

Severe Tropical Cyclone Nathan

Storm tide and wave monitoring data, Coastal Impacts Unit DSITI

On 8 March 2015 a low pressure system was observed in the Coral Sea travelling west towards the coast of far north Queensland. The system developed in to a tropical cyclone and was named Nathan at 09:00 (EST) 11 March. Intensifying and continuing west, the system came within 70 km of Cape Melville before turning and heading back out to sea. On 17 March the system again turned towards the coast. Tropical Cyclone (TC) Nathan intensified and crossed the coast as a category 4 at 04:00 20 March. Data from DSITI's storm tide and wave monitoring networks was made available via the public website and to the State Disaster Coordination Centre to inform disaster managers about prevailing wave conditions and storm tide levels.

As the cyclone tracked north of DSITI's existing east coast monitoring sites a drifting miniature wave monitoring buoy, or Baby Ocean Buoy (BOB), was deployed in TC Nathan's path to provide additional wave information closer to the system.

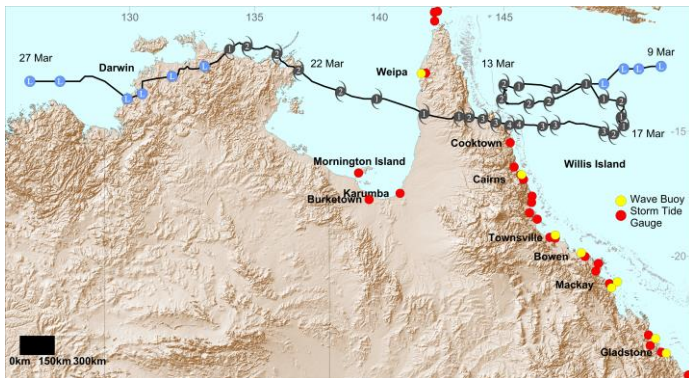


Figure 1 – TC Nathan track map

DSITI storm gauge network

Typically as a cyclone approaches the coast, ocean water levels rise as a result of strong onshore winds and reduced barometric pressure. This rise in water level is known as storm surge and can cause inundation and flooding in coastal areas. The destructive capacity of a storm surge depends significantly on the height of the astronomical tide at the time that the cyclone crosses the coast. The higher the tide, the more likely it is that destructive flooding and erosion will take place.

DSITI operates a network of 34 storm tide gauges along the Queensland coastline capable of recording real time water levels during extreme events.

The storm surge and atmospheric pressure for selected northern storm tide gauges along the eastern coast during TC Nathan are shown in Figure 2.

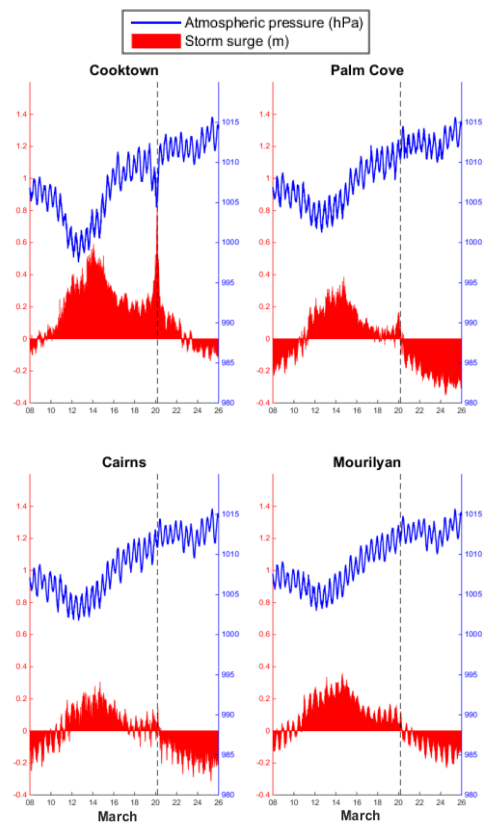


Figure 2 – Storm surge and atmospheric pressure for east coast gauges

Figure 2 shows a drop in atmospheric pressure across all sites as TC Nathan initially tracked near to the coast as a category 2 along a strong monsoon trough. The corresponding broad scale surge reduces with distance from the cyclone to have little effect south of Mourilyan. As TC Nathan approached the coast a second time, a more localised peak storm surge was observed at Cooktown coinciding with the cyclone nearing landfall. TC Nathan continued to cross far north Queensland towards the Gulf of Carpentaria, negative surges were observed along north east Queensland as the wind direction changed to offshore.

The storm surge and atmospheric pressure for selected gauges in the Gulf of Carpentaria are shown in Figure 3.

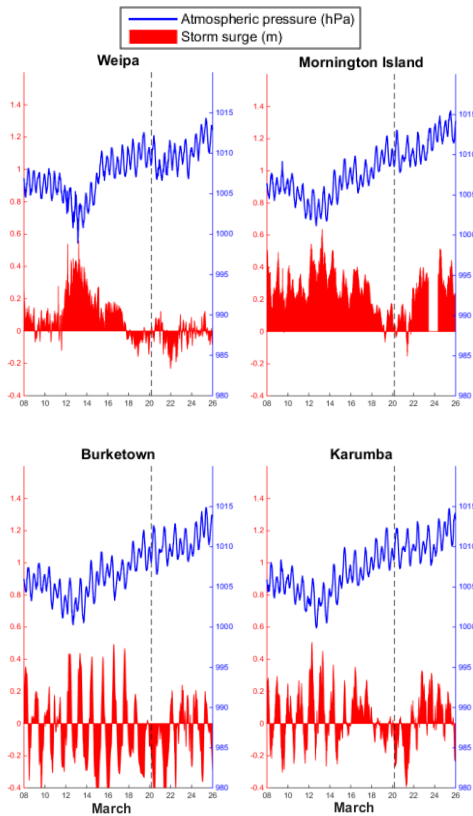


Figure 3 – Storm surge and atmospheric pressure for gulf gauges

The peak positive surge was observed at Weipa and Mornington Island during the initial approach of TC Nathan to the east Queensland coast, but no noticeable pattern appears during the days post-crossing when the system travelled rapidly west-north-west across the gulf for about 30 hours.

Figure 4 shows the measured storm surge at Cooktown. This was the only site within the DSITI gauge network where the tide level exceeded the highest astronomical tide (HAT). It was also the site closest to where TC Nathan crossed, being about 80 km north of Cooktown.

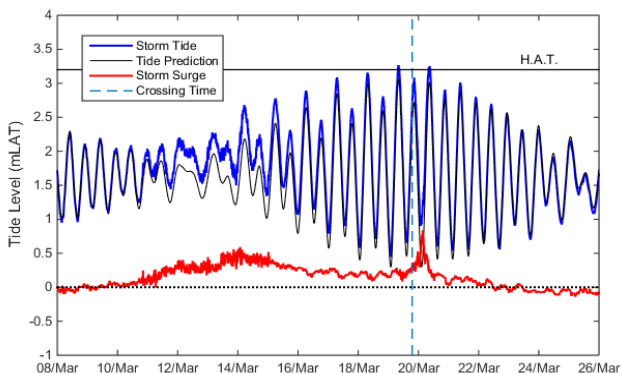


Figure 4 – Cooktown storm tide

HAT at Cooktown was exceeded twice for two high tides around the time of crossing; however the largest recorded storm surge of 0.8 m occurred near low tide. It is possible that a larger surge occurred between Cooktown and Cape Flattery.

DSITI wave monitoring

DSITI operates a network of 14 wave monitoring stations along the Queensland coastline measuring wave heights, periods, directions and water temperature.

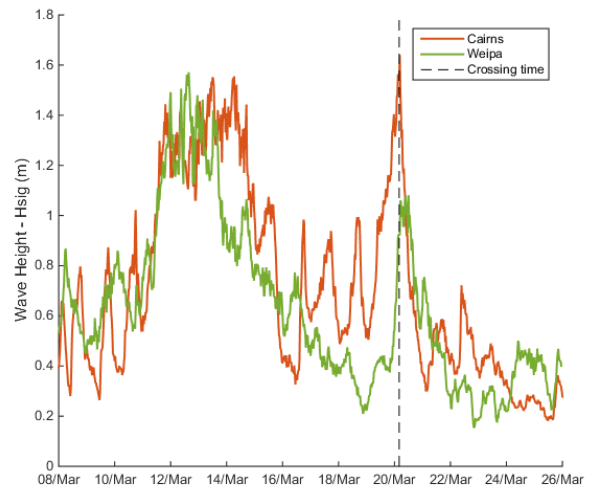


Figure 5 – Significant wave height

Figure 5 displays the significant wave heights recorded at the Cairns and Weipa wave monitoring buoys. Both locations show two increases in wave height from 11 March when TC Nathan first approached the coast and the 18 March when it again approached and subsequently crossed. The deployment of BOB allowed the collection of wave data closer to the system as it drifted in to the path of TC Nathan. The closest that TC Nathan passed to the DSITI moored buoys was approximately 220 km from Cairns and 150 km from Weipa. BOB recorded a maximum significant wave height of 5.06 m about 20 km south of the cyclone track near Cape Flattery. Further information about BOB's voyage can be found in the *BOB's Bash with Nathan* fact sheet.

Further information

Additional information about DSITI's storm tide and wave monitoring networks can be found on the Queensland Government webpages:

www.qld.gov.au/tides and www.qld.gov.au/waves