
An eyewitness account of Hurricane *Hugo*, 21–22 September 1989

Stephen D. Meloche

Aberdeen, Scotland

Witnessing a hurricane at first hand is something that a fair number of people across the south-eastern USA can say they have done. However, to be a meteorologist working directly in the path of a deadly hurricane such as *Hugo* is something else altogether. My aim in this article is to present some observations, both meteorological and personal, leading up to and throughout the storm. I am sure there are far more scientifically detailed reports already published on this particular event, but I feel that the observations and feelings of an eyewitness may be of interest to the readers of *Weather*.

Looking back nearly a decade, one's memories focus on particular facts and emotions that are perhaps not so clear in the aftermath of such an event. Indeed, most people I have spoken to remember a deep and pervading 'numbness' following the storm. Some things become more clear with the passage of time.

Distant warning

On 17 September 1989, South Carolinians began to take notice of Hurricane *Hugo* (see Fig. 1 for the track of the hurricane). After devastating Guadeloupe and the Virgin Islands, *Hugo* turned toward Puerto Rico with 113 kn sustained winds, 380 to 500 mm of rain and a 3 m storm surge, leaving 38 persons dead, hundreds injured and tens of thousands homeless. By 19 September, *Hugo* had lost quite a bit of power after its encounter with the mountainous land mass of Puerto Rico. By the time it had skirted east of the Bahamas on the 20th, the sustained wind was only 92 kn. Nonetheless, *Hugo* left a further 25 people dead and more than 50 000 homeless in this 'weakened' state.

By the end of the 20th, as *Hugo*'s central pressure fell from 965 to 950 mbar, a hurricane

watch was issued for the coastline between Miami (Florida) and Cape Hatteras (North Carolina). People were advised to stock up on food, water and medical supplies, take precautions to protect their property, and await further instructions in the event that evacuation was required.

Difficult choices

Being a meteorologist in this situation was not easy. We were told to remain non-committal when questioned by friends and neighbours – which happened often. One can imagine what people would think if they saw their local weather forecaster evacuating family, boarding up windows, hoarding food, and purchasing a power generator. Unlike Noah's neighbours, people would probably take notice! It was difficult to hide the anticipation and the foreboding. We had to believe that we would have sufficient time to act when the decision to evacuate came, and that the plans would work.

Behind the scenes, however, there was plenty of action. The National Guard was put on alert, as well as police, fire and other emergency crews. They began storing chainsaws and heavy equipment in pre-planned depots. Hospitals and storm shelters stocked up on food, water, fuel, and medical supplies. By evening on the 20th, the Governor declared a state of emergency, asking residents in coastal areas to be prepared to evacuate by morning. It was an uneasy night for several million South Carolinians.

The evacuation

On the morning of the 21st I was advised to evacuate my wife, who was then 8 months

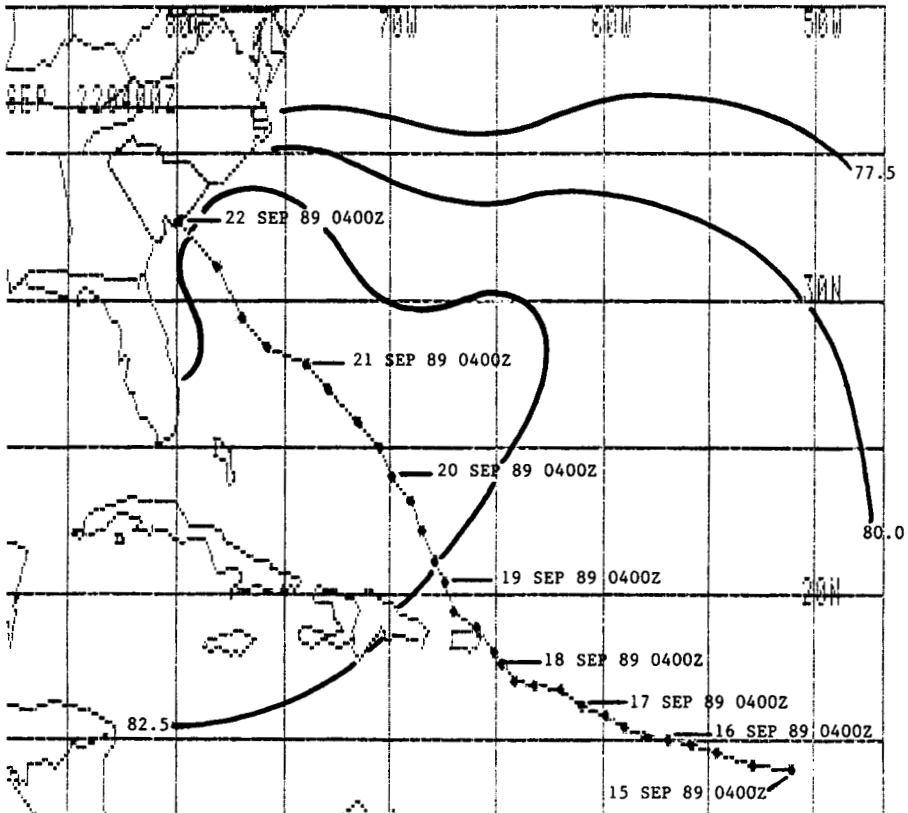


Fig. 1 Hugo's storm track between 15 and 22 September 1989. Times are GMT (GMT = local time + 4 hours). Bold lines indicate sea surface temperatures in degrees Fahrenheit (77.5°F=25.3°C, 80.0°F=26.7°C, 82.5°F=28.1°C).

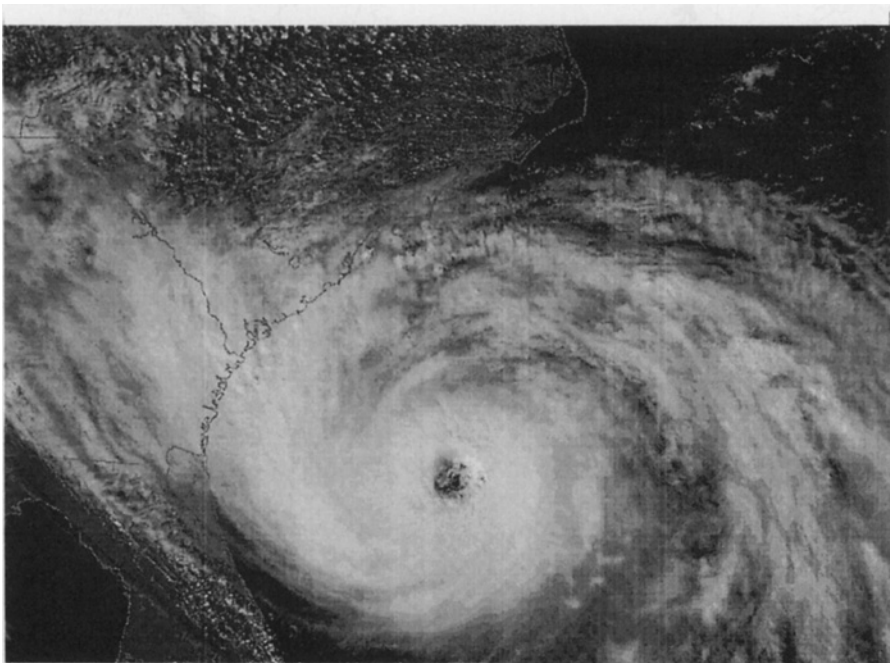


Fig. 2 Visible satellite image for 2000 GMT (GMT = local time + 4 hours) on 21 September 1989. The eye of the hurricane is 295 km south-east of Charleston.

pregnant. She had packed the day before and was ready to leave, knowing that I would be alright staying behind. The routine trip inland to Atlanta (Georgia) normally takes 5 hours but, due to the thousands of people evacuating, it would take her 12 hours to complete.

About mid-morning, I went into the Charleston Air Force Base weather station for duty. After settling into the command post, my commander, the assistant forecaster and I assisted in the military evacuation plans that had already been put into motion some 24 hours before. This required evacuating all aircraft along with their crews but, ironically, many of our aircraft were already 'safe' in Puerto Rico delivering relief supplies to the people left homeless by *Hugo* just days before. The Navy had decided to send out to sea several warships and submarines as they would be far safer in open waters than in the harbour. The Citadel, a pre-civil-war military academy, required assistance in implementing their evacuation of personnel and equipment. We also co-ordinated the move of Navy and Air Force families living

in 'unsafe' areas of Charleston on to the relative safety of base housing.

The weather on the 21st was not unlike other September days along the Atlantic seaboard. It was warm (the temperature reaching 26°C) and humid with an east to north-easterly wind ahead of *Hugo* (see Fig. 2). There were intermittent bands of heavy showers with their associated gusty wind throughout the morning and early afternoon. However, by the end of the afternoon, the convective activity ceased temporarily as subsidence ahead of the approaching storm affected the region. By sunset, there was a rather ominous shield of cirrostratus approaching from the south-east and a distinctly tropical feel to the evening.

Ground zero

By the evening of the 21st, all evacuations were complete and severe weather warnings had been posted for the Charleston area. The wind became increasingly gusty, although much lighter than expected. The first feeder band

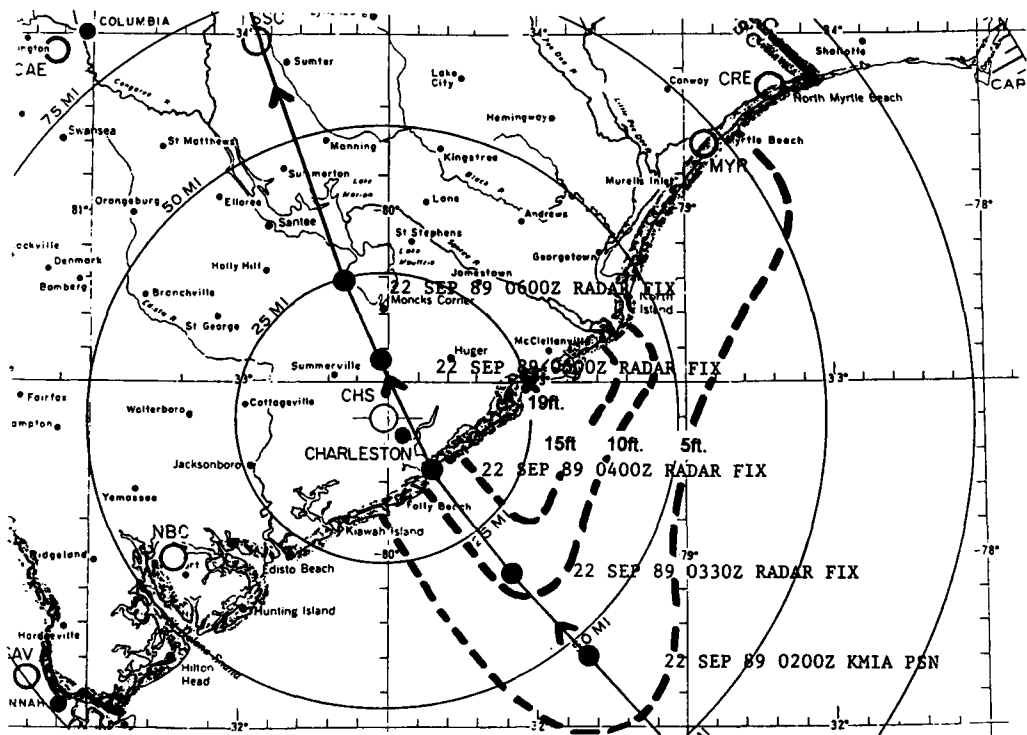


Fig. 3 Close-up of the storm track between 0200 and 0700 GMT (GMT = local time + 4 hours) on 22 September 1989. Concentric circles are in 25n. mile (46 km) intervals. Dashed lines show the storm surge in feet (10ft=3.048m).

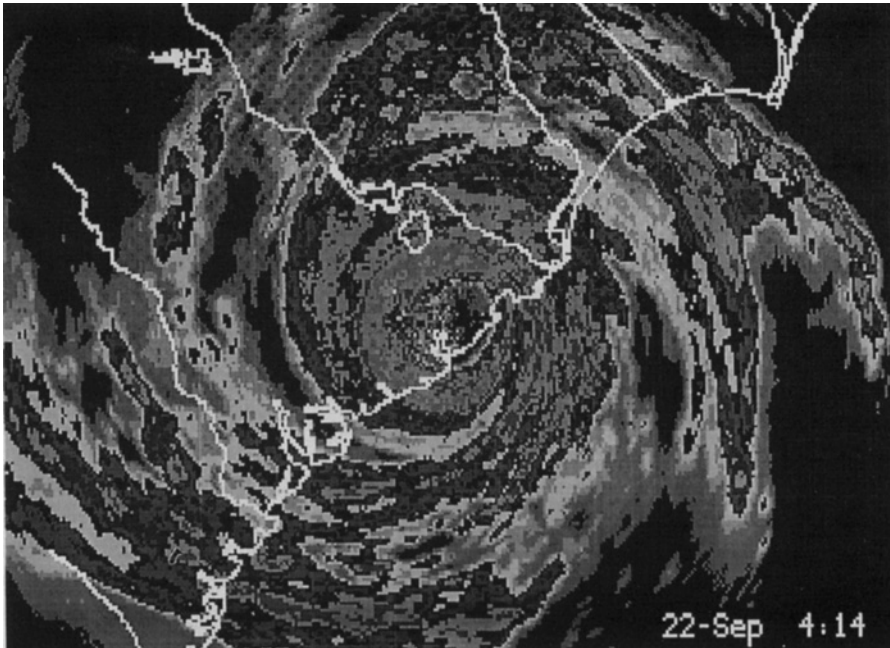


Fig. 4 Charleston radar at 0414 GMT (GMT = local time + 4 hours) on 22 September 1989, approximately 30 minutes after landfall and 1 hour after high tide. The city of Charleston is in the south-west quadrant of the eye and the Air Force base in the west quadrant.

passed through around 9.00 p.m. (0100 GMT on the 22nd) and sustained winds finally reached 35 kn. From then it became too dangerous to leave the building with flying debris on the increase. Figure 3 shows a close-up of the track of *Hugo* as it approached land.

Once sustained wind speeds reached 50 kn, we were forced to chain the doors shut as they were being sucked open by the low pressure on the downwind side of the building. At one point, we saw a large piece of sheet metal strike a military vehicle, lifting it off the ground on to two wheels before settling down again.

By the time the eye wall approached us at 11.00 p.m. (0300 GMT on the 22nd), there was a constant low roar created by the wind. Our ears began to pop as the pressure dropped rapidly. One person observed that all the toilets had the water sucked out of them by the low pressure. Rain was now seeping through the reinforced concrete walls, driven by the 75 to 85 kn sustained wind.

On the 22nd, just after midnight (0400 GMT), the eye wall passed through us, as can be seen on the radar image in Fig. 4. There seemed to be one final gust of wind that made

the building shudder and then the electricity failed. It became quiet and still. We alerted the police and fire departments that they had no more than 20 to 30 minutes to venture out to respond to emergencies before the eye wall returned. We then went outside into the eye with our flashlights. It was eerily calm and pitch dark – all that was heard or seen were the exploding power transformers all across the city. I looked up into the midnight sky and could see only scattered shreds of cloud and brilliantly lit stars. We all felt a deep sense of awe.

We then set about restarting our emergency power generator that had been struck by a large piece of debris and displaced from its foundation. This generator measured 2.5 by 3 m and weighed over a tonne, so one can imagine the force required to move it! Once we had restarted the generator, the wind and cloud began to increase, heralding the return of the eye wall. When we returned to our office we were notified by the police and fire crews that they were back in their shelters and ready for the 'show' to start again. The wind increased rapidly and our ears popped as the pressure

rose. The low roar returned as did the regular crashes of debris against the building. The wind was now blowing from the opposite direction as the eye moved north-west.

By 2.00 a.m. (0600 GMT), after seeing that the building was holding up well, I went into an empty office and fell asleep! (There were reports all over Charleston of people and animals strangely falling asleep through the worst of the storm.) It was a deep sleep, but I was abruptly awakened about an hour later as a window smashed, having been struck by debris. During the next few hours before dawn, the wind very slowly subsided. The amount of debris lessened and the low roar of the wind disappeared. A large section of the ceiling fell in, fortunately in unoccupied offices. Some of *Hugo's* vital statistics, as it made landfall over Charleston, are shown below.

Highest sustained wind: 117 kn

Highest gust: 130 kn

Total rainfall: 135 mm

Central pressure at landfall: 934 mbar

Maximum coastal storm surge: 5.8 m

The aftermath

When the sun rose around 6.30 a.m. (1030 GMT), we prepared to venture outside. An hour later, the wind had subsided to safe levels. When we stepped out of the building, we were shocked and stunned. It was deathly quiet; we all felt numb. No one spoke for at least 30 minutes. In the immediate vicinity there were dozens of cars with their windows blown out and paint chipped off; there were several inches of standing water everywhere. Hundreds of trees were snapped like twigs at the 6 m level. Most buildings sustained damage; several dozen were made unsafe.

One of the more amazing sights on the base was seeing what had happened to a C-124 cargo aircraft that was part of an outside historical 'air park'. It had broken its mooring cables, been lifted by the wind, and spun around exactly 180 degrees. This was a large four-engine transport aircraft capable of carrying several large military vehicles. Its minimum air speed was 110 kn and it is estimated that at least that amount of wind was required to lift it up, snap its mooring cables and turn it around. The

aircraft itself was almost undamaged, but its wings clipped several dozen surrounding trees.

It was a slow recovery for Charleston. Overnight, thousands had become homeless, nearly 20 people died and hundreds of businesses were wiped out. Martial law was declared to restore order and was not lifted for over a week. Most residential areas did not have sewage, water or electricity restored for 10 to 14 days. I remember vividly my first shower 7 days later – most Charlestonians had to wait longer.

The nights following *Hugo* were pitch black, with only the occasional gunshot or siren breaking the silence. During the day, hammers, chainsaws and emergency sirens were the most familiar sounds. We spent our days helping people to find food, water, dry ice, shelter and medicines, repair homes and sort out insurance claims. Nights were spent eating with neighbours, sharing our goods, and planning the next day's search for whatever was needed. Most of us lived on peanut butter sandwiches, stale bread, cold beans, tuna fish and bottled water for the first week or so.

More people were injured after *Hugo* than during the storm. Millions of wasps had also been made homeless as nests were destroyed. Snakes left the marshes and moved to the higher ground of Charleston's suburbs and the rising water level evacuated unnumbered millions of poisonous 'fire ants'. Many injuries resulted from moving felled trees, performing home repairs, and chainsaw accidents. It was not until Christmas that Charleston could be said to be on her feet again. On Christmas Eve, the city received a gift in the form of an unprecedented 20 cm of snowfall overnight. It was as if nature were saying 'sorry' for *Hugo*. The city's children were, needless to say, delighted! It had been 26 years since a comparable amount of snow had fallen. Over Charleston's 300-year history, there have been over 90 hurricane strikes. For all the devastation that *Hugo* wrought, I believe some good came of it. No one could say that they were the same afterwards, and most, I believe, were changed for the better.

Correspondence to: Mr S. D. Meloche, 35 Cortham Crescent, Aberdeen AB12 5BA.