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Cyclonic inflation

By Jennifer Marohasy
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I was concerned when I heard late last Thursday that a category 5 cyclone was heading straight for Yeppoon in central Queensland. I have a house there, on a ridge just two streets from Lammermoor Beach. Category 5 cyclones have wind speeds in excess of 200 km/h, with strongest gusts exceeding 279 km/h. They typically leave a trail of absolute destruction.

As it turned out, tropical cyclone Marcia made landfall further north, just after passing over Middle Percy Island. My house is still standing, the bananas in the front yard now all leaning badly.

There is a weather station on Middle Percy, and it recorded a top wind speed of 156 km/h, the strongest gust was 208 km/h, and the lowest central pressure was 972 hPa. This raw observational data is available at the Bureau's website and indicates a category 3 cyclone.

The US Navy's Joint Typhoon Warning Centre was tracking the cyclone and, like me, noted the surface observations from Middle Percy Island. The US Navy had been estimating wind speeds based on the Dvorak modelling method. This method is considered much less reliable than aircraft reconnaissance, with surface observations (from anemometers and barometers) historically the ultimate measure of a tropical cyclone's wind speed and central pressure. For example, in the case of Cyclone Yasi, a barograph at Tully sugar mill recorded a minimum central pressure of just 929 hPa, and this is the value in the final report from the Australian Bureau of Meteorology confirming that Yasi was a category 5 system.

In the case of Marcia, the US Navy acknowledged that their Dvorak estimates were higher than the surface observations from Middle Percy Island. In particular their real time "warning", no longer available on the internet, noted an "intensity of 110 knots" based on the anemometer on Middle Percy. This corresponds with the highest wind gust recorded on Middle Percy Island as Marcia passed over. The maximum sustained wind speed, however, never exceeded 156 km/h, and the central pressure was never less than 972 hPa. This makes Marcia a category 3 based on the Australian system, and only a category 2 based on the Saffir-Simpson Hurricane Wind Scale.

Yet the bureau continued to report the cyclone, not as it was, based on the surface observations, but as they had forecast it in a media release the previous day: "Tropical Cyclone Marcia to reach Category 5 system at landfall".

The cyclone did pass just to the west of Yeppoon, then directly over the city of Rockhampton.

The Bureau issued its first technical bulletin for Marcia, at 4pm Friday afternoon stating that, "surface observations have not captured the highest winds," and acknowledges that the minimum pressure recorded since landfall was 975 hPa inside the eye wall at 1.30 pm at Rockhampton. This central pressure only qualifies Marcia as a category 2. Maximum wind gusts never exceeded 113 km/h for Rockhampton suggesting a category 1.

Today, Sunday, Daniel Smith from James Cook University has completed the official "Preliminary Damage Assessment Report for Tropical Cyclone Marcia". This report documented the cyclone as crossing the coast at 8am as a category 5, and sustaining wind speeds of more than 200 km/h. I immediately emailed asking the basis for this assessment. Dr Smith indicated by return email that it is based on the Bureau's listing of Marcia as a category 5 at the time it made landfall, noting that the Bureau has "its own methodology of computing cyclone wind speeds."

But what exactly is this methodology?

Precedence would suggest the methodology should ultimately be based on surface observations, in which case Tropical Cyclone Marcia was most likely a category 3 at landfall, and unambiguously a weak category 2

system when it passed over Rockhampton. But this is not what the Bureau has been reporting in its tracking maps, or technical bulletin.

When it comes to temperatures based on surface observations, I know from experience that those recorded by the Bureau at any particular place and time are no-longer the official temperatures. That the bureau subjects observed temperatures to a process of homogenization before using these adjusted temperatures to calculate warming trends and other important statistics. Now it seems cyclones are also being homogenized; with output from virtual models replacing observational data.

The trouble with this approach of course, is that one day a real category 5 cyclone will hit Yeppoon, but how well prepared will the community be if they remember Marcia as a category 5, when in fact it was only a 2. There is an enormous difference between a real category 5 with maximum wind gusts approaching 300 km/h, and the 150 km/h gusts that battered Yeppoon on Friday.

Of course there is one big advantage for the Bureau in homogenizing Marcia, finally, as anticipated by those ever animated by the idea of catastrophic global warming, a monster category five cyclone has roared ashore for what would otherwise have been a disappointingly quiet cyclone season.

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