

Severe Tropical Cyclone Oma

Storm Tide and Wave Monitoring Data

On Friday 11 February 2019 a tropical low in the Coral Sea off the coast of Cairns, Queensland tracked eastwards before developing into Tropical Cyclone (TC) Oma on 12 February. TC Oma gradually moved southwest, briefly intensifying to a category 3 severe tropical cyclone before moving into the southern Coral Sea as a category 2, and eventually being downgraded to a tropical low on 23 February.

DES Wave Monitoring Data

DES operates a network of 19 wave monitoring buoys along the Queensland coastline measuring wave height, period, direction and water temperature.

Significant wave height (Hs), average period (Tz) and direction were measured during TC Oma (Figure 3) demonstrating the impact along the SE Qld Coastline. Wave monitoring sites adjacent to the cyclone track showed increased wave heights and wave period from 21 February as TC Oma drew closer to the coast, before decreasing on 23 February when TC Oma was downgraded to a tropical low. The largest wave to be recorded by the DES wave monitoring network during the passage of TC Oma, was 13.1 m, recorded by the Brisbane wave buoy (Figure 4). On 22 February waves were travelling in a south-easterly direction as a result of the steep gradient of TC Oma coupled with a high pressure system in the Southern Ocean.

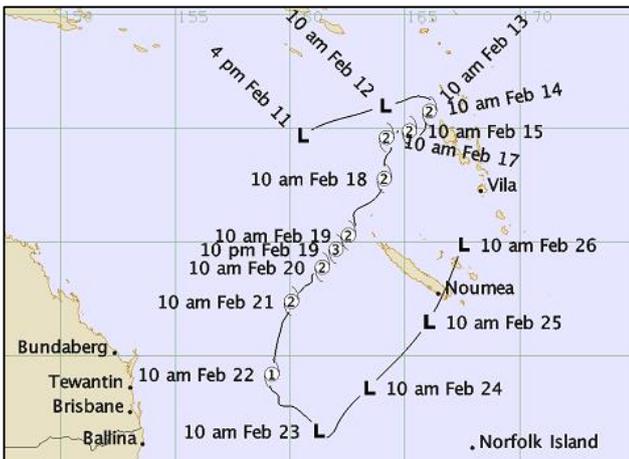


Figure 1 TC Oma Track Map (courtesy of BOM).

Data from DES'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.

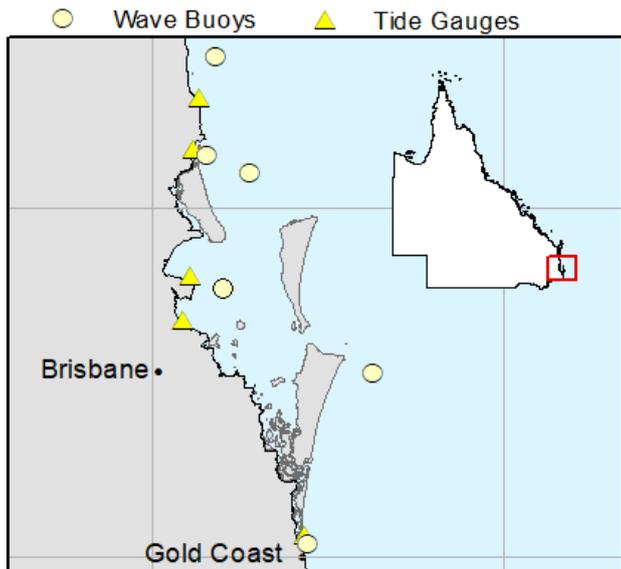


Figure 2 South East Qld wave buoy and tide gauge locations

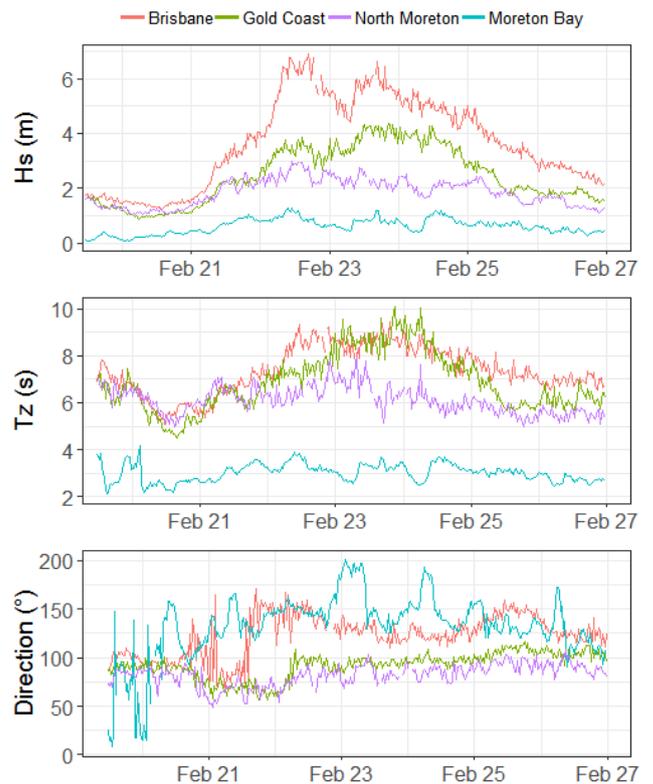


Figure 3 Significant wave height (Hs), Average period (Tz) and Direction for South East Qld wave monitoring sites



Figure 4 Brisbane maximum wave height (Hmax) and significant wave height (Hs) during the passage of TC Oma

Wave conditions recorded at a number of DES wave-monitoring stations were identified as record top ten wave heights (Table 1).

Table 1 Hmax and Hs produced by TC Oma that made the top ten highest waves. Note* Bundaberg wave site has only been operational for 3.5 years

Site	Hmax (m)	Ranks	Hs (m)	Rank
Bundaberg*	4.5	#3	2.2	#7
Caloundra	5.5	#5	3.1	#6
Mooloolaba	7.9	#10	-	-
North Moreton	5.8	#10	3	#10
Brisbane	13.1	#4	6.8	#6

DES Storm Tide Gauge Data

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 set-up is referred to as storm tide.

DES operates a network of 36 storm tide gauges along the Queensland coastline capable of recording real time water levels during extreme events.

Table 2 lists the highest recorded storm surge (residual) as a result of TC Oma at a number of the SE Queensland storm tide gauges. The table shows the largest maximum storm surge, which was at the Gold Coast (Figure 5), while other monitoring stations along the coastline recorded maximum storm surge levels between 0.29 and 0.45 metres.

Table 2 Maximum Surge and Storm Tide levels during the passage of TC Oma

Site	Max Surge (m)	Max storm tide (m, LAT)	Max storm tide (m, HAT)
Gold Coast	0.88	2.16	0.14
Shorncliffe	0.29	2.82	-0.1
Scarborough	0.45	2.70	0.10
Golden Beach	0.40	1.48	0.04
Mooloolaba	0.37	2.27	0.10

It should be noted that the maximum water level on the beach may have been higher due to additional wave set-up and run-up landwards of the gauges.

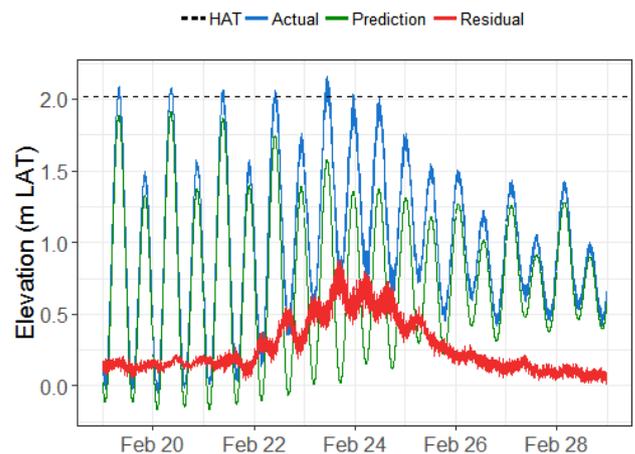


Figure 5 Gold Coast storm tide

Residuals for the SE Queensland tide gauges is displayed in Figure 6 and clearly demonstrates the impact of TC Oma at the Gold Coast.

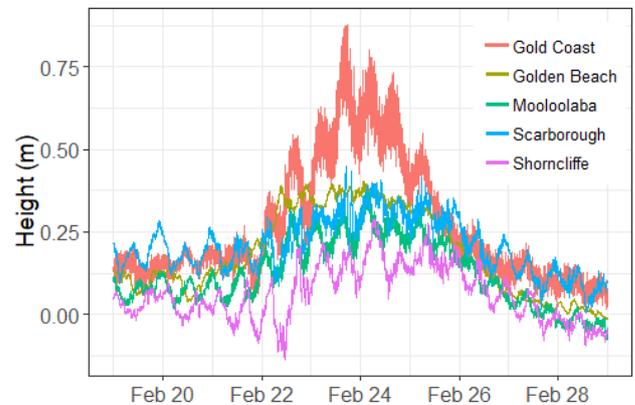


Figure 6 Storm Surge at SE Queensland tide gauges during TC Oma

Impacts of TC Oma

The Bureau of Meteorology observed damaging sustained wind gusts of up to 130 km/h and significant beach erosion occurred along SE Qld due to the wave energy produced by TC Oma. At Cape Moreton wind gusts greater than 40 km/h were recorded, predominantly coming from a south-easterly direction (Figure 7) and reached speeds up to 90 km/h (kph).

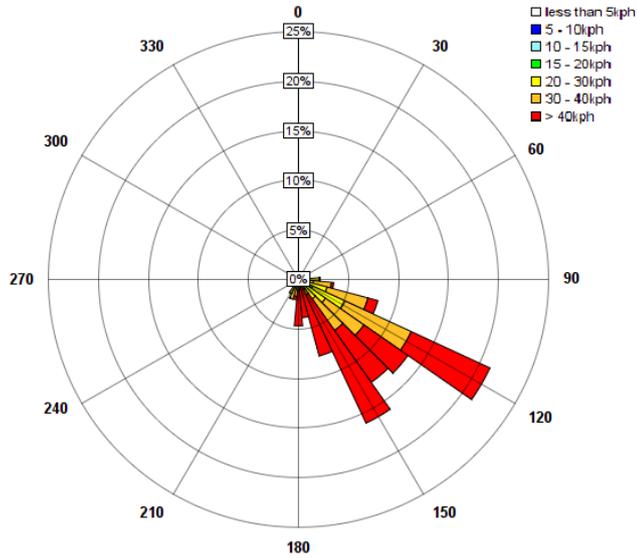


Figure 7 Wind Speed and Direction at Cape Moreton for the period 17/2/2019 to 28/2/2019

A beach profile survey was conducted on Bribie Island prior to TC Oma on 11 December 2018 and after TC Oma on 03 March 2019, allowing the erosion caused by TC Oma to be measured. Two beach profiles were mapped (Figure 8 and Figure 9) showing the level of erosion resulting from TC Oma. Photos taken at the survey site on Bribie Island before (Figure 10) and after (Figure 11) show the extent of beach erosion, with clearly evident erosion scarps.

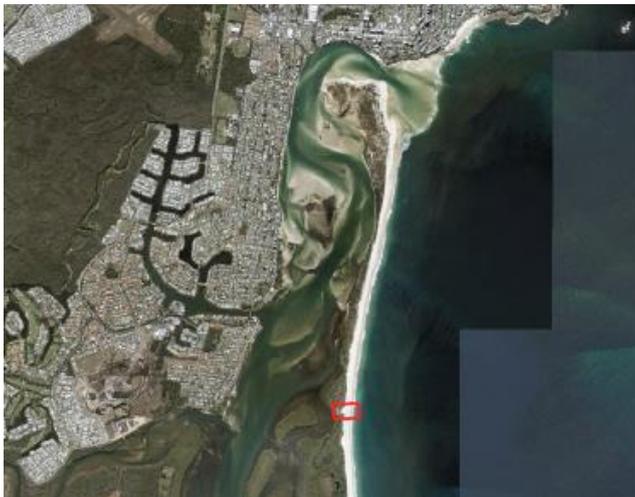


Figure 8 Survey site on Bribie Island

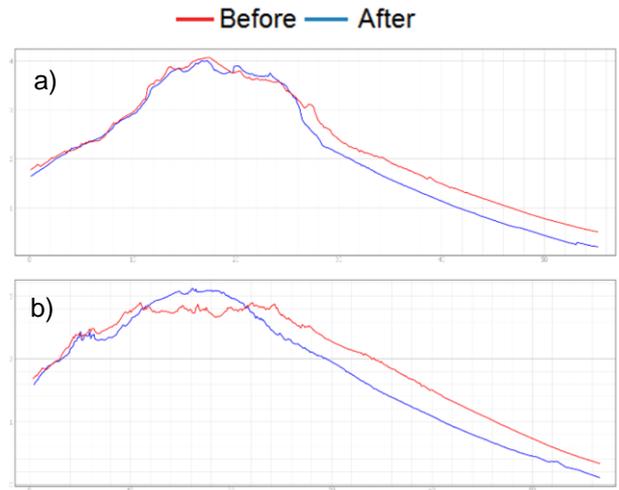


Figure 9 a) Profile 1 and b) Profile 2 conducted at Bribie Island



Figure 10 Bribie Island on 11 December 2018 before TC Oma



Figure 11 Bribie Island on 03 March 2019 after TC Oma

Further Information:

Additional information about DES'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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