

Severe Tropical Cyclone Debbie

DSITI storm tide and wave monitoring data | Coastal Impacts Unit

On 25 March 2017 a tropical low in the Coral Sea off the coast of north Queensland tracked south before turning south west and developing into Tropical Cyclone (TC) Debbie. TC Debbie took a south-westerly track while intensifying to make landfall as a category 4 Severe Tropical Cyclone (STC) at Arlie Beach around 12:40 (AEST) on 28 March 2017.

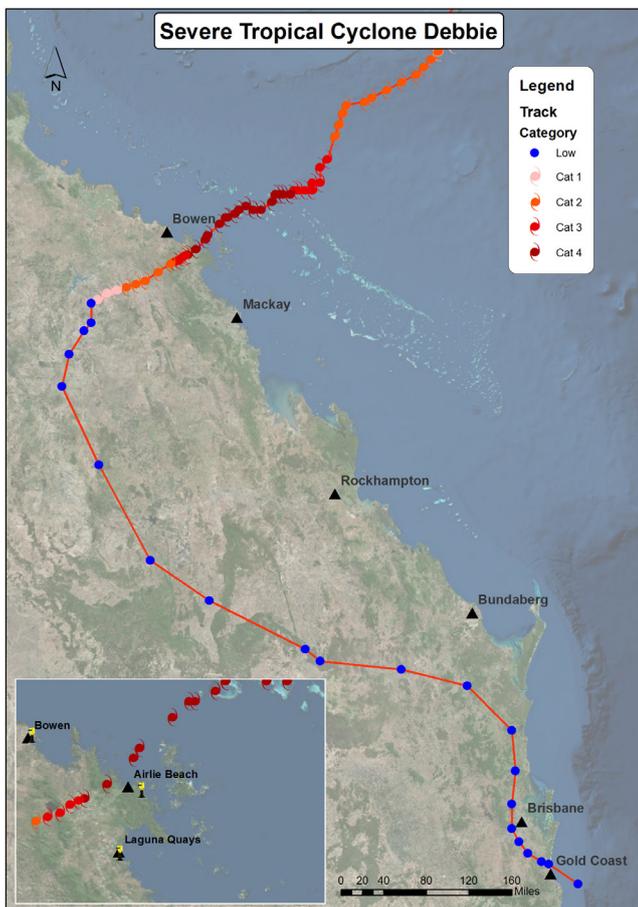


Figure 1 Track map of STC Debbie and ex-STC Debbie

After making landfall STC Debbie continued to track inland until it was downgraded to a tropical low. It then followed a southerly arc towards the coast then veered south along the coast and crossed back to sea near the Gold Coast. Data from DSITI's storm tide and wave monitoring networks were made available via the public website and State Disaster Coordination Centre to inform

disaster managers about prevailing wave conditions and storm tide levels.

Typically as a cyclone approaches the coast, ocean water levels rise as a result of strong onshore winds and reducing barometric pressure. This rise in water level is known as storm surge and can cause inundation and flooding in low-lying coastal areas. The destructive capacity of a storm surge depends significantly on the height of the 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. The combination of surge, tide and wave setup is referred to as storm tide.

DSITI wave monitoring data

DSITI operates a network of 14 wave monitoring buoys along the Queensland coastline measuring wave height, wave period, wave direction and water temperature.

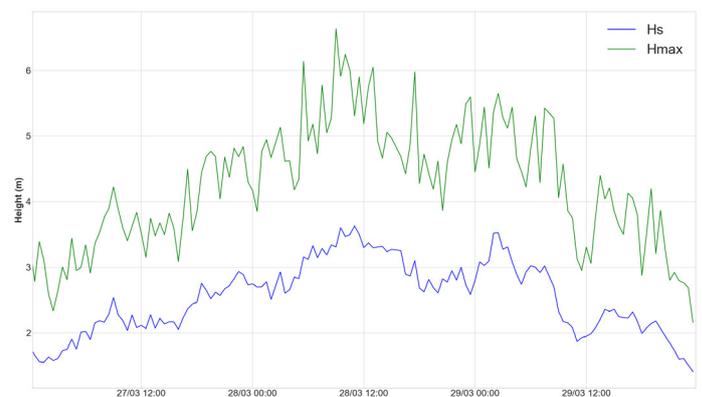


Figure 2 Hay Point maximum wave height (Hmax) and significant wave height (Hs) during the passage of STC Debbie

Winds circulate clockwise around a tropical cyclone producing onshore winds to the south and offshore to the north of cyclone landfall on the east coast of Queensland. The third largest wave on record at Mackay, the nearest buoy to the south of the crossing point, was 8.69 m. Damage to the buoy prevented further monitoring so larger waves may have occurred. A little further south at Hay Point (Figure 2) the maximum wave height reached 6.63 m and 5.72 m at Abbot Point.

The wave height to the north of landfall was considerably lower with a maximum wave height of 3.67 m at Townsville.

Table 1 Wave height (Hmax and Hsig) during the passage of STC Debbie and ex-STC Debbie

Site	Hmax (m)	Hsig (m)
Townsville	3.67	1.97
Mackay	8.69	3.57
Hay Point	6.63	3.63
Abbot Point	5.85	2.92
Mooloolaba	6.15	3.46
Brisbane	9.55	5.37
Gold Coast	5.72	3.17

DSITI storm tide gauge data

DSITI operates a network of 34 storm tide gauges along the Queensland coastline capable of recording real time water levels during extreme events. The maximum surge levels in the data occurred on the outgoing ebb tide at Bowen, Shute Harbour and Laguna Quays, and at around low tide at Mackay. The highest storm tide level was recorded at Laguna Quays where the Highest Astronomical Tide (HAT) level was exceeded by 0.91 m with the storm surge reaching 2.66 m on the outgoing tide (Figure 3).

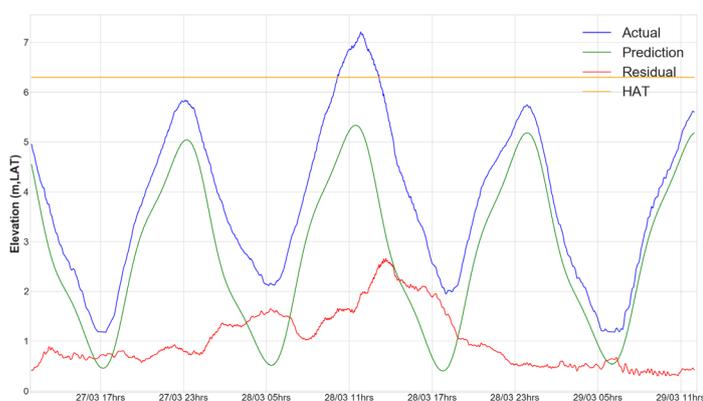


Figure 3 Storm tide data for Laguna Quays

Ex-STC Debbie

Ex-STC Debbie tracked southeast over the Sunshine Coast and Brisbane during the afternoon and evening of Thursday 30 March 2017. Damaging wind gusts of up to 131 km/h were observed by the Bureau of Meteorology. Storm surges were recorded at several sites throughout ex-STC Debbie's passage. The storm tide levels did not exceed HAT and the largest storm surge of 0.90 m was recorded at Hervey Bay in the Urangan Boat Harbour (Table 2).

The maximum wave height of 9.55 m was recorded at the Brisbane wave monitoring site and 6.15 m at Mooloolaba (Table 1). The Gold Coast buoy reported a maximum wave height of 5.72 m.

Table 2 Maximum Surge and Storm Tide levels during the passage of STC Debbie and ex-STC Debbie

Site	Max surge (m)	Max storm tide (m,LAT)	Max storm tide (m,HAT)
Bowen	0.52	3.57	-0.16
Laguna Quays	2.66	7.21	0.91
Shute Harbour	1.23	4.54	0.21
Mackay	1.11	6.64	0.06
Urangan	0.90	4.03	-0.25
Mooloolaba	0.31	1.98	-0.19
Golden Beach	0.28	1.24	-0.20
Scarborough	0.77	2.42	-0.01
Shorncliffe	0.88	2.55	-0.07
Gold Coast Seaway	0.44	1.82	-0.09
Russell Island	0.75	2.28	-0.61

Additional information about DSITI's storm tide and wave monitoring networks can be found here:

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

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