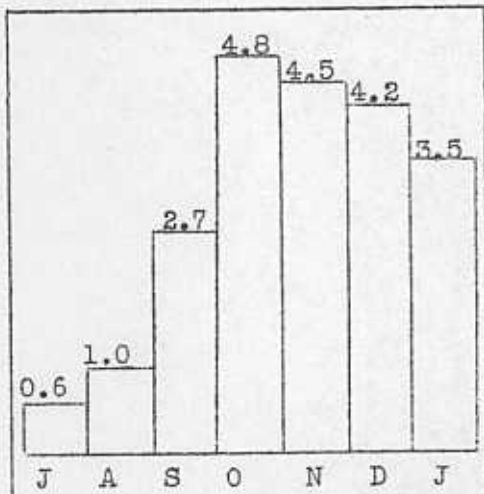


2. Specific attention will be given in this narrative to the struggle of the various Divisions of the Fifth Army against a stubborn German army, rugged terrain, and extremely unfavorable weather. Every conceivable operational factor was in some way influenced adversely by this combination.

3. By 9 October the Fifth Army had advanced to a line roughly bounded by the south banks of the Volturno River. One measure of the difficulties encountered is that more than a month was required to advance an additional 20-30 miles to the 15 November Winter Line.

Climatology

4. Italy is characterized by a relatively dry, sunny, summer climate which is terminated by the onset of heavy fall rains. Whereas the coastal cities of Naples and Rome receive on the average somewhat less than an inch of rain in July and August, this increases abruptly in September to 2.7 inches and to 4.8, 4.5, and 4.2 inches in the next three months respectively. Furthermore, it should be emphasized that the figures quoted are representative of coastal stations. Substantially higher amounts would be expected for stations under orographic influence.



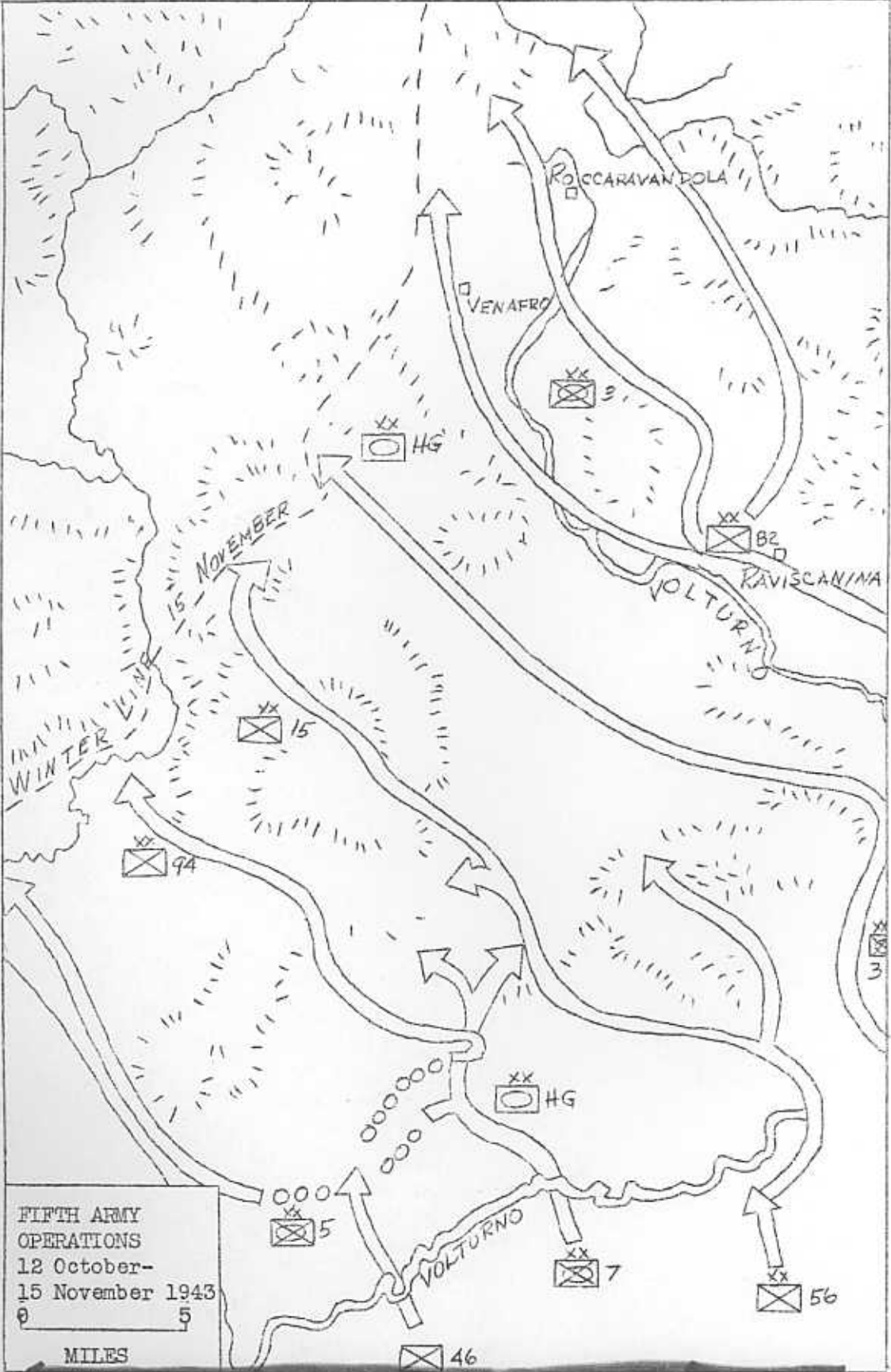
Average monthly precipitation in inches interpolated for a coastal station of 250 ft. elevation between Rome and Naples (data taken from U. S. Department of Commerce "Climatic Data for the World" and Kondrow "Climate of the Continents" p. 388)

5. The precipitation which fell during the Fall months was in excess of climatological norms. 1942 was a wet year.

The Weather and Related Military Actions

6. H-Hour was 0330 9 September. A weak anticyclone dominated the area. As a result, the sea was smooth, the sky nearly clear, and the wind light north to northeast as the assault boats headed for the beaches at Salerno. 1-5 Though landing conditions were good, the tough 16th Panzer Division provided anything but a welcome reception. 6 Despite this, the landing was successfully accomplished. 7

7. The warm, dry weather which prevailed on D-Day persisted for several additional days. Dust churned up from the heavy vehicular traffic over the narrow unpaved roads hung over everything like a fog.



FIFTH ARMY  
 OPERATIONS  
 12 October-  
 15 November 1943

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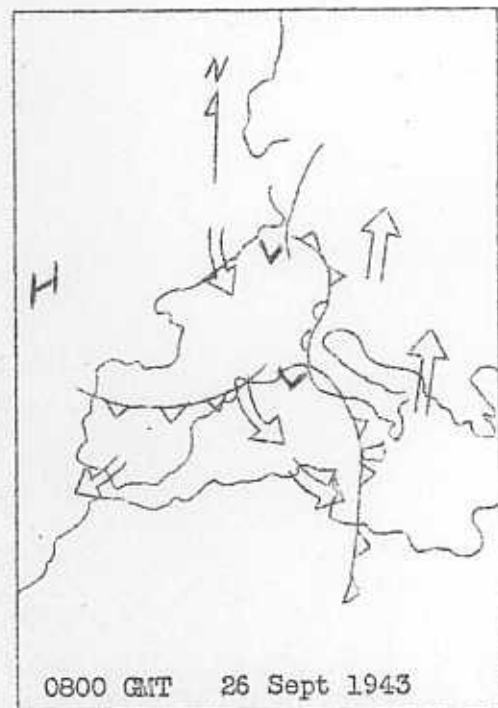
MILES

XX 46



Men had to wear masks to protect themselves from it.<sup>8</sup> On the night of 14 September, the 509th Parachute Infantry Regiment was to have been dropped near Avellino. Because of the dust stirred up by the vehicles and the bursting shells, it was not possible to identify the town from the air. As a consequence few planes found the actual drop zone. The battalion was actually dropped over an area of more than 100 square miles.<sup>9,10</sup>

8. Weather generally favorable to operations lasted until the last week in September. Then the prevailing anticyclone yielded to a frontal system moving eastward toward Italy. Rain began falling late in the afternoon of 26 September as the cold front approached Avellino. The continued heavy rain during the night washed out the recent road repairs.<sup>11</sup> Several key bridges were washed out and the advance of VI Corps was effectively slowed.<sup>12,13</sup> From this time on, water supplies ceased to be a problem, for it rained continuously. This caused considerable misery to lightly-clad soldiers who had discarded their heavy clothing during the preceding hot, dry period.<sup>14-18</sup> As a result of the all-night rain on 27 September, the plowed fields used as bivouac areas became seas of mud, and this made it very difficult to move the vehicles.<sup>19-21</sup> One important trestle bridge just south of Acerno was heavily damaged by the torrential run-off.<sup>22,23</sup> Only emergency traffic was allowed on the road in this vicinity while the engineers made necessary repairs. The 7th Infantry's forward command post switchboard was washed out.<sup>24</sup> Supply was interrupted, and rations had to be cut to two per day until the by-passes were repaired.<sup>25,26</sup> Ambulances had difficulty evacuating casualties.<sup>27,28</sup> The wet ground made it difficult to get field artillery pieces in and out of positions,<sup>29</sup> bulldozers sometimes being required.<sup>30</sup>



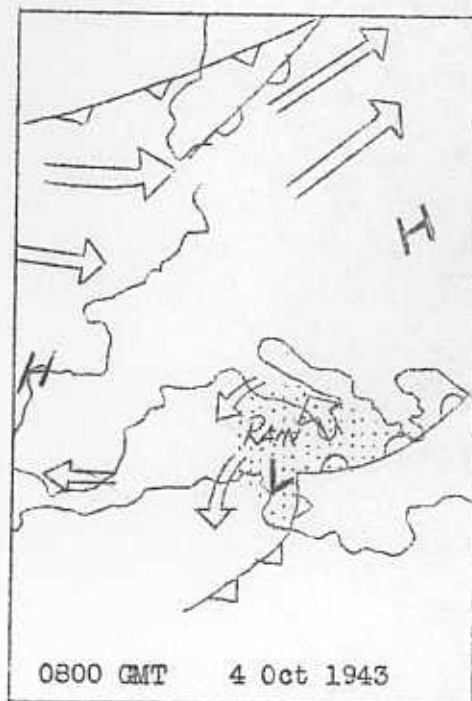
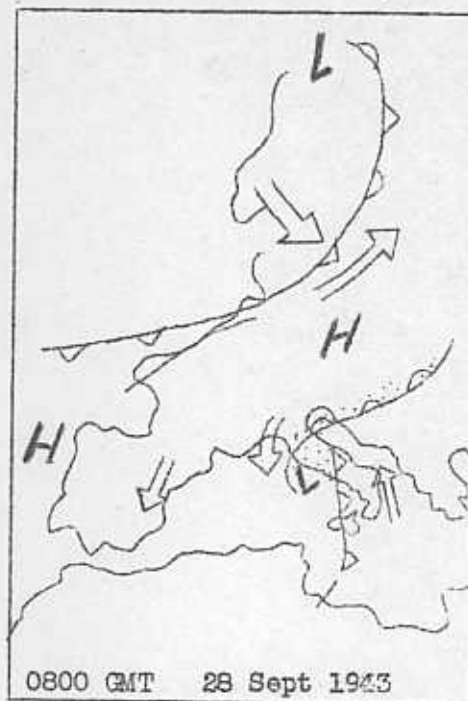
Avellino

9. A second violent storm struck the area on 28 September producing winds with gusts to 86 miles per hour at the beachhead. Nearly a hundred craft were driven ashore<sup>31</sup> and unloading was seriously disrupted for two days thereafter.<sup>32-34</sup> This storm was so violent that it disrupted communications near Paestum,<sup>35</sup> and undid a sizeable number of the road repairs carried out the previous day.<sup>35-46</sup> Because of these delays the final advance on Avellino did not get underway until the foggy night of 29 September.<sup>47</sup>

10. All but a few B-25's and -26's were grounded during the period of 26-28 September. These planes flew 126 sorties against the Volturno bridges, but bombing accuracy was poor and damage was negligible.<sup>48,49</sup>

11. By the end of the first week of October, various units of the Fifth Army began to draw up along the south bank of the Volturno River. The burdens imposed by the demolitions of the retreating German troops and the unusual intensity of the fall rains were heavy and progress was slow. The flooded streams washed out many of the temporary bridges built to replace the scores of spans blown by the retreating enemy.<sup>50</sup> Men struggled to get their vehicles through the ever-present mud. It was common to have to winch the trucks from the parking area to the highway.<sup>51-59</sup>

12. Extremely heavy rain with an hour of hail fell during the afternoon and night of 3-4 October as a wave cyclone off southern Italy caused moist unstable air to rise.<sup>60,61</sup> This seriously complicated movement of 45th Infantry Division units over the bypasses near Benevento. This rain continued during 4 October and held up the 40th



Infantry Regiment enroute to Pannarano.<sup>62</sup> During 6 and 7 October the rains continued intermittently. On 8 October a low pressure center developed over Sardinia and the resultant flow of warm, moist air over the inland mountains of Italy produced continuous, heavy rain.<sup>63-66</sup>

13. The low rain cloud which hung over the nearby hills could not be distinguished from fog by the men fighting in ridge positions. Frequently this cloud--or fog--produced such poor visibility that men neither could shoot nor ascertain the effect of artillery missions.<sup>67-69</sup>

14. The difficult conditions under which men in the front lines were living had brought many to the point of exhaustion.<sup>70</sup> Mud and the very rough, mountainous terrain caused extreme difficulty in evacuating wounded from their stations.<sup>71-73</sup> The 30th Infantry Regiment of the 3rd Division was still dressed for summer weather! This fiasco occurred because their barracks bags had been left in Sicily--due to a lack of shipping space--and had never caught up. Before being relieved, this unit was supposed to clear a path to the Volturno River. Yet, on 9 October it reported failure to accomplish this mission since transportation, including its signal equipment, was completely bogged down in the mud.<sup>74,75</sup> The 30th Infantry's difficulties were typical of the troubles encountered by other units. As a consequence,, the date of the attack on the Volturno was postponed for three days until the night of 12-13 October in order to provide for greater preparedness.<sup>76-80</sup>

15. Road conditions had been so difficult and opportunities for maintenance and overhaul so limited that 10 October was designated as motor-maintenance day. Most vehicles were very much in need of attention.<sup>81</sup>

16. The Volturno River was a serious obstacle. Even though the 45th Division had taken high country to protect the right flank, there were several high mountains on the north side of the river from which the Germans had perfect observation and from which his heavy artillery could command the entire front, particularly near a strategic point called Triflisco Gap. The approach on the south side of the river was over flat land which had been softened by the recent heavy rains. The enemy had smashed all bridges, of course, and the normally 200-300 foot wide river was swollen to a torrent. Nightly patrols were sent out in an attempt to feel out the terrain and to locate strong points of the enemy defense.<sup>82,83</sup> This activity was aided occasionally by fog which hung through the valley on 9 and 10 October.<sup>84-88</sup> Then on 12 October the weather cleared as low pressure to the south caused easterly down-slope winds. The night of 12-13 October was clear and cold.<sup>89-96</sup> This aided the first crossing of the Volturno River.

17. By the morning of 14 October the crossing had been completed and the battle was again resumed. Rain commenced to fall once more. Though it interferred with observations it did not prevent ground movement.<sup>97</sup> Under Allied pressure the enemy steadily retreated along the west bank of the upper Volturno.<sup>98</sup> Dragoni was the next major objective of the 34th Division. Some units encountered such extremely rugged terrain between the Volturno and Dragoni that they encountered great difficulty in

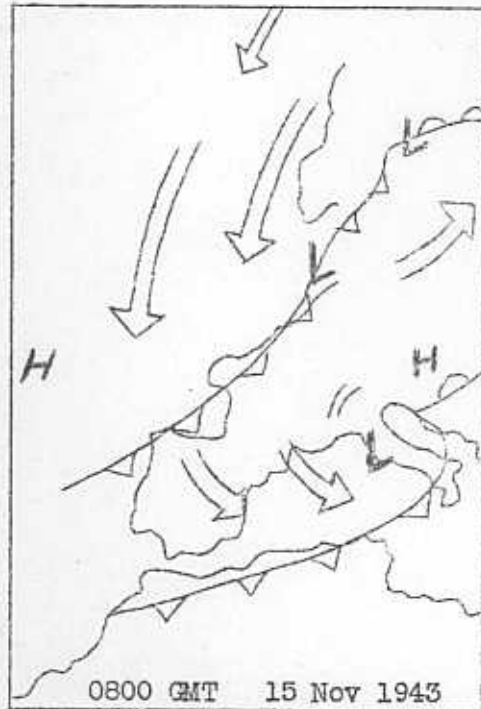
negotiating slopes and steep hills.<sup>99</sup> On the morning of 19 October observers in hill positions noted the advance of the 133rd Infantry as it moved along the west side of the Volturno. At one time Dragoni's presence could be identified only by the sound of its bells.<sup>100-102</sup> The 135th Infantry had similar difficulties with mist on the morning of 20 October, but completed its crossing of the Volturno just before 0200 and entered streets of Alife just before daylight.<sup>103,104</sup>

18. The slow, tortuous advance continued during the later part of the month. Rain continued to fall in torrents during day and night. Roads were hub-cap deep in mud, bivouacs were flooded fields of mud, and the troops were cold, wet, and miserable. Along the west coast the 7th Armored Division was essentially bogged down in low ground.<sup>105,106</sup> Sharp action continued inland over and around the fog-shrouded, rain-swept hills. One incident involved the 34th Division's push on north-west past Raviscanina. The 135th Infantry was to be guided up to its line of departure by men from the 100th Battalion. The fog was so dense on 26 October in the hills above town that the guides became lost.<sup>107,108</sup> During the period of 23-27 October other units experienced similar difficulties because of fog.<sup>109-114</sup>

19. During the latter half of October the weather was variable but generally so bad that the activity of the air force was seriously hampered.<sup>115</sup> Quite frequently requests for air missions had to be rejected because fog or rain made it impossible to get the planes off the field.<sup>116</sup> When planes did get off, the combination of mountainous terrain and unexpected bad weather occasionally produced casualties.<sup>117</sup>

20. Much of the forward action was conducted in mountainous terrain in an attempt to rout the Germans from well-fortified positions. The combination of cold and wet weather,<sup>118,119</sup> slippery road conditions,<sup>120-123</sup> steep and muddy trails,<sup>124-126</sup> and enemy artillery fire<sup>127</sup> made an extremely difficult situation and left many of the men near exhaustion.<sup>128-131</sup>

21. Early in November the men in the high positions on the mountaintops began to encounter snow mixed with rain as cold air from high latitudes penetrated southward. This added to their discomfort, for the woolen clothing which had been issued was inadequate to these combat conditions. The overcoat was too cumbersome; the field jacket was neither durable or warm enough. Neither water-proof footwear nor wool socks were available in sufficient



quantities until December.<sup>132</sup> The high rate of maintenance due to the extremely rough terrain over which the Allied troops were operating caused wool socks to be an item in short supply. Because of supply problems imposed by the deep gorges and precipitous ridges and exposure to the elements men suffered severely, and the troops occupying the mountain positions suffered most of all. All supply had to be by men and mules, and some places were inaccessible even to the mules.<sup>133-142</sup> Casualties were carried out laboriously on litters, some trips requiring hours.<sup>143-146</sup> During this period, trenchfoot began to appear as a formidable enemy.<sup>147-151</sup>

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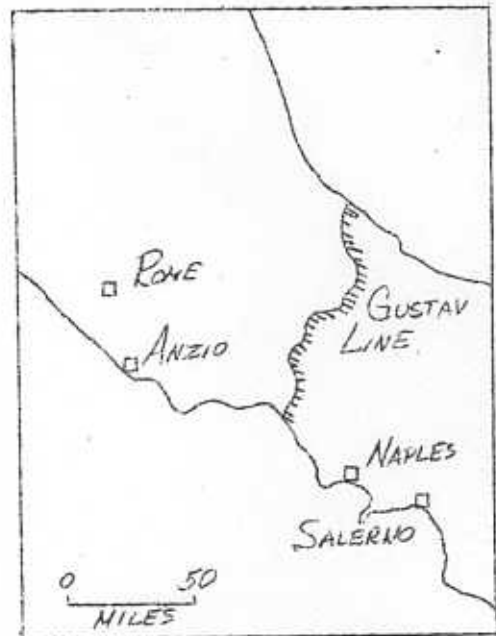
## Chapter VI

### ANZIO January-February 1944

The VI Corps landed at Anzio on 22 January 1944 with conspicuous success. Favorable weather materialized as forecast for D-Day but later periods of strong winds, low clouds, rain, and cold adversely affected operations, particularly in the air.

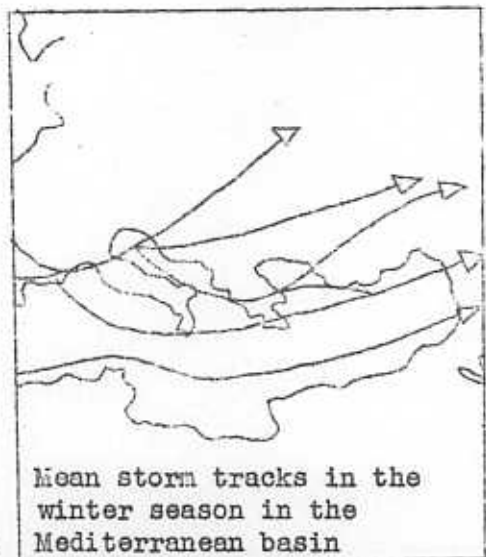
#### The Military Setting

1. After crossing the Volturno in the fall of 1943 the Fifth Army moved northward into the forward enemy position sometimes designated as the Winter Line. In the meantime the Germans busily fortified the Gustav Line, their main defensive barrier on the approach to Rome. The Allies made painfully slow progress because of a tenacious trio: a stubborn enemy, rough terrain, and unfavorable weather. Desiring to turn the enemy's flank, General Alexander ordered the Fifth Army to plan a landing on the west coast behind the Gustav Line for 20 December.<sup>1,2</sup> A combination of factors forced abandonment of this date and postponement for a month. Finally the attack was set for the period 20-31 January, the date to be as close as possible to 20 January. After a successful landing on 22 January, the Allies moved.



#### The Climatology

2. The proposed operation was fraught with risk. Past weather records showed this time of year could promise only two good days out of seven on the average because of frequent occurrence of cyclonic storms with accompanying strong winds. Therefore, plans were made so that the assault convoy could be completely unloaded in two days. Finally Operation SHINGLE was formalized on 12 January with D-Day set for 22 January and H-Hour for 0200 of that day.<sup>4</sup>



3. The American dress rehearsal held on beaches south of Salerno the night of 17-18 January was scarcely successful. In the rough surf so many accidents occurred that further training seemed mandatory before the actual assault could take place. However, there was not time for a second rehearsal.<sup>5</sup>

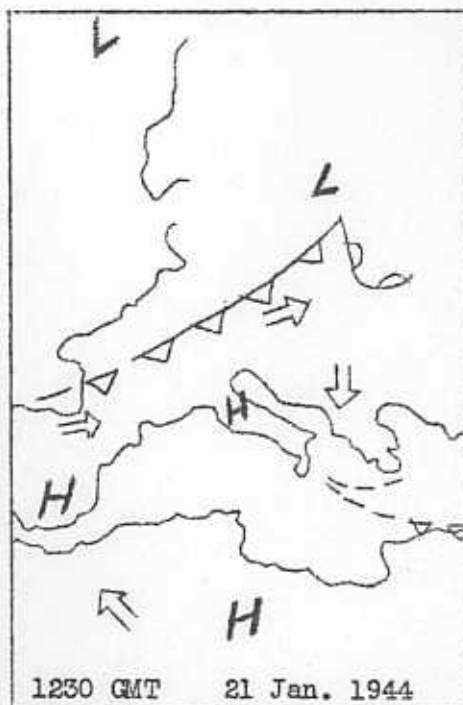
4. At 0500 21 January 1944 the assault force of 243 vessels set out from Naples bound for the Anzio-Nettuna beaches.<sup>6</sup> Despite the blessing of a forecast for favorable sea conditions, this was an extremely hazardous venture. The beaches, shallower than at Salerno, were guarded by two offshore sand bars. In addition, the low probability of a any extended period of good weather assured that in due time a complicated supply problem would develop as wind and sea would interrupt supply shipments.

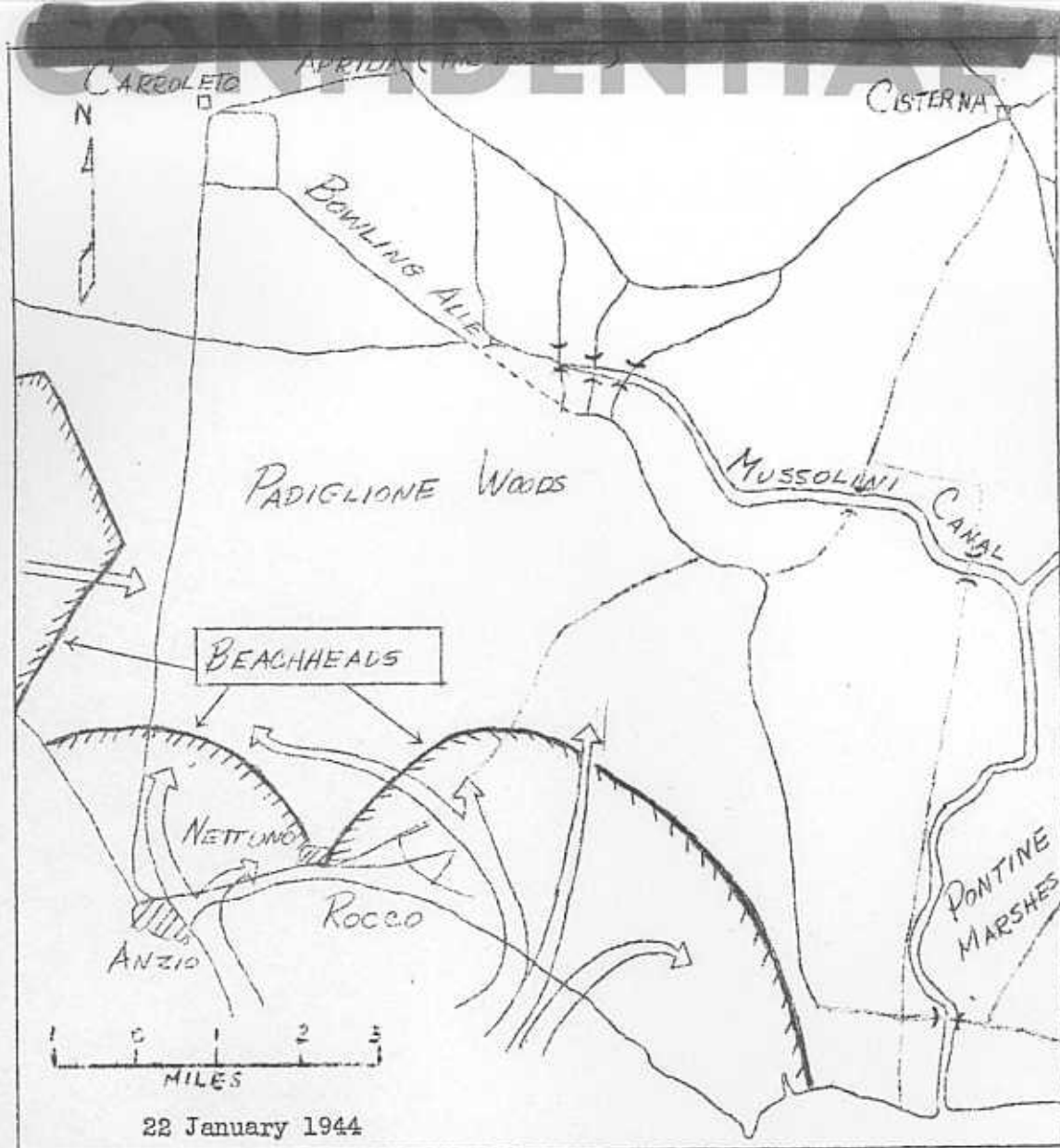
#### The Weather

5. As the convoy arrived at the destination, the forecast for slight winds, negligible swell, and thick haze was found verified.<sup>7,8</sup> At 0200 22 January the first wave of assault craft hit the beach, and to their astonishment the men found no opposition. The enemy had been caught completely offguard. (Later intelligence showed that the Germans knew a landing was coming but had expected it at a later date.) In these fortuitous circumstances the initial landing and unloading proceeded according to plan.

6. A large anticyclone dominated the entire Mediterranean basin from the time of the landings through 23 January. During this period fair weather prevailed over all of Italy. Then a change occurred. The center of the high receded southwestward into the Atlantic. An active wave cyclone moved into western Europe and on 24 January its cold front swept southward into Italy. This frontal action produced a period of high winds which reached gale proportions. The winds raised a surf that shut down discharge of supplies.<sup>10,11</sup>

7. Then on the night of 25-26 January the cold front associated with the second cyclone in this family swept down across Italy. The accompanying winds this time washed ashore all the ponton causeways, broached 12 LCT's, 1 LST, and 1 LCI.<sup>12</sup> Though most ships rode out the storm under power some dragged anchors and drifted into the unswept minefields near Torre di Astura. The morning light revealed scores of dead and survivors in the stormy sea.<sup>13</sup> The winds continued strong on 26 January as a result of a small low which developed on the front near the southern tip of





22 January 1944

Italy and the new eastward intrusion of a strong high pressure cell. No ships unloaded their cargo on this day. Finally on 27 January the pressure gradient weakened over Italy as the low moved eastward. This allowed the LST's to unload their all-important supplies.<sup>14</sup>

8. By this time the 3rd Division, on the right flank of the assault perimeter, was pushing hard toward Cisterna even though the drive had been handicapped by the storm. Severe bombing of Allied positions occurred when breaks in the low clouds permitted enemy air attacks.<sup>15</sup>

9. The storm of 24-27 January left the ground off the main roads soggy and muddy. This made ground movement of armor very difficult. Tanks bogged down repeatedly.<sup>16</sup> In addition to the tank crews' difficulties with trafficability the heavy smoke from the artillery fire clung close

to the ground on this cloudy, wintery day and seriously hampered the visibility.<sup>17,18</sup>

10. Though air support could be drawn from over 2500 aircraft in Italy, Corsica, and Sardinia, heavy cloudiness during this latter part of January severely limited the extent to which it was utilized. For example an attack on Cisterna by 70 B-26's planned for the afternoon of 31 January had to be canceled because of heavy clouds.<sup>19,20</sup> Repeated incidents of this general nature developed a serious situation. Allied air support was reduced to a minimum during the week of persistent low clouds prior to 3 February.

11. Being spared air attack, the enemy built up his forces in the area and prepared to mount a heavy counterattack. He attacked on the night of 3-4 February and focused his drive on the Campoleone sector. A weak cold front produced solid low clouds and drizzle on 4 February and ruled out air support for VI Corps ground forces. The military situation deteriorated for the Allies until at noon it appeared critical.<sup>21</sup> The weather situation likewise deteriorated as a second, more active front swept down from the north bringing colder polar continental air in its wake. The 1st Division began to withdraw on the night of 4-5 February. Its 3rd Brigade faced almost certain destruction that night had it not been for the hampering effect of the mud and poor visibility on the movement of German tanks.<sup>22</sup> This action was fought in rain and near-freezing weather.<sup>23,24</sup>

12. On 6 February the center of a rather intense high pressure cell moved eastward from the Atlantic to France. Northerly winds from this cell flowed down over the Alps. The resultant drying effect reduced cloudiness over Italy so that aerial photographs could be taken for the first time in more than a week. These photos confirmed the suspected buildup in enemy artillery strength.<sup>25</sup> Clear weather persisted for three days during which time artillery units flew many night observation missions during moonlight hours.<sup>26,27</sup>

13. Each day saw more tanks bogging down in action off the roads.<sup>28</sup> This made control of the road network of even greater tactical importance to the Germans.<sup>29-32</sup>

14. After several rather pleasant days of anticyclonic weather the cyclonic regime once more became dominant. An active cold front started to move southward through the peninsula on 8 February and a wave development on this front brought cold rains and winds of near-gale proportions. The P-1 observation planes were grounded, though one Cub plane did manage to get aloft in the afternoon and direct firing for some of the cruisers lying offshore.<sup>30,31</sup> Under the cover of this storm the enemy renewed the attack on "The Factory" near Aprilia. After heavy fighting he finally took this objective and Carroceto on 10 February.

15. The rough seas produced by this storm caused one convoy bound for Anzio from Nisita to return to the Naples harbor. After a day spent at anchor the convoy made a second try and finally was able to dock at Anzio at 0800, 10 February.<sup>32</sup>



16. The largest single cause of hospital admissions during the period was trenchfoot. This derived from several factors. In the first place, the operational area was flat country continually under enemy observation. This necessitated much time be spent in foxholes or slit trenches for whatever slight protection these might afford. In the second place, much of the land was reclaimed swampland and had a normally high water table, which had been raised even higher by the intermittent rains. (Foxholes dug in this type of ground quickly filled with water.) In the third place, the temperatures hovered but slightly above freezing during the nights. The net effect of these three factors was that after a few days in the lines a fighting man was very likely to become a weather-induced casualty. As a result of the conditions under which the severe fighting took place, the strength of the 1st Division was reduced to the point where it was doubtful that it could even hold the positions to which it had been forced back.<sup>33-39</sup>

17. Though the entire resources of the Strategic and Tactical Air Force were made available to VI Corps to stem the German advance heavy clouds constantly interfered with its use. For example, bombers had attacked enemy assembly areas along the Albano road in the early morning hours of 10 February. Then an overcast which began to develop at 0945 became so heavy that by 1045 further bombing was impossible. This required 174 mediums and two groups of heavies to turn back without unloading their bomb loads.<sup>40</sup> This same general condition persisted into 11 and 12 February and did not let up until the afternoon of 13 February. Then clear weather finally permitted accurate bombing and air support against the Germans' heavy artillery.<sup>41,42</sup>

18. As the weather improved during 12-16 February the Americans were able to regroup their badly battered units and brace for the next enemy blow. On 16 February the enemy opened a major offensive which lasted for four bloody days. As the action raged back and forth on 17 February the weary Allied soldiers were cheered to see wave after wave of friendly aircraft overhead in a tremendous program of direct support. An overcast developed on 18 February, however, and prevented a repetition of the air support of the previous day. Even so, an observation plane of the 45th Division artillery was able to get up at 1100 and direct fire control on a group of 2500 Germans seen moving down the Albano road from Carroceta.<sup>43</sup> Though the night of 18 February was stormy the morning of 19 February promised clear and warmer weather. Fighters and bombers were out again in force and as the day wore on it became apparent that the German attack had been stopped. VI Corps had held the beachhead!

19. The remainder of the month of February wore on punctuated by periods of rain and overcast on 21 February, 25 February, and 28 February-1 March. During the last period one incident is reported in which the 7th Infantry was attempting to destroy tanks at a bridge southwest of Ponte Rotto. Flares had been set out to illuminate the intended target for the Allied tank destroyers, but the rain was so heavy that night that it ruined most of the flares.<sup>44</sup>

20. At this time German armor experienced great difficulty in movement due to extensive road craters and minefields despite the fact that

Allied air force was grounded by weather. On the afternoon of 28 February the Germans took advantage of the favorable opportunity to set up a smoke screen under cover of which they could rearrange many of their troop units. The wind was blowing parallel to the Allies' lines and the Germans effectively maintained the screen from 1630 until dark.<sup>45,46</sup>

21. The remainder of the Anzio story is one of generally improving weather which made possible an increasing flow of supplies from Liberty Ships, LCT's, and even DUKW's, and increased air support. Though much sharp fighting was still in store for VI Corps the final decision was no longer in doubt. The triumphal entry into Rome was finally made on 4 June 1944.

22. Looking back on the January-February Anzio action certain miscellaneous weather-dependent items deserve mention. Since the beachhead was so vital to the flow of supplies the 102nd Antiaircraft Balloon Battery had kept up to 40 balloons over the shipping area to counter the strafing attacks which came every night weather permitted. A later evaluation showed this effort to have been generally successful though losses up to 408 per cent, primarily due to bad weather, were experienced in the first five weeks.<sup>47</sup>

23. Care of the wounded was a problem of critical proportions at Anzio. There was no safe area. Both front and rear lines were subjected to shelling and bombing. The ground was too wet to permit digging-in hospital tents. Therefore, all-out efforts were made to evacuate wounded to hospital ships.<sup>48</sup> The problem of evacuating wounded proved to be very critical. The Anzio wharf was such that hospital ships could not dock at it so casualties had to be taken to the ship via LCT's. The periods of storm and wind frequently interrupted this procedure. Due to weather there was one period of 14 days when no hospital ships were present at Anzio.<sup>49</sup>

24. One anachronism had to do with water--of which there was so much. At a point four miles northeast of Anzio the 16th Armored Engineering Battalion reported that extremely muddy water was delaying the output of clear water from two water points. The result would be rationing of water if the rain continued the next day!<sup>50</sup>

25. "B" rations were carried to the beachhead by Liberty Ships. Their availability to the men depended upon opportunities to unload the ships. There was one period of 11 days during 9-20 February when seas were so rough that Liberty Ships could not be unloaded. As a consequence only "C" rations--which could be unloaded by LST--were available to the men.<sup>51</sup>

26. The Anzio action took place in the vicinity of the Pontine marshes which were famous in history for high malaria incidence. A system of dikes had been established as a drainage system. These were destroyed by the Germans as a means of increasing their defensive positions. One of the by-products of the higher spring temperatures was increased danger of malaria. This did not prove, however, to be a serious problem.

27. In summary, Anzio was a bitter struggle between two rather evenly matched ground forces. Perhaps the telling factor in the eventual American victory was marked air superiority. The evidence suggests that the frequent grounding of the Allied air forces by weather contributed greatly to the prolongation of the battle.

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Artificial moonlight in Monghidoro area, Italy, is produced by 8,000,000 candlepower searchlight. Light reflected from low clouds was used over roads to speed and improve transportation. These lights were also used for special missions, such as lighting German positions while the Infantry attacks at night and for observation by artillery. 19 November 1944.



Heavy rains caused sticky mud, which bogged down trucks in Quinzano area, Italy. This road is Route 6531 running east from Loiano on Highway 65. The trucks are hauling supplies to the 85th Division in the valley below. 29 October 1944.

## Chapter VII

### D-DAY AND THE INVASION OF NORMANDY

The weather factor strongly influenced both the planning and operational stages of the invasion of Normandy. The date set for D-Day depended upon tides, illumination, and expected weather (in addition to over-all logistics). The unfavorable forecast for the beginning of the first period caused a postponement from 5 June to 6 June. Even then the decision to go ahead on 6 June was made in the face of considerable uncertainty as to future developments in the weather. Gusty winds of 8-18 miles per hour from the northwest produced heavy seas which made the 6 June landing operations hazardous. Broken clouds hindered accurate aerial bombing. Yet, from the point of view of tactical surprise the weather was nearly ideal. The Germans apparently did not believe the attack could or would be launched under such marginal conditions. Though rough water caused losses the element of surprise derived from mounting an attack under marginal conditions gave a distinct advantage to the Allies.

#### The Planning Stages

1. Few events in history have required the finely coordinated efforts of so many men as the invasion of France in June 1944 by the combined naval, air, and army forces of Great Britain and the United States. Since the assault of necessity had to be launched from the sea, the weather factor was from the beginning one of the key considerations. The Quebec Conference in August 1943 approved the strategic OVERLORD outline plan.<sup>1</sup> Three tactical commanders of the invasion--the Commander-in-Chief of the 21st Army Group, the Allied Naval Commander-in-Chief, Expeditionary Force, and the Commander-in-Chief, Allied Expeditionary Air Force--assumed the task of working out a joint tactical plan for the crossing of the English Channel and the assault on the Normandy beaches using the OVERLORD plan as a working basis. These commanders were collectively known as the Neptune Joint Commanders, after the code name given to the first phase of the projected invasion.

2. The two basic elements called for in the execution of Neptune were tactical surprise and speed. They were necessitated by the extremely grim alternative to failure to gain a foothold in France. Considering the invasion problem broadly, there were five aspects that the Neptune commanders had to consider:

1. How to assemble and embark tens of thousands of troops and their heavy equipment and weapons.
2. How to transport them across the channel.
3. How to break the coastal crust of enemy defenses.
4. How to fight the battle against the enemy defenders.

5. How to conceal Allied strategic intentions from the German high command.

The Neptune planning staff appointed separate committees and charged them with the responsibility of making specific plans for each of the five aspects of the invasion.

3. It is to be noted that each aspect was affected by the weather, although not by the weather exclusive of any other factor. Completely separate from any military or political considerations, factors such as times of high and low tide on the Normandy beaches, the intensity of ground illumination as affected by twilight, and the phase and altitude of the moon proved more basically determinative of the period within which the assault could be effected than the weather itself.

4. The results of the statistical and climatological studies carried on by various meteorological groups made it possible to provide estimations of the probabilities of different sets of conditions occurring during the month of May, June, and July. These basic sets of conditions were the amalgamation of more detailed sets of minimum conditions for the particular operating branches. They were never wholly accepted by all the forces, but represented the conditions which the meteorological section of Supreme Headquarters, Allied Expeditionary Force (SHAEPF) kept in mind as to naval requirements, air force requirements, and army requirements.

5. The basic naval requirements were: the surface winds in the beach area should not exceed 8-12 miles per hour or 13-18 miles per hour offshore in the assault area during the day D to D+2; winds might be 19-24 miles per hour in the open sea, but only for limited periods; in the days preceding D-Day there should be no prolonged period of high winds of such direction and in such Atlantic areas as to produce any substantial swell in the channel; furthermore, visibility should not be less than three miles and moonlight was required for the final approach.

6. The army requirements for airborne troop landings were: for paratroops, the surface wind over the target area should not exceed 20 miles per hour in the target area and should not be gusty; for gliders the surface wind should not be over 30-35 miles per hour; the intensity of the ground illumination should not be less than half moon at 30° as altitude or equivalent in diffuse twilight. For ground forces, the ground should be sufficiently dry to allow movement of heavy vehicles off made-up roads.

7. The air force requirements varied for airborne transport, heavy bombers, medium and fighter bombers, and for base areas, but generally called for cloud ceilings ranging from 1,000 to 2,500 feet along the route to and over the target area, with visibilities approximately three miles. Over the base area the clouds should not be below 1,000 feet and visibility not below one mile, except for heavy bombers, for which there was an additional stipulation that the low cloud tops must be less than 5,000 feet high, and there should be only fragmentary middle clouds.

CRITICAL LIMITS

NAVY

ARMY

AF

8. Summarization of these requirements for the three branches of the service led to the formulation of the following over-all requirements for the period of the assault:

1. D-Day should be within the period of one day to four days after the new or full moon.
2. D-Day should itself be quiet and should be followed by three quiet days.
3. Clouds should be less than 3/10ths in amount below 8000 feet and visibility more than three miles, or, as an alternative, the cloud base should generally be above 3000 feet and with morning mist or fog not excluded.<sup>2,3</sup>

9. The statistical work of the meteorological groups indicated that the chances of obtaining these sets of conditions together over a period of days were very low. For example, they were 24 to 1 against obtaining them in May, 13 to 1 against in June, 50 to 1 against in July. The important result that did come from these examinations was that June was likely to be the best of three early months, so that if the operation was planned for May and postponed, June, with better chances, was still to come. If the operation was planned for June and deferred, its chances of similar conditions in July and subsequent months would be less good than for May or June. Because of these and other logistical considerations, the D-Day that had been originally scheduled by Combined Chiefs of Staff for May was postponed to a more favorable period in June, the specific date to be left to the discretion of the Supreme Commander.<sup>4</sup> From the point of view of channel weather this delay was an unfortunate one, for the weather in late May actually was much better than in June.<sup>5</sup> This was not all loss, however, for the ideal May weather provided the opportunity for heavy bombing of the continent.<sup>6</sup>

10. The responsibility that fell to the Supreme Commander in the selection of D-Day was not one to be envied, for he was faced by the building-up of inexorable pressures which are the inevitable accompaniment of such dynamic enterprise; he was faced with demands (sometimes approaching absolute) of the various services carrying out their part of the assault. All these factors were set within a reference frame of an uncertain weather situation which might produce conditions which would bring the invasion to a disastrous halt.

11. In order to provide the very best meteorological advice possible, in January 1944 the directors of the meteorological services concerned--the British Air Ministry, the U.S. Army Air Force and the British Admiralty--ordered that five-day forecasts be prepared, these forecasts being of the type deemed necessary for the invasion. Further, they arranged regular conferences between the forecasting centers. The purpose of the conferences was to arrive at an agreed-upon forecast for a period of five days. This advice was then to be submitted to the Supreme Commander and his Commanders-in-Chief. The forecasting office at the



Admiralty prepared the forecasts of sea and swell in view of the fact that they had carried out extensive researches in the subject, particularly dealing with the swells from Atlantic depressions. These conferences were started in February, first on a two or three times a week basis.<sup>2,3</sup> From the first of April the conferences were held each day. This change was made in response to pressure from the services. It soon became evident that, except in settled weather, the forecasts from the Centrals tended to differ so widely that an agreed-upon forecast had low confidence and meant very little. As the time of the operation approached there was an increasing concentration on the first 48 hours, with an outlook for the following three days given nearly always with low confidence. From mid-April on conferences were held twice daily. During much of May when operational forecasts were required for preliminary maneuvers in the channel meetings were held three times daily. On the day immediately preceding D-Day further conferences were held at 0300 double summer time each morning on which to base the final advice given to the Supreme Commander's meeting at 0415 hours.

12. The gently sloping Normandy beach was known to have a notoriously high channel tide that rose approximately 19 feet from low to high water. This meant that at low tide Rommel's beach defenses lay exposed more than a quarter of a mile behind a moist sandy shelf, and at high tide the channel lapped almost to the sea wall behind OMAHA Beach. During the month of May Rommel had been extremely active in constructing a profusion of concrete pyramids, angle girders, ten-foot stakes, and heavy timber ramps along the beach. If these were to be avoided and removed, some daylight and low tide were essential requirements.<sup>7</sup> Yet a low-tide landing would require personnel to advance across a wide strip of exposed, irregular beaches--an invitation to another Tarawa. For tactical reasons, therefore, the army preferred to approach the beach under cover of darkness and touch down at first light under a tidal condition about halfway between extreme low and high tide. This would enable landing far enough up on the beach to be in sand instead of mud, yet low enough on the beach to land before the first series of obstacles were reached. The assault also had to be made on the rising tide so that the landing craft could be grounded and get away to avoid beach congestion. Both the air force and the navy insisted on daylight as an essential condition to preliminary embarkment. Finally, in order to gain daylight for air and naval bombardment the army compromised on its position on darkness and agreed to an H-Hour 30 minutes after dawn. Since tide conditions were known to vary from beach to beach, and since five beaches had been selected for the assault, five different H-Hours were selected extending from 6:30 to 7:30 in the morning of D-Day.<sup>8-13</sup>

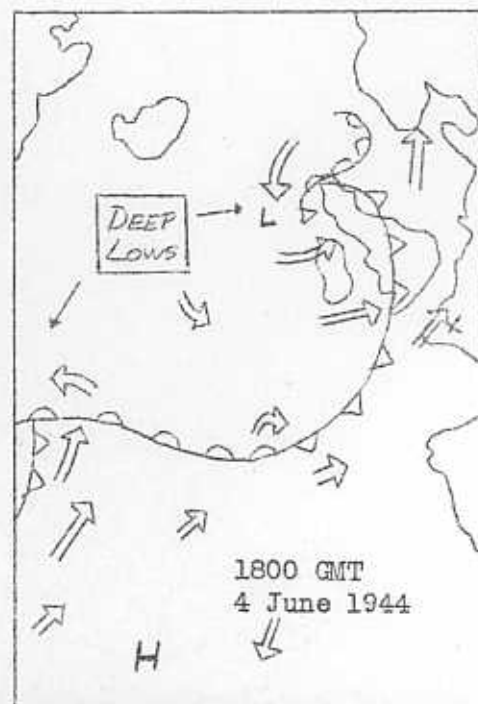
13. In order to meet these requirements of the services the choice of D-Day was limited therefore to two three-day periods in each month. Of all the days in the month 6 June best fit the requirements for there would be sufficient daylight before the incoming tide would reach the under-water obstacles. 5 June would be acceptable with 30 minutes' less daylight, and 7 June with 30 minutes more, but by 8 June the tide would not reach the obstacles until two and one half hours after daylight. This was considered to be too risky in terms of lost concealment provided by darkness.

14. In the light of all the factors under consideration the Commander-in Chief on 17 May underlined 5 June tentatively as D-Day. The vital question was: would the prolonged fine weather system which had prevailed through late May and early June--which was beginning to break up--give place to another fine weather system or yield to a period of uncertain or stormy weather?<sup>1,14</sup>

#### Days of Decision

15. As a result of the increasing complexity of the weather situation over the Atlantic considerable difficulty was encountered by the combined forecasting groups in reaching agreement on the expected weather for 5 June. Their difficulty stemmed from the shift in the weather regime from settled anticyclonic weather to unsettled westerly cyclonic weather with all its attendant uncertainties.<sup>15</sup> The 1800, 3 June weather chart showed two depressions in the Atlantic moving east-northeast toward the Orkney-Shetland area. The pressure falls in the British islands were by themselves indicative that the channel winds would freshen from the southwest and bring in low clouds from the Atlantic on 4 June. The forecasts for 5 June made on a basis 1800, 3 June chart indicated that conditions would be unfavorable on 5 June for the assault.<sup>5</sup> On the basis of this information, finally summarized at 0415, 4 June, Eisenhower decided to postpone D-Day 24 hours.<sup>16</sup> The weather during 4 June was rainy and overcast. The 1800, 4 June weather chart showed the cold front of the depression itself just off the north tip of Scotland.<sup>5</sup> This cold front passed on through the channel area during the early morning hours of 5 June.

16. At the same time the historic decision was being made the weather chart for 1800, 4 June showed another deep depression south of Greenland. This chart was a very unusual one for this time of year. The pressure at the center of the



depression off Scotland was the lowest of the century up to that year.<sup>17-19</sup> Though this precluded any possibility of a quiet spell it likewise eliminated possibilities of great amounts of low cloud likely to be present in a southwesterly air stream.<sup>19</sup>

17. A meteorological conference was held early in the morning of 5 June at which time the following advice was given:

"The fair to fine interval, which by 0415 had begun at Portsmouth will probably last into the forenoon of Tuesday. During this interval, cloud will be mainly less than five-tenths, with base at 2500-3000 feet.

"Wind on the beaches in the assault area will probably not exceed force three in this interval and will be westerly. Visibility will be good.

"During Tuesday, cloud will very probably increase again from the west, giving the period of overcast sky with cloud base at about 1000 feet in the assault area late in the day; these cloud conditions will continue overnight Tuesday to Wednesday. Wind will be westerly force four on the English coasts and mainly force three on the French coasts. Conditions will probably continue unsettled after Tuesday and it is difficult to time further changes. But it is likely that after another front has passed on Wednesday, when the 10/10 cloud at 1000 feet lasting over Tuesday night becomes broken, the cloud base will increase to 2000-3000 feet, though the passage of Wednesday's front till about Friday, beyond which no useful forecast can be given, will be intervals of completely overcast sky with cloud base down to 1000 feet. Considerable fair intervals of broken clouds can reasonably be expected between the overcast intervals. Visibility will be good throughout."<sup>2,20</sup>

General Eisenhower decided at 0415 on 5 June to accept the risks involved in making the assault under the conditions outlined in this forecast. H-Hour for OMAHA Beach was set at 0630, 6 June.<sup>16,19</sup> Though conditions were not optimum postponement to 7 June would risk deterioration of weather conditions as well as necessity of refueling ships already at sea; further postponement would mean a delay until 19 June before tide and moon conditions were suitable. The former alternative represented the lesser of two evils.<sup>20-24</sup>

#### Pre-Invasion Incidents

18. Because of the early sorties required, part of the American assault force had already put out into the channel on 3 June. On 4 June a convoy was plowing along through rough seas when the message came through that D-Day had been postponed. Orders were received to return to Portland-Weymouth to take aboard fresh water and fuel.<sup>25</sup> Some 247 gunfire support

craft, LCT's, LCM's, and other small craft were involved in this operation. Because of the heavy weather, seven LCTL smokers swamped under tow, one LCT capsized, another LCT swamped, and others that returned to Weymouth missed the assault.

19. The decision to postpone had the disadvantageous effect of causing personnel to be exposed to the rough seas for an extended period of time. A British bombarding squadron had been at sea two days when postponement signal was received. In order to mark time for 24 hours and still maintain the same distance from Normandy in case the invasion was "on" the next day the squadron had to detour north for 12 hours then turn south again. A near-disaster occurred during these time-wasting maneuvers when the squadron ran into a convoy in a fog. Fortunately there were no mishaps.<sup>26</sup>

20. The 14th Minesweeping Flotilla had been sweeping ahead of one of the convoys. Early on 4 June this flotilla found mines in a location south-southwest of the Needles and began to clear them despite the bad weather. Radio silence was on so the minesweepers could not acknowledge receipt of the postponement signal. Two destroyers in the vicinity thought the minesweepers had not received the signal so closed in on them to pass on the information by semaphore. In so doing the destroyers steamed into the unswept water where the minefield had been discovered and suddenly found themselves surrounded by floating mines, the moorings of which had been cut by the minesweepers. The only thing to do was to stop engines and wait to be extricated by the minesweepers, a mission successfully accomplished. This did not prove to be an extensive minefield, but one of the unswept mines in the field claimed the first casualty of Operation Neptune.<sup>27</sup>

21. "X-craft" (British midget submarines) had been entrusted with the task of marking the assault area. They were to fix positions accurately by daylight, then lie on the bottom of the sea until the assault forces approached Normandy at which time they were to rise and show shaded lights to seaward, thus acting as temporary light ships. X-23 and X-20 had a difficult cross-channel trip because of rough water. While fixing their navigational positions the surf was so rough that all the officers were at one time or another washed overboard. This ordeal lasted 76 hours, during which time continuous hand pumping was required to get rid of water which had been shipped. Sixty-four of the 76 hours of the ordeal were spent submerged.

#### D-Day Weather--CMAHA Beach

22. Reports on the state of the weather and the sea on D-Day vary in detail, but all accounts agree that conditions were not ideal for an amphibious landing. Oral descriptions from men who survived several hours' tossing in an LCDF or an LCM tend to exaggerate the strength of the wind and the height of the waves, and it would be unwise to accept the opinions of non-professionals on a matter that has historic importance. The account that will be given is based on the observations made aboard the USS Ancon, flagship of the Commander Assault Force "O"; on nine

officially recorded observations taken by British naval vessels at various points just off the beaches as well as some distance out in the Baie de la Seine; an observation by an accredited oceanographer who embarked into a landing craft at 0200, 6 June; and on notes made by an officer of the 21st Weather Squadron, 9th U.S. Air Force.

23. By the early morning of 6 June the northwest low that had forced the postponement of the assault by one day had abated somewhat, but measurements made about H-Hour showed that a gusty wind was still coming from the same direction with a velocity of from 10 to 18 knots (12 to 20 miles per hour). The sky was partially overcast with visibility about ten miles, and the sea was from the west with moderate swells from the north-northwest. In the transport area ten or eleven miles offshore the wind waves averaged from three to four feet in height, with occasional interference waves as high as six feet. The short period of these waves made transfer of personnel and vehicles to landing craft difficult, and on the journey into the beach it was estimated that as many as 50 per cent of the men were seasick. On OMAHA Beach itself the breakers during the initial landings were estimated between three and four feet, and this figure is supported by Signal Corps photographs taken during the assault. Amateur guesses that the surf reached six to eight feet are undoubtedly exaggerated, since mass landings could not have been made in water as rough as suggested by these estimates.



24. The wind continued gusty throughout D-Day, reaching 22 miles per hour occasionally. At 1200 the wind waves one to two miles off the beach were recorded at three-four feet, but the water was extremely choppy with many whitecaps. A weather officer of 21st Weather Squadron, 9th U.S. Air Force, landing on OMAHA Beach at 1500, reported the surf to be three feet high or less. Observations made at sea just east of OMAHA on the afternoon of 6 June gave a wave height averaging three feet, with a maximum of four feet.

25. It was not until the afternoon of 7 June that the wind dropped below ten knots (12 miles per hour). During the morning the waves were still choppy and from three to four feet high, with one ship reporting a maximum of five feet at 0600. By 1500, however, with a drop in the wind, the waves were recorded at two to three feet, and by 1800 the surf was only one to two feet high on the beach. 28-30

The German Outlook

26. To what extent were the Germans surprised by the D-Day operation? The available evidence does not provide a single answer. For example, General Blumentritt was asked whether the storm that had passed through the channel on 5 June had not lulled the defenders into a sense of security at a critical moment: "No, it didn't have that effect--because we thought the Allies were sure to have the kind of vessels that would not be affected by heavy seas. So we were always on tenterhooks, and just as ready at one time as another." General Rundstedt replied:

"Although we had no definite report of the date of invasion, that did not matter as we had been expecting it anytime from March onward. The one real surprise was the time of day at which the landing was made--because our naval staff had told us that the Allied forces would only land in high water. The further effect of your choice of low tide for the landing was that the leading troops were protected from fire to a considerable extent by the rocks."<sup>31</sup>

27. The German meteorological service was hampered by a lack of reporting stations far to the west which were available to the Allies. Because of this the German meteorologists apparently failed to pick up the prospective break in the weather for 6 June.<sup>32</sup> Though the German weather planes flew daily over the North Sea to points west of Ireland, the data gathered was of limited usefulness.<sup>33</sup> The forecast of the chief German meteorological officer for this event is not available. One report indicates that he informed his high man that the weather was so poor that no invasion could take place.<sup>34</sup> Other sources are less sure about this point.<sup>33</sup>

28. Whichever is the case, it is reasonably certain that Admiral Krauche had no patrol boats in the channel during the night of 5-6 June, and because of the tidal conditions could not get them out of the harbors before daylight on 6 June.<sup>32</sup>

29. The Luftwaffe's channel reconnaissance had deteriorated into high altitude, routine flights. The extensive cloud cover of 5 June acted as an excellent blanket which prevented detection from the air.

30. Detection of the armada through the clouds was spoiled by virtue of the destruction of German radar stations along the Baie de la Seine by Allied bombers several days before.<sup>35</sup> Apparently the Germans' first knowledge of the giant armada was at 0530, 6 June when their shore positions received a broadside from the Allied naval vessels.<sup>36</sup>

The Operational Stage

31. The first phase of the invasion was the air drop of the 82nd and 101st Airborne Divisions at the base of the Cotentin Peninsula, and the drop of the British 6th Airborne Division in the vicinity of Caen.

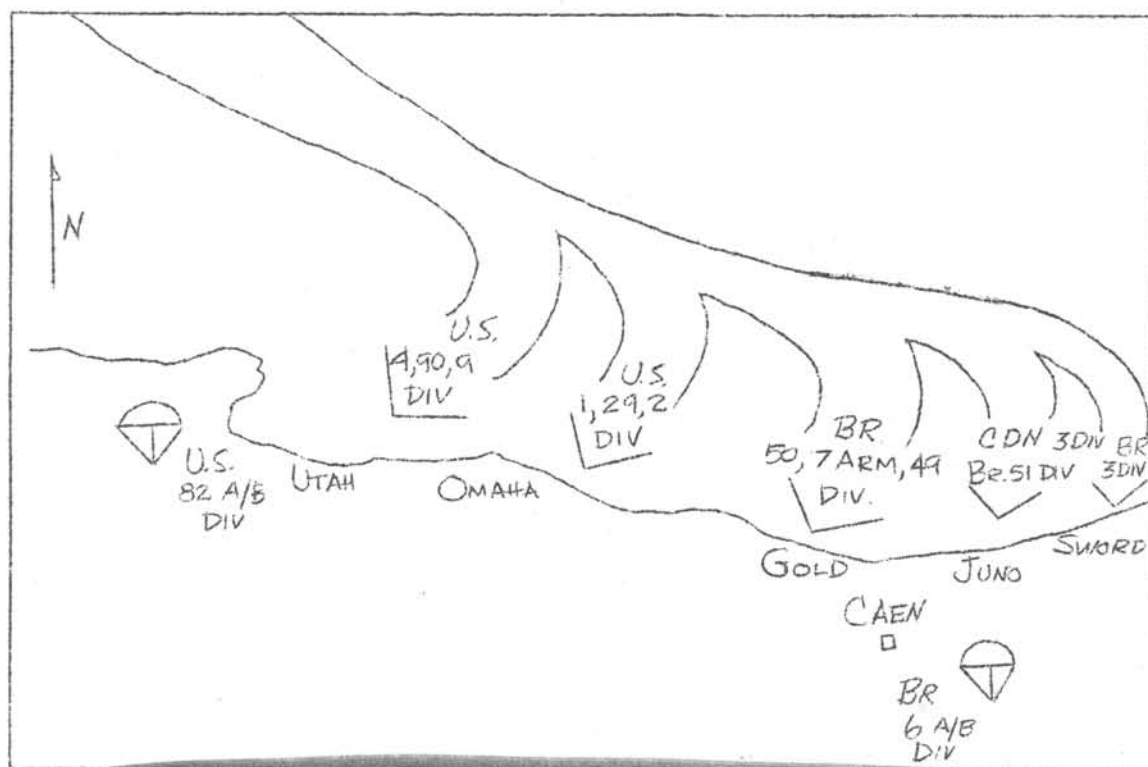
Air

Eight hundred planes transported 6,600 men of the 82nd and 101st Airborne Divisions to their drop zone shortly before 0130, 6 June.<sup>37</sup> Due to cloud and wind conditions the Pathfinders did not locate the exact drop areas.<sup>38</sup> This was due partly to bad weather and partly to anti-aircraft fire.<sup>39</sup> As a result landings were scattered. As late as 8 June the 101st had gathered only 2,100 combat troops.<sup>37,40</sup> Though this action was disorganized and 60 per cent of the equipment of the paratroopers was lost,<sup>38</sup> the two airborne divisions succeeded in their mission: the capturing of the causeways across the inundated areas behind the UTAH Beaches.<sup>41,42</sup> The dry weather of the previous month benefitted the attacker here as he found many of these areas were relatively dry.<sup>43</sup>

32. Farther to the east the British 6th Airborne Division dropped out of the skys punctually at 0050 in the vicinity of Caen. Here again the drop was dispersed due to unexpected low clouds. Also some of the beacons were not visible because they had been set up in standing crops, and this contributed to the errors.<sup>44-46</sup> Rommel's antiglider stakes proved to be ineffectual in preventing landing as they had not yet been wired together nor fitted with mines. Some gliders were severely damaged, but the majority of the men and equipment reached the ground unharmed.<sup>36</sup>

The Landing--6 June 1944

33. The Allies invaded continental Europe in a five-prong thrust with the intent of establishing a foothold then penetrating quickly and deeply. The British beachheads--SWORD, JUNO, and GOLD--were more exposed to the westerly winds and suffered the worst weather.<sup>47</sup> OMAHA and UTAH Beaches were farther to the west and received more protection from the



peninsula. As the great Allied armada closed in on the Normandy coast that fateful morning the weather, though substantially as forecast, was still a cause for considerable concern. Spray and rain lashed the decks during the crossing of the channel, and a gusty westerly wind of 17-23 miles per hour produced a moderately choppy sea with waves in mid-channel of five to six feet in height.<sup>48</sup> From the transport area to the beach the wind moderated somewhat and blew from the northwest from 12-20 miles per hour.<sup>49</sup> The sky was overcast and the visibility about ten miles. Because of confusion in the transport area due to darkness and to choppy seas the LCT's with their dual-drive tanks, the LCT (A)'s, and the LCM's did not arrive at the line of departure either at the prescribed time or in the prescribed location.<sup>50</sup>

. . . on UTAH Beach

34. The 4th Infantry Division led the assault of VIII U.S. Corps on UTAH Beach. Though the landing was made on time the assault waves went into the beach 1,000 yards south of the contemplated position. This error was due to the obscuration of the coast line by the haze of air bombardment. It was actually a fortunate error since this unit encountered fewer obstacles at this position than in the section originally planned. Thirty amphibious tanks which were launched 5,000 yards offshore arrived on the beach with only one loss and the beachhead was soon secured along the 4,000-yard front. During the day units made successful contact with the 101st Airborne Division.<sup>51-53</sup>

. . . on OMAHA Beach

35. The major American assault was along 7,500 yards of sand and shingle between Pointe de la Percee and Colleville. The beach was backed by 100-foot bluffs, these being intersected by four small valleys leading inland. Easy Green sector of OMAHA Beach was 30 yards wide and lay near St. Laurent; Dog Red, 480 yards wide, lay adjacent to the northwest. In the long view the assault was successful; in the short view, hardly anything went according to plan. Most of the difficulties were weather induced--either directly or indirectly--and are enumerated: 1. German resistance along OMAHA Beach was more active than anticipated. This was due to the fact that a partial overcast hampered effective bombing by the air force.<sup>54-56</sup> It became necessary to bomb by instruments. In order to avoid dropping bombs on the assault forces many bombs were released so they fell half a mile or more inland.<sup>57</sup> 2. Landmarks ashore were obscured as a result of smoke and dust along the beach raised by naval fire, aerial bombardment, and a slight early morning mist.<sup>58</sup> In addition to the poor visibility and the rough water the strong northwesterly wind had increased the eastward-setting tidal current to three miles an hour. This produced errors in navigation and added to the confusion among the landing craft.<sup>59,60</sup> Because of the mislandings, certain units such as the Engineer Special Brigade were not able to carry out important assigned missions.<sup>57,61</sup> Underwater demolition teams did not clear gaps to the beach as effectively as had been contemplated in the over-all plan. In addition, the underwater obstacles were more numerous than anticipated,



the tide began to flow approximately a half hour earlier than indicated by tide tables due to the westerly winds and thus covered the obstacles farthest from the shore line, and the dual-drive tanks that were to provide tank support did not materialize.<sup>62</sup> 3. The rough water induced by the winds affected all surface craft. The dual-drive tanks (DD's) previously mentioned were a tactical surprise which the Allies prepared for German troops. These tanks were fitted so they could 'swim' ashore from landing craft. Sixty-four DD's were scheduled to be in the primary wave; only two reached shore of 28 launched at sea; of the 64 only 29 were in operating condition when reaching the beach and most of these were carried to shore in the LCT's.<sup>59,63,67</sup> Various other craft suffered different fates. Some landing craft were hurled onto the beaches by the waves and some of the smaller ones swamped before reaching shore. Still others were flung on the mined underwater obstacles.<sup>60,68-70</sup>

36. Many of the men were in poor condition by the time they finally reached the beach, if they reached it. Many wounded were drowned in the rapidly rising tide.<sup>61,68</sup> Seasickness had been a prevalent ailment suffered by men who had spent many hours in the rough channel waters. Its<sup>68,71-</sup> debilitating effect was a temporary impairment of their combat efficiency.

37. The complexity of the operation defies description. Minor incidents reported include: LCA's sinking due to heavy seas,<sup>77,78</sup> DUKW's filling with water because of the steepness of the LST's ramp from which they were launched,<sup>79,80</sup> jeeps drowning out in five feet of water and having to be dragged in to the shore,<sup>81</sup> men and assault craft hurled into the barriers of the mined-underwater obstacles,<sup>82</sup> a cannon company turned into a rifle company as a result of loss of equipment,<sup>83</sup> infantrymen finding their weapons inoperative because they were jammed with sand,<sup>84,85</sup> the units who had to remain on board because their LCVT's could not be launched coming ashore the next day in calm conditions.<sup>86</sup>

#### . . . on SWORD-JUNO-GOLD Beaches

38. British units encountered essentially the same conditions in their assault area though the surf, if anything, was somewhat higher.<sup>87</sup> The fact that the landing hour was delayed because of rough water meant that the assault engineers had great difficulty in dealing with the underwater obstacles before the incoming tide covered them.<sup>88,89</sup> Because of the later hour the abating wind resulted in fewer losses of assault craft than on the American beaches.<sup>89</sup>

39. The end of 6 June saw the British and American forces in the process of establishing their beachhead positions. Despite the many obstacles which had to be overcome, the tremendous operation--which Winston Churchill characterized as the most difficult undertaken by man--was brought to successful realization.

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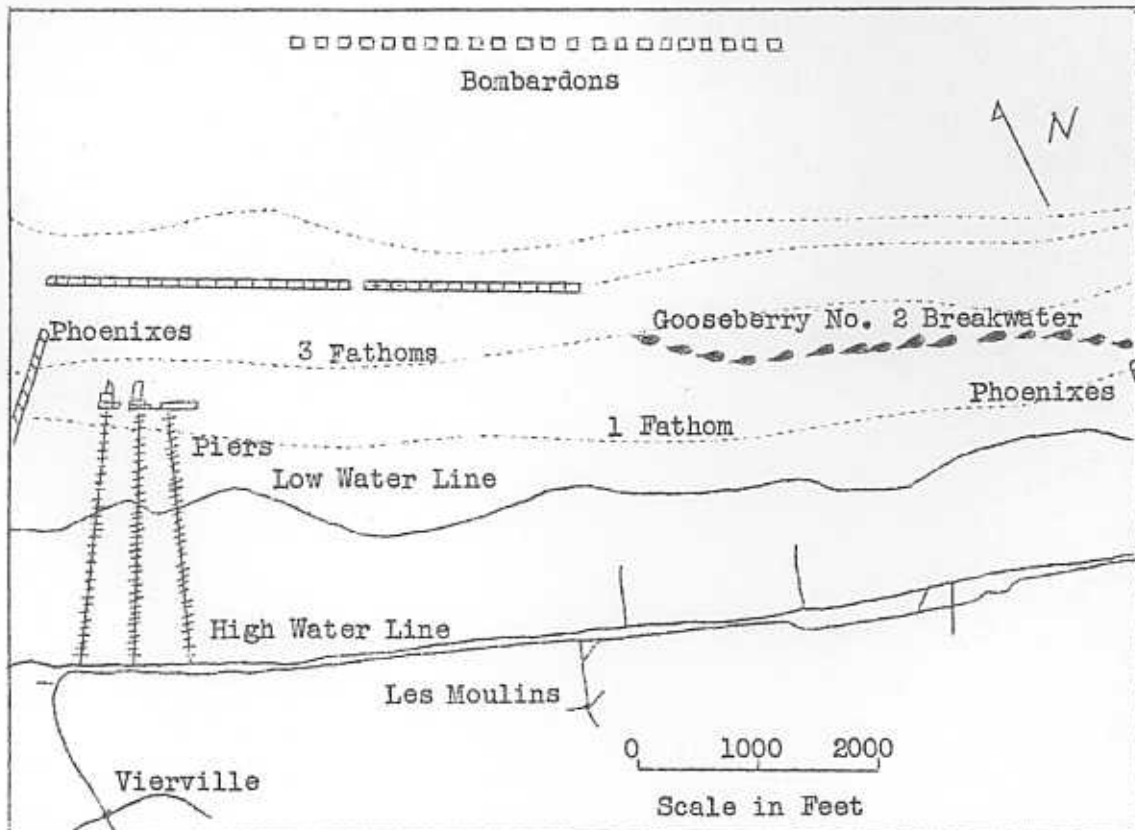
Chapter VIII

THE GREAT STORM OF 19-22 JUNE

A northeasterly gale blew up suddenly on the morning of 19 June 1944 in the channel area and persisted until 22 June before blowing itself out. It accomplished more in three days than the enemy had been able to accomplish in the fortnight since D-Day.

The Setting

1. A daring plan had been evolved to facilitate the flow of supplies through the newly-captured beachhead until major port facilities became available. This plan consisted of the construction of mammoth prefabricated artificial harbors called Mulberries. Mulberry A was to be established on OMAHA Beach to handle the supplies for the American forces. Mulberry B was to be built on the beach near Arromanches and was to handle supplies for the British. The magnitude of the project can be visualized from the fact that 158 sea-going tubs were required to tow the 1,500,000 tons of prefabricated parts from the English ports to the Normandy coast. The harbors were to provide moorings for seven liberty ships, five large coastal vessels, and seven medium coastal vessels; there were two piers



Plan for Mulberry A

for LST discharge and a third pier to provide for discharging the cargo of two coastal vessels simultaneously.

2. The artificial harbors were protected by 200-foot long, 20-foot wide, 60-foot deep concrete caissons called "Phoenixes." These weighed 6,000 tons apiece. The "Bombardons" were 95,000 cubic feet breakwaters. Finally, there was a string of block ships which were to be sunk in two fathoms of water to which was given the name "Gooseberry." In the shelter of the breakwaters there were three long steel piers supported by three rows of pontons called Whale bridging, which terminated in the Lobnitz pierheads.<sup>1,2</sup>

3. The construction of the artificial harbor received high priority attention immediately after D-Day. As early as 12 days later the task was nearly completed, and small vessels were using the central pier.<sup>1,3-6</sup> The solution to the supply problem hung heavily upon the success of the Mulberry project and the capture of major ports like Cherbourg.

4. On the same morning that General Collins jumped off for Cherbourg a sudden change in the weather occurred which had an ominous portent. Commodore Cliver, Commanding Officer in the JUNO area made a log entry that a gale sprang up suddenly at 0330 on D plus 13.<sup>7-9</sup> The Second Army had hoped to launch its offensive on 18 June but had to delay because certain essentials were still unloaded.<sup>10</sup> The change in the weather intimated the necessity of further delay.

5. The possibility of channel storms with north-northeast winds had not been ignored by the planners. It was known that northeasterly gales develop in the channel in winter and spring with ease, but their frequency decreases rapidly as the season progresses. After the middle of June the possibility of a prolonged northeasterly wind of more than 25 miles per hour is very rare. The exposure of the Normandy beaches made them particularly susceptible to this condition. In the planning stages the odds were given on the development of this kind of situation. The risk was assumed by the planning staff. They gambled, and lost.<sup>11-12</sup>

6. Even as late as 18 June 1944 there was no forewarning of a blow. The weather forecast received from ANCXF on that date read as follows: "Wind north to northwest, force three. Weather fair to cloudy. Visibility good. Seas two to three feet waves. Outlook Wednesday to Friday little change from above."

#### The Synoptic Situation

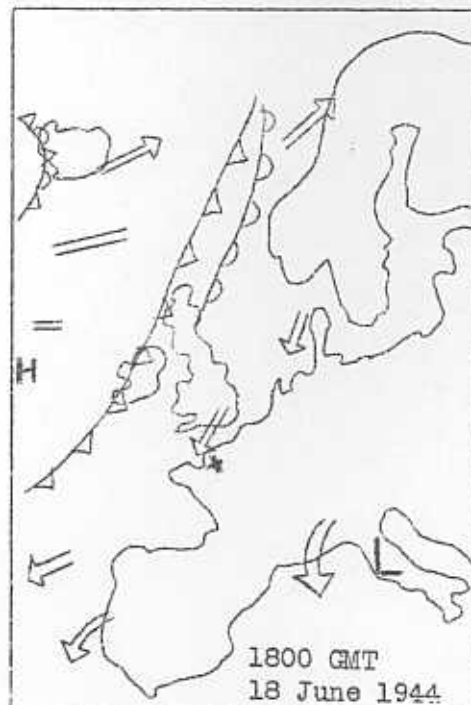
7. Though all these factors were not known to the forecasting staffs at the time the synoptic development leading up to the storm was as follows: On 17 June a high pressure ridge slowly moved over Ireland and Scotland and was in the Irish Sea area by 18 June (this was the time the landings would have been carried out had 6 June, D-Day, been rejected); a cold front moved eastward to the coast of the British Isles on 18 June; the pressures rose rapidly behind it; this rise persisted despite the advance of another storm system into the regions of rising pressure. This rise



in pressure resulted in an effective movement of the center of high pressure northeastward from the Azores region. The most significant--and probably the least known--factor in the development was the deepening and northward movement of a low center in the Mediterranean resulting in a fall of pressure in south and southwest Europe. The combination of the rising pressure over England and the falling pressure over the continent produced the sharp pressure gradient in the channel area with the resultant winds of 25-35 miles per hour on the average.<sup>13</sup>

#### The Weather

8. On the afternoon of 18 June unloading operations were steadily becoming more difficult despite the presence of Mulberry and the assurance of the ANCXF weather forecast. After losing several heavily loaded DUKW's when waves swamped them the deputy commander of the Mulberry unit decided to consult the aerologist on the Augusta, which was standing offshore. A similar reassuring message was finally received: "Cloudy to partly cloudy, visibility fair, 4-6 miles. Wind northeast, velocity channel 8-13 knots. Ceiling 2-3,000 feet." By this time the wind velocity was already over 22 miles per hour and one could see white caps on the water outside the breakwater. Advice came into the shore that the aerologists aboard the Augusta considered the falling barometer as simply indicative as a minor depression that would pass during the night. However, during the night the barometer continued to fall from 30.04 inches to 29.92 inches and the wind was 30-35 miles per hour.<sup>13,14</sup>



9. By mid-morning on 19 June the onshore winds built up a sea that nearly put the tops of the Phoenixes under water. Since gun platforms were awash evacuation of the AA troops got underway at 1000. In the afternoon the seas were getting still higher and the caissons were awash. All the Whale roadways began to heave and undulate in the heavy swell and

traffic was halted lest vehicles get out of control.<sup>15</sup> The 21st Weather Squadron reported waves of 4-6 feet with a 5-6-foot surf on the beach on 19 June.<sup>16</sup> With winds gusting to 36 miles per hour all work on the Mulberry stopped. An inspection by the last light of 19 June revealed that some of the outer Phoenix breakwater units were beginning to show signs of collapse.

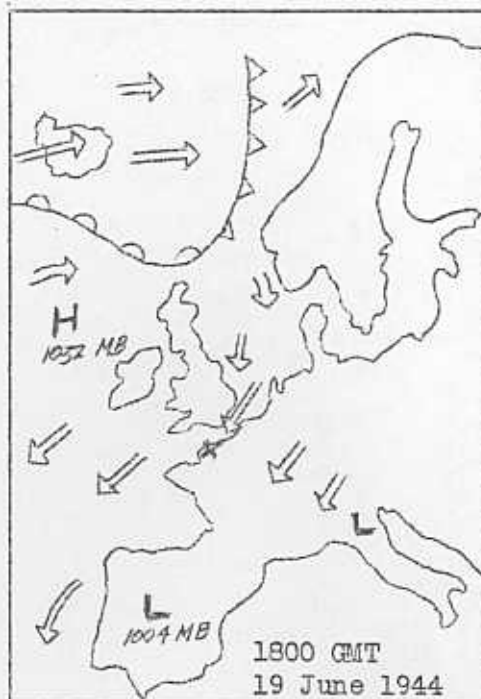
10. Mulberry A had been constructed with the greatest possible rapidity. This may have been a contributory factor to its inability to withstand this buffeting. Its sister unit, Mulberry B, was having a much easier time since it had been positioned inshore of the Cavallos Reef.<sup>17</sup>

11. During the night of 19-20 June some of the Whale bridging inside the western breakwater began to part its mooring cables. A U.S. salvage barge and five British LCI's drifted against the eastern side of the central LST pier.<sup>17</sup>

12. The Cherbourg operation had been predicated upon ample supplies of ammunition. When the storm cut down the movement of supplies into the beachhead to a mere trickle, General Bradley became desperate and requested an emergency air ammunition lift. This was a risky venture because the only available fields were fighter fields using mesh runways and it was quite possible the heavily laden C-47's would have difficulty landing. Continuous precipitation fell during most of 19 June and on the morning of 20 June and hindered the establishment of this lift, yet within the next few days 500 tons per day were being moved in by air express.<sup>16,18-20</sup>

13. After a patch of clear sky appeared about noon on 20 June scud drove in again along with wind of increased force which was estimated to be 45 miles per hour.<sup>21</sup> By this time it was apparent that the issue was a fight for survival of the Mulberry itself. Additional shipping had drifted against the LST pier; Phoenixes in the outer breakwater were nearing collapse; even the Lobnitz pierheads appeared to be so close to breaking up in heavy seas that personnel were evacuated; the Bombardon floating breakwater had snapped its moorings and all 24 Bombardons were adrift.<sup>14,22</sup> By this time the waves were running six to eight feet high with a surf of five to six feet inside the breakwater and from six to seven feet along the unprotected stretches of the beach.<sup>16</sup>

14. A dramatic description of the awesome period from 20 June until the gale blew out is provided in force Mulberry:



"After noon (on the 20th) and the turn of the tide the gale resumed with new force. The wind now blew sheets of water off the wave tops--indication to the seaman's eye that the wind had reached a force over forty knots. (p. 186) . . . LCT's, wandering in the gale without anchors ranout of fuel. Rather than chance the shore, now piled high with wreckage, they let themselves be blown into the Whale bridging in the hope their people might jump to safety. Small arms fire, shaking fists, screams and curses shouted against the whistling wind were of no avail. (p. 187) . . . Phoenix tows were reported in the area (outside the breakwater). They were ordered back to U.K. but could not make it. Equipment was beached or scuttled. One Phoenix went clear adrift to disappear in the darkness driven by the wind--an utter menace, fatal to any ship she might crash in her path. (p. 188) . . . Orders were passed that all efforts to protect the (Lobnitz pierhead) structures be abandoned. Men must now concentrate on saving their lives. . . . in the glare of portable lights, bodies of men in the water had been seen floating by, face down . . . A watch was set, equipped with short lines, boat hooks, and tarpaulins to recover any bodies within reach . . . Men clung to the supporting timbers of the (Lobnitz) superstructure and to each other to keep from being washed overboard. In a short while many became hopelessly seasick and lay dangerously unguarded, retching. These men were secured with life lines. (p. 193) . . . The storm continued into the next day, 21 June. . . . Seventeen LCT's, barges, LCVP's and small craft had piled into the bridging . . . The Phoenix continued to disintegrate . . . Nothing could be done except let the storm take over . . . Agonized army men made their way out from shore to find out what hope there was of getting in ammunition. . . . Men slept . . . sacked down. It was better not to see the collapse of the whole war. Evacuation, if it were possible, lay ahead. The invasion of Europe was over. The Germans must know the losses. A counterattack would surely start."<sup>23</sup>

### Effect on Supply

15. During the period of the storm there were practically no unloading activities on the beach. A considerable amount of small shipping lying off the beach was driven onto the beach and much of it was destroyed. Full unloading activity was not resumed until 24 June. Fortunately, supply dumps which had been built up before the storm were sufficient to carry the V Corps through the storm period. Food supplies were adequate but men had to use "C" and "K" rations longer than intended due to delays in unloading unit kitchens. Finally, there was a delay of as much as a week in the buildup of supporting units.<sup>24</sup> One estimate of the loss of tonnage which resulted is the following: 140,000 tons of stores; 20,000 vehicles; and 83,000 men.<sup>17,25</sup>

check

Storm Damage

16. During 22 June the gale gradually abated. The seas continued to run high to hinder the work of salvage. The scene was appalling. Eight hundred craft of all kinds were stranded on the beach,<sup>26</sup> 300 of which were above small-boat size.<sup>19</sup> Nearly half of the available LCT fleet was included.<sup>26</sup> Of the great Mulberry A harbor which was so near to completion on 18 June there remained nothing but masses of wreckage. The Whale bridging was twisted and severely damaged primarily as a result of the impact of various drifting craft; the Bombardons were lost; seven of the blockships had broken backs; the great concrete Phoenixes were essentially obliterated.<sup>16,26-30</sup>

17. The Mulberry A harbor off Arromanches came through the storm in much better shape. In addition to the shelter gained from the Cavallos Rocks, its breakwaters were more nearly complete. Even so some of its Bombardons broke loose and became a total loss. Sections of the pierheads were in tow at sea on their way to France at the time of the blow and every one of these was lost. Yet within the shelter of Mulberry A breakwaters at least 155 craft weathered the gale.<sup>26</sup>

18. A temporary survivors' camp was established on the beach for the 500-600 officers and men of the wrecked craft. All hands turned to to repair damage and clear the beaches. By prodigious efforts 600 craft were temporarily repaired and refloated on the next spring tide. The wreckage of Mulberry A was hurled on the beach in such depth that a large amount of machinery had to be diverted to clearing the debris so supplies could be brought in over the beach itself. Tractors and dozers had to clean up more debris from this storm than material destroyed by enemy fire on D-Day.

19. But for this storm--the worst known in June for 40 years--the harbor experiment might have been the means of hastening the liberation of France by several months. ★

Historical Comparison

20. The magnitude of the loss suffered by the Allies through this storm perhaps can best be understood by comparing it with other historical catastrophes which occurred in these same waters. The American loss of shipping and supplies in and alongside Mulberry A was almost as heavy between 19 and 22 June as the total losses sustained by the Spanish Armada from the day it left Coruna, Spain, with 130 vessels in June 1588 until it limped back into that harbor late in August with but 60 ships.<sup>31</sup> Between 19 and 22 June the Americans lost 82 vessels of different kinds,

in all about 15,000 tons of shipping.\* The Armada carried 30,483 men, of whom 8050 were seamen. In the battles and gales in the summer of 1588 the Spanish invasion also had 37,206 soldiers in the low countries, ready to be transported to England in barges as soon as the Armada had established temporary control of the Channel. Thus the Spanish assault force amounted to 57,561 soldiers. The American assault force on D-Day was made up of 55,180 seaborne and 20,329 troops. But the Spaniards provided for no buildup, while the Allies put forth only a fraction of their strength in men and supplies for the first blow.

21. The storm of June 1944 was more severe than that which blocked Napoleon's plans at Boulogne but it did not inflict decisive losses on the Allies. The supply losses were unquestionably serious because they occurred in the early and critical period of the bridgehead.

22. In the light of incidents such as this, it is small wonder that Eisenhower was heard to say on one instance, commenting on the weather, "When I die, they ought to hold my body for a rainy day, and then bury me out in the middle of a storm. This damned weather is going to be the death of me yet."<sup>32</sup>

23. This, then, is an overview of the weather during the critical period from 19 June to 22 June when the Allies were establishing the foothold on the Continent.

\*Details vary in different sources. Cmdr. Kenneth Edwards R.N. presents the following summary:<sup>26</sup>

	<u>Losses</u>		<u>Damaged</u>	
	<u>Enemy Action</u>	<u>Weather</u>	<u>Enemy Action</u>	<u>Weather</u>
D through D - 6	64	34	106	106
D - 7 through D - 18	27	118	29	297
	<u>Lost or Damaged</u>			
		<u>Enemy</u>		<u>Weather</u>
June (entire month)		261		606

## THE GREAT STORM

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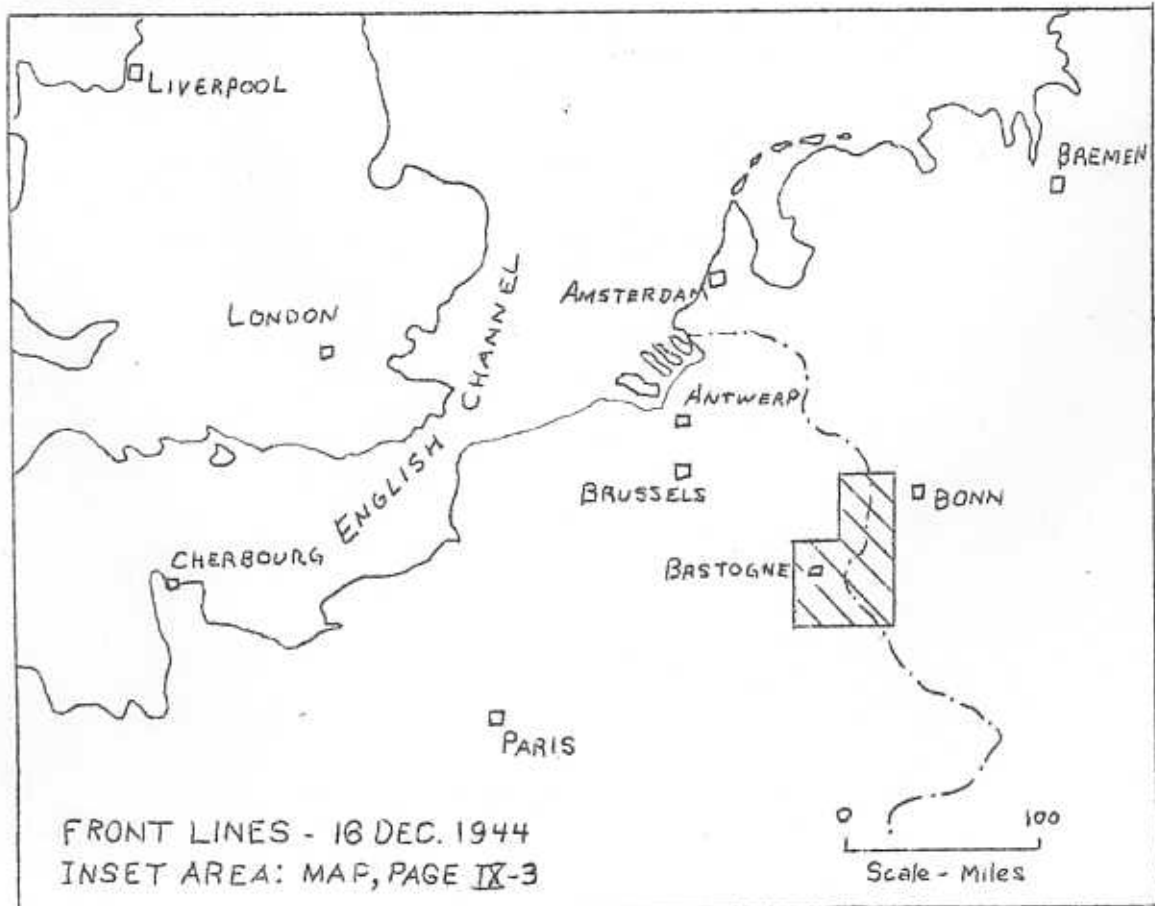
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## Chapter IX

### THE BATTLE OF THE BULGE

The weather played a dominant role in the savage battle which took place in the Ardennes Forest, Belgium, in December 1944 and January 1945. The German high command desperately needed to mount a counteroffensive but lacked air support; therefore, they coordinated their ground attack with an anticipated ten-day period of poor flying weather which was to ground the Allied Air Force. After several delays due to incomplete preparation the all-out counteroffensive was launched on 16 December 1944. Panzer columns, probing through the fog, caught the Allies completely by surprise. The issue remained in doubt for one week while confused fighting under extremely adverse weather conditions took place. A miraculous break in the weather occurred on 23 December which enabled the Allied Air Force to take to the air and break the back of the German offensive. Hard fighting continued well into January before the Bulge was straightened out. The Battle of the Bulge is one of the best examples of the way in which strategic planning was geared to the occurrence of a particular type of weather situation in order to minimize the superiority of one aspect of the enemy's arms.





### Choice of Date

1. In certain large-scale campaigns of World War II the weather played a very dominant role. Success sometimes depended upon the surprise factor, associated weather conditions which were deteriorating or marginal. D-Days of certain campaigns were postponed or set ahead because of the proximity of unfavorable seasonal changes, and the weather was used as an ally or fought as an enemy on more than one battle-ground.

2. The Battle of the Bulge, fought in mid-December 1944 in the Ardennes, Belgium, was such a major campaign. The enemy purposely chose a time of deteriorating weather to launch an all-out counteroffensive against the steadily advancing Allies. In late September Hitler had ordered an all-out blow against his foe. However, it was apparent to the Fuhrer and General Oberst Alfred Jodl that the attack could be started only at a time when prevailing weather conditions would ground the enemy air forces. They (the Germans) could muster sufficient manpower and equipment to undertake a large-scale offensive operation but there would be no hope of success in the face of the decided Allied air superiority. Since the Luftwaffe was unable to provide air support for this operation the German high command planned to take advantage of a period of unfavorable flying weather which would permit their ground forces to advance unmolested from Allied air attacks.

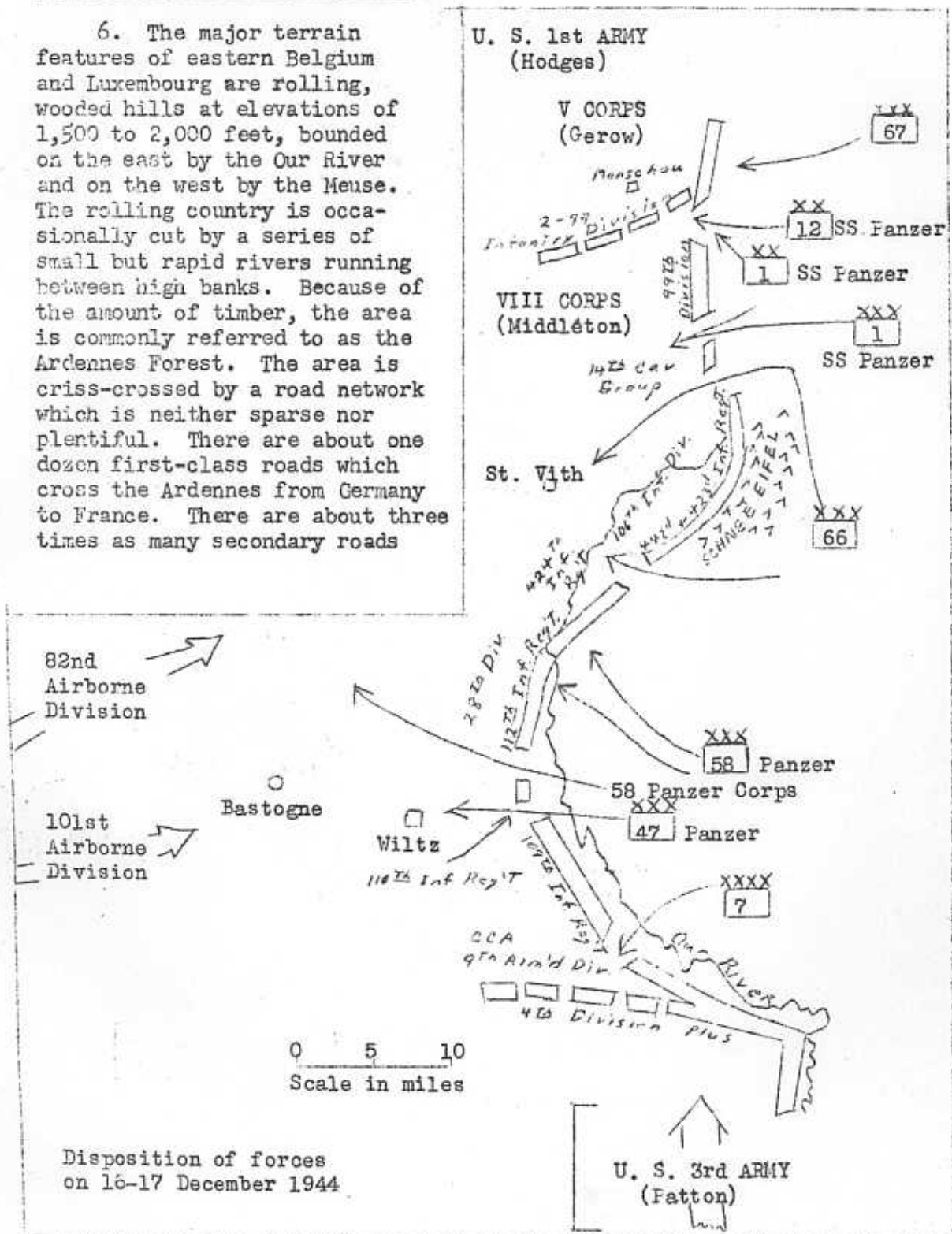
3. Hitler once again called upon his personal air force meteorologists who had been instrumental in the selection of previous attack dates and set them the task of forecasting a ten-day period of poor flying weather. Lt. Col. Schuster, head of the meteorological service, recommended the last week in November which is notoriously the worst period of flying weather in northwestern Europe. Furthermore, the new moon would be rising at this time and this would minimize night raids on troop reinforcements which were moving to the front.<sup>1</sup>

4. Actually several dates were set and abandoned, partially because of unsuitable weather, but principally because of inability to complete preparations and assault command problems. The first date, 25 November, gave way to 1 December; this in turn gave way in succession to 10 December, then to 14 December, then to 15 December. Finally, on 12 December Hitler set the jump-off day of the offensive for 16 December when the meteorologists assured him of four to five days of thick fog.<sup>2</sup>

5. Hitler decreed that surprise was to be achieved by ruthlessly enforced security. This was accomplished to a very considerable extent. Later, on 28 December, Hitler declared, "the best omen was the weather development which had been forecast by a young weather prophet who actually proved to be right. The weather situation enabled us, already two or three days earlier (before the jump-off), to actually camouflage the final build-up so that the enemy failed to recognize it. To achieve this had appeared almost impossible."<sup>3</sup>

### Terrain and Troop Dispositions

6. The major terrain features of eastern Belgium and Luxembourg are rolling, wooded hills at elevations of 1,500 to 2,000 feet, bounded on the east by the Our River and on the west by the Meuse. The rolling country is occasionally cut by a series of small but rapid rivers running between high banks. Because of the amount of timber, the area is commonly referred to as the Ardennes Forest. The area is criss-crossed by a road network which is neither sparse nor plentiful. There are about one dozen first-class roads which cross the Ardennes from Germany to France. There are about three times as many secondary roads



and many trails. Many of the roads pass through long stretches of woods and wind up and around the numerous hills.

7. As of the first of December the Allies' forward line paralleled the German west wall. The array of forces, reading from north to south, was: the Ninth Army, the First Army, and the Third Army. Under General Hodges' First Army command was General Collins' VII Corps, General Garow's V Corps and General Middleton's VIII Corps. VII Corps held the northern end, V Corps the middle sector, and VIII the southern end of the First Army line. The primary concern of V Corps was to capture the dams at the Roer River. VIII Corps was spread out along the 80-mile Our River front. The 2nd and 99th Infantry Division lines lay near Monschau on the north. These two divisions were attached to V Corps. The 106th Infantry Division, the 28th Division, the 9th Armored Division, and the 4th Division held the remainder of the front. These four divisions were under VIII Corps' command. Poised for the attack, but unbeknownst to the Americans, were the German LXVII Corps, 12 SS Panzer Division, 1 SS Panzer Division of the I SS Panzer Corps, LXVI Corps, LVIII Panzer Corps, XLVII Panzer Corps, and Seventh Army.<sup>4,5,6</sup> The two U.S. Divisions on the northern half of the VIII Corps Ardennes front recently arrived in Europe; the two divisions on the southern half came from a hard month spent in the Hurtgen Forest.<sup>7</sup>

#### Climatology

8. Northwest Europe, climatologically speaking, constitutes the area bounded by a line through northern Spain, northward through central France, on through Denmark and the Norwegian coastal area. This area is characterized by very mild winters, damp air carrying much cloudiness, cool summers, and the maximum rainfall in autumn. The Mediterranean area is bounded by a line through northern Spain, northern Italy, continuing along the coastal areas of Yugoslavia and Greece. Here the winters are mild, summers are hot; there is abundant sunshine. The maximum rain in the northern portion occurs in the autumn and spring, whereas in the southern portion of the area most rain occurs in the winter. The area called Eastern Europe lies east of the line drawn from the Black Sea to Finland. Its dominant characteristic is the very cold winter. Central Europe experiences likewise cold winters with warm summers. The most rainfall occurs in the summer.

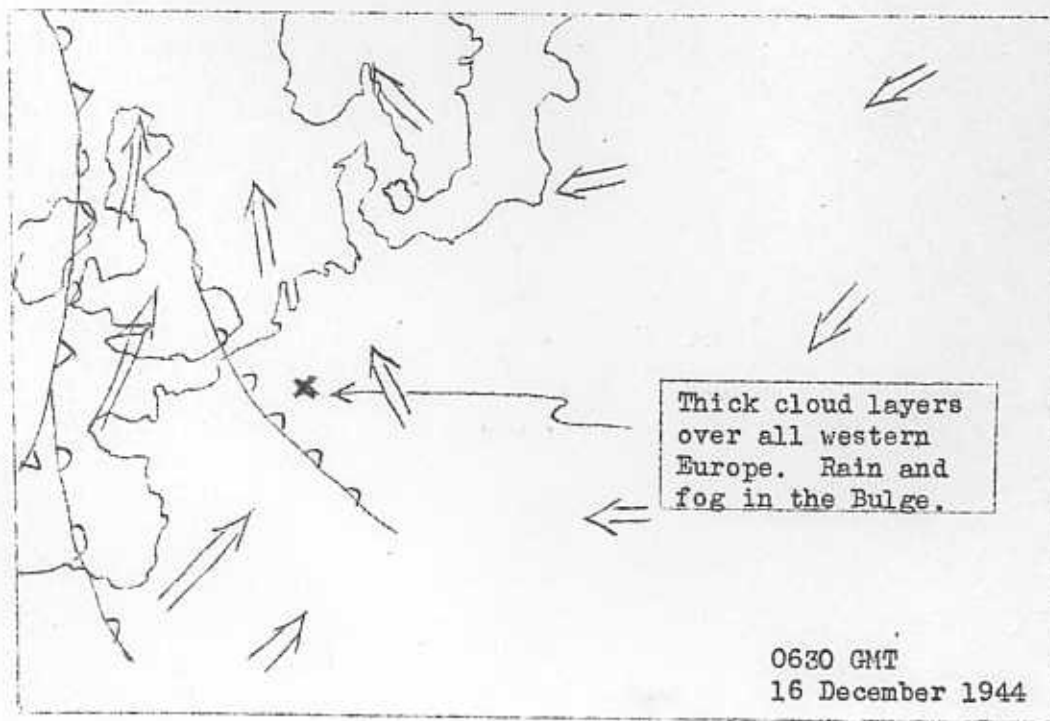
9. The significant thing about these climatic regimes is that the boundary between Northwestern and Central European zones intersects the area of concern in this narrative. Therefore it might be expected that the Ardennes would partake of the features of both northwestern and Central Europe, depending upon the strength of the dominant influence. The month of December, 1944, proved to be an excellent illustration of the transition in regimes. At the start of the Battle of the Bulge, the Ardennes area lay at the western periphery of a very intense Russian continental anticyclone. As a consequence a heavy cloud cover lay over the whole area. Conditions were essentially stagnant for about a week after the assault began. Then in the last week of December

the continental regime extended its influence westward and brought a radical change in the weather of the previous week. This change of climatic regime had tremendous implications on the military action, as will be pointed out in succeeding paragraphs.<sup>8</sup>

Prelude to the Attack: 16 December minus 1

10. Extended periods of rainy and cloudy weather during the first part of December minimized Allied air reconnaissance. For three days prior to 16 December von Rundstedt massed his troops for the attack with no worries of detection from the air.<sup>9,10</sup> On 15 December a warm front approaching the Ardennes from the west brought rain which fell steadily all day. Aside from a few scattered artillery shells, there was no activity in the sector.<sup>11</sup> There was little awareness of the imminent attack. First Army's G-2 summarized the situation on 15 December as follows:

"Although the enemy is resorting to attack propaganda to bolster morale of his troops, it is possible that a limited offensive will be launched for the purpose of achieving a Christmas-morale victory for civilian consumption. Many PW's now speak of the coming attack between the 17th and 25th of December while others related the promises of the recapture of Aachen as a Christmas present for the Fuhrer."<sup>9</sup>



The Attack: 16 December

11. The two predominant features of the weather map of 16 December consisted of a large, 1050 mb high with its axis elongated in a north-west-southeast direction centered over central Russia, and a very deep 975 mb low northwest of Britain. The occluded front from the low center lay north-south through England. The warm front which produced the rain of 15 December lay north-northwest--south-southeast through the Ardennes. The presence of these two very intense pressure centers produced a pressure gradient that caused a strong southerly flow over all northwest Europe. The combination of a dissipating warm front, southwesterly winds, and a gentle upslope motion produced by the terrain was ideal for the formation of an extensive persistent blanket of fog and low clouds. This condition set in during the night, and by morning fog lay all over the lowlands. At 0630 on the morning of 16 December the Germans started a heavy artillery barrage along the entire length of the 60-mile front.

12. By noon it was clear that a full-scale offensive was under way. Four infantry divisions and a parachute division attached to Dietrich's 6th Panzer Army attacked between Monschau and Manderfeld to open a gap for two SS Panzer Divisions of I SS Panzer Corps. Twelve SS Panzer Divisions struck out over the important Elsenborn Ridge located just to the rear of V Corps front. I SS Panzer Division started a thrust through the gap between the Elsenborn Ridge and the Schnee Eifel intending to cross the Ambleve River at Stavlot and push on toward the Meuse River. II SS Panzer Corps remained in reserve. Sixth Panzer Army planned to move through the hole, turn north, and cut the three major roads leading to the break-through area, and establish a defensive line from Liege to Monschau. Manteuffel's Fifth Panzer Army, to the south, grouped so that tanks would be in the first assaults scheduled to take place under huge search lights which had been laboriously moved to the front. LXVI Corps had the task of surrounding the Schnee Eifel and the two green regiments of the 106th Division. LVIII Corps and XLVII Corps pushed through the 28th Division with the intent of isolating Bastogne and allowing the Panzers to move on to the Meuse. The Seventh Army moved ahead with the intent of pushing back the 4th Division, moving rapidly to the south and establishing a defensive line from Givet and Echternach on the Meuse.<sup>12,13</sup>

13. The Germans infiltrated, encircled, cut communications wires, and pushed on toward their well-defined objectives. The fog pervaded the whole battlefield and blotted out hills and towns. Smaller units did not know either what was happening or what they were supposed to do, and so they used their ingenuity.<sup>14</sup> The temperatures were low enough that snow lay on the ground and blowing snow mixed with the fog. The enemy infantry attacking the 422nd, 423rd, and 424th Infantry Regiments of the 106th Infantry Division wore white snowsuits for concealment.<sup>15,16</sup> One small bit of action concerns German tank Commanders peering from open turrets for better visibility as their tanks pushed through the snow. A platoon leader of E Company, 424th Infantry Regiment, directed automatic weapons fire on the tanks in such concen-

tration that the commanders closed their hatches. The snowy fog was so thick that the tankmen lost direction and were halted by a burst of anti-tank fire.<sup>17</sup> The attack started in the central portion of the Allied lines with enemy spotlights and searchlights focused on Allied snow covered positions. Some Germans charged headlong while others slithered across the snow-covered fields in white camouflage outfits.<sup>18</sup> Enemy armor plowed forward in juggernaut style unhindered by the few anti-tank guns which were immobilized in the deep snow and mud.<sup>18</sup> The Germans ran into the stiffest opposition of the day from the infantrymen of the 2nd and 99th Divisions. Here the Allies found help in muddy roads and fields which were so soggy that the Germans were unwilling to risk tank movement.<sup>19</sup>

14. In the afternoon of 16 December the Luftwaffe was in the air in numbers as in the days of earlier Nazi conquest.<sup>20</sup> On the other hand, Allied air was practically grounded. This curious contradiction is explained by virtue of the improvement of the weather in the Ardennes toward the center of the Russian high to the east. An additional reason the American air commanders did not order strikes was their lack of awareness of the offensive. By the evening of 16 December sufficient knowledge of the proportions of the attack had been accumulated to enable issuance of intelligence orders for 17 December.<sup>21</sup>

15. Another phase of the German attack was a paratroop drop along the northern flank for the purpose of cutting off roads leading south to the attack area. Original plans called for this attack in the early hours of 16 December, but bad weather caused the 24-hour delay. About midnight on 16 December 800 paratroopers dropped from 60 Junkers transport planes in the general area of the Malmedy Eupen woods.<sup>22</sup> (Another source indicated that of 106 aircraft which set out on this mission, only 35 reached the correct dropping area.<sup>23</sup>) This mission went wrong from the very outset. The pathfinder units used incorrect wind data and arrived at the drop zone almost one quarter hour early. This gave warning to the American air defense in advance. Also it meant that the last transports received no guidance and had to drop blindly.<sup>24</sup> The maximum surface wind for German paratroop operations was 14 miles per hour. In this instance the surface winds were 36 miles per hour.<sup>24</sup> Not only were the men widely scattered but many jumpers incurred broken bones as they hit the snow-covered, woody country of the Ardennes. Many died the slow death of starvation, exposure, and exhaustion<sup>23</sup> or were picked up by the Americans.<sup>25,26</sup> This daring but poorly executed mission may have had its effect in terms of psychological warfare. Confronted with the suddenness of the German attack and the Skorzeny mission, a considerable panic spread through the ranks. One entire unit of the 3rd Armored Division moved north of the jump area to guard against possible attacks; it remained out of action for a week while sister units attempted to stem the orthodox German attack to the south.<sup>22</sup>

German  
PARADROP

★

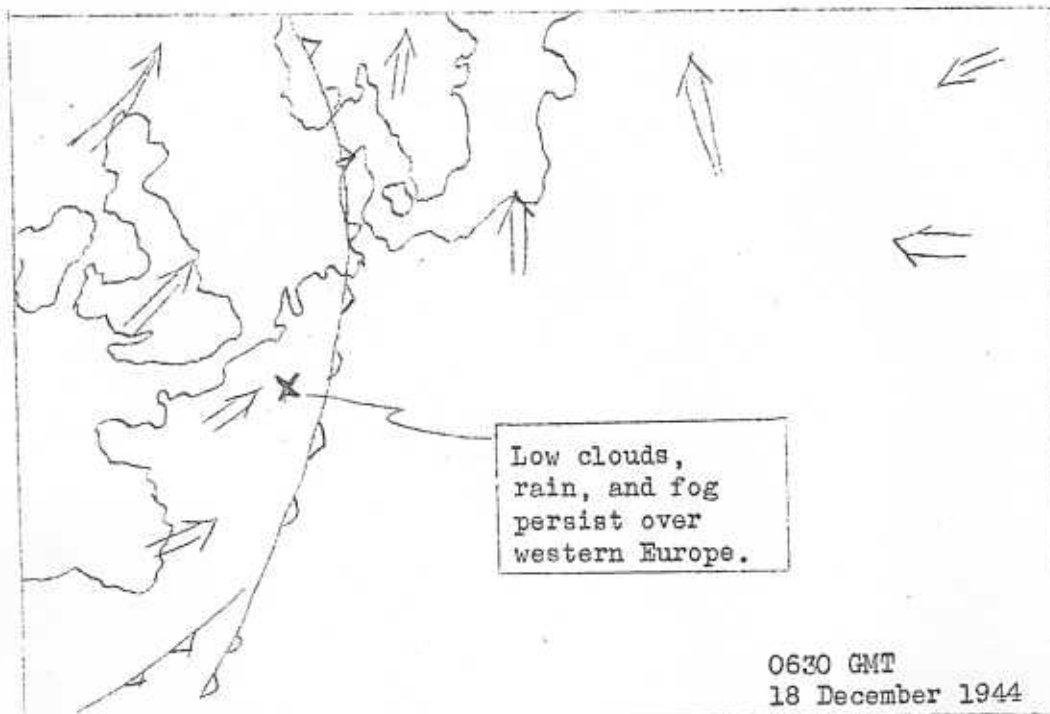
Course of Battle: 16 December plus 1

16. On the northern end of the battle front near Malmedy morning dawned murky and overcast.<sup>27</sup> During the past 24 hours a new center formed on the occlusion to the west and continued to deepen. At 0630 pressure was 960 mb over the northern tip of Britain. The old warm front was just passing the Ardennes area. Because of the intensity of the storm the pressure gradient was very strong over western Europe.

17. All attempts to crack the 2-99 Division line by a frontal assault from the east failed. Attempts made at encirclement using back roads led to difficulty because of the poor quality of the roads. XII SS Panzer Division lost most of its tanks in the mud when the Division was ordered to abandon the roads and strike out cross-country.<sup>28</sup> Other units of the 106th Infantry Division operating in lower elevations experienced drizzle, mist, soggy snow which was churned into an icy mush. The big 105mm howitzers and the 6 by 6 prime movers slid and skidded as the 589th Field Artillery Battalion attempted to extricate itself from the mud.<sup>29,30</sup>

18. About noon a radical change in the cloud condition occurred in the 99th Division area. After hours of ceiling zero the sky suddenly cleared. This enabled the air-ground liaison group to bring in 32 Allied fighter-bombers for the first time. Not only did they drive off the German Luftwaffe, but they bombed the concentration of 50 enemy tanks and armored vehicles, knocking out at least five and slowing the Germans. Before a second run could be made the overcast closed in again. The presence of Allied air, however, was a great boost to the morale.<sup>31,32</sup> The sudden clearing could be attributed to the passage of the warm front, the recurrence of the overcast was due to the influence of the vigorous storm moving in from the west. Shortly after the overcast closed down air activity, German armor overran one of the 99th Division's airstrips. When the artillery liaison pilots and the ground crews found themselves under fire by enemy tanks, they ran out to their planes, took off directly into hostile fire.

19. -Cloud conditions were not so severe as to ground all Allied planes during the afternoon. During the afternoon a reconnaissance plane had skidded under a cloud bank in the valley of the Ambleve River and spotted a column of Panzers moving west. The pilot alerted four fighter-bombers who were on the prowl for this column. They inflicted heavy damage on the Panzers and slowed them down, and for the first time reported the true location of these forward units to the First Army.<sup>33</sup> Another enemy column advancing on St. Vith from Schonberg were brought to a halt at 1700 two kilometers east of the town with the aid of Allied air.<sup>30,34</sup> Hopeful that aviation weather had improved, the 106th Division then asked VIII Corps for an airdrop to encircled units. By 1535 the next day all units needed ammunition, food, and water, but "nonoperational weather" had prevented the proposed airdrop. On 19 December the division lost contact with its isolated and logistically starved 442nd and 423rd infantry regiments.<sup>34</sup>



### 16 December plus 2

20. On 18 December the massive continental high pressure system maintained its position. The Atlantic frontal system swept past the Ardennes region in the early morning hours, and the low off the northern tip of Britain gradually started to fill and recede northwestward. Weather reported from the 99th Division front on the morning of 18 December was snow and cold, visibility zero. The roads were made up of ruts, slush, and mud.<sup>35</sup> This was the start of a period of bad weather which was due to last for five days.<sup>20,36</sup> Both enemy and ally reported difficulty with trafficability. Early in the morning of 18 December headquarters battery, 924th Field Artillery Battalion, 99th Division, was attempting to get through to Elsenborn. The men came upon a column of 400 trucks of the 2nd Division jammed bumper to bumper heading south through Krinkelt. In their haste to make headway the battery tried a nigh impossible feat, a cross-country route. The trucks and trailers slowly forced their way through knee-deep snow, and after five hours of labor finally succeeded in covering the six miles to Elsenborn without loss.<sup>37</sup> The 422nd and 423rd Infantry Regiments of the 106th Infantry Division withdrew from their positions and moved southward through the Schlausenbacher Wald under cover of thick fog and rain. Though the actual distance to the new assembly area was three miles, it seemed much more to the heavily laden, tired, and hungry men as they slipped and slid through the mud and slush.<sup>38,39</sup> Toward evening ground fog and haze settled rapidly, cutting visibility to a few hundred feet.<sup>40,41</sup>



21. At this time the Panzer Lehr and two Panzer divisions were less than three miles from Bastogne. Panzer Lehr Division intended to reach the town at evening but received incorrect road information. The road which was chosen was narrow and muddy, and it took the division three hours to travel less than a kilometer.<sup>42,43</sup> At the same time the units of the 101st Airborne Division raced for Bastogne along the road from Camp Mourmelon to Bouillon, Belgium, 50 miles west of Bastogne. Since speed was of the essence, the column ran with lights full ablaze. The frontal cloud deck had moved to the east leaving the night clear, and the column was vulnerable to air attack. The story of Bastogne might have been different had the Luftwaffe appeared at that time.<sup>44,45</sup>

16 December plus 3

22. At 0630 the Ardennes lay imbedded in a ridge line of high pressure. One hundred miles to the east the frontal system lay stagnant. The very strong continental high continued to act as a bulwark and a new low center formed south of Scandinavia as the old low center lay stationary northwest of the British Isles. A new wave development on the southern extension of the frontal system appeared to be in the making with the center lying over northern Spain. Such a synoptic situation provided the appropriate positions for extensive ground fog, different as to cause of production but just the same fog to the dough boys. It was painfully clear by this date that von Rundstedt's objective was a major breakthrough.<sup>46</sup> On this day III Corps received orders from supreme headquarters to suspend its offensive against the Seigfried line and launch an active attack on the enemy's south flank.<sup>47</sup> The frontal overcast still influenced the skies over Metz and merged with the snow-covered terrain on the horizon as columns of white-camouflaged vehicles swung northward.<sup>48</sup>

23. Farther to the north the pitched battle for possession of the city of Bastogne increased in intensity. Thick ground fog pervaded the whole area. Visibility varied from zero to perhaps 500 yards depending upon time and location. Control of the roads was prime objective. Units of the 10th Armored Division and 101st Airborne Division set up roadblocks in the vicinity of Noville and Longvilly, some five miles north and east of Bastogne, to blunt the attack of the advancing German Panzer units. The thick fog made it difficult to discern friend from foe.<sup>49</sup> Fog aided German infiltration attempts.<sup>50-54</sup> One of the unusual sights of 19 December was that of two columns of men from the 101st Airborne Division sloshing through the mud and dirty water on the streets of Bastogne, mostly without overcoats, some without helmets, some without weapons, moving along the Longvilly road. In contrast, units of Allied armor moved westward along the same road.<sup>55</sup>

24. A sudden change occurred at 1030. The fog suddenly started to lift as if a vast curtain were raised. Company B, 20th Armored Infantry Battalion, 10th Armored Division, had its command post in a schoolhouse in Noville. Whereas, a few minutes before, the rumblings of tanks and the clatterings of small vehicles had been the only evidence of a build-up, now the commanding officer looked out and saw that his company faced an entire Panzer division! Extremely intense and sharp action during the following hour resulted in heavy enemy casualties in comparison with Allied losses.<sup>51,56</sup> In the afternoon the fog came down again, this time mixed with smoke drifting from the fires set in Noville.<sup>57</sup> On the northern front Col. Piper's Panzers took advantage of the thick fog in the early morning hours to infiltrate the town of Stoumont.<sup>58</sup>

25. Weather conditions this day drastically curtailed activities of the Tactical 9th Air Force. The 8th Air Force was in the air operating against tactical targets.<sup>20</sup>

#### 16 December plus 4

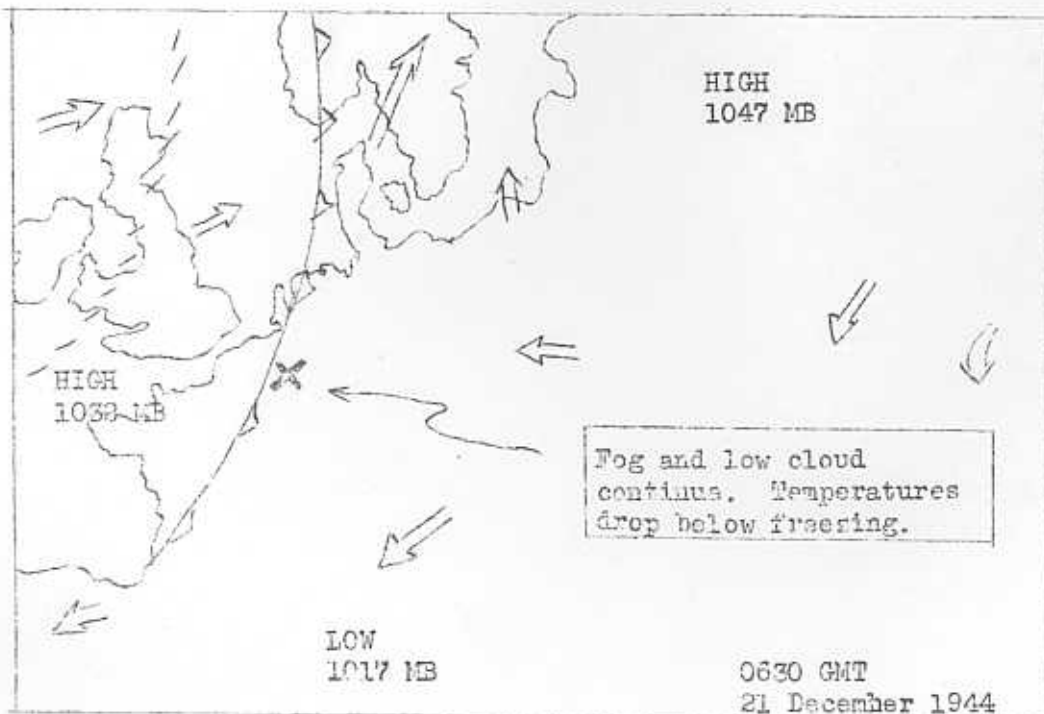
26. Thick fog covered the entire Ardennes area during the night. Taking advantage of this condition, the enemy moved very close to American outposts near Feqy on the road from Bastogne to Noville. This move was made entirely without artillery support because of the fog.

27. The synoptic situation on 20 December saw the large Russian high pressure cell extending itself somewhat westward, the wave cyclone in the northern Mediterranean deepening, and a series of deep lows moving rapidly northeastward along the northern periphery of the large anticyclone. The Ardennes remained under the influence of the high pressure ridge during the night and the thick ground fog persisted. The ghostly action continued during the early morning hours. Units of the 101st Airborne Division and the 10th Armored Division fought to maintain the roadblocks north and east of Bastogne while the Germans sought to dismantle the barricades of felled logs. As the morning wore on, the fog tended to become patchy. Visibility improved enough in the thin spots that enemy activity could be discerned. The 420th Field Artillery Battalion of CCB of 10th Armored Division guarded a roadblock 1300 yards east of Marvielle on the Wiltz-Bastogne road. During a period of temporary improvement in visibility they saw a group of Germans attempting to break up the established roadblock. Quickly they called on the 420th Armored Field Artillery for support and averted a catastrophe.<sup>51,59</sup> At the same time men of the 506th Parachute Infantry Regiment of the 101st Airborne Division and others grimly held on to their positions in Noville, north of Bastogne. Noville itself lay in low ground and was a perfect location for thick fog. A mixture of the fog with smoke from the burning buildings produced zero visibility among the buildings. At one time a German Tiger tank rammed right into the heart of Noville without being observed. After a few minutes of furious action, the tank tipped over. The crew jumped out and ran from town through the American lines. The fog was so thick that not a shot was fired at them.<sup>60</sup>

28. After 1000 clear spots showed up in the fog blanket. In one of these instances Noville garrison was able to see the enemy armor circling their position<sup>61</sup> The main body of the 506th Parachute Infantry Regiment started withdrawal from Noville toward Bastogne in the late morning. The weather was clear. After 1300 the fog again closed in and providentially screened their departure from the enemy. Even at this late date some of the vehicles bogged down in soft ground a few miles north of Bastogne<sup>62,63</sup> In late afternoon as the fog once again closed in and reduced the visibility, the fighting raged on. Both sides saw little or nothing of the other. The fog itself proved to be a psychological enemy, multiplying, in the men's minds, the size of the opposing force and reducing the effectiveness of his own.<sup>64</sup>

29. A similar type of fluid operation raged back and forth on the northern front as Germans attacked St. Vith and were repulsed by units of the 3rd Armored Division.<sup>65</sup>

30. During the day the temperatures dropped and it was apparent that a definite change in the weather was in the making. The ground became hard enough for tracked vehicles to move about over the hills in almost any direction.<sup>66</sup> Late in the day a few snow flurries began to fall,<sup>67</sup> as moist air rose over the cold trapped air.



16 December plus 5

31. On the weather map of 21 December the high pressure system consisted of three separate closed centers. The weak cold front, oriented north-northeast--south-southwest, lay in a shallow trough between the western and center lobe quite near the Ardennes. The Ardennes again lay in the ridge line with very little pressure gradient. The general orientation of the high pressure system was west-east with a strong west-east flow on the north and an east-west flow on the southern side. The cold air mass from the east still covered the Ardennes.

32. The snow and cold brought about immediate changes in tank tactics. Previously tanks stayed on the roads in order to avoid miring down in the soft ground; now it was possible to operate overland. The snow cover dictated that tanks either be whitewashed or covered with sheets when they were parked.<sup>51</sup> The fog and mist still continued to cover the whole area. Despite poor visibility and cold the roads were jammed with vehicles. At the lower elevations the temperatures hovered about freezing and the narrow roads were muddy and slippery. The presence of the mist and fog saved Allied convoys from punishment at the hands of enemy planes, who were overhead.<sup>68</sup>

33. Fierce small-unit action continued in the vicinity of Bastogne under conditions in which it was always difficult to be sure who was the enemy and who was friend.<sup>69,70</sup> General McAuliffe, of the 101st Airborne, sent urgent requests to higher headquarters by radio asking for additional ammunition supplies. The weather on 21 December did not cooperate.<sup>71</sup> However, the medium and heavy bombers continued to hit roads and centers of supply to the east.<sup>72</sup>

34. Similar ground fog persisted in the vicinity of Malmedy. The fog was so thick that two companies of German infantry and ten tanks led by a captured American tank moved up and launched an attack in the early morning hours without being seen.<sup>73</sup> Somewhat later in the morning American lines east of Malmedy formed a general "U" shape, open to the east. The Germans attacked down the center of the U across open fields in the early morning hours under concealment of fog which limited visibility to less than 50 yards. About 1030 the fog lifted, revealing the Germans out in the open. Few Germans escaped the heavy concentration of artillery and mortar fire which immediately fell upon them.<sup>74</sup> American units involved in this action were 99th Infantry Battalion and elements of the 117th Infantry Regiment of the 30th Division.

16 December plus 6

35. On the map of 22 December the tendency toward cellular division, indicated 24 hours previously, reached fulfillment. The map was characterized by two separate high pressure cells, one over north-west Russia, the other just southwest of the British Isles with a deep trough lying between the two. A 1011 mb low influenced the central

Mediterranean. The Ardennes area lay just north of a semistationary frontal system in a region of rather strong pressure gradient. 22 December brought with it a pot-pourri of weather. The 12th Infantry Regiment of the 4th Infantry Division, holding a line a mile north of Consdorf on the southern front, reported snow during the night of the 22 December and temperatures well below freezing. Morale dropped to a low point, for the men had no overcoats or blankets and the foxholes were half full of cold water.<sup>75</sup> XII Corps, operating in southern Luxembourg, reported a light snowfall, freezing temperatures which aided road conditions, and heavy ground fog which prevented air support.<sup>76</sup> III Corps started their assault on 22 December at below-freezing temperatures in the midst of a howling blizzard. Here, also, men had no special winter warfare clothing nor snow-camouflage equipment for themselves or their vehicles.<sup>77</sup> Snow fell on the 4th Armored Division on the morning of 22 December as it moved northward from Arlon on a drive to relieve encircled Bastogne.<sup>78</sup>

36. The fortunes of the defenders of beleaguered Bastogne reached a low ebb on 22 December. There was an acute need for medical supplies, ammunition, and gasoline. Heavy cloud and low fog persistently prevented supply of these needs by air. As a final measure to overcome bad weather, two pathfinder teams were scheduled to drop into the area at 1600 on 22 December. This would enable supply planes to operate on pathfinder aids. However, icy conditions forced cancellation of this operation at 1641.<sup>79,80</sup> This was a discouraging turn of events. Food supplies were rationed to two boxes of K Rations per day per man. An increasing number of men fell victim to trenchfoot.<sup>81</sup> Small patrols operated in the camouflage suits made from bedsheets procured from Bastogne housewives.<sup>82,83</sup>

37. Snow which fell on the morning of 22 December near Pheir-du-Mont gave units of the 82nd Airborne Division their first taste of winter warfare.<sup>84</sup> Thick snow was reported on the morning of 22 December on the northern front in the vicinity of Malmedy by units of the 38th Infantry Division.<sup>85</sup>

38. Farther to the north the 67th Regiment of the 2nd Armored Division set off southward from Oidweiler-Aachen-Acquire about 25 miles southwest of Liege. The night was pitch black, there was zero visibility, and a cold, driving rain fell. Despite these obstacles the convoy accomplished 76 miles in good order by 1530.<sup>86</sup>

Footnote: The variety of weather conditions reported on 22 December can be explained through a combination of two factors: First, temperatures of the air mass over the Ardennes hovered near freezing. In the lower elevations, particularly toward the north, reports of rain would indicate that the temperatures were slightly above freezing. In the southern portion of the front the predominate report is that of snow. The lower surface temperatures correspond to the higher elevations. Persistent reports of fog would seem to correspond to locations in which a pocket of very cold air became trapped. The synoptic situation was rapidly changing on 22 December with a weak cold front passing through the Ardennes area in the early morning hours of 22 December, and

followed immediately by the influence of a looped-back warm front approaching from the west. Thus, the cold front would provide enough uplift to produce the snow reported in the southern portions of the front, whereas the warm front overrunning would give rise to the rain.

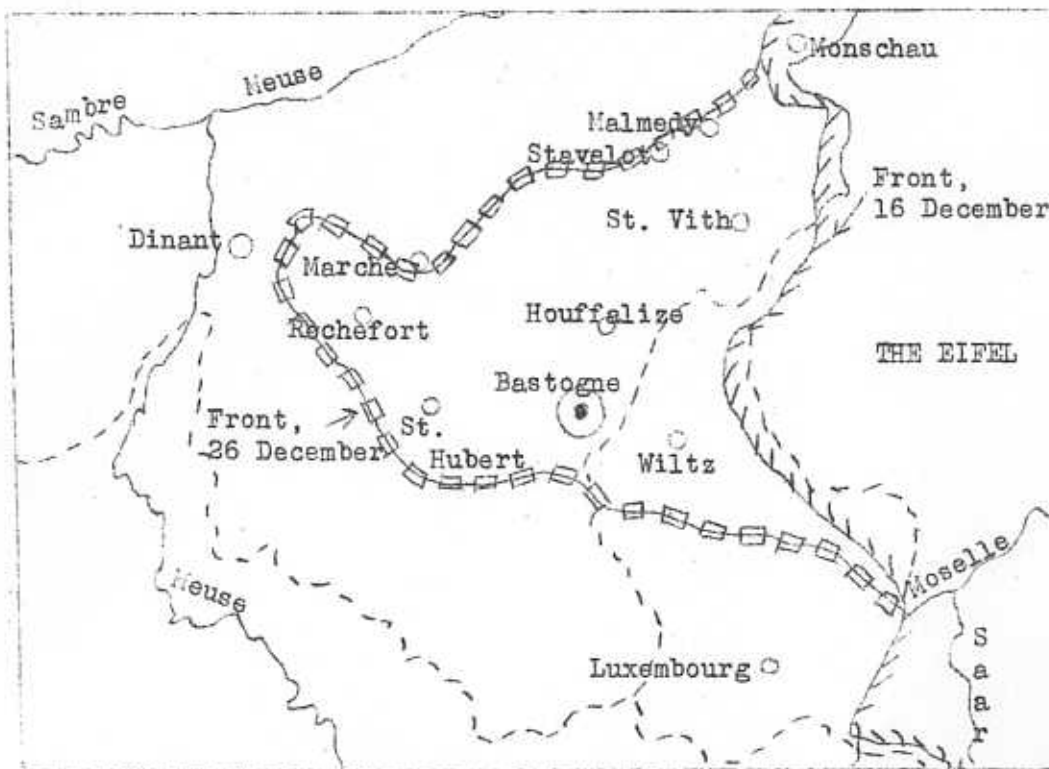
16 December plus 7

39. A radical change in the Ardennes weather set in on 23 December. The deep trough in northwest Europe filled rapidly and the two anticyclonic centers tended to merge, leaving the Ardennes imbedded in a well-established northeasterly flow which extended all the way from central Russia to the Atlantic. The north Atlantic anticyclonic storm centers receded somewhat northward since the Mediterranean low assumed an elongated east-west axis.

40. For eight days a thick, gray blanket of cloud had effectively grounded the Allied Air Force of more than 4,000 planes.<sup>87</sup> Early on the morning of 23 December the 9th Air Force meteorologists alerted the Tactical Air Command to good flying weather which was expected across the entire front.<sup>88</sup> The change in the synoptic situation brought with it cold, dry winds from the east, ceiling and visibility unlimited—perfect flying weather.<sup>89-92</sup> The air controller for the defense of Bastogne received radio information at 1000 that supporting planes were on their way. Clear weather left German vehicles exposed. Clearly visible tracks left in the snow led to positions in the woods where enemy vehicles were located. All over the Ardennes the Allied Air unleashed its pent-up fury against German columns. Later in the day the long-awaited C-47's made a low-level drop of food, medical supplies, and ammunition to the defenders of Bastogne.<sup>51,79,86</sup>



41. 23 December marked the turning of the tide. This was the day the 12th Panzer Division began to fall back from position east of Malmédy.<sup>93</sup> As a result of poor communications Allied Air presumed Malmédy to be in enemy hands. Four times in the next three days the town was bombed by Allied B-24's.<sup>94,95</sup>

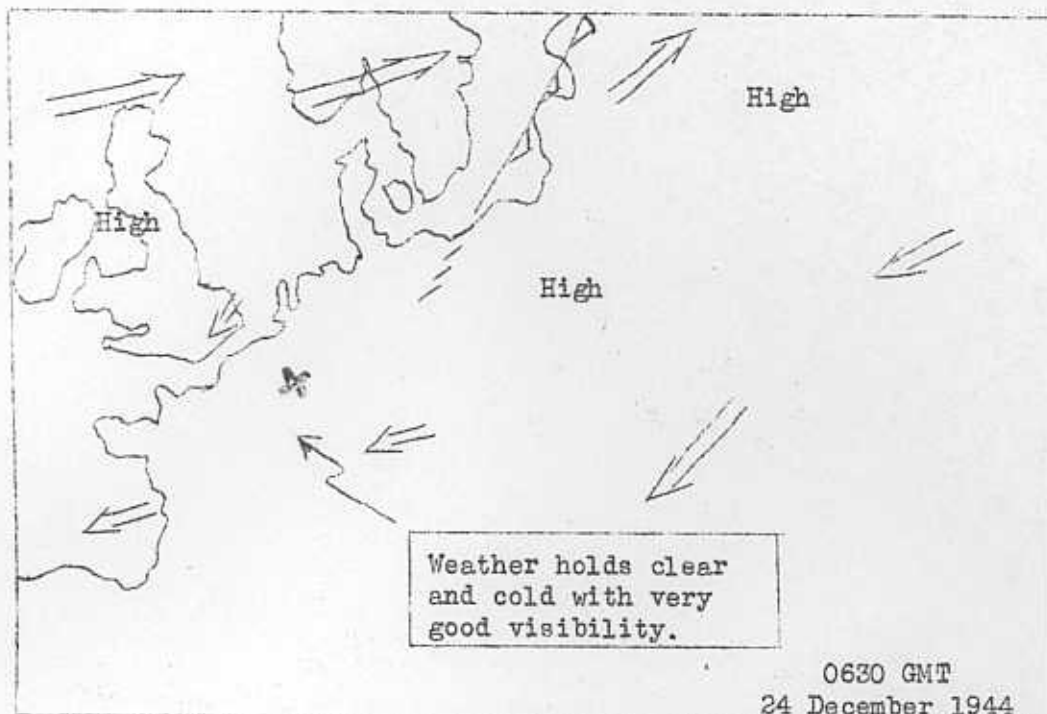


42. The tremendous burst of Allied air activity continued all day, and by nightfall of 23 December the 9th Air Force had successfully completed 1,269 sorties.<sup>89</sup> The good weather likewise brought out the German air force in large numbers, flying 800 fighter sorties.<sup>96</sup>

16 December plus 8-10

43. Little change occurred in the synoptic situation for the next three days. Cold, dry air continued to stream out of the east. Temperatures continuously remained below freezing. The ground became hard. It was ideal weather for tank as well as aircraft operation. Allied planes averaged more than 250 sorties daily during 23-25 December.<sup>97</sup> Generally good visibility prevailed except in patches of local ground fog in the hollows.<sup>98</sup>

Footnote: XIX TAC report 2,846 sorties flown from 23 December to 27 December destroying or damaging 341 tanks, 2,450 motor transports, 243 gun positions, 88 planes, and attacking 123 German garrison towns.<sup>98</sup>



44. The "turn of the tide" at Bastogne commenced on 23 December when good weather made possible the first airdrop. On 24 December 100 tons of vitally needed supplies arrived via air. There was still desperate need for medical supplies since the 101st Airborne Division's hospital fell to the Germans in the first few days. The first real relief came on 26 December when one Combat Command of the 4th Armored Division punched through the thinning German lines into town.<sup>100</sup>

16 December plus 11-12

45. On 27 December the high pressure belt extending from the Atlantic across the mid-section of Europe into Russia weakened enough in the vicinity of the Ardennes to allow a weak cold front to move southward through the area. A second more vigorous frontal system moved across the Ardennes on 28 December. Despite the intrusion of these systems the cold air mass continued to hold the area in its grip. The low temperatures brought much suffering to the participants on both sides. Men stationed in foxholes had to take turns warming up in the nearest houses, if they were fortunate enough to be located near a house. Otherwise, they expended much of their energy supply in trying to avoid freezing to death.<sup>72</sup>

46. On 27 December the 35th Division, 26th Division, and the 4th Armored Division of III Corps pushed northward through knee-deep snow



across the Sure River in their attempt to raise the siege of Bastogne and secure the Arlon-Bastogne highway.<sup>101</sup> The first convoy since the road was cut six days previously arrived in Bastogne on 28 December-- a cold day featured by occasional snow squalls forming in the cold unstable air mass.<sup>102</sup>

16 December plus 13-17

47. Starting with 29 December a high pressure center located over Britain brought the Ardennes under the influence of arctic air from northern Scandinavia. Intermittent snow continued to fall, and by the first of the year a heavy blanket covered the battlefield in drifts so high in spots that it prevented movement of tanks and half-tracks.<sup>103,104</sup> The continual movement of vehicles associated with the fluid action caused packing of the snow on the roads and produced an icy sheet which made trafficability hazardous and extremely slow. Night movements were particularly difficult. Night marches which coincided with times of heavy snow squalls were marked by tanks and half-tracks sliding off the roads and vehicles even becoming lost.<sup>105,106</sup>

48. On 31 December units of the 6th Armored Division moved northward to the Neufchateau--Bastogne road preparatory to an assault on the enemy. Combat Command A was ready to attack on schedule early in the morning of 31 December. Ice and snow on key roads delayed Combat Command B until late afternoon. This delay forced Combat Command A to make only a limited objective attack until Combat Command B could catch up.<sup>107</sup>

49. Temperatures that hovered around zero, snow-covered frozen ground, waist-high snow drifts, and winds that frequently blew with the fury of a blizzard characterized the new year in the Ardennes.<sup>108,109</sup> Despite the bitter German resistance the Allies' major foe was the severe weather.

50. On 3 January the Allies counterattacked along the entire front. A freezing mist prevailed over the entire battle front during the early morning hours. Later on it started to snow. (There are some reports of a mixture of sleet and rain in the morning, following which temperatures fell rapidly.<sup>111,112</sup>) Icy roads were nearly impassable. Low visibility prevented air support.<sup>112-114</sup> Time and again when one tank or half-track skidded on the icy road the entire column was held up.<sup>110</sup>

51. The slowly retreating Germans made the most of terrain and weather, as witnessed by the following small incident. Company I of the 3rd Battalion, 120th Infantry Regiment, 30th Infantry Division, moved out at 0830 on 3 January to attack strategic ground 500 yards southeast of Otaimont near Malmedy. The day was foggy, and snow fell, making observation for supporting fire very difficult. All seemed to be going well when suddenly the enemy inflicted seven casualties on the 3rd Platoon. The new snow had fallen on a German defensive position and obscured it so well that the 3rd Platoon did not realize it was there until German guns cut them down.<sup>115</sup>

52. The snow and cold continued on 4 January, but despite all obstacles the doughboys continued to push stubbornly ahead. By the first week of January one third of the Bulge had been reduced. Men suffered from the weather and severe fighting but had the consolation at last that they were winning.<sup>116.117</sup>

53. The same severe weather conditions persisted for the next two weeks: Intense, penetrating cold, occasional periods of snow, early morning fogs and mist, periodic howling winds that piled the snow into still higher drifts. Yard by yard the Allied soldiers reduced the Bulge. The tenacity which brought victory is illustrated in this incident: On 7 January the 2nd Battalion, 333rd Infantry Regiment, 84th Division set out to capture a vital cross road where the Laroche road and the Houffalize road meet. The weather was poor as usual but became much worse as a snow squall blew up during the attack. By 0930 the crossroads was in the hands of the 2nd Battalion. German prisoners said that an attack in such severe weather was not expected.<sup>118</sup>

54. On 16 January First and Third Army patrols came together in Houffalize, north of Bastogne. This eliminated the tip of the German penetration. Ten days later on 23 January the 7th Armored Division forced its way back into St. Vith just one month after the Germans had captured the town. This action effectively brought the Battle of the Bulge to a conclusion.<sup>119</sup>

#### Effect of Weather on Personnel

55. Fighting men - both allied and German - suffered indescribable agonies in the Ardennes campaign as a result of the extremely severe weather conditions during the latter part of December and January and the bitter fighting which raged throughout. Temperatures hovered around zero degrees Fahrenheit. This was arctic weather, and clothing which the men wore was inadequate at best. The cold penetrated layer on layer of clothing and froze hands and feet. Ironically, many of the units had been equipped with shoe pacs, down sleeping bags, mountain tents, heavy mittens, small gasoline stoves, and wind-breaker outer garments when they had participated in winter mountain maneuvers in the States. Yet during the action in the Bulge they had, in addition to their regular wool uniforms, only heavy, cumbersome wool overcoats.<sup>120</sup> There were insufficient numbers of overshoes in the larger sizes. Frequently men with large feet were forced to choose between no overshoes or overshoes worn without the combat boot inside.<sup>121</sup> The shoe pacs finally arrived on the scene, but late in the campaign. Dry socks were always in short supply. Even though the men of the 83rd Division received one pair of dry socks each day, wading through icy streams and plowing through deep snow drifts frequently resulted in soaking two or more pairs of socks in a few hours.<sup>122</sup>

56. Improvisation was the order of the day. One of the officers of the 35th Infantry Division designed "booties" to be worn under overshoes in lieu of combat boots. These consisted of simple moccasins made of three thicknesses of blanket material.<sup>123</sup> These proved to be very effective. When the 101st Airborne Division received its first airlift of supplies at Bastogne, 2000 burlap bags were found among the groceries. The men in the fox holes immediately put these bags to good use as foot wrappings in lieu of arctic overshoes.<sup>124</sup> In order to have their sleeping bags with them at all times, some men cut leg holes and wore the bags continuously during the day as warm uniforms, and during the night for the original purpose.<sup>122</sup> The standard GI gloves froze up when they became wet and wore out in a few days under combat conditions. Sometimes under such circumstances men used spare pairs of socks as substitutes for mittens.<sup>122</sup> In order to make it possible to fire their rifles while wearing mittens a special offset trigger was devised. A Belgium toy factory produced nearly 100,000 of these in 19 days in December.<sup>125</sup> Heavy snow-falls in December and January created a demand for white snow-suits. These were neither in stock anywhere in Europe nor was there sufficient white material to make them. Therefore military government personnel organized a campaign in the larger German towns of the Ninth Army area, calling on civilians to loan all suitable white cloth available in their homes. This produced a total of 41,500 bed sheets. A factory in the Netherlands turned out 75,000 snow-suits before the end of January.<sup>126</sup> By the time ample cold-weather gear became available, the need for it was nearly past. This involved a special salvage problem.

57. During the period of cold weather one of the most urgent problems continuously facing the doughboys was the simple animal problem of how to keep from freezing to death. This was particularly critical for the wounded. A wounded man had a life expectancy of about 30 minutes in the freezing cold.<sup>127-129</sup> The weather was so cold that front line medics had to carry their morphine syrettes under their armpits to keep them warm enough to use.<sup>127</sup> The front line soldiers faced a real dilemma. On one hand there was need for cover, and on the other the ground was so hard that it was nearly impossible to dig a fox hole. It sometimes took as long as five hours to dig as deep as three feet. Sometimes the men called on the engineers to blow out the fox holes for them with TNT.<sup>128,130-132</sup>

#### Effect of Weather on Equipment

58. In addition to trafficability difficulties described above the severe winter weather of the Ardennes campaign brought with it problems of maintenance of all types of vehicles. Brake linings froze to brake drums while vehicles were still. This caused axle failures when the vehicles were moved. Exhaust pipes clogged up and gave rise to burnt out valves.<sup>133</sup>

59. Tanks required supplementary cleats on each section of steel track to provide footing on the icy roads.<sup>133</sup> Tank turrets froze and

would not traverse until chipped free of ice.<sup>134-136</sup> This lessened the effectiveness of the Allies' mechanized equipment and put an additional responsibility for attack and defense on the infantry.

60. In the extremely cold weather enough moisture condensed on weapons to cause them to freeze up. Automatic weapons were the greatest concern. Oil could not be used on the weapons because it froze up. A special light grease had to be used with artillery pieces, but it was in short supply.<sup>135</sup>

61. The wintery weather brought with it headaches for communications units as well. Time after time a by-product of a vehicle slipping off an icy road was the breaking of communications lines. When the location of breaks was not obvious, long stretches of wire had to be excavated from the snow.<sup>135</sup> Radio mouthpieces tended to ice up from the moisture of the breath. Radio batteries tended to freeze up, then go dead.<sup>137</sup>

62. The 13th Field Artillery Observation Battalion, 7th Corps, reported that weather conditions in this campaign were the worst for sound ranging yet encountered. The maximum reported wind during the period was 56 miles per hour; the highest average wind for a day was 36 miles per hour; 24 hour averages between 15 and 20 miles were recorded on 18 days during the 23-day period.<sup>138</sup>

### The Unusual

63. Weather extremes brought with them unusual effects on various items of equipment and unusual ingenuity on the part of some GIs as they reacted to their environment.

64. German mines were everywhere. Many had been layed in December before the snow set in. The heavy blanket of snow and ice proved to be an aid to the Allies in preventing many mines from exploding even though the snow was so deep that mine detectors were not operative. In the period before the temperatures dropped extremely low, the melted snow seeped around the firing pins of the mines, froze them up when the temperatures fell low during the night, and prevented them from detonating. Other mines did not go off because continued immersion in wet snow moistened the chemical components.<sup>137.139.140</sup>

65. During the latter part of December one GI of the 83rd Division noticed just as his unit was starting an action that the chamber of his M1 had iced up. Exercising an extreme bit of ingenuity he promptly urinated into the chamber. This provided sufficient heat to thaw it out. The action was none too soon for five minutes later he killed a German with the smoothly functioning rifle.<sup>137</sup>

66. The hard ground made fox hole digging very difficult but it did have its advantages when the job was accomplished. In the early part of the campaign when the German Panzers were on the roll, many American positions were over-run. The ground was so hard that heavy tanks

went across the tops of the fox holes without breaking in the sides. The GIs crouched in the fox holes while the tanks passed, then rose up to shoot up waves of German infantry who followed in the wake of the tanks.<sup>141</sup>

67. During the Seige of Bastogne, a pilot of the 439th Glider Group brought in a load of shells, but flak hit his glider before he reached the assigned area. This necessitated an immediate landing on a snow-covered slope. The glider's brakes would not hold on the slippery surface and it soared off a fifteen-foot-drop. The pilot finally brought his craft to a stop to find himself only 10 yards from the battery which needed the shells.<sup>142</sup>

68. General Patton became tired of the wet weather of the first half of December. About 14 December he called his chaplain and ordered him to publish a prayer for good weather.

"Almighty and most merciful Father, we humbly beseech Thee of Thy great goodness, to restrain these immoderate rains with which we have had to contend. Grant us fair weather for battle. Graciously harken to us as soldiers who call upon Thee, that, armed with Thy power, we may advance from victory to victory, and crush the oppression and wickedness of our enemies, and establish Thy justice among men and nations. Amen."

This prayer was published on 23 December. As indicated earlier in this narrative, the weather cleared on 24 December and allowed the Allies to break the backbone of the von Rundstedt offensive.<sup>143,144</sup>

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## Chapter X

### BATTLE OF THE COLMAR POCKET 20 January-3 February 1945

The final offensive in Alsace, France, took place between the Vosges Mountains and the Rhine River in an area which became known as the Colmar Pocket. This was the climax to the stalemate on the southern end of the Allied front that had come about in the early part of December.

The January weather was severe: a foot or more of snow lay on the ground on plains, with much more in the hills, and temperatures hovered between zero and 15°F. Radical changes occurred at the end of the month. Much warmer air invaded the region and brought about severe flooding and difficulty with trafficability.

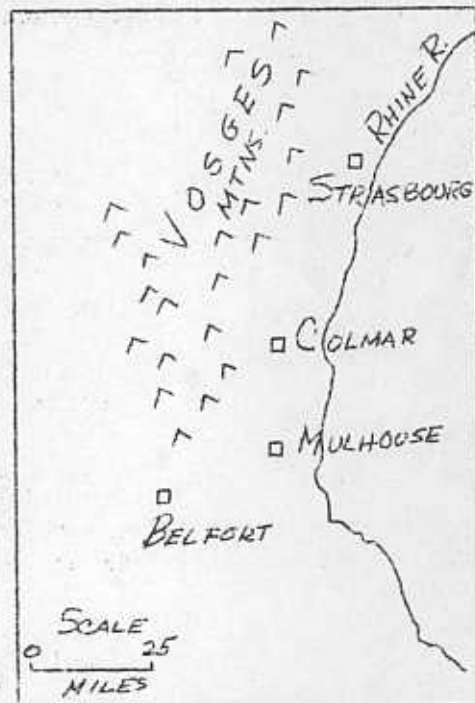
This incident is of particular interest in the way that several effects of weather extremes on operations are shown in sharp contrast.

#### The Military Setting

1. Another of the campaigns in World War II in which weather played a significant role is that of the reduction of the Colmar Pocket. This was an Allied offensive conducted in the vicinity of Colmar, a large city on the plains of Alsace, France. The French First Army had been weakened by the mid-November offensive through the Belfort Gap south of the Vosges Mountains. As a consequence it had not been able to eliminate the German resistance developed in that area at a time just prior to the Battle of the Bulge.<sup>1</sup>

2. After the Allied finally had gained the offensive in the Ardennes sector in the middle of January attention could be directed to the elimination of this Colmar Pocket. Eisenhower's determination to get rid of the annoyance caused his to support the French with the entire United States XXI Corps of four divisions: the 3rd, 28th, and 75th Infantry Divisions, and the French Fifth Armored Division. The 12th Division and the French Second Armored Division were added later. With this concentration of force an attack which began on 20 January brought about the surrender of Colmar on 3 February 1945.<sup>2</sup>

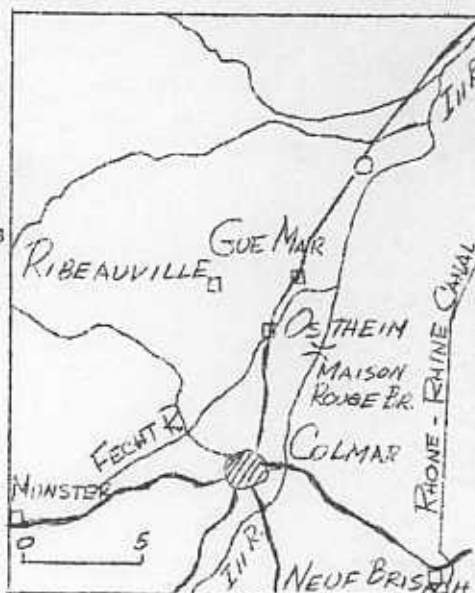
3. A dramatic summary of the type of action involved in this operation is contained in the Presidential Unit Citation given to members of the 3rd Infantry Division, quoted as follows:



"The 3rd Infantry Division . . . fighting incessantly, from 22 January to 6 February 1945, in heavy snowstorms, through enemy-infested marshes and woods, and over a flat plain criss-crossed by numerous small canals, irrigation ditches, and unfordable streams, terrain ideally suited to defense, reached the German defense wall on the northern perimeter of the Colmar bridgehead and drove forward to isolate Colmar from the Rhine. Crossing the Fecht River from Guemar, Alsace, by stealth during the late hours of darkness 22 January, the assault elements fought their way forward against mounting resistance. Reaching the Ill River, a bridge was thrown across but collapsed before armor could pass to the support of two battalions of the 30th Infantry on the far side. Isolated in attack by a full German panzer brigade, outnumbered and outgunned, these valient troops were forced back yard by yard. Wave after wave of armor and infantry was hurled against them but despite hopeless odds the regiment held tenaciously to its bridgehead. Driving forward in knee-deep snow, which masked acres of densely sown mines, 3rd Infantry Division fought from house to house and street to street in the fortress towns of the Alsatian Plain. Under furious concentrations of supporting fire, assault troops crossed the Colmar Canal in rubber boats during the night of 29 January. Driving relentlessly forward, six towns were captured within eight hours, 500 casualties afflicted on the enemy during the day, and large quantities of booty seized. Slashing through the Rhone-Rhine Canal the garrison at Colmar was cut off and the fall of the city assured. Shifting the direction of attack, division moved south between the Rhone-Rhine Canal and the Rhine toward Neuf-Brisach and the Brisach Bridge. Synchronizing the attacks, the bridge was seized and Neuf-Brisach captured. . . "3,4

#### Terrain Features

4. The Colmar Plain is about 7 miles wide and 50 miles long extending from Mulhouse on the south to Strasbourg on the north. It lies between the Vosges Mountains and the Rhine River, with more mountains on the east side of the river. Thus, high mountains overlooking the plain on both sides afford excellent artillery coverage of any activity in the valley. The Fecht and Ill Rivers flow generally north-south parallel to the Rhine. Several smaller streams and canals cut the plain. For example, the Canal de Colmar runs from the junction of the Canal de la Lauch and the



Ill River, 900 yards northeast of Colmar, due east to the Canal du Rhone-Rhine. It is about 7 feet deep and 50 feet wide. The water level of the canal lies above that of the plain by the virtue of levees which are 15 feet wide at the bottom, 8 feet wide at the top, and 12 feet high.<sup>5</sup> It is only because of this feature that the plain can be considered defensible for otherwise the ground is extremely flat.

### The Weather

5. The severity of the winter in western Europe is directly related to the intensity of the Siberian anticyclone. When this massive mountain of cold, continental air builds up to abnormal 'heights,' and when it is centered somewhat more to the west than usual, outbursts of cold, frigid air may cover all of Europe to the Atlantic. This was the situation that prevailed during much of December and January.

6. The Battle of the Bulge, just concluded, was fought under the severest of weather conditions. In the first half of January a mild thaw had caused the snow to melt; it was followed by a cold wave which caused the ground to freeze.<sup>6</sup> At the time the action in the Colmar Pocket began about one foot of snow covered the plains and one to ten feet blanketed the mountains.

7. At one time it was contemplated the offensive should begin in the middle of February. However, the climatology of the region indicated that the month should be less cold and cloudy than January and could produce a thaw. Since the difficulties posed by cold-weather operation seemed to be less than those coincident with a thaw, the attack was set up to start on 20 January.<sup>7</sup>

8. The fears of the thaw were fully realized for the Siberian high started to weaken toward the end of the month and an active frontal system from the Atlantic moved into the area. The weather regime changed in a dramatic manner on 30-31 January from mid-winter to spring. As far as the doughboy was concerned, however, it was simply an exchange of one kind of difficulty for another.

### The Offensive

9. The movement of the U.S. divisions to the Colmar area was a difficult operation. Snow was falling when the 75th Infantry Division left Belgium to move into the new sector. Snow was still falling when the Division arrived in Alsace two days later. The doughboys who had traveled by the "40 and 8" railway cars had an arduous trip. Sleep was impossible in the jolting cars. It was so cold that the troops easily could have frozen to death.<sup>8</sup> More than 1400 vehicles of the 75th Division moved by motor convoy through the Vosges Mountains. The roads were icy and blackout conditions made driving conditions even more hazardous.<sup>9</sup> The roads were so slippery that in some cases the tractor prime movers of the heavy guns could not gain traction on the slopes and could not

keep the gun from sliding sideways on curves on the descent. In order to meet this situation bulldozers were used in tandem with the prime movers to pull the guns uphill.<sup>10</sup> Some of the quartermaster heavy trucks couldn't make it through the mountains because they had no chains.<sup>11</sup>

10. On 20 January the French First Army jumped off from its long-held position immediately north of Mulhouse in its attack against the south side of the Colmar Pocket. The thrust from the north by XXI Corps began two days later. It was on the morning of 22 January that the 30th Infantry Regiment, 30th Infantry Division, joined the attack from the north. Their vehicles and armor had been painted white. Suits to provide camouflage in the snow were improvised from mattress covers, sheets, and pillowcases. It was very cold. During the warmest part of the day the temperature stood at 14°<sup>F</sup>. It was lower in the late afternoon, evening, and early morning.<sup>12</sup> Heavy snows which concealed the German minefields and limited the use of armor caused a temporary slowing of attacks near Mulhouse.<sup>13,14</sup> The first major obstacle which faced the 3rd Infantry Division was the Necht River. The time of attack was scheduled for three hours after darkness on 23 January in order to coordinate with the action on the southern front.<sup>15</sup> The 7th and 30th Infantry Regiments successfully made a crossing on a narrow front near Guemar at 2100, spread out in a general south to southeasterly direction, and by daybreak some units had elements across the Ill River two miles to the east. Moving rapidly on southward the Masison Rouge bridge was captured intact by 1155.<sup>16</sup> The latter part of this action was carried on during a raging snow blizzard.<sup>17</sup> This wooden bridge was to be the means of supporting with tank support further thrusts of the 30th Infantry Regiment. After allowing some vehicles to move across the bridge traffic was closed while the engineers installed reinforcing treadway. Due to supply difficulties the amount of treadway available was 15 feet short of that needed. Since it was so urgent that armor be moved across the Ill, the engineers decided to gamble that the structure was strong enough. The first tank slowly moved across the bridge. When it reached the unreinforced section the bridge suddenly gave away and the tank dropped down into the river.<sup>16</sup> This incident was catastrophic in that it left the 30th Infantry without tank support. The Germans, in the meantime, rapidly recovered from their surprise and mounted vicious counterattacks. Enemy tanks and infantry met the men of the 30th Infantry Regiment on three sides, isolated them in small pockets, and forced them back to the river bank. The ground was frozen solid and it was impossible to dig foxholes for cover. Late in the afternoon of 23 January it became evident that the alternatives were: either to be killed or wade the icy cold water of the Ill River to get to a position of relative safety. A majority of the entire regiment chose the latter. The men were nearly frozen from exposure to the waters of the river and the frigid blasts of wind which met them as they climbed out on the west bank. A rush call went out for pyramidal tents, stoves, blankets, clothes, hot coffee, and food.<sup>18</sup> The 30th Infantry suffered so severely from this incident that it had to take time out for reorganization before attempting any further operations.

11. Bitter day-and-night fighting continued during the next week. The 353rd Antiaircraft Battalion effectively produced artificial moonlight over 20,000 yards of the front line at a time.<sup>19</sup> On 26 January



an incident marking nice coordination between ground and air took place near Holtzwihr. The Germans were pressing the 1st and 2nd Battalions of the 15th Infantry Regiment, 3rd Infantry Division. Allied artillery marked the area in question with identifying smoke for friendly fighter bombers. The day had been cloudy. Yet just before the German counter-attack the clouds broke over the woods and allowed Allied fighter bombers to attack so effectively that the Germans were forced to withdraw. Then the clouds once more closed in on the area.<sup>20</sup>

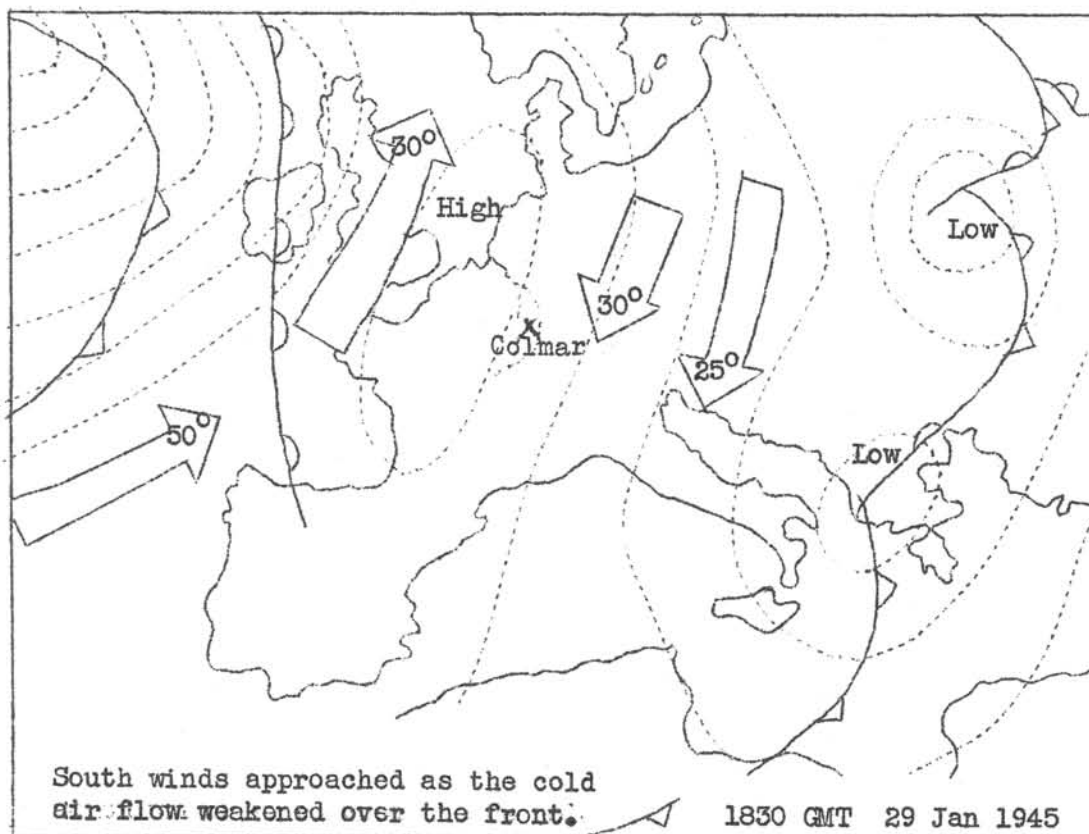
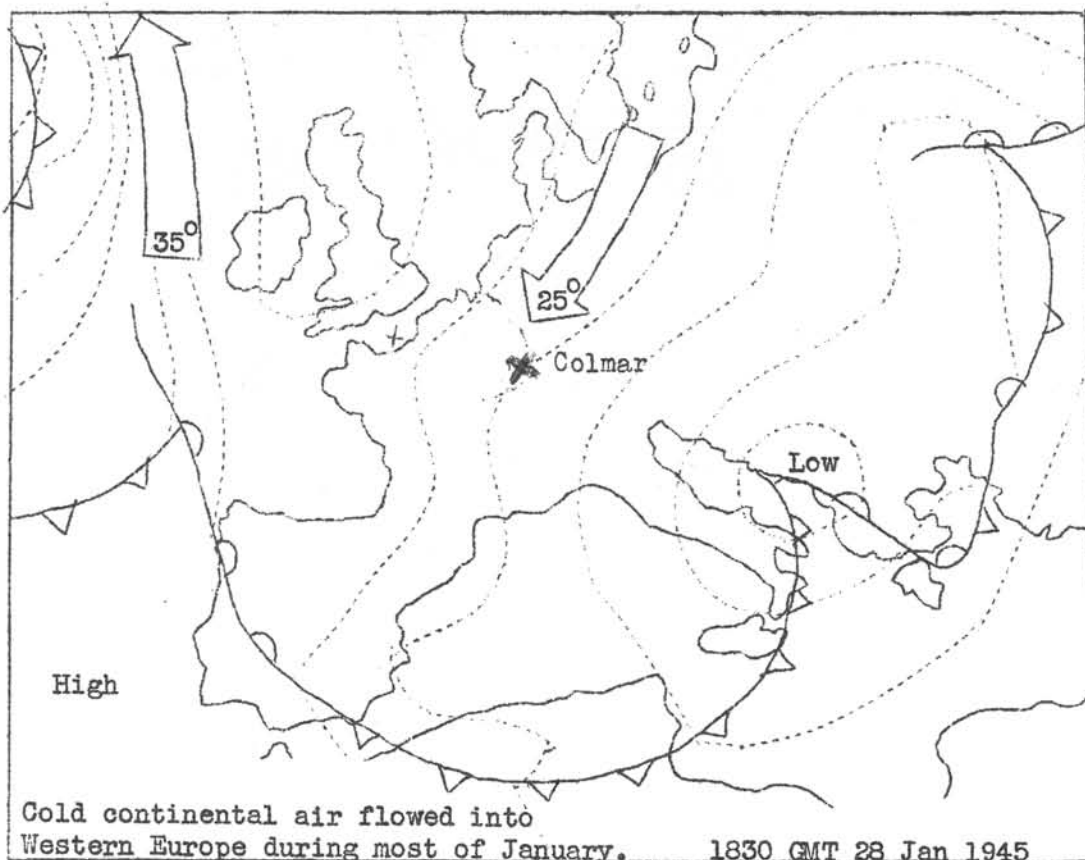
12. A formidable obstacle which faced the 7th Infantry Regiment of the 3rd Infantry Division was the Colmar canal. The canal was a body of water some 50 feet wide and 6 to 8 feet deep. It was not frozen over, the current was slow, and the water was very cold. While waiting for the word to attack the personnel suffered greatly from the cold. Many of the men had to sleep in snow foxholes. Two hundred of the men had frozen feet which had to be treated before trenchfoot developed.<sup>21</sup>

13. Intermittent snow hindered operations at several times. On 26 January the 9th Colonial Division (French) was maneuvering so as to overrun Cernay from the east. A heavy snowfall on that day prevented the anticipated advances.<sup>22</sup> Field artillery battalions reported limitation on numbers of rounds fired due to poor visibility on account of snowfall.<sup>23,24</sup>

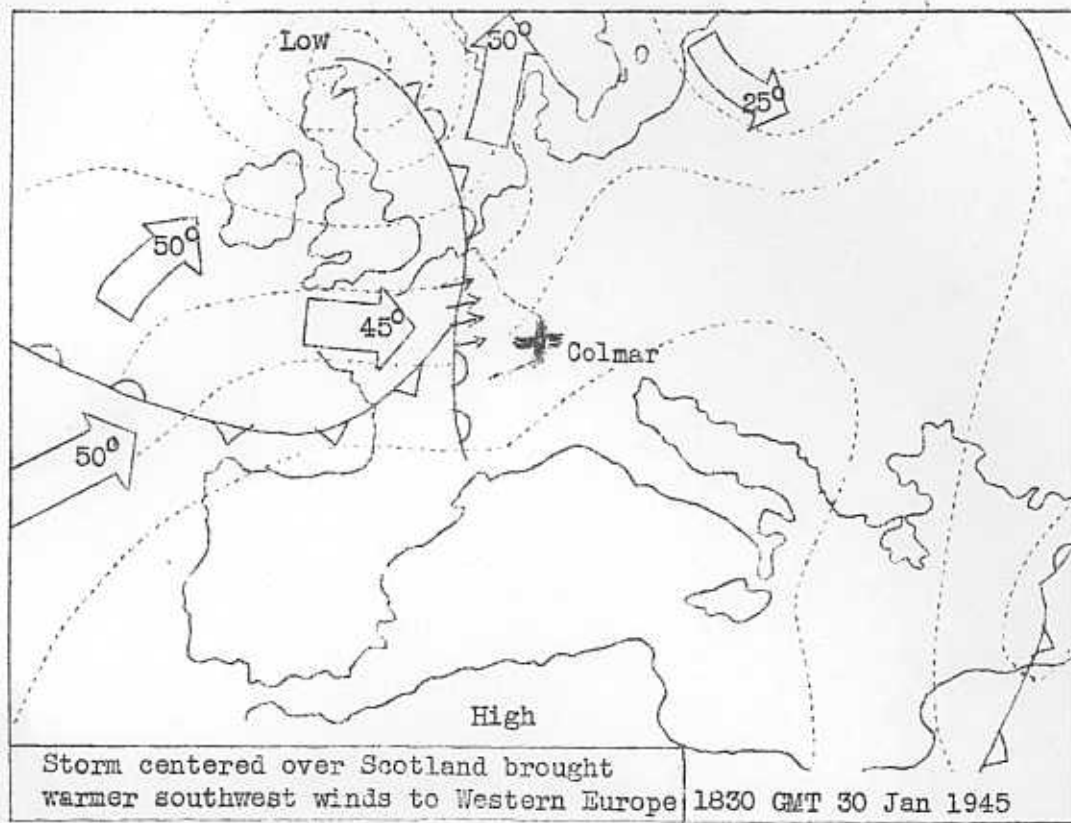
14. On the larger scale there was the supply problem. At first this was one of combatting the constant snow and ice on the convoy routes. Snow and ice not only curtailed road construction and repair but also the turn-around time of truck transportation. Ambulances likewise sometimes required 8 to 12 hours making round trips between the hospital areas and front lines.<sup>25</sup> One of the factors creating difficulty in the supply of 3rd Division was the heavy non-divisional traffic on MSR's.<sup>26</sup> One of the beneficial aspects of the very cold weather was the way in which the frozen ground facilitated vehicular operation when clearing stations were established in open fields.<sup>27</sup> It was found that even the mules had difficulty walking on the icy roads and trails of the Vosges Mountains with their pack loads.<sup>28</sup> Road patrols had to be continually used and wreckers were placed at strategic points along the highway where the movement was particularly difficult. Ordnance and engineer crews were kept on the road 24 hours a day to meet all emergencies. Large piles of cinders and sand were stacked along all routes, and small sacks of cinders and sand were carried by all vehicles for emergencies on the icy roads.<sup>29</sup> There was considerable difficulty in the operation of the vehicles themselves due to freezing temperatures. This showed up most frequently in terms of frozen gas lines and fuel pumps.<sup>30</sup>

15. Despite the low temperature that prevailed at this time some of the land near Holtzwihr and Rietwihr was so swampy that tanks and tank destroyers became stuck in the morass.<sup>31-33</sup>

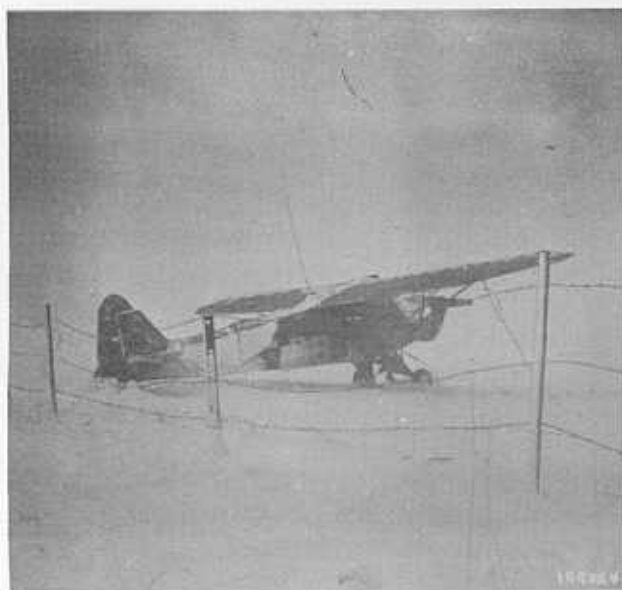
16. This was an extremely difficult period for personnel. The continued low temperatures posed a continual threat of over-exposure and frozen feet. Much patrol activity took place through deep snows which hampered movement.<sup>34-36</sup> The ground in the camp areas was so hard that it was difficult to fix tents and dispose of the refuse.<sup>37</sup>



17. The number of telephone line failures occurring during the month of January was about normal. There were some instances in which snow and ice, accompanied by strong wind caused damage to the open wire circuits. Likewise some trouble resulted from the low temperatures which caused old wire lines to contract until they snapped. There were only few instances in which the lines were broken as a result of enemy action.<sup>38</sup>



18. During this time significant changes were occurring in the overall weather picture. The Siberian high was tending to weaken and recede eastward. A frontal system lay from the Mediterranean as far east as the Ukraine. Another active frontal system was approaching western Europe. On 29 January the warm front of an occluding wave cyclone lay on a north-south line from Ireland to Spain. At 1830 on 30 January the occluded front was nearing the Colmar Pocket. In contrast to the temperatures which had prevailed temperatures in the mid-forties characterized the air mass which followed the occluded front. This low in turn was followed by a developing wave cyclone which lay on 30 January west of Spain. This wave cyclone deepened into an active low and its warm front passed through the battle zone on 31 January. As a result of this transition tropical maritime air with characteristic temperatures as high as the fifties covered all of France. The result of this dramatic change in the weather regime was a sudden thaw. The snow that had lain to a depth of one foot along the plains and up to ten feet in the mountains began to melt. The rivers that were already full overflowed their banks. Soon a flood condition prevailed on the waterways which was the highest in the last



A blizzard grounded this artillery liaison plane of the 422nd FA Battalion on a snow-covered field near Bastogne, Belgium, 19 January 1945.



Troops of 82nd Airborne Division advance in a snow-storm behind the tank to attack Herresbach, Belgium, 31 January 1945.



Troops of 1st Division march down a fog-shrouded road into Murringen, Belgium, 31 January 1945.



Above: Tanks and men are clearly outlined against snow background as elements of 44th Armored Infantry and 6th Armored Division move forward across a field on the outskirts of Bastogne, Belgium, 31 December 1944.

Below: Five white-painted Sherman tanks blend with snow to make difficult targets for Nazi armor in Belgium. The 774th Tank Battalion, 3rd Armored Division, is moving through 75th Division sector. 16 January 1945.



Four of the thirteen men pictured do not have camouflage clothing. Infantrymen of Hq. Co., 2nd Bn., FUSA, trudge through the snow along a woods near Iveldingon, Belgium, in the drive to recapture St. Vith. 20 January 1945.





Combat engineers of the Third Army keep roads clear for fast moving supply conveyes near St. Hubert, Belgium, 14 January 1945.



Men of 245th Combat Engineers use a sanding device made from a salvaged German vehicle on an icy road near Sourbrodt, Belgium, 7 January 1945.



Machine gunners of the 376th Antiaircraft Artillery Battalion free their gun from snow near Monschau, Germany. 20 January 1945.



Men of 63rd Combat Engineers Battalion, 44th Infantry Division, prepare to blast holes in the ground, which is frozen to a depth of 18 inches, for artillery emplacements. Preparations are being made for emergency use of emplacements by 105 mm howitzers in Pauling area, France. 25 January 1945.



Engineers of 75th Division sweep a snow-covered road for enemy mines before tanks move up to attack near Commanster, Belgium, 22 January 1945.

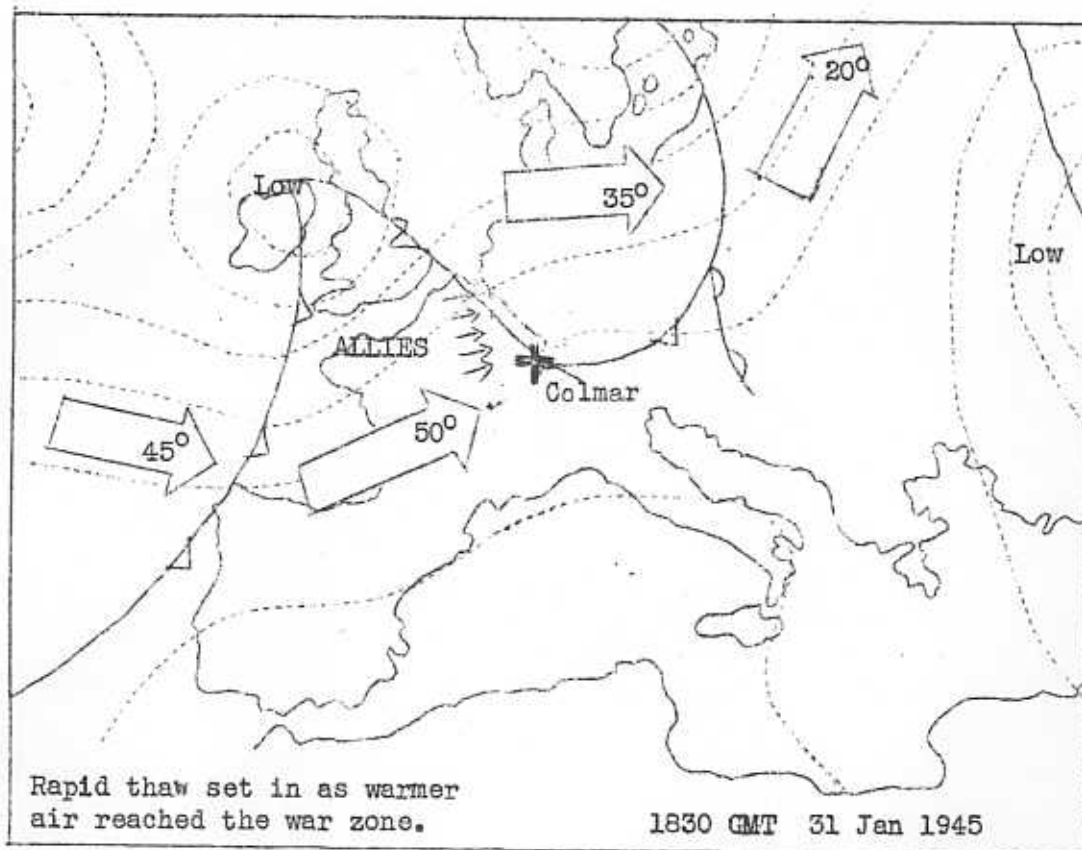


Engineers of 82nd Division sweep a road for mines before tank advance toward Herresbach, Belgium, 28 January 1945.



Rows of German mines in the foreground are exposed by melting snows. Mines were planted in snow near Diekirch, Luxembourg. Personnel of 150th Engineers at left are searching for additional enemy mines. 20 January 1945.





100 years. Highways were inundated. Road beds became soft in spots. Potholes and rough spots appeared. These were aggravated by the constant traffic. Shipments of crushed rock, sand, asphalt, and other such road-bed materials took a sizeable share of the shipping space.<sup>29,39,40</sup> Surprisingly enough tank action off the roads was not completely halted because of a gravel bed underneath 8 to 12 inches of topsoil.<sup>41</sup> In addition to the high temperatures producing thaw, the entire area was deluged with warm rains which aggravated the situation.

19. One of the most unusual byproducts of the contrasting weather regimes is seen in the following incident. Mines which the Germans had hidden in the snow fields were a continual hazard. An order came through that no more minefields were to be picked up. Instead they were to be fenced in, properly marked, and let alone. The reason for this order was that mines were unsafe, since freezing water had pushed the pin up. This set the fuse off as the pin was taken out.<sup>42</sup>

20. Despite the manifold difficulties with respect to trafficability which were brought on by the thaw Colmar fell into Allied hands on 3 February. By 9 February all the survivors in the area had been driven across the Rhine. In this operation the enemy suffered more than 22,000 casualties and heavy losses in equipment.<sup>43-46</sup>

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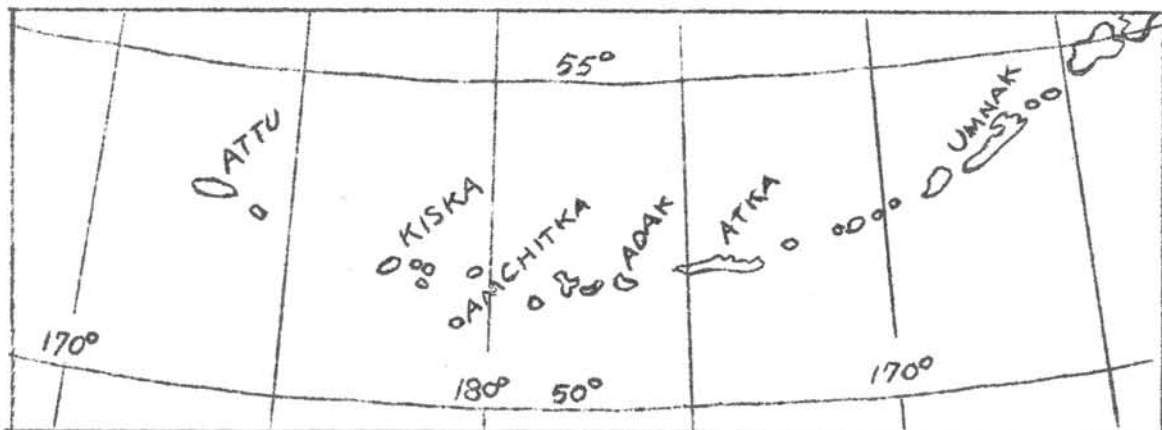
## Chapter XI

### PACIFIC BATTLES

Several outstanding island battles in the Pacific illustrate the importance of weather to every phase of warfare. Major military effects were produced by fog in the Aleutians, rain in the Philippines, rain and mud in Burma and on Okinawa.

#### Part One -- Fog and the 7th Division in the Aleutians

1. In the spring of 1943 the Japanese still held Attu and Kiska far out on the Aleutian chain, having seized them in June 1942. American forces had bases as far west as Atka, Adak, and Amchitka.<sup>1</sup> Attu, the westernmost island of the two occupied by the Japanese, was held less strongly by the enemy and was topographically less formidable to attack than Kiska. By spring 1943 the U.S. had assembled troops, shipping, and material deemed sufficient to dislodge the Japanese, and a landing force of 12,000 men including large elements of the 7th Infantry Division went aboard naval transports for a double pronged attack on Attu scheduled for 7 May 1943.<sup>2</sup>



#### Weather and Terrain

2. The climate of the area is characterized by a cold, dripping-wet fog with frequent rain and snow, and often high winds. Attu Island, 35 miles long and 15 miles wide, consists of steep mountains with sharp valleys, and a tundra of muskeg and coarse grass on the coastal band and in the valleys. The tundra supports little weight, and with traffic soon becomes a muddy morass.<sup>1</sup>

#### Fog Delays, Conceals, and Results in Collision.

3. "Bad weather" delayed the movement of the convoy from Cold Harbor, Aleutians, until 4 May so that the landing schedule was set back one day.<sup>3</sup> But on 8 May the landing was again postponed, until 11 May, because of a "sea so high that waves swept right over the forward 40mm mounts

on the battleships", and clouds that came right to the surface of the sea.<sup>3,4</sup> The dense fog, however, concealed the convoy from enemy air and submarine observations and attack. On the disadvantage side though, the dense fog made maneuvering and station keeping very hazardous while waiting for the weather to improve. On the evening of 10 May the minelayer Sicard rammed the destroyer MacDonough, causing both to retire from the task force and leaving vacant their important assignments in the landing.<sup>4</sup>

Fog Delays and Confuses.

4. On the morning of 11 May troops assigned to the Massacre Bay landing debarked to landing craft, but the fog was so bad the attack was again delayed until the visibility improved. Fortunately by now the sea was calm and the temperature was relatively high (48°F) so the troops did not suffer while spending the day in the fog-bound landing craft. At noon the decision was to land at 1530 regardless of the fog. The first wave following destroyer Fruitt's tooting whistle, and followed closely by two more waves, hit the beaches.<sup>5</sup> Although the fog partially lifted, there was apparently considerable confusion among the coxswains as to the right landing area. One reference states "Many of the coxswains became lost while enroute to the beach and the second wave landed first, closely followed by the first and third."<sup>1</sup> Another reference states "The fog was so thick that they didn't see the land until they actually hit it. Visibility was zero 30 feet above the ground."<sup>6</sup>

Too Foggy for Enemy

5. Nevertheless, by 2000 some 2,000 troops were ashore at Massacre Bay with command posts and communications established on a beachhead extending a mile inland.<sup>5</sup> Apparently the enemy did not expect landings to be made in such foul weather and gave little or no opposition.

Fog Halts Advance

6. The 1st Battalion of the 17th Regiment landed near Holtz Bay on the opposite side of the island as the other pincer in the two pronged attack. Fog and darkness, not the enemy, halted their advance a half mile short of their first objective, an enemy held hill mass.<sup>7</sup>

Japanese Advance, Retreat with Fog

7. Fog still covered the island at dawn of the next day, limiting visibility to 100 feet or so. The troops were uneasy at sounds of sporadic firing, for they couldn't see who was firing, or what they were firing at.<sup>8</sup> The fog lifted at various times during the day, but it was difficult for the forward observer to correct the range, and artillery had to resort to base-point firing most of the time. The Japanese used the fog to their advantage, advancing and retreating with the fog line. They used the heights to shell the U.S. forces without their positions being detected.<sup>9</sup>

Fog Delays; Gusty Winds Destroy Planes

8. On the third day fog still prevailed, resulting in cancellation of a planned attack in force against the Japanese. The fog continued to hold up the advance of both prongs of the attack. But fog was not the only adverse weather factor. Three planes catapulted from one of the ships for a strike against the enemy crashed when they flew up valleys and were caught by strong, gusty winds.<sup>10</sup>

Fog Conceals

9. However, the fog was a friend as well as an enemy. It provided cover for the U.S. ships maneuvering in Attu waters, shielding them from enemy planes and submarines. Twenty enemy torpedo bombers were unsuccessful in locating any of the ships in the fog on 13 May. And the fog also held the Japanese carrier planes below decks.<sup>11</sup>

Fog Limits Air Support

10. Friendly air support was also nearly nonexistent. On 13 May six B-24's were ordered to divert to Kiska because of poor observation over Attu. The next day the weather again prevented a flight of 11 bombers from giving support, with one Liberator crashing into a mountain. P-38's gave a very limited amount of support on 15 and 16 May with weather canceling all support missions on 17 and 18 May.<sup>12</sup>

Wet Weather and Trench Foot

11. The wet weather made miserable fighting conditions. A newly dug foxhole soon half filled with water. The water-logged tundra soon became a muddy morass and slowed the movement of supplies from the beaches.<sup>3</sup> Communication wires shorted out.<sup>9</sup> Clothing and leather boots remained wet.<sup>3</sup> The leather boots let feet get wet and, after a period of inactivity, trench foot crippled the wearer and made him a casualty. At the end of the battle for Attu, the figures showed that fewer men were wounded in actual combat than were forced out of action by trench foot, a fact for which the inadequate leather boot came in for much criticism.<sup>13</sup>

Fog and Rain

12. The battle for Attu against the fog and the enemy continued with the surviving Japanese being slowly penned into one small corner of the island at Chichagof Harbor. The fog so held up the advance of the attacking forces that instead of the expected 36 hours it took seven days for the two pincers to make a junction across the narrow widths of the island.<sup>2</sup> On the night of 21-22 May a steady rain began, which soaked all personal gear, sleeping bags, boots, musette bags, combat kits, and made mud holes out of foxholes.<sup>14</sup>

Counterattack in Snowstorm

13. The desperate Japanese used the weather again early on the morning of 29 May, when at 0300 in a blinding snowstorm they suddenly began a desperate 1000-man counterattack. It was difficult to distinguish friend from foe in the hand-to-hand fighting that ensued in the darkness

and snowstorm. Many Japanese escaped.<sup>15</sup> But organized resistance ceased with this final desperate enemy effort, and the fighting ended on 31 May, although a few die-hard enemy fought on until 9 June.<sup>2</sup> Thus ended the battle for Attu and another successful amphibious landing -- this time in one of the world's foggiest areas.

#### Fog Conceals Rescue Convoy

14. The sequel to this narrative on the war in the Aleutians, however, is that concerning the Japanese secret evacuation of Kiska. As the Allies built up an assault force of 20,000 men and nearly 200 ships,<sup>2</sup> the crafty Japanese prepared to gamble on a fog cover to evacuate the 5183 personnel isolated there. This daring plan faced all the obstacles of searching Catalinas, surface patrol forces, Army planes bombing the Kuriles, destroyer blockade, and naval bombardment. Awaiting assurances of thick weather, Japanese Admiral Kawase remained in Paramushiro a week or more until 21 July, (Kiska time) when he set out with two light cruisers and six destroyers as the transportation group and five or more destroyers for screening. In the dense fog they escaped Allied detection. But, on 25 July they suffered two collisions, losing the support of two destroyers.<sup>16</sup>

#### Clear Weather Permits Naval Bombardment

15. Meanwhile U.S. Navy ships and men had taken advantage of the exceptionally bright, clear day of 22 July and carried out a powerful naval bombardment on installations on Kiska. Two battleships, five cruisers, and nine destroyers had taken part in two different groups.<sup>17</sup> The Japanese victims were depressed and jittery as they prepared for their rescue.<sup>16</sup>

#### Fog Covers the Rescue Mission

16. On the morning of 28 July a northwest wind carried fog over Kiska harbor and at noon Admiral Kawase ordered the waiting transportation group to make the last 50-mile dash to Kiska. At 1840 the eight ships anchored in the harbor, and in the incredibly short time of 55 minutes all Japanese personnel were on board, the demolition charges had been set off, and buildings set on fire. As the ships filed out of the harbor, the fog lifted. The rescue was conducted without a shot and Admiral Kawase's elusive fleet returned to Paramushiro on 31 July (Kiska time).<sup>16</sup>

#### Jittery Men Shoot at Friendly Forces in Fog

17. This daring achievement remained a complete secret to the Allies until after 15 August, when a huge assembled force landed on Kiska after a strong naval bombardment. Expecting to meet 10,000 enemy, they found not one.<sup>2</sup> Still in search of Japanese defenders on 17 August, troops groped through a clammy fog and found the enemy's main camp with signs of evacuation. Apparently jittery at not finding the enemy and yet expecting to meet him at any moment in the swirling mists, patrols sometimes shot at friends; "25 men died and 31 suffered wounds from such errors in Kiska."<sup>18</sup> One machine gun section of the 87th Mountain Regiment fired at moving blurs in the fog for an hour, killing several, before the mistake was discovered.<sup>19</sup>

Enemy Used Fog to Advantage

18. Thus the Japanese successfully used the weather on this occasion to effect a rescue and to stage a huge hoax which had tied up many Allied ships and men and wasted munitions, all of which were sorely needed elsewhere in the battle of the Pacific.

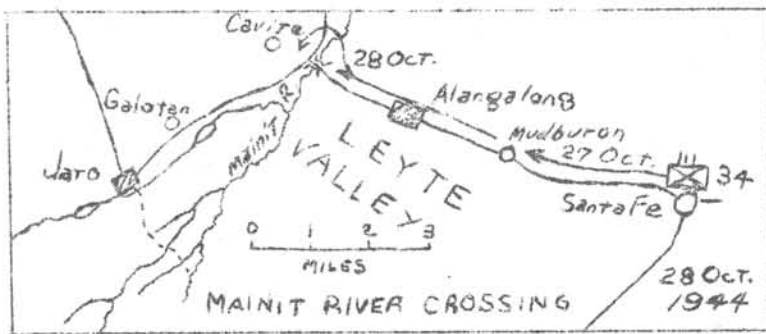
Part Two --- Crossing the Mainit River, Leyte

Enemy Stops 34th Infantry at Mainit River

19. In late October 1944 the 24th Infantry Division pushed westward through the northern Leyte Valley, P.I. After capturing Santa Fe (see map) on 26 October, 1st and 2nd Battalions of the 34th Infantry Regiment advanced westward the next day toward the Mainit River bridge where they arrived on the morning of 28 October. General Susuki, commander of the Japanese 35th Army, had his forces concentrated near Jaro. Remnants of the previously-mauled Japanese 33rd Infantry Regiment and the 41st Infantry Regiment were dug in on both of the steep banks of the bridge where they hoped to stem the advance of the numerically superior American forces. C Company, 34th Infantry Regiment, made the first contact with the enemy, followed shortly by A and B Companies. The 63rd Field Artillery Battalion soon arrived and shelled enemy positions to a depth of 300 yards east and 100 yards west of the river. After this concentration, 1st Battalion moved ahead and attempted to secure the east bank of the river. Enemy fire pinned it down at the river.

Rain Covers Outflanking Move

20. At this point E and F Companies put the weather situation to use and thereby increased the advantage already held by the 24th Division by virtue of its numerical superiority. Although there was a heavy driving rain, trafficability had not been seriously handicapped, because the main highway was of all-weather construction. Taking advantage of the concealment provided by the storm, these two companies pushed north some 500 yards through the heavy undergrowth and there forded the river unseen and unheard. From that vantage position they rushed and overran the positions occupied by the Japanese 41st Infantry Regiment on the west bank. Though the bridge itself had been mined, the surprised enemy failed to set off the charge. By 1500, 28 October, the 34th Infantry held the bridge. Thus, the American forces used weather to take an objective with much less effort than might have been expended otherwise to overcome the Japanese rearguard force.<sup>20</sup>



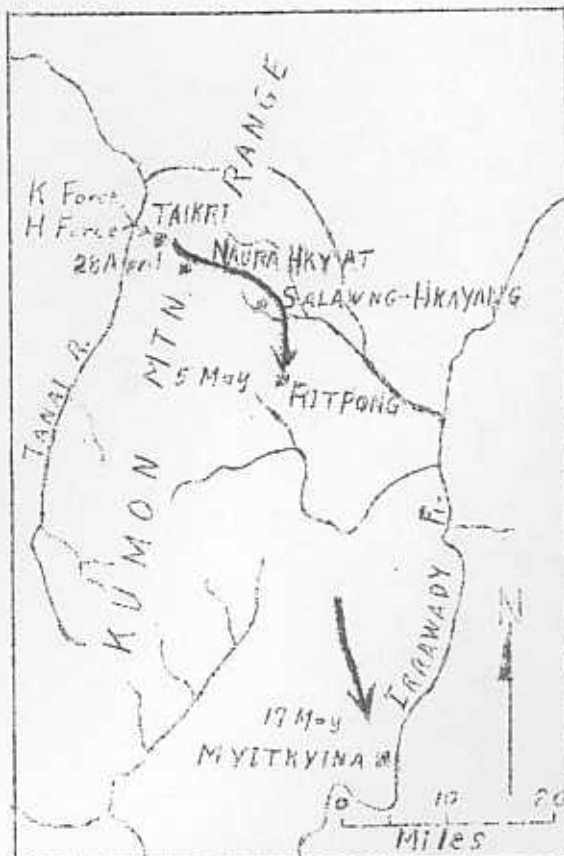


Part Three -- Merrill's Marauders and the Monsoon Rains in North Burma Mountains

21. The Japanese salient in Burma had established an air base at Myitkyina, from which the enemy was threatening air traffic carrying supplies from India to China in early 1944. Located in the northern Irrawady basin and in the path of the projected Ledo Road, the Myitkyina base attracted Allied attention because it was also the key base of Japanese military operations in northern Burma. By the time a campaign could be launched to take the city, however, the monsoon rains of 1944 were nearly due.

7 Days to March 17 Miles

22. Merrill's Marauders, the 5307th Composite Unit (Force GALAHAD), drew the assignment to march over the Kumon Range and descend upon Myitkyina in a surprise attack. With Force K starting at Taikri on 28 April, the men worked their way over a trail which had been virtually abandoned to the erosion of monsoon rains for ten years. Rains fell intermittently, and the Kachin tribesmen of the region warned that the soldiers could cross the 6100 foot Naura Hkyat pass only in dry weather. Nevertheless, on 1 May Force K reached the summit of the pass. Given this assurance, Force H then began the ascent from Taikri. The climb cost an exhausting effort particularly on the part of Force K. The men cut new trails where rains had washed away the original trail. They carried cargo that the pack animals could not safely carry on the narrow trail. Twenty animals at various times lost their footing, often because of the deep mud, and plunged to their deaths down the steep mountain slopes. Hot, humid air and ankle-deep mud further sapped the energy of the soldiers. They took seven days negotiating the 17 miles of mountain trail, but the effort paid handsome dividends when they surprised the Japanese force at Ritpong and took it in fighting which lasted through 5-8 May.



Monsoon Impedes Offensive

23. Proceeding southward, the Marauders took the airstrip at Myitkyina on 17 May and helped pave the way for the eventual capture of that city.<sup>21,22</sup> However, the monsoon rain and clouds hampered

ground operations and interfered with air support so seriously that the city did not fall until 3 August 1944.<sup>23</sup>

Achieved Surprise

24. In this case the Marauders surprised an enemy who might logically have assumed the rains had already rendered the trail utterly impassable. By traversing the trail just before the onset of the steady, torrential monsoon rains the Marauders succeeded, whereas a delay of even one week probably would have rendered it impossible.

Part Four -- Rain and Mud Stop Tenth Army on Okinawa

25. In the island-hopping war in the Pacific the U.S. Tenth Army landed on the western shores of Okinawa on 1 April 1945. Two days later both the III Marine Amphibious Corps and XXIV Corps had pushed completely across the narrow island. The 1st, 2nd, and 6th Marine Division, making up III Corps, then turned northward, and against light resistance succeeded in occupying all the northern part of the island by 18 April. Meanwhile the 7th, 27th, 77th, and 96th Infantry Divisions of XXIV Corps directed their efforts toward annihilation of the 100,000-man Japanese Thirty-Second Army strongly defending the southern third of the island. The U.S. forces met increasingly strong resistance as they pushed southward,<sup>24</sup> but by the end of the third week in May they had penetrated to the inner defenses of the enemy's stronghold, Shuri, between Naha on the west coast and Yonabaru on the east, well toward the southern end of the island. The 1st and 6th Marine Divisions, relieved in the north, had taken over the west end of the line. On 21 May the 383rd Regiment of the 96th Division forced a break in the defenses on the east slope of Conical Hill near the east coast just north of Yonabaru and raised the hopes of Tenth Army to the possibilities of an envelopment of the enemy.<sup>25,26</sup>

Five Weeks of Dry Weather

26. From 1 April to 18 May Tenth Army had enjoyed the advantage of unseasonably dry weather for Okinawa, except for one period, 7-14 May, when rain had turned the accumulation of dust into mud which had finally stopped tank, artillery, and transport movement all along the front.<sup>27</sup>



Twelve Inches of Rain Make Mud

27. On the night of 18-19 May rain began again and continued to the end of the month with only occasional breaks. Nearly 12 inches of rain fell during this period.<sup>28</sup> During the first days of rain the tempo of activity along the front was high as units prepared to exploit the favorable tactical situation with the break in the Shuri defenses.<sup>27</sup> Soon, however, the deepening mud began to divert the attention and energy of the troops as tanks again bogged down, and the units were unable to effectively attack.

Mud Stops Tanks, Supplies

28. The mud became a factor of greater consequence than the stubborn Japanese and held Tenth Army to no appreciable gain for over a week.<sup>25</sup> "The mud prevented the use of tanks to convert the break into a break-through,"<sup>27</sup> and before the end of the month the supply situation in forward areas became so serious that it consumed most of the time and energy of the troops.<sup>29</sup> Thus the attack was doomed to failure before it began.

Attack Surprised Enemy

29. An attack on 22 May by Company F of the 184th Infantry, 7th Division, on a hill southeast of Yonabaru on the east coast, surprised the enemy, who did not expect the Americans to attack when their tanks and heavy weapons were immobilized by the rain and mud. In two days of muddy fighting, consequently, the 184th succeeded in forcing another 2,000-yard crack in the Shuri defenses.<sup>30</sup>

Mud Stops 7th Division

30. The 32nd Regiment, 7th Division, on 23 May followed the attack of the 184th. But the mud had immobilized the armor and heavy assault guns that the commanders had expected to spearhead the drive. The infantry had to go alone.<sup>31</sup> But the Japanese had emplaced many anti-tank guns and automatic weapons which covered all approach routes to their Shuri stronghold. Without tanks the 32nd was effectively stopped. The rains continued, and the mud became deeper. On 26 May 3.5 inches of rain fell.<sup>32</sup> Supply to forward units became a serious problem. Naval, artillery, and air support were all negligible on account of the restricted visibility accompanying the rains.<sup>33</sup>

Mud Stops 96th Division

31. The 96th Division near the east coast on the 7th Division's right, was in an area of greater enemy action, but were unable to make any progress through the mud. During an attack by the Japanese through a gap in the lines between Companies C and L of the 382nd Infantry Regiment early on the morning of 24 May, it was impossible to call for the needed illumination and artillery from the ships off shore in Buckner Bay, because the rain had drowned out the radio contact. As a consequence, the enemy succeeded in driving Companies A and B off of Hill Oboe before they were repulsed.<sup>34</sup>

Mud Stops 77th Division

32. The 77th Division in the center of the line in front of Shuri was stymied by the mud just as much as the 96th Division on their left. The 307th Infantry had to hand-carry all their supplies and their wounded over the last 1000 or so yards. Eight men were required to carry a litter through the knee-deep mud. Weapons were dirty and wet. No attack was possible for them.<sup>29</sup>

Mud Stops 1st Marine Division

33. Wana Draw in front of the 1st Marine Division to the west of center on the II Corps front became a lake of mud and water. It was impossible for tanks to maneuver, and even amphibian tractors were unable to negotiate the morass to bring supplies forward to front-line units. The men hand-carried their supplies and evacuated the wounded through knee-deep mud while under fire. The soaking rain caused foxholes on the clay slopes to cave in and filled them with water. The men's clothes and equipment were wet throughout the period. Sanitation measures broke down as bodies of dead Japanese lay outside of the foxholes and decomposed under swarms of flies. The troops were unable to sleep, and were often hungry. Thus the living conditions began to take a mounting toll of men.<sup>35</sup>

Mud Stops 6th Marine Division

34. Units of the 6th Marine Division manning the line on the west coast found the Asato River rising from the heavy rains when they waded across it on 23 May. They had to evacuate their casualties back across the stream in chest-deep water, requiring 12 men to each stretcher.<sup>36</sup> Units suffered heavy losses as they tried to advance without assistance from the tanks immobilized in the mud.<sup>37</sup> Forward movement was next to impossible. The rain increased on the night of 25-26 May. Traffic came to a standstill; supply was impossible except by back-pack.<sup>38</sup>

Mud Closed Main Supply Routes

35. The heavy amount of precipitation played havoc with all the roads. Engineers worked on a 24-hour basis to keep the MSR's open, but they couldn't keep up with the washouts and the clay that seemed to swallow all the crushed coral they could dump on it. The route along the east coast was abandoned so that the engineers could concentrate on the main route down the center of the island. Although 400 trucks were used on 30 May to dump coral and rubble into the mudholes on this route, it was closed the next day to all but the most essential movement. The rains stopped nearly all construction work as troops were diverted to road maintenance, and completion schedules fell far behind. <sup>39-43</sup>

Sticky Mud Stops Rolling Wheels

36. "Roads which had gradually been deteriorating became impassable wallows," an observer wrote. "At first by-passes were bulldozed around the worst spots and dozers were strategically situated to push mired vehicles through,

but soon even this had to be abandoned . . . The M-29 cargo carrier or Weasel, which had proved a life-saver in the mud on Leyte, was powerless to push its way through the thick adhesive clay which clung to its treads and clogged up its suspension system until it choked out the motor.

"Even when traction was possible the powerful dragging effect of the clogging mud strained engines to the limit of their power, and beyond. The roads were lined with steaming radiators where cooling systems had given up the struggle of keeping pace with the laboring motors. The M-5 tractor, designed as a prime mover for heavy artillery, was the last to succumb, and it usually managed to get supplies to the battalion dumps, but from there forward, food, ammunition, and water were carried on the straining backs of hundreds of weary doughboys, slipping, sliding, and sinking halfway to their knees, covered from head to foot with caked mud, their clothing endlessly soaked with the rain that never, never stopped." <sup>44</sup>

#### Supplies Hand-Carried

37. Water transportation along the coast was used to get supplies nearer the forward dumps, but there was then the problem of getting the supplies to the forward areas. Supply trucks moved toward the front only as fast as they could be winched or bulldozed through the mud holes. The units in the center of the island suffered the greatest supply strain. Much of the ammunition, food, and water had to be hand-carried to the forward areas. <sup>39-42</sup> Poor flying weather limited air supply to a minimum. <sup>45</sup>

#### Evacuation of Wounded Stopped

38. Evacuation of casualties was as great a problem as supply. As many as eight men were required to carry a litter through the knee-deep mud. At times evacuation to field hospitals ceased because of impassable roads. On 26 and 27 May all air evacuation from Okinawa was suspended because the rains had made the airfields unusable. <sup>46,47</sup>

#### Air Observations Limited

39. The nearly constant overcast severely limited aerial observations although there were occasional breaks. Such a break did occur on 26 May, when aerial observers noted enemy troops and civilians moving both north and south behind the Shuri defenses. The conclusion at the time was that fresh troops were relieving the tired Shuri defenders, and it was not until later that it was learned the enemy was withdrawing to new defensive positions. <sup>48</sup> Had more frequent observations been possible this erroneous conclusion would surely not have been made.

Enemy Makes Air Strikes During Clear Nights

40. Japanese air was especially active during brief breaks in the weather. On the clear evening of 24 May they succeeded with seven different raids on U.S.-held airfields.<sup>49</sup> Kamikaze attacks on U.S. ships were numerous, and they scored 13 hits on 12 ships. Again on 27 May and the moonlight night following, the Japanese came through with no less than 56 raids of from two to four planes each. During the clear night nine ships were hit in kamikaze attacks.<sup>50</sup>

Overcast Gave Enemy Protection

41. The defending Japanese in their well-organized positions did not completely escape the disadvantages of the wet weather. The rains flooded many of them from their caves.<sup>25</sup> On their withdrawal from the Shuri defenses during the last days of the month, they too must surely have had their difficulties coping with the rain and mud. However, the overcast weather did permit the Japanese near freedom from American observations behind their lines, enabling them to conduct an orderly withdrawal in time to set up new defenses which held off the Americans for another three weeks of pursuit and fighting.<sup>51</sup>

Mud--Disadvantage to Attacker

42. But the rain and mud certainly created a greater disadvantage for the attacking forces. Deprived of fire power by the immobilizing mud and limited visibilities, the Americans were seriously weakened, and the problems of logistics were multiplied many times over by the bottomless mud. "There seems little doubt that the rains delayed the collapse of the Shuri line by perhaps as much as a week."<sup>25</sup> \*

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- Snow on Ground affecting -  
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 Efficiency of Equipment: I,18.  
 Field Tactics: X,10.  
 Heavy Weapons Fire: I,19.  
 Intelligence Observation: IX,40.  
 Movement because of Advantage of Concealment: I,20.  
 Movement because of Trafficability of Roads: I,18.  
 Movement because of Trafficability over Terrain: IX,20,47. X,13.
- Temperature below 32° affecting -  
 Air Evacuation of Wounded: IX,57.  
 Air Movement via Powered Aircraft: IX,36.  
 Communication: X,17.  
 Construction, Maintenance: I,21,24. X,18.  
 Efficiency of Equipment: I,12,19. IX,58-61,64. X,19.  
 Efficiency of Personnel: I,11,13,15,18,22,24. III,31. V,20-21.  
 IX,45. X,9-10.  
 Field Expedients: I,13,21. IX,56,65.  
 Field Tactics: IX,66.  
 Movement because of Trafficability of Roads: IX,35.  
 Movement because of Trafficability of Terrain: IX,43.

Movement because of Trafficability over Water: I,23.  
Postponement, Cancellation: I,16.  
Small Arms Fire: I,20.

Trenchfoot: V,21. VI,16. IX,36. XI,11.

Visibility Change affecting Field Tactics: IX,24,27,34.

Visibility Poor affecting -

Air Tactical Support: IX,50. XI,30.

Artillery Fire: X,13. XI,30.

Field Tactics: I,16. VI,9,11.

Postponement, Cancellation: I,16.

Weather, Bad affecting -

Air Re-supply: IX,33. XI,37.

Air Tactical Support (preventing): I,5. II,11. VI,20. IX,25.

Communications: V,9.

Efficiency of Personnel: IV,19.

Movement via Powered Aircraft: III,26,35.

Postponement, Cancellation: III,25,30. V,9. VI,27. VII,19. XI,3.

Wind affecting -

Airborne Assault: IV,16-18. IX,15. XI,8.

Air Observation: III,12. VI,14.

Smoke Operations: III,15,17. VI,20.

Winterization: I,8,11,15,17,19.