

CASE STUDY: Tropical Cyclone Monica, April 2006

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The track of tropical cyclone Monica (Figure 1) took it from the southeast tip of Papua New Guinea, across Cape York Peninsula and the Gulf of Carpentaria and then into the Northern Territory. The mean sea level analyses (Figure 2) shows tropical cyclone *Monica* approaching Cape York Peninsula. Severe Tropical Cyclone *Monica* made landfall on a remote part of the east coast of Cape York Peninsula south of Lockhart River as a severe tropical cyclone (see radar image in Figure 3). Lockhart River reported a maximum wind gust of 109km/h at Lockhart River, 3pm EST 19 April and a lowest MSL pressure of 986.0 hPa. Highest rain totals were 215mm at Lockhart River in the 24 hours until 9am on 19 April, 239mm at Violet Vale in the 24 hours until 9am on 20 April and 282mm at Musgrave in the 24 hours until 9am on 21 April.

Flood Damage

Strathmay Station (Western Cape) recorded 800 mm on top of an already large wet resulting in 25cm of water running through the house and a wall of water 5km wide and up to 4 meters deep running across the property. Owners state that the local aboriginals had confirmed that the land around the house had never previously flooded (approximately 100 years). Lotus Bird Lodge (Eastern Cape) experienced 3-meter deep floodwaters through its 4 star accommodation Lodge. There was little structural damage from the cyclone (except for around Lockhart River where Cyclone *Monica* struck). Damage and impact was largely flood related – decimated roads, significant stock losses, buildings water damage, contents, trees down, flooded plant and equipment.

Daintree River: In the days leading up to its crossing Cape York Peninsula on 19 April, Cyclone *Monica* dumped heavy rainfall on the North Tropical Coast from Cooktown to Tully. Rainfalls up to 500 mm were recorded in the Daintree River and moderate flooding occurred at Daintree Village on Thursday 20th April.

Barron River: Very high totals were recorded in a narrow coastal strip around Cairns in the 24 hours to 9am Thursday 20th April with the highest total of 340mm. River levels in the Barron River downstream of Bilwon rose sharply during the afternoon of Thursday 20th April, peaking in the delta area early on Friday morning causing moderate flooding.

Mulgrave and Russell Rivers: Cyclone *Monica* brought rains into the Mulgrave-Russell River system, which resulted in moderate flooding at Gordonvale in the early hours of Thursday 20th April.

Tully and Murray Rivers: Rainfall totals of up to 450mm were recorded in the Tully and Murray Rivers in the 48 hours to 9am Thursday 20th April. This resulted in river levels reaching the highway levels in the Tully at Euramo late Thursday and in the Murray River at Murray Flats early Friday morning with widespread moderate flooding.

Summary

A tropical low was analysed in the far northern Coral Sea on 16 April. The low moved towards the southwest and it reached cyclone intensity on 17 April and began a more westward track toward Cape York Peninsula. The system intensified to category three strength before making landfall 40 km south of Lockhart River on the afternoon of 19 April. The system weakened over land, before entering the Gulf of Carpentaria as a weak cyclone early the following day.

Monica began to intensify rapidly as it tracked to the northwest over the Gulf of Carpentaria reaching 56 m/s (110 knots) intensity at 0600 UTC 22 April then attaining maximum intensity of 69 m/s (135 knots) 24 hours later about 120 km to the northeast of Nhulunbuy. At this time, *Monica* had an eye diameter of around 30 km but the effects of the very destructive core were very much confined near to the eye wall. The Cape Wessel AWS recorded a mean wind of 36 m/s (70 knots) prior to failing as *Monica*'s maximum winds approached to an estimated 15 km of the station. A radar image around this time is shown in Figure 4 and in Figure 5 is the corresponding enhanced infrared satellite image which indicate its category 5 intensity from the very large temperature difference (as seen by the satellite) between the eye and the surrounding high cloud. The convective structure of *Monica* maintained its intense nature until it made landfall at 0900 UTC 24 April at Junction Bay, 35 km west of Maningrida.

Just 12 hours after landfall the system had weakened to below cyclone intensity, and passed to the north of Darwin as a tropical low during the afternoon of 25 April. Fortunately *Monica* crossed Cape York Peninsula at a remote location, avoiding the local townships of Lockhart River and Coen. However there was widespread tree damage and moderate damage to infrastructure along the Arnhem Land coast, extending as far west as the township of Jabiru. Maningrida community received substantial damage as the cyclone passed just to the north of the township, with several houses damaged by fallen trees. The uninhabited coastal crossing point suffered severe vegetation damage, with 50-70 per cent of all trees fell, as well as evidence of a 5-6 m storm surge zone in Junction Bay.

Maximum Winds

109km/h gust at Lockhart River at 15:00 EST 19 April.
130km/h mean wind at Cape Wessel, 8 pm CST 23 April.
148km/h gust at Maningrida, 6:40 pm CST 24 April.
118km/h gust at Jabiru, 3:02 am CST 25 April.

Lowest Reported Pressure

986.0hPa at Lockhart River.
970.2hPa at Cape Wessell.
986.2hPa at Maningrida.
986.6hPa at Jabiru Airport.

Rainfall - Queensland

215mm at Lockhart River in the 24 hours until 9am, 19 April
239mm at Violet Vale in the 24 hours until 9am on 20 April
282mm at Musgrave in the 24 hours until 9am on 21 April

Rainfall - Northern Territory

190mm at Ngayawili in the 24 hours until 9am on 25 April
340mm at Majestic Orchids (near Darwin River Dam) in the 24hours until 9am on 26 April
261mm at Kidman Springs in 24 hours until 9am on 27 April

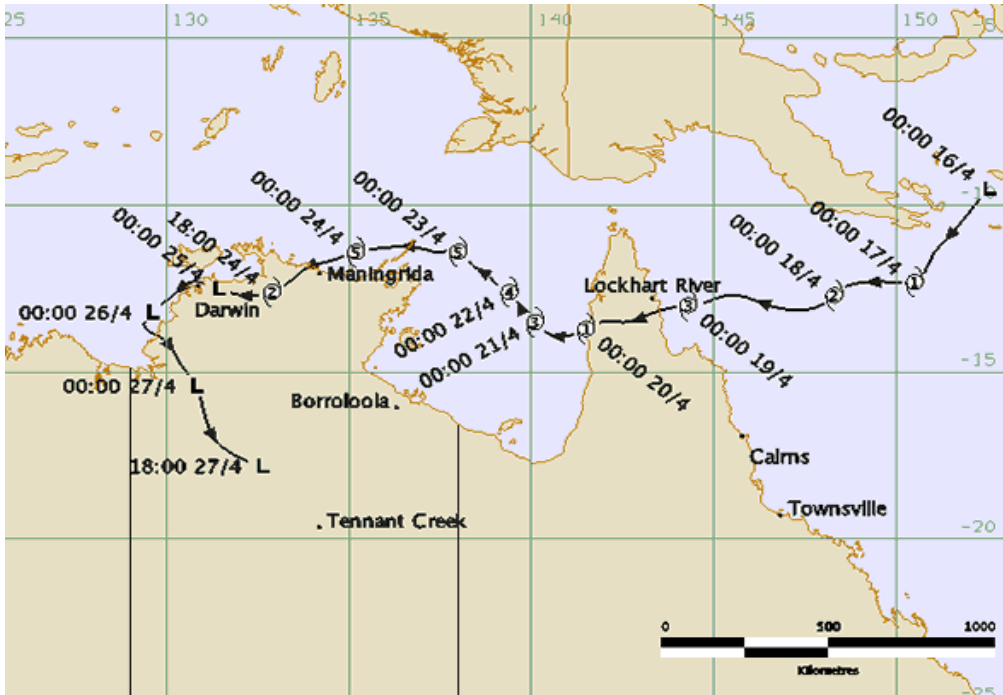


Figure 1 Track of Tropical Cyclone Monica.

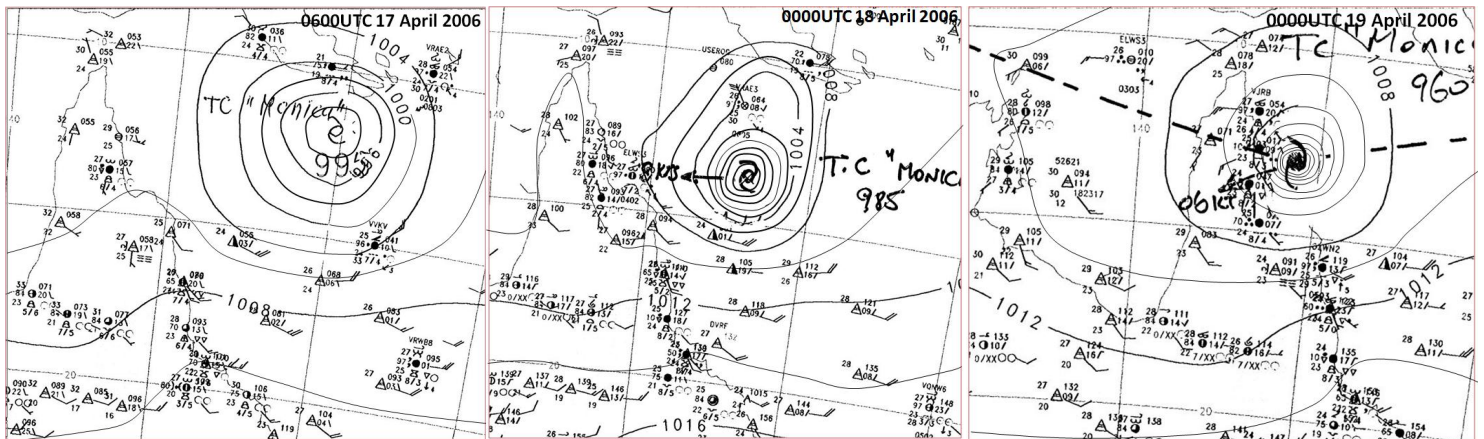


Figure 2 Mean sea level analyses of tropical cyclone Monica approaching Cape York Peninsula in top left frame for 0600UTC 17 April 2006 (4pm 17th local time), in top right frame for 0000UTC 18 April 2006 (10am 18th local time) and in lower left frame for 0000UTC 19 April 2006 (10am 19th local time),

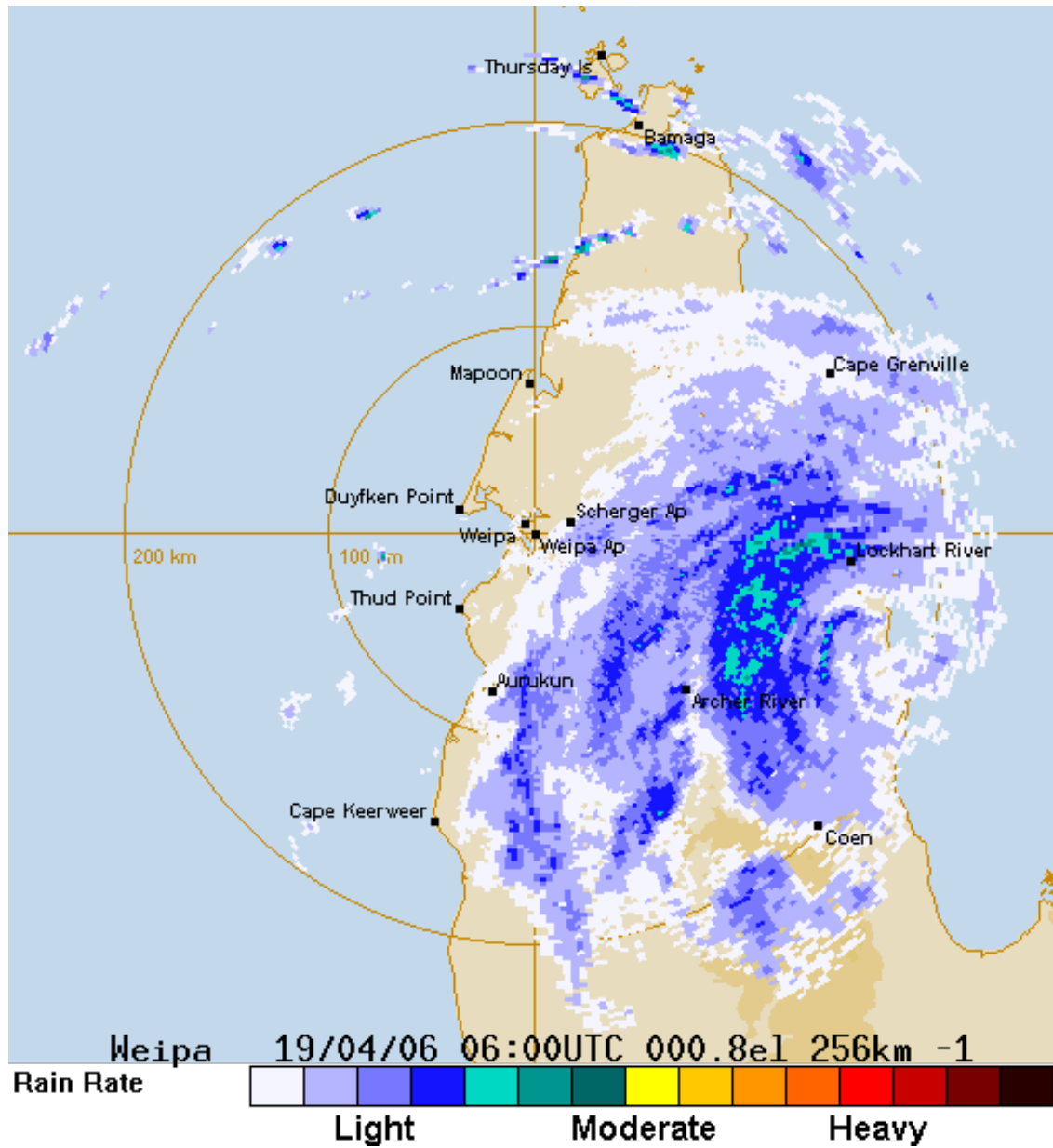


Figure 3 Radar image (from Weipa radar) of *Monica* at landfall south of Lockhart River at 4pm local time 19 April 2006.

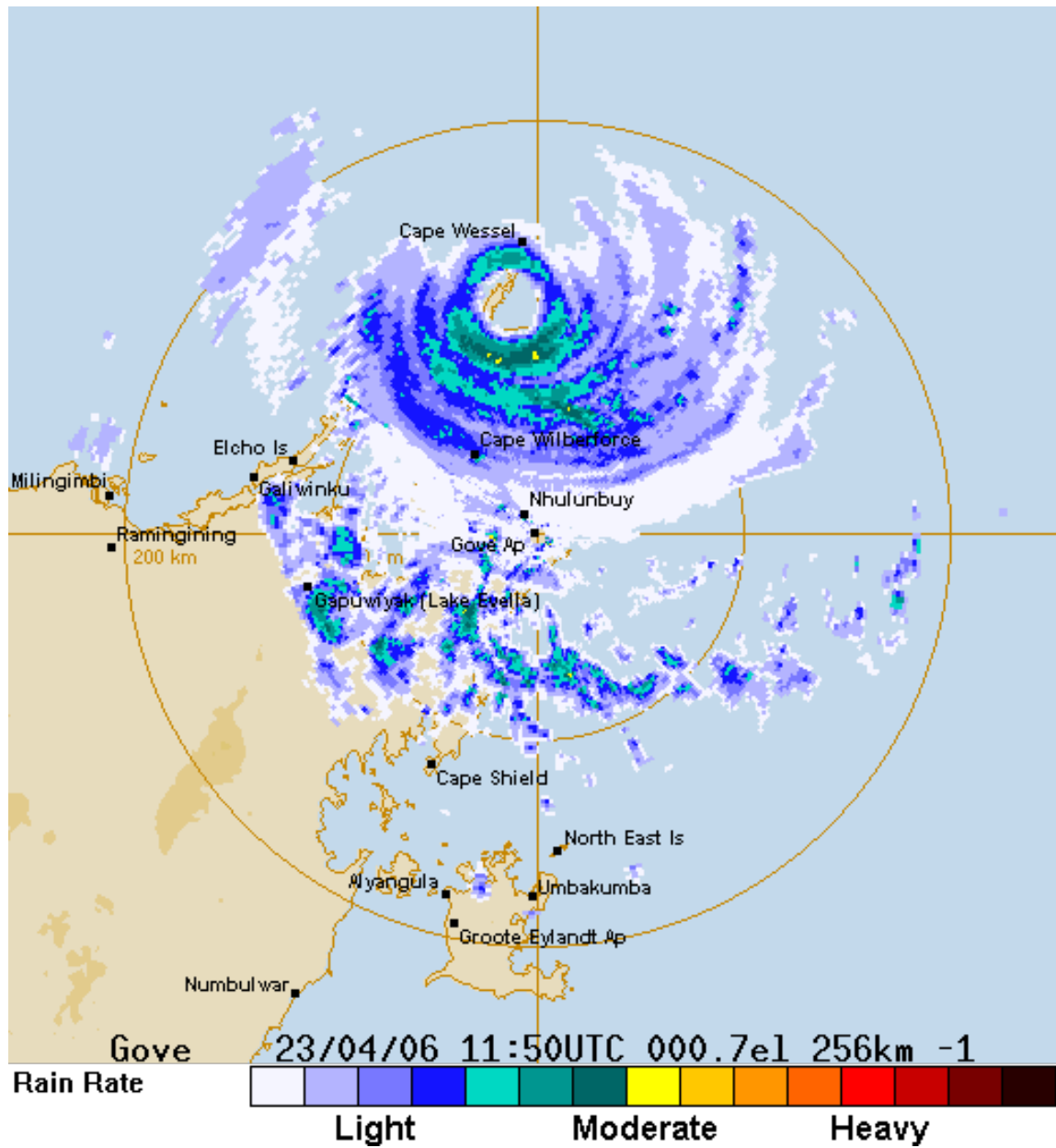


Figure 4 Radar image (from Gove radar) of *Monica* at 9.20pm Central Standard Time 23 April 2006.

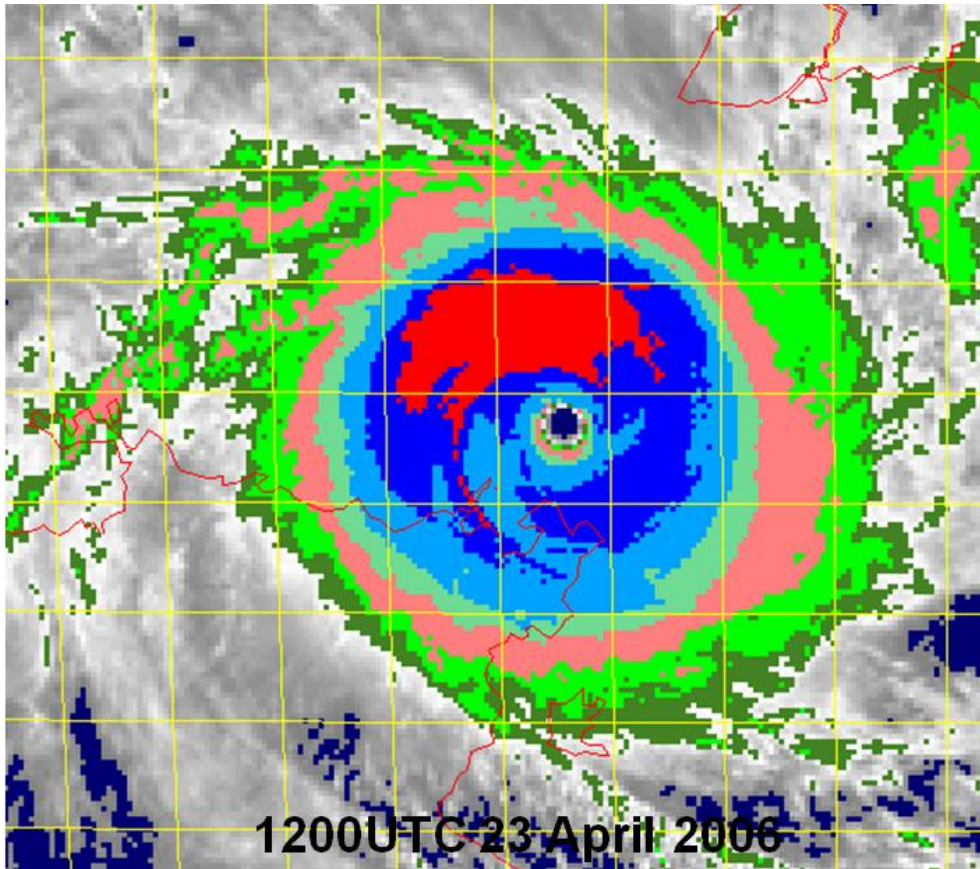


Figure 5 Enhanced Infrared satellite imagery at 1200UTC 23 April 2006 (9.30pm 23rd CST) with the red area colder than -80°C ; dark blue area -76°C to -80°C ; blue area -70°C to -76°C and navy blue area warmer than $+9^{\circ}\text{C}$.