TROPICAL CYCLONE INFORMATION SERVICE

Prepared by Coastal Services Unit, Environmental Sciences Division

Report on tropical cyclone Craig

Issued March 2003.

- Category 2 cyclone with winds to 130 kilometres per hour near centre.
- 3rd highest significant wave measured at Weipa in 21 years of recording.
- Storm tide exceeded HAT at Weipa by 0.17 metres.
- Peak positive surge at Weipa of 1.03 metres.
- Peak negative surge at Karumba of -0.80 metres.

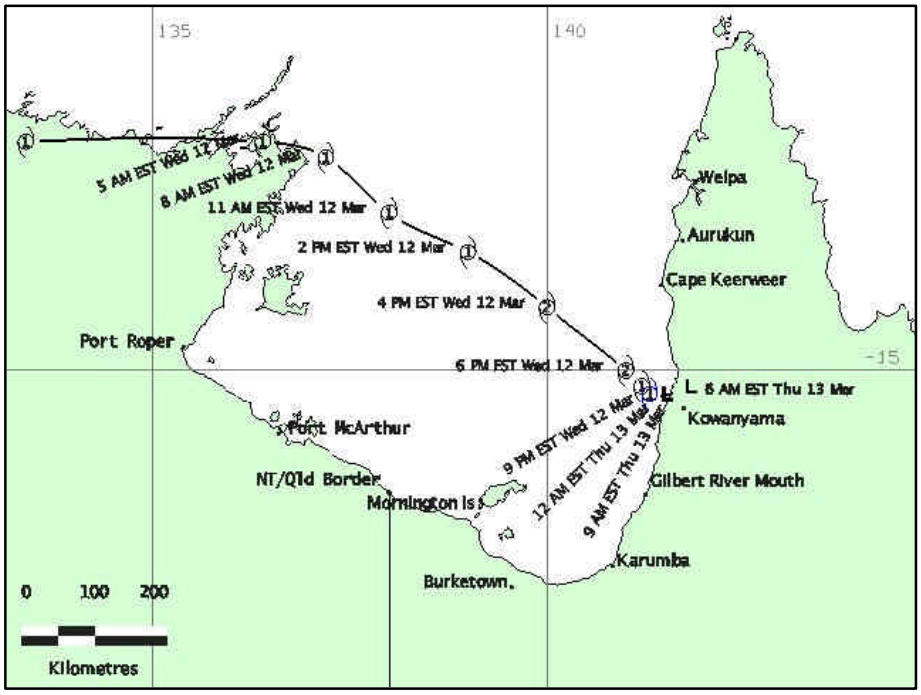

Figure 1 – Revised cyclone track courtesy of Bureau of Meteorology

Summary

Tropical cyclone Craig formed in the Timor Sea on 9 March 2003, deepened into a Category 2 cyclone (on a scale of 1 to 5) and crossed the Northern Territory coast near Cobourg Peninsula at 1430 (AEST) on 11 March 2003 with a central pressure of 980 hectopascals (hPa). The Bureau of Meteorology at Darwin issued Tropical Cyclone Advice's for tropical cyclone Craig that advised '*¼abnormally high tides could cause SERIOUS Flooding at the coast near the base of COBOURG PENINSULA and elsewhere between CAPE DON and GOULBURN ISLAND this afternoon.*'

The cyclone weakened to 988 hPa (Category 1) before passing into the Gulf of Carpentaria at 0530 (AEST) on 12 March 2003 where it re-intensified to 985 hPa (Category 2). Environmental Protection Agency (EPA) storm tide advisers reported to the Department of Emergency Services, State Disaster Coordination Centre at noon on Wednesday 12 March.

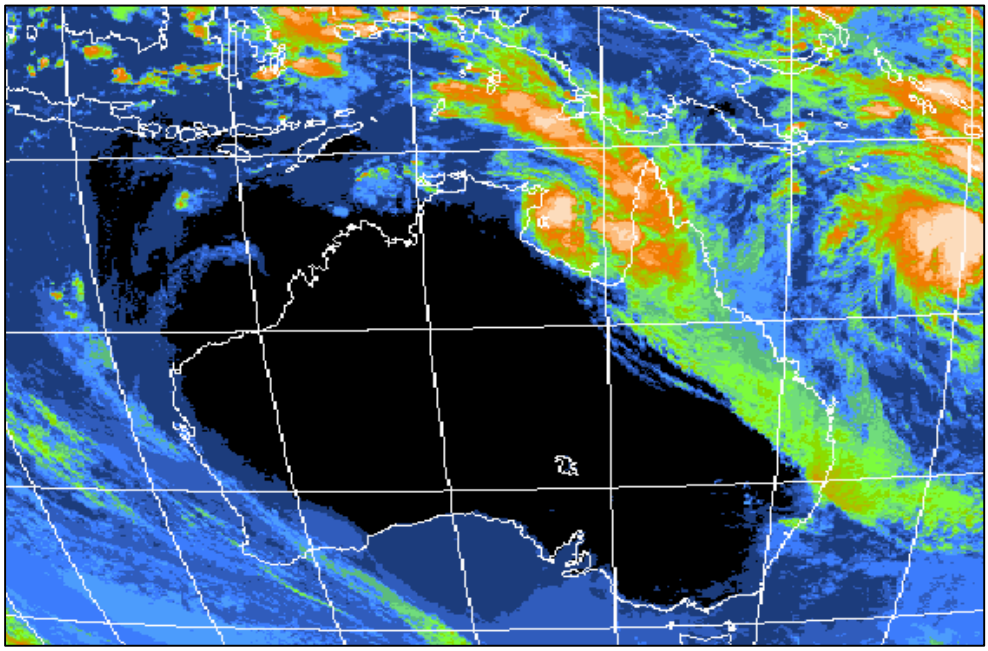

Figure 2 - Satellite image of cyclone at 1000 (AEST) 12 March 2003

The EPA's storm tide gauges at Weipa and Karumba, and its wave recording buoy at Weipa, were used to monitor water levels and increased wave conditions due to the presence of the tropical cyclone. Selected records from the period of monitoring are included in the following report.

The peak surge recorded on a tide gauge was 1.03 metres at Weipa, with the storm tide exceeding Highest Astronomical Tide (HAT). The third highest wave in the history of the Weipa wave recording station was also measured during this event.

Of some note in this event is the speed of the cyclones passage across the Gulf of Carpentaria, and its alignment with an active monsoon trough. The trough had existed across the top-end of Australia for several weeks prior to tropical cyclone Craig. In March, this same system controlled the movements of four cyclones (Graham and Harriet in Western Australia, and Erica and Craig on the northern and eastern parts of the continent). In the Gulf, winds blowing onto the western shores of Cape York Peninsula persisted north of the trough line, while winds were offshore south of the line. The progressive build up in wave heights and periods over several days as the cyclone advanced is clearly evident in the wave plot below.

Cyclone activities in Gulf of Carpentaria

According to Bureau of Meteorology tropical cyclone advices issued during the event, the cyclone moved rapidly across the Gulf of Carpentaria, crossing the western coast of Cape York Peninsula just south of Kowanyama at approximately 2000 (AEST) on 12 March. It then quickly degenerated and the cyclone watch was cancelled. No flood warnings were issued, and only minor damage was reported from the area.

A summary of the preliminary tropical cyclone advices issued by the Bureau of Meteorology during the cyclone event is contained in Table 1.

Storm tide recording

The EPA storm tide system (comprising 21 storm tide gauges along the Queensland coastline) allows real-time access to storm tide data via the public telephone network during cyclone events. Water level data were obtained from the EPA storm tide gauges at Weipa and Karumba (Figures 3 and 4). Table 2 summarises the peak surge and peak storm tide recordings from these sites.

At Weipa, a positive storm surge of 1.05 metres was recorded. The storm tide exceeded Highest Astronomical Tide (HAT) despite the fact that predicted high tides were comparatively low (not springs), and the peak surge occurred while the tide was ebbing. Had the peak surge occurred 4 hours 30 minutes earlier (when the recorded storm tide peaked), the storm tide would have been 0.1 metres higher. At Karumba, a negative storm surge of 0.80 metres was recorded, and consequently, the observed tide was below the predicted level.

The reason tides were above predicted at Weipa, and below predicted at Karumba is dramatically illustrated in figure 5 which

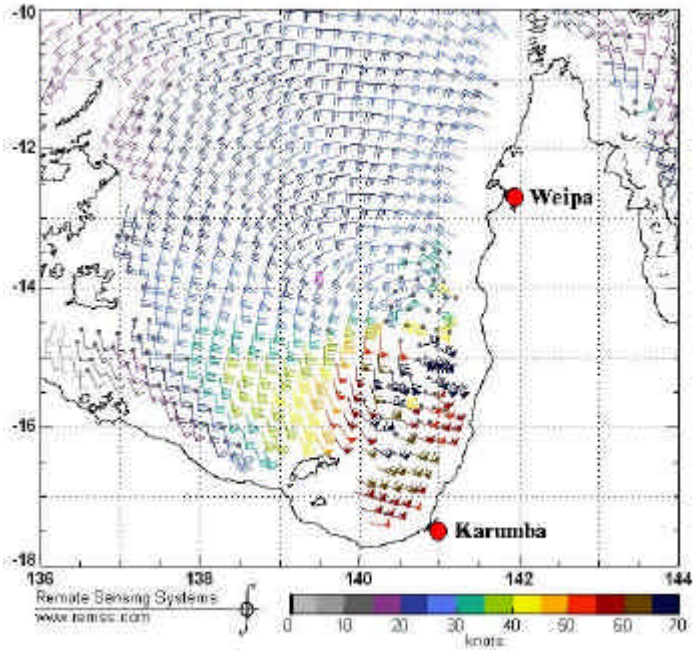

Figure 5 - Ocean surface winds obtained by QuikSCAT

shows ocean-surface winds obtained by NASA/JPL's SeaWinds Scatterometer aboard the QuikSCAT satellite on 12 March. This figure shows the wind field associated with tropical cyclone Craig producing strong on-shore winds (pushing up the water) at Weipa, and off-shore winds (holding back the water) at Karumba.

Storm tide station	Time & date (AEST)	Peak surge[1] recorded (metres)	Storm tide[2] recorded (metres above AHD[4])	HAT[3] (metres above AHD)
Weipa	1600 12 March 2003	1.05	1.80	1.63
Karumba	2240 12 march 2003	- 0.80	1.69	2.60

Table 2 - Summary of storm surge events during tropical cyclone Craig

1 The peak surge represents the largest rise (or fall) in the level of the sea above (or below) predictions caused by a combination of wind strength, reduced atmospheric pressure and wave setup.

2 The storm tide represents the actual tide recorded for a particular site during the event and is a combination of the astronomical tide and the storm surge.

3 The Highest Astronomical Tide (HAT) refers to the highest tide level predicted to occur under average meteorological conditions, and any combination of astronomical conditions. These levels will not necessarily be reached every year. The HAT values quoted here were obtained from the 2000 Queensland Tide Tables

4 Australian Height Datum (AHD) is the datum adopted by the National Mapping Council of Australia as the datum to which all vertical control for mapping is to be referred.

Wave records

The Environmental Protection Agency operates a network of wave monitoring stations along the Queensland coastline. One of these stations is in the Gulf of Carpentaria at Weipa, and large waves were recorded at this station during the passage of tropical cyclone Craig.

The Weipa station has been operating since December 1978. The wave recording buoy is 11 kilometres west of Lorim Point in 6.6 metres of water (reduced to Lowest Astronomical Tide). A peak significant wave height of 3.35 metres was recorded at 1930 on 12 March 2003 (the 3rd highest significant wave height ever recorded at the site). The significant wave height is the average of the one-third highest waves in a 26.6 minute record and is a standard wave parameter. A peak maximum wave height of 5.29 metres was recorded at 1900 on 12 March 2003 (the 3rd highest maximum wave height ever recorded at the site). Peak wave periods greater than 10 seconds were recorded throughout the 12 March 2003.

Both the Hsig and Hmax values shown above were extracted from records that were less than the standard recording length of 26.6 minutes. This was necessary due to the large number of values being rejected at the peak of the wave heights. This unusually high number of rejected values may be attributed to the wave measuring buoy's inability to operate in breaking wave conditions that probably existed at the time. As a result of this, actual wave heights may have actually be slightly higher than the values shown.

Coastal Conditions

Reports from Counter Disaster and Rescue Services officers suggest that, despite wind gusts to 130 kilometres per hour, there was little structural damage or serious flooding. No injuries have been reported, and clean-up operations are underway in Kowanyama, Pormpuraaw and Mapoon.

Attachments

Northern Territory Region								
Advice	**Date**	**Time (AEST)**	**Cat**	**Central Pressure**	**Latitude**	**Longitude**	**Max Winds**	**Sea/Land**
1	8/3/2003	1130	TL	1003	11.7	129.5		S
2		1730	2	998	11.6	128.8		
3		2030	2	998	11.1	128.6		
4		2330	2	998	11.1	128.6		
5	9/3/2003	0230	2	998	11.0	128.8		
6		0530	2	997	11.0	129.0		
7		0830	2	996	11.5	129.2		
8		1130	2	995	11.0	129.0		
9		1430	1	992	11.0	129.0		
10		1730	2	992	11.0	129.0		
11		2030	2	992	11.0	129.0		
12		2330	2	990	10.8	129.4		
13	10/3/2003	0230	2	990	10.8	129.4	100	
14		0530	2	988	10.6	130.3	110	
15		0830	2	985	10.8	130.4	130	
16		1130	2	985	10.8	130.5	130	
17		1430	2	985	11.1	130.6	130	
18		1730	2	985	11.2	130.9	130	
19		2030	2	985	11.3	130.7	130	
20		2330	2	985	11.3	131.1	130	L
21	11/3/2003	0230	2	985	11.5	131.3	130	L
22		0530	2	985	11.5	131.4	130	L
23		0830	2	980	11.5	131.8	150	S
24		1130	2	980	11.7	132.2	150	S
25		1430	2	980	11.8	132.5	150	L
26		1730	2	980	11.9	133.0	150	L
27		2030	1	988	12.1	133.4	110	L
28		2330	2	990	12.3	134.4	100	L
29	12/3/2003	0230	2	988	12.5	135.5	100	L
30		0530	2	988	12.1	136.4	100	L
31		0830	2	988	12.3	137.2	100	S
32		1130	2	988	13.0	138.0	100	S
Queensland Region								
33	12/3/2003	1400	1	988	13.5	139.0	110	S
34		1700	2	985	14.5	140.5	130	S
35		1900	2	985	15.6	141.1	130	S
36		2000	2	985	15.8	141.4	130	L
37		2100	1	990	16.5	141.7	120	L
38		2200	2	995	17.0	141.5	100	L
39		2300	TL	997	17.3	141.5	80	L

Table 1 - Information extracted from tropical cyclone advices

Attachments

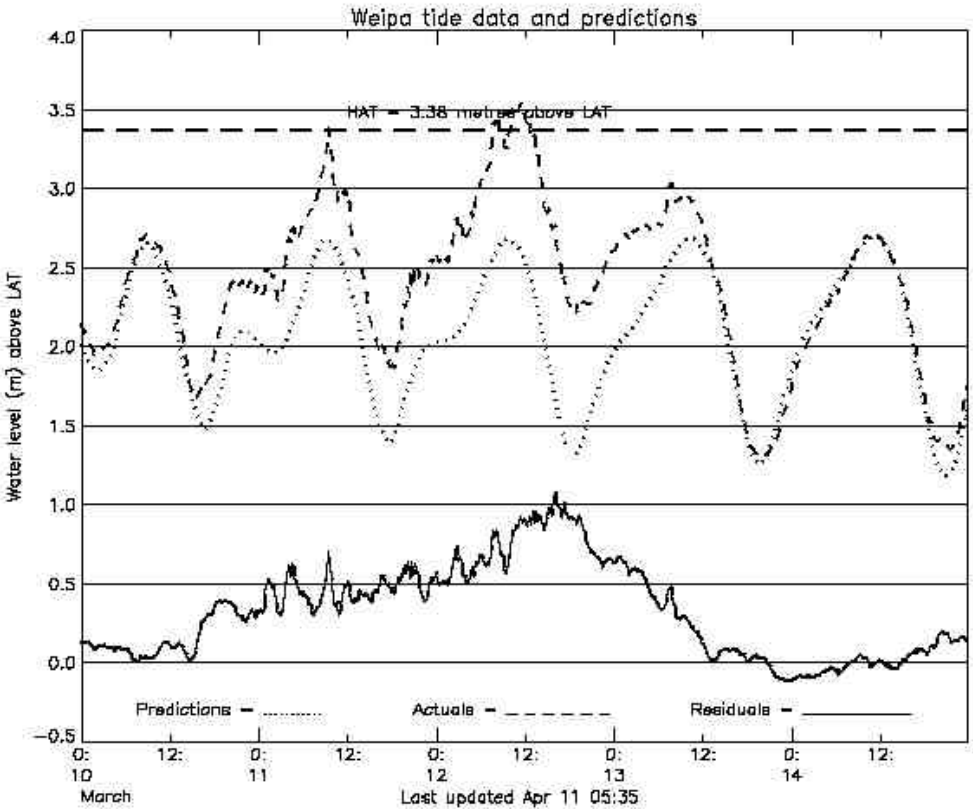

Figure 3 - Weipa tide data 10–14 March 2003

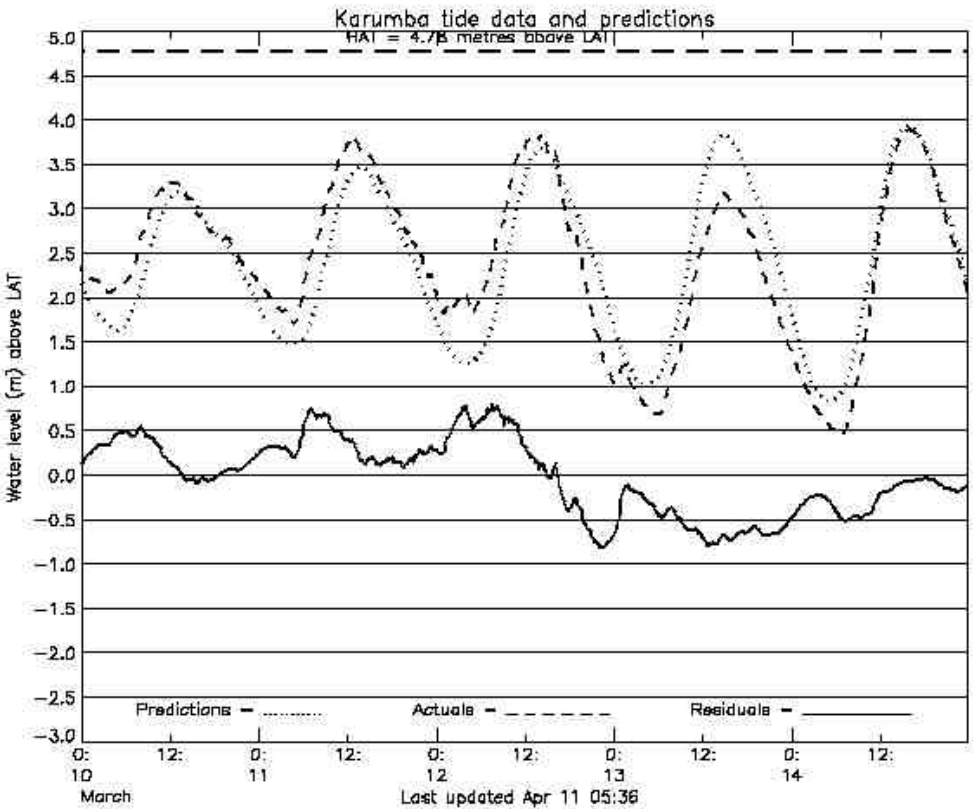

Figure 4 - Karumba tide data 10–14 March 2003

Attachments

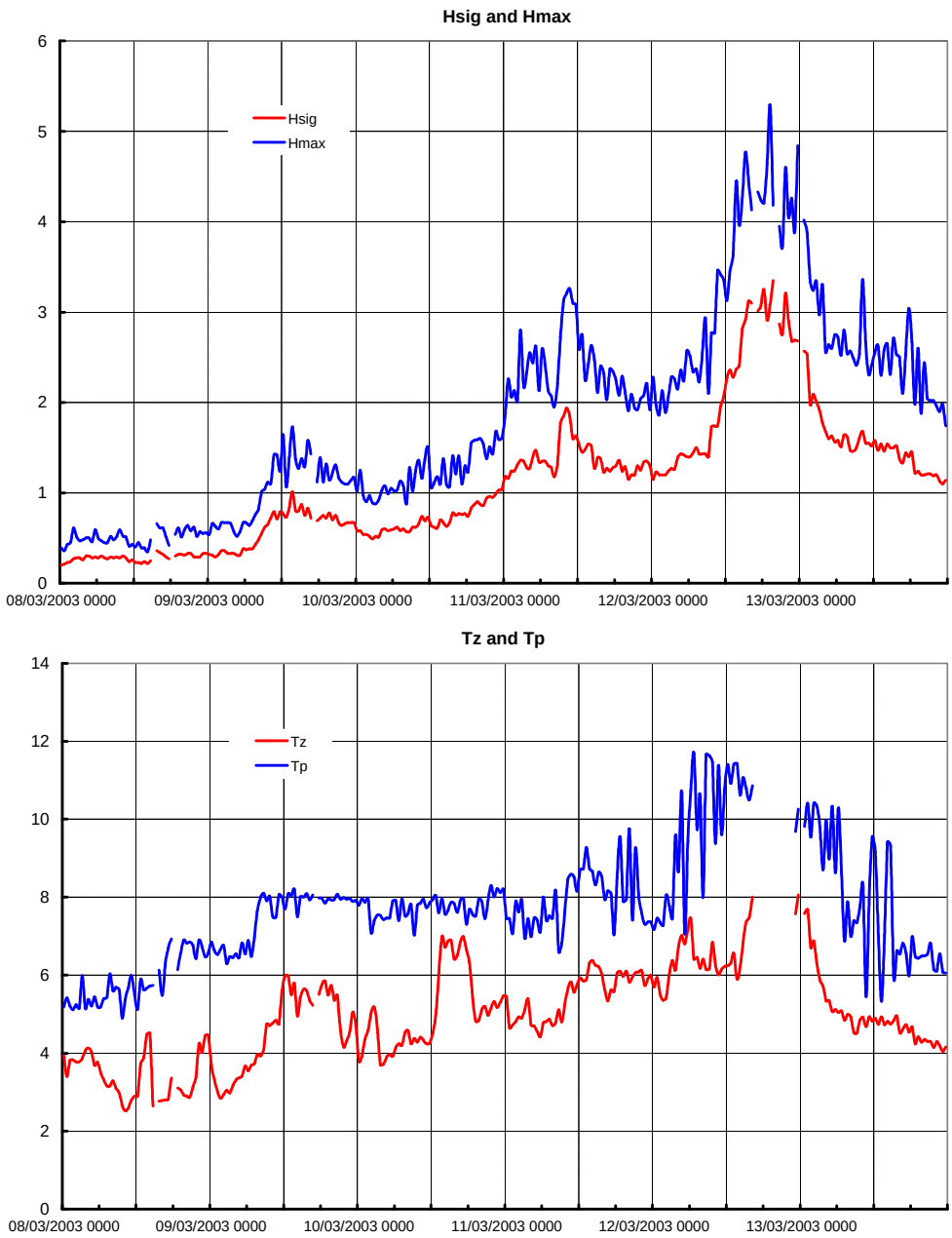

Figure 6 - Weipa wave recordings