



MAURITIUS METEOROLOGICAL SERVICES



TECHNICAL REPORT ON
RAZ DE MAREE
12 MAY 2007
BY
M. BEEBEEJAUN



31 May 2007

Raz de Marée
on
12/13 May 2007
affecting the
South Western coasts of Mauritius

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PREFACE

This technical report aims to give an overview of the hydrometeorological hazard which occurred on the 12 May 2007 and recommends a set of actions to be undertaken by the MMS, the social and economic stakeholders.

The most pertinent need highlighted is a systematic approach for the issuance of an early warning system for a 'Raz de Marée' event for the Republic of Mauritius for the safety of life and property at sea.

The primary mission is to establish a network of open seas observations among the key regional players of the south West Indian Ocean countries. The other initiative is to acquire a couple of wave measuring equipment to be installed in the South Eastern and South Western sectors of Mauritius and Rodrigues.

These 2 steps which I consider adjustment would result in improvement of ocean forecasts for high waves/tidal surge phenomenon striking the coasts of Mauritius and its other outer islands by the issuing agency of such type of warnings.

The electronic and written media should be extensively used for the awareness campaign of the society at large.

I am confident that this report will help to make all stakeholders better understand the phenomenon and enable to respond effectively to the many challenges related to weather and climate disasters.

Y. Boodhoo

Ag. Director

Mauritius Meteorological Services

ABSTRACT

The Republic of Mauritius is encircled by an aquamarine sea and white sandy beaches presenting an undeniable beauty when viewed from a distance. However, life in this small island is occasionally interrupted by various hydrometeorological natural hazards including exceptionally high swell waves causing tidal surge subsequently termed as Raz de Marée.

Past records indicate that such phenomenon occurred also in May 1976, May 1987 September 1994 and March 1995. The Raz de Marée of 12 May 2007 has been significantly destructive due to its strike force and damages caused mainly in the southern and western coasts of Mauritius and in Rodrigues. A preliminary bilan indicated that six people (5 in Rodrigues and 1 in Mauritius) lost their lives. 10 fishing boats were damaged in Mauritius and 15 houses inundated by sea water.

The average height of waves breaking over the reefs were estimated to be of the order of six metres with a maximum of 10 metres and these coincided with the high tide predicted for 12 May at 2223 hours. The swell waves of lesser intensity continued to influence the coasts for the following 3 days before subsiding gradually. These swells waves were generated near Crozet island about 2500 km far to the South West of the Mascarenes islands by a very deep mid latitude cyclone whose central pressure was 945hPa and radius of gale force winds extending to about 1200km. The maximum gust estimated in the centre of the low pressure area (or cyclone) was 175 km/h. The rise in the sea level was about 10 centimetres above the predicted value during high tides and 28 cm above mean sea level. The periodicity of the swell waves was 18 seconds compared with normal time periods of the order of 13 seconds and the velocity of propagation of the waves was 50 km/h.

The Mauritius Meteorological Services (MMS) issued warnings to mariners in its weather bulletin of 12 May 2007 about the occurrence of swells but underestimated its height and impacts due to absence of accurate and reliable data and information.

However, the warning bulletins were regularly updated in the light of fresh in situ observations. Live broadcasts and successive regular bulletins by the Meteorologist on duty and the directorate throughout the day on 13 May through public and private electronic media and the televised broadcasts was a common feature.

A formal early warning system for this type of episodic high wave event is now necessary. The formality for its establishment is taken care of by the Central Cyclone and other Natural Disaster Committee which is under the aegis of the bureau of Prime Minister's Office. The Meteorological Services has already taken steps to set up a communication network with its key stakeholders and to issue a special warning bulletin for the high waves to the marine user-community and the public at large. This devastating event resulting from the Raz de Marée will henceforth be used as a catalyst to improve the forecasts of such tragic phenomena through closer collaboration of key regional and international partners.

Raz de Marée on 12/13 May 2007 affecting the South Western coasts of Mauritius

1. Introduction

On 12 May 2007, huge significant waves of the order of six meters in the region of Grand Port to Flic en Flac through Gris Gris were reported breaking ferociously over the reefs and the sea water moving inland along the coast during late evening at around 2200 hours.

The roaring noise of the waves and their force of action against the coasts were so threatening that many people living in the vicinity ran for their lives to look for shelter towards higher grounds among families and friends. The sea water penetrated in many places but was more significant in areas such as Pointe des Galets due to absence of coral reefs.



Beach flooding at La Prairie

Although Raz de Marée occurred previously in May 1976, May 1987, September 1994 and March 1995 the inhabitants of the South Western sector of Mauritius classified the one of May 2007 as the most dreadful of all the events. However, no special warnings for any of these events were issued by the Meteorological Services. Twice a year, at the time of equinoxes, the mid latitude lows in the southern ocean basin abruptly start to migrate pole ward or equatorward. The response of the ocean is dramatic and curious. An intense narrow band of strong winds in the form of a northward jet builds up over the surface layers of the sea when the low pressure is significantly deep. The amplitude of the waves further increased by the coupling effect of a South West to North East oriented anticyclone located to the South South East of South Africa thereby generating exceptionally high waves. These waves after acquiring sufficient energy from the wind move long distances undisturbed

across the ocean in the direction of the wave crests. South Westerly Swells formed in the area of Crozet and Kerguelen Islands occasionally strike the south-western coasts of Mauritius with severe impacts.

2. Historical events

May 1976

- A similar phenomenon took place in the South Western region and the senior inhabitants of Riviere des Galets witnessed the scene. It is related that dead bodies from the nearby cemetery were found floating into the sea. (Tidal wave on 31 May/ 01 June 1987, S. Ragoonaden, June 1987). The people around also indicated that it was God's wish to have 2 burial ceremonies for the same corpses and considered the dead as Saints. It was also reported that about 100 fishermen lost their fishing boats but did not reveal whether the fishing vessels were destroyed by the waves or simply carried away at open seas.

May 1987

- The high waves that affected the south western coasts during the event of 31 May 1987 caused equal discomfort among the inhabitants. There was drastic Geomorphologic changes at villa Pointe aux Roches. Massive sand invasion had been noted in some places. 16 houses located 5 metres above mean sea level and about 15 metres from the high water mark were severely inundated. Beach erosion was common in some places and the sand beneath the coastal trees washed away. Swells reported were 4.0 metres. The waves were formed near Crozet island by a deep low pressure area with central pressure of 970hPa.

September 1994

- The surge in mid September 1994 caused minor flooding in the vicinity of the estuary and the cemetery. Deep low near Crozet island 980hPa. South South Easterly swells of the order of 3 - 4 metres were reported on 12 September 1994.

1 March 1995

- The surge was caused by tropical cyclone Ingrid. Although not of the same origin, waves of 4.0 metres were observed at Riviere des Galets.

3. High Wave event during 12 MAY 2007

As per the data available from Saint Pierre tide gauge station, at midnight 11 May 2007, the significant waves height recorded was 2.0 metres and it decreases gradually to 1.0 metre on 12 May at 1100 hours. The wave height which was 2.4 metres on 12 at 1600 hours increased at a rate of about one metre per hour until 1900 hours when it reached to 5.5 metres. The high periodicity of the waves, 18 seconds, explains the destructive power of the swell waves when it struck the Mauritian coasts. (Fig 1)



Fig 1: Movement of the swell wave towards Mauritius from source region

The highest significant wave recorded was 6.4 metres and the absolute maximum wave height was 11.3 metres and was recorded on 12 May at 2300 hours by St. Pierre, Ile de la Reunion wave rider.

The swell waves were definitely responsible for the Raz de Marée event of 12 May 2007. Observations indicated that the giant waves (Fig 2) attained maximum intensity on 12 May 2007 between 2200 and 2300 hours coinciding with the high tide due at 2223 hours.

(Data source: courtesy Meteo France, La mairie de Saint Pierre, Ile de la Reunion, Tide gauge stations at Port Louis - Table 1, Fig 6)

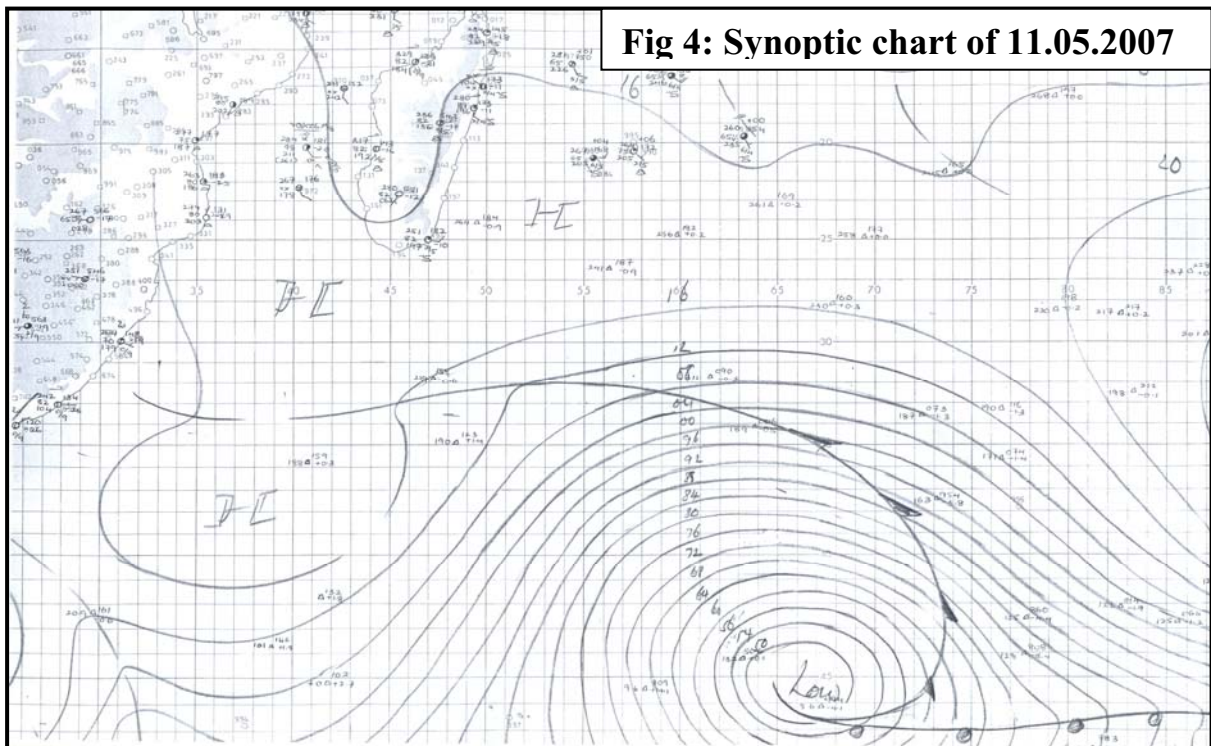
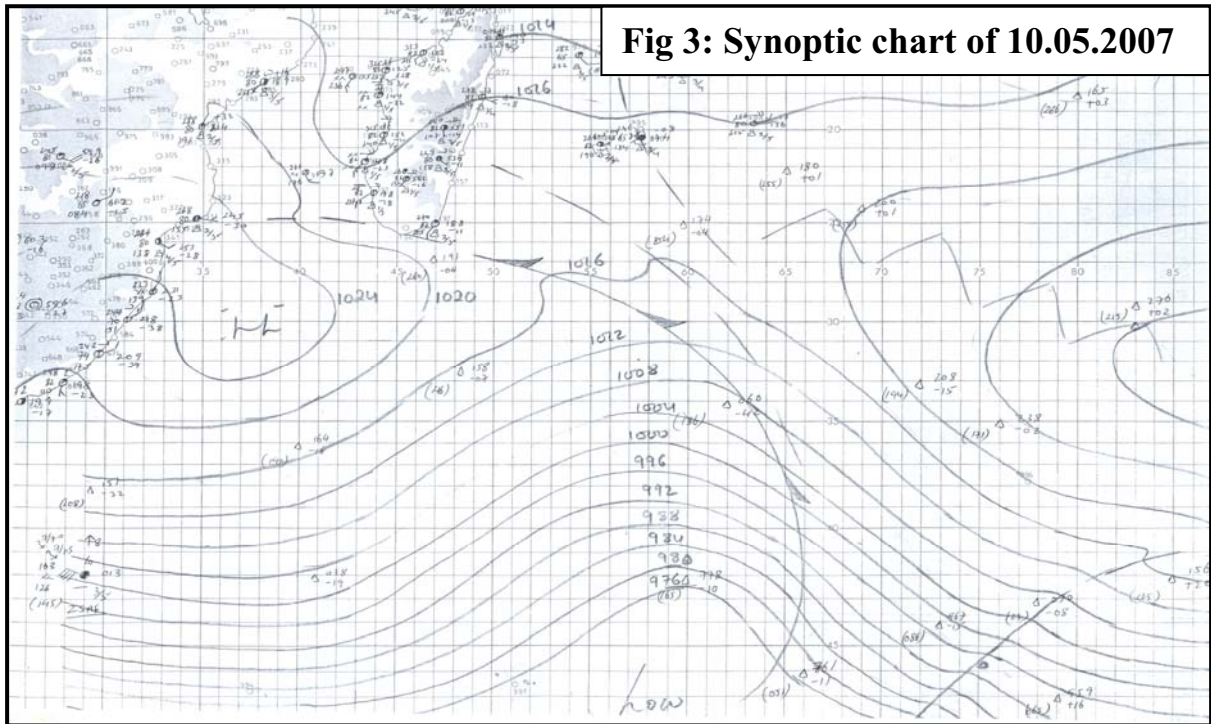


Fig 2: High waves breaking in the south western coasts of Mauritius on 13 May 2007

4. Formation of Raz de Marée 12 MAY 2007

➤ MAURITIUS

A very deep midlatitude low pressure area was formed in the roaring forties between Crozet island and Kerguelen island on 10 May 2007. Its central pressure was estimated to be 945hPa with a radius of gale force winds extending to 1200 km. The distance from Mauritius was around 2500 km. The maximum gust estimated near the center of the low was 175 km/h. The low pressure area was quasistationary for nearly 24 hours and generated swells of the order of 8 metres. An anticyclone with central pressure 1024hPa was located to the North West of the deep low (see fig 3 and fig 4).



These sub polar lows generally become more active in the start of southern hemisphere winter, while moving equatorward. The strong winds originated from these low pressure systems generates high amplitude waves in the region. These waves leave the site of formation to move equatorward after acquiring enough

energy from the wind. They are recognized as one of the biggest traveler of the ocean with little loss of energy and are practically independent of the environmental changes.

The violent swells that struck the South Western coasts of Mauritius originated from the low pressure formed on 10 May 2007. The fetch was not too deep but the acute pressure difference contributed to develop the waves sharply in vertical extent. A ship reported a south westerly swell of four metres on the 12 May at 1800 UTC to the South East of the Malagasy Republic.

Table 1

Hourly sea level data (mm) at Trou Fanfaron, Port Louis 11 – 13 May 2007 Time UTC

Date	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
11	1680	1706	1749	1796	1758	1777	1762	1720	1701	1602	1560	1521	1520	1580	1680	1736	1814	1859	1878	1837	1847	1754	1712	1637
12	1611	1599	1648	1718	1768	1798	1815	1815	1811	1744	1657	1586	1519	1559	1636	1753	1831	1942	1930	1984	1990	1863	1728	1651
13	1531	1562	1544	1633	1755	1809	1909	1893	1899	1828	1740	1617	1526	1575	1608	1697	1785	1894	1950	1994	1963	1919	1826	1680

HW: High Water LW: Low Water ABS: Absolute

Date	1HW	Time (UTC)	2HW	Time (UTC)	ABS	Time (UTC)	1LW	Time (UTC)	2LW	Time (UTC)	ABS	Time (UTC)
11	1783	0410	1876	1800	1909	1743	-	-	1523	1125	1508	1102
12	1824	0623	1992	1845	2047	1836	1604	0012	1520	1210	1493	1206
13	1929	0705	2021	1901	2057	1836	1560	0050	1522	1245	1461	1313

DATE	1HW (cm)	Time (UTC)	2HW (cm)	Time (UTC)	1LW (cm)	Time (UTC)	2LW (cm)	Time (UTC)
11	171	0419	184	1751	-	-	146	1056
12	176	0544	189	1823	155	0006	144	1151
13	181	0641	193	1855	147	0045	143	1237

High, Low and Absolute Tides (mm) at Port Louis 11 – 13 May 2007

Tide Predict (cm) at Port Louis 11 – 13 May 2007

➤ **RODRIGUES**

The swell started to affect Rodrigues as from 13/0900 hrs. However, they continued to sweep the island until 16 May 2007 to subside gradually the day after. The signals of the **seiches** (Fig 5) intensified to reach an absolute value of 280 cm during the spring tide.



View of the gigantic wave 13.05.2007 estimated 7 metres from Pointe Canon Meteorological Station, 2.5 km away.

The height of swell waves estimated at open seas was of the order of 7 metres with periodicity of about 18 seconds. The wave heights estimated in the lagoon were of the order of 3 metres. The tides predicted and recorded are given in the table below.(Table 2)

No material damage to infrastructure, no sea water penetration inland and no significant accumulation of water in the lagoon (Fig 7) were observed during the Raz de Mareé episode in the island of Rodrigues. However 2 National Coast Guard (NCG) officers and 3 fishermen lost their lives as their embarkation could not resist the huge waves at the open seas.

Table 2**Hourly sea level data (mm) at Rodrigues 11 – 15 May 2007 Time UTC**

HH DD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
11	199	206	213	219	219	216	209	199	189	180	174	173	178	188	200	212	220	222	221	213	201	190	181	177
12	178	186	199	212	223	229	229	220	207	193	177	166	164	172	186	204	223	235	239	235	223	206	187	170
13	162	166	178	196	218	235	244	244	231	212	190	171	157	158	169	190	215	239	252	258	245	225	201	174
14	155	151	158	177	203	227	246	253	250	230	205	179	158	148	152	171	202	232	258	268	265	248	219	186
15	158	142	141	156	181	208	240	259	262	250	228	197	169	151	147	158	182	212	247	268	273	262	238	206

HW: High Water LW: Low Water ABS: Absolute

Date	1HW	Time (UTC)	2HW	Time (UTC)	ABS	Time (UTC)	1LW	Time (UTC)	2LW	Time (UTC)	ABS	Time (UTC)	Date	1HW (cm)	Time (UTC)	2HW (cm)	Time (UTC)	1LW (cm)	Time (UTC)	2LW (cm)	Time (UTC)
11	219	0330	222	1700	223	1710	173	1030	177	2320	170	1015	11	221	0344	226	1700	164	1026	170	2303
12	230	0530	239	1800	241	1810	164	1130	-	-	160	2355	12	230	0513	240	1754	155	1131	-	-
13	245	0610	260	1835	265	1830	162	0015	155	1225	144	1205	13	241	0612	253	1836	155	0003	146	1220
14	253	0705	268	1925	272	1925	150	0045	148	1325	144	1315	14	250	0700	264	1916	141	0051	138	1304
15	263	0740	273	1950	280	1945	140	0130	146	1330	132	0130	15	257	0744	271	1955	128	0133	133	1345

High, Low and Absolute Tides (cm) at Rodrigues 11 – 15 May 2007**Tide Predict at Rodrigues 11 – 15 May 2007****5. Observed features during 12 MAY 2007 event.**

- ❖ It was reported that about 15 families suffered material damages to their houses and belongings due to inundation mainly at Rivière des Galets.
- ❖ Total number of loss of lives 6 (including 2 officers of the National Coast Guard and 4 fishermen).
- ❖ Deposits of significant quantity of sand over the road in particular between Le Morne Village and Baie du Cap.
- ❖ Flooding of tarred roads especially in Radier Macondé and Le Morne Village area.

- ❖ Small fishing boats thrown ashore at Baie du Cap.
- ❖ A survey from Flic en Flac to Souillac indicated that the ocean water penetrated generally 20 to 30 metres inland. The penetration was more marked at some places with about 60 metres inland thereby inundating 15 coastal houses mainly at Rivière des Galets region.
- ❖ La Prairie, which is a rocky beach, the gigantic waves projected stones weighing around 1.5 kg to about 60 metres away from high water mark.
- ❖ The local residents of Baie du Cap indicated that the ocean water reached inland as far as 25 metres from the beach, something never observed before and insisted that such scenery did not occur during Tsunami event of 26 December 2004.
- ❖ The waves reaching the lagoon between Baie du Jacotet and Pomponette reduced the visibility considerably due to the formation of a dense sea spray.
- ❖ Debris from the ocean carried by the waves clearly marked the inland boundary of the ocean water penetration.
- ❖ The high waves persisted for the whole day on Sunday 13 March 2007. They became less intense subsequently but remained a threat for the next 3 days.
- ❖ The high tide in Mauritius was expected at 12/ 22:23 hours. The predicted tide level was 189.0 cm and the recorded value read 198.4 cm. The mean sea level is 170 cm. (Fig 8)
- ❖ The height of waves at open seas remained about 3.0 metres till Friday 18 May 2007.
- ❖ Height of significant waves estimated in Mauritius 6.0 metres and time period 18 seconds. The estimated absolute maximum height of wave was around 12 metres.

- ❖ Height of significant waves estimated in Rodrigues 7.0 metres and time period 18.0 seconds.

High tide in Rodrigues was expected at 13/2236 hours

predicted value 253 cm

recorded value 260 cm

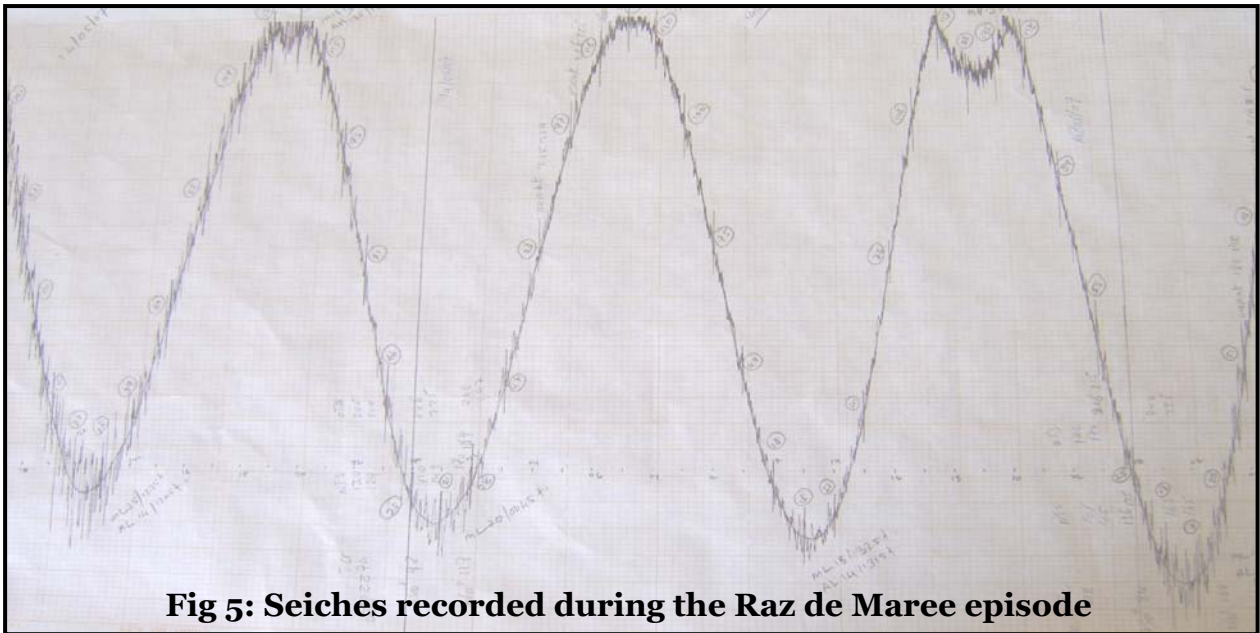


Fig 5: Seiches recorded during the Raz de Maree episode

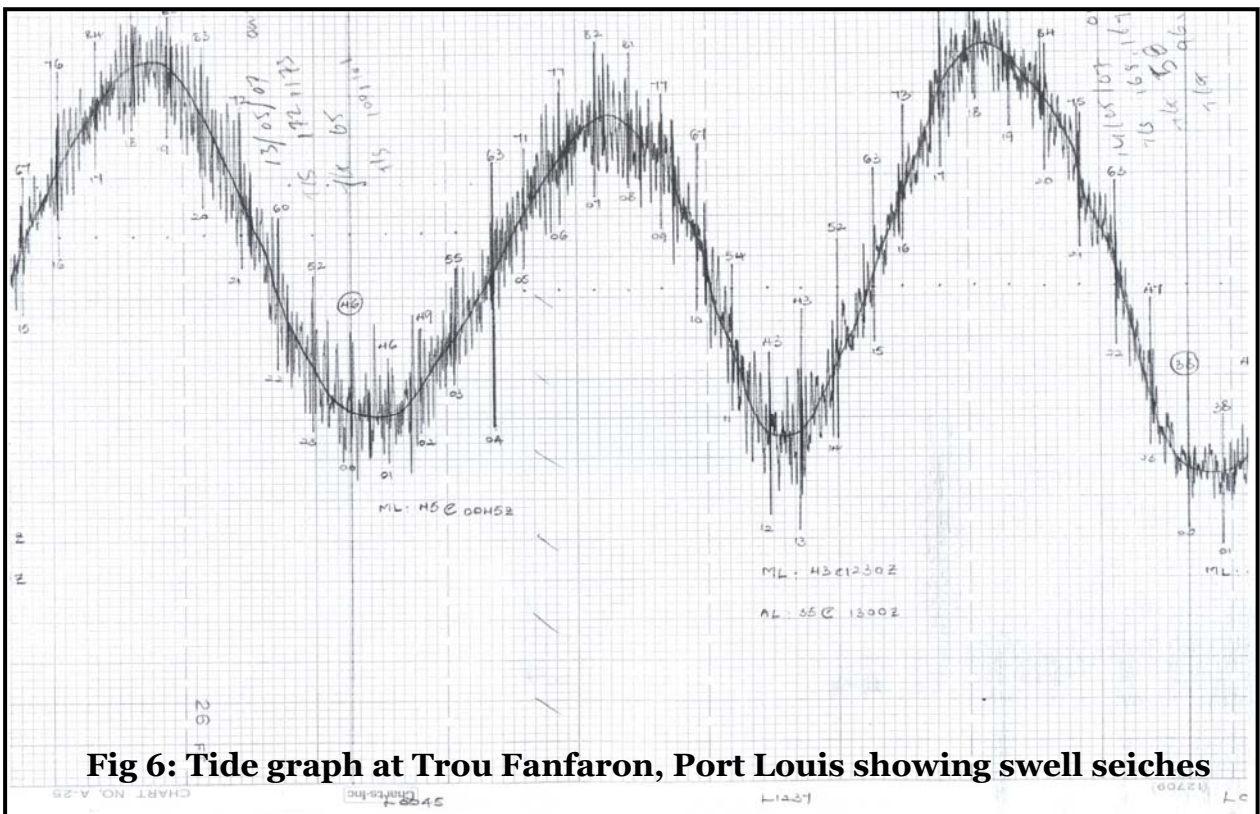


Fig 6: Tide graph at Trou Fanfaron, Port Louis showing swell seiches

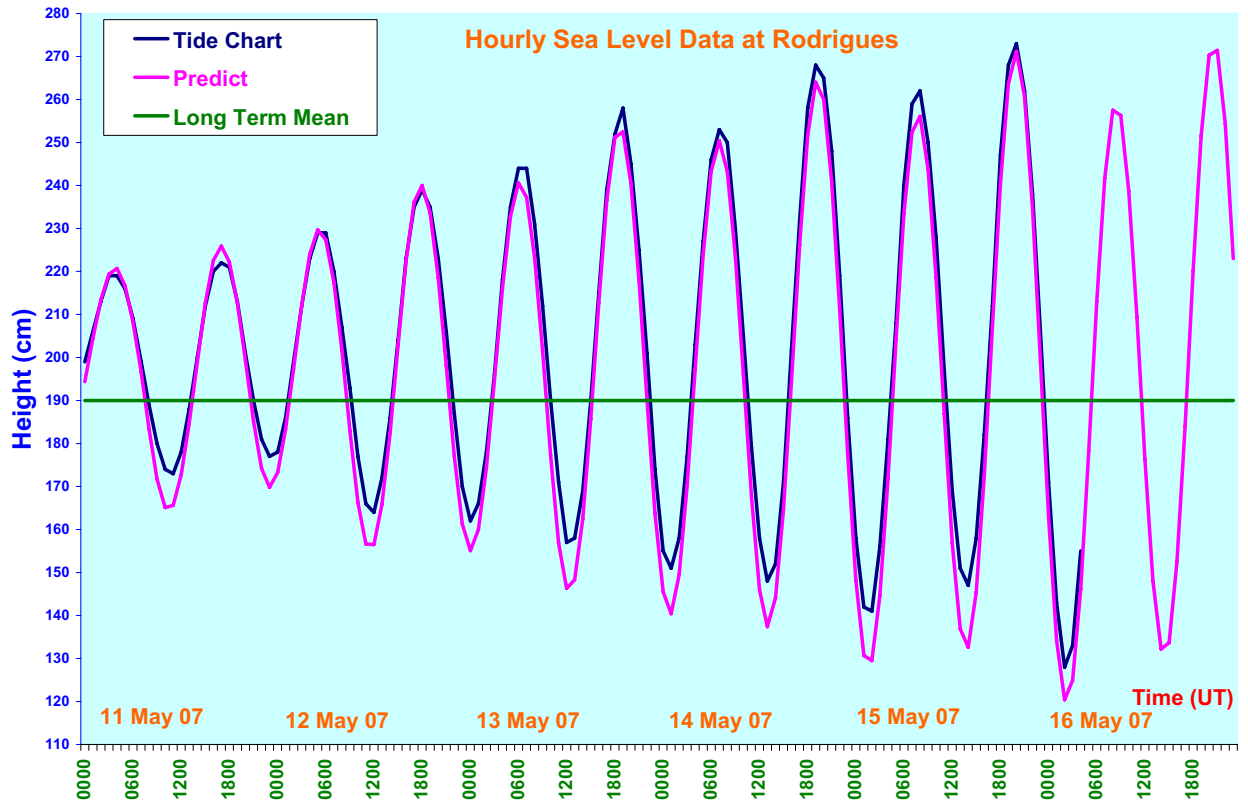


Fig 7: No significant changes between the predicted tide and the actual water level at Port Mathurin, Rodrigues

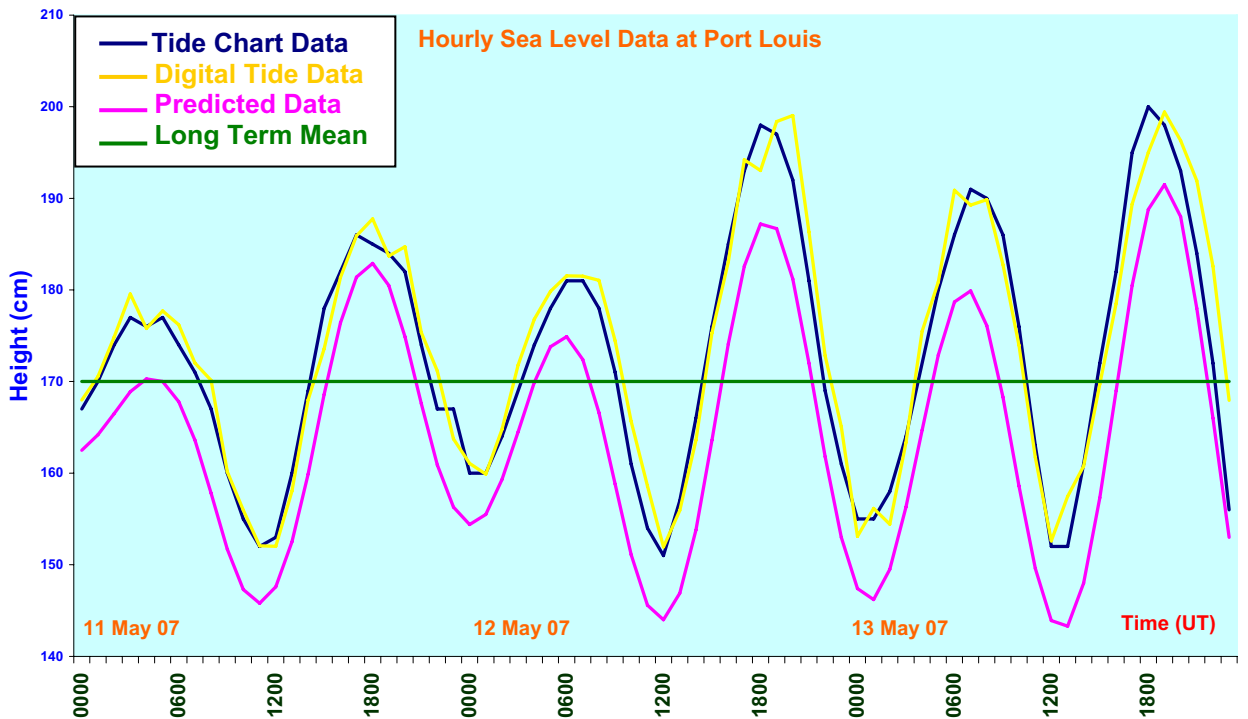


Fig 8: 10 cm of sea water above predicted value recorded at Port Louis tide gauge station

In situ observations of

**Raz de Maree Event
(12 May 2007)**

along the

South Western coast

of the

Republic of Mauritius

In Images



Debris from the ocean marking the boundary of the sea water penetration at Le Morne Brabant



Sand accumulation along Le Morne village coastal road



Gabion stones used to protect the beaches against high waves projected 60 metres off the high water mark



Debris boundary showing inland penetration at La Prairie



Sea spray affecting visibility at Baie du Jacotet and inland flooding



The blue sea turned chocolate due to soil erosion at Radier Macondé



Picnickers venturing at waves of the order of 2.5 metres inside the lagoon at Flic-en-Flac public beach



Waves of the order of 6 metres estimated at Riviere des Galets close to the shore



Search and rescue operation by the National Coast Guard at Flic-en-Flac through helicopter



Severe beach erosion at Le Morne showing the naked roots of filao trees



Flooded coastal road at Lardier



Local residents who fled the raz de marée event were shocked at the sight of sand and mud invasion in their houses



Two residents of Maconde indicating water penetration inland (40 to 50 m)



Inland swell waves displaced a log from the other side of the bay at Maconde



An estimated 3 – 5 tons of sand accumulation along the coastal road at Baie du Cap

6. Velocity of the Swell Wave

Swell waves are the longest traveler in the ocean. One set of waves observed in the North Pacific was estimated to have travelled halfway around the world from the Indian Ocean, the great circle route passing South of Australia (Snodgrass et. al, 1966). The direction of travel is generally determined from the orientation (in deep water) of the wave crests and the distance is calculated from the difference in arrival time of the slowly varying “wave train” or group of waves of different length and hence of different frequency. A description of the above phenomenon is beyond the scope of this report. For further information kindly consult the following references: Scott Russel 1844; Lamb 1932 section 236.

It has often been noticed that, when an isolated group of waves, of sensibly the same length, is advancing over relatively deep water, the velocity of the group as a whole is less than that of the individual wave composing it. If attention is fixed on a particular wave, it is seen to advance through the group, gradually dying out as it approaches the front, whilst its former place in the group is occupied in succession by other waves which have come forward from the rear.

The velocity of the wave train may then be approximated by $C_v = \frac{1}{2} C$

A relationship between wave velocity, wave length and Time period is given by

$C = 3.03T$ where C is the wave velocity

T is the time period of wave in seconds

The time period of the swell wave recorded was 18 seconds.

$$C_v = \frac{1}{2} \times 3.03 \times 18$$

$$\approx 27 \text{ knots}$$

$$\approx 50 \text{ km/h}$$

Time taken for the first wave train to reach the Mauritian coasts is 50 hours.

An easy thumb rule to be used by the bench forecasters for the calculation of the speed of propagation of swell wave is just to approximate it to one and a half time the periodicity.

7. Common characteristics occurring during Raz de Marée events in Mauritius

- ❖ The surge in the sea water caused by giant waves mainly affects almost the southern and western coasts of Mauritius. The area most vulnerable to this type of event is in the vicinity of Rivière des Galets.
- ❖ The occurrence of such high waves episodic events in Mauritius occur always during the migration equatorward or poleward of the axis of the mid latitude lows.
- ❖ Generally all the swell waves except those accompanying the storm surge are formed near Crozet island with the contribution of the subpolar cyclones and enhanced by a fairly strong anticyclone to the southwest of the Mascarenes islands.
- ❖ Most of the significant wave height (SWH) of the swell waves affecting the south western coasts of Mauritius were of the order of 6.0 metres in the neighbourhood of the reefs.
- ❖ Sand accumulation over the roads, beach erosion and inundation of the coastal roads in the southwestern sector of Mauritius especially the Radier Macondé area were repetitive issues.
- ❖ About 15 houses in the Rivière des Galets region are continuously inundated at every event.
- ❖ No loss of lives has been deplored during the preceding events except during the last Raz de Marée episode of 12 May 2007.
- ❖ All the events coincided with the high tides.
- ❖ The tidal surge is progressively becoming more violent.

8. Action taken during the Raz de Marée 12 MAY 2007

- ❖ A weather communiqué for the general public was issued on the 12 May 2007 at 16.15 hours and included south westerly swells of the order of 2.5 metres.
- ❖ A weather bulletin was issued on 13 May at 0615 local time which clearly warned the public not to venture at sea due to rough seas with swells of the order of 3.0 metres.
- ❖ On the 13 May 2007, at 0700 hours, the Meteorologist on duty intervened live on MBC Radio and stressed on the danger mentioned in the issued warning

bulletins. He emphasized on the expected wave height and urged the public not to venture at sea.

- ❖ A communiqué was updated on 13 May at 1130 hours which highlighted the existence of tidal surge with southwesterly swell waves of the order of 3 to 4 metres. The public was strongly advised not to venture at sea.
- ❖ The meteorological personnel were sent to perform in situ observations along the southern and western coasts and to relay those to the meteorological office for necessary updates in the regular weather communiqué and broadcasts.
- ❖ The meteorologist intervened live at regular intervals in all private and public electronic media. About 20 live interventions were carried out on 13 May 2007. This may have contributed to save more lives.
- ❖ The Acting Director explained the event to the public through a televised broadcast.
- ❖ A bulletin for Rodrigues Island mentioning southwesterly swells was issued on 12 May 2007 at 16.30 hours.
- ❖ The morning weather communiqué issued for Rodrigues on 12 May 2007 at 04.20 hours indicated south westerly swells of the order of 2.5 metres.
- ❖ In the fishermen bulletin for Rodrigues issued at 13/10.00 hours, south westerly swells of the order of 3.0 metres was highlighted and the public advised not to venture at sea.
- ❖ Another communiqué for Rodrigues issued on 13 May at 16.15 hours. Swells of 3 to 4 metres were forecast and the public was strongly urged to refrain from going at sea.

9. Critical Appreciation and Comments

- ❖ Of all the Raz de Marée episodic events that struck the coasts of the Republic of Mauritius, the one of 12 May 2007 had been the most devastating. The waves peaked exceptionally high and the threat lasted longer (almost 3 days) than the preceding ones.
- ❖ The model outputs generated by world centers could not precisely reveal the severity of this event. Different models had different appreciation of the event.
- ❖ The Mauritius Meteorological Services (MMS) usually forecast the significant wave heights which is defined as the average height of the 1/3 highest waves, which also turns out to be about the wave height estimated by trained observers

looking at sea-waves. These days the Significant Wave Height (SWH) is more commonly defined to be four times the root-mean-square elevation of the sea surface, and is a standard statistic for the roughness of the sea surface. The absolute maximum wave height is approximately twice the SWH.

- ❖ As noted earlier the recorded SWH was 6.4 metres and the absolute maximum 11.3 metres which may explain the discrepancy in the interpretation of our forecasts. Our colleagues from other centres in the region give both the figures to the public. To include both figures in our forecasts is an option to be discussed among the stakeholders. According to World Meteorological Organization (WMO) manual the state of the sea is based on the SWH.
- ❖ The severity of the event could not be accurately determine as the satellite altimeter data giving estimates of SWH only measure the roughness of the sea in a small footprint (≈ 10 km diameter) immediately below the satellite. The gridded data are then constructed from median values of individual “passes” across each grid box. This limits the reliability of forecasting coastal wave heights. Also this data source is not available in real time at the MMS and cannot be used as a forecasting tool.
- ❖ The MMS is a specialist of high sea forecasts and is discharging its international obligation of providing Global Maritime Distress Safety System (GMDSS) maritime bulletins for open seas satisfactorily. It is a fact that due to absence of observations and equipments, the shallow water waves forecast is not accurate and precise as the wave heights vary rapidly close to the coasts. Also, the MMS cannot rely on the satellite which cannot measure waves if its footprint overlaps land. The data received through the satellite passes are analysed to extend analysis nearer shore which is a limitation for providing accurate forecast.
- ❖ The absence of an established warning system for these gigantic waves striking the coasts was another setback for the tragic event of 12 May 2007. As a special warning for such event did not exist, the public did not pay much heed to Raz de Marée episode. This was obviously clear when people refused to step out of the sea in spite of the warning issued by the MMS and relayed by the National Coast Guard personnel.
- ❖ Following the unprecedented event of 12 May 2007, and upon the recommendation of the Prime Minister’s Office the MMS have already decided to

issue a special warning bulletin whenever a Raz de Marée is forecast to strike the Republic of Mauritius.

10. Future Directions of MMS

There is no argument to justify loss of life and property during hazards of any origin. In order to improve the meteorological protection for the safety of the local population, the MMS recommends the following actions:

- (a) Acquisition of 2 moored buoys or wave-rider buoys to be deployed off the lagoon in the South East and South West of Mauritius and Rodrigues including capacity building for its maintenance. These equipments will provide valuable in situ data for issuing, upgrading and termination of warning bulletins for such hydro meteorological hazards.
- (b) Inclusion of a formal warning system for the Raz de Marée events occurring in the Republic of Mauritius by the Central Cyclone and other Natural Disaster Committee as part of a marine multi-hazard Early Warning System.
- (c) Networking with all national key stakeholders for rapid disseminating warning information to the public and Marine user community.
- (d) The public and Marine users should be made aware of any development in the issuance of new types of bulletin during Raz de Marée events. An intensive awareness campaign should be targeted through the electronic and print media. Lectures and talks to primary, secondary and tertiary schools should be organized at regular intervals with images of the previous destructive events to keep memories afresh.
- (e) Brochures and other materials highlighting safety precautions to be taken upon issuance of warning of Raz de Marée event. Safe spots should be clearly marked with easy access.
- (f) Regional and International cooperation in data and knowledge sharing must be established with friendly countries through the help of the parent Ministry. Negotiation for the exchange of wave data and multi-hazard warnings with Meteo France, Ile de la Reunion, has already been initiated by the Acting Director of Meteorological Services.
- (g) Identify areas prone to sea flooding along the coasts of Mauritius and Rodrigues.

- (h) Research/ studies to be carried out in collaboration with other stakeholders and or research organisation.

11. Concluding Remarks:

The devastating Raz de Marée event of 12 May 2007 resulting in loss of life and property in Mauritius and Rodrigues has created an enthusiasm in the Meteorological personnel to generate as far as possible a “make no mistake” forecasts and make the Republic of Mauritius in a real state of preparedness to face this type of hazard. The major lesson learnt during this disaster which left a sequel of death and inhibited a feeling of scare among the local population was the absence of a basic and fundamental need, an early warning system for Raz de Marée for the Republic of Mauritius.

Although such event cannot be prevented, its impacts can be mitigated through community and emergency preparedness, early warning, adequate response, and public awareness. The Central Cyclone and Other Natural Disaster Committee (CCNDC) is urged to encourage and establish networking among partners at the National, Regional and International scale. Tools and equipments to provide in situ real time observations are a sine qua non to improve any multi-hazard early warning systems. If the right initiatives are taken by the appropriate authorities including the Meteorological Services, the Early Warning System for Raz de Marée for the Republic of Mauritius will blossom and not fade out as a passing interest.

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