

**SEVERE WEATHER FORECASTING AND DISASTER RISK
REDUCTION FULL DEMONSTRATION PROJECT
(SWFDDP)**

REGIONAL SUBPROJECT RA V

**PROGRESS REPORT N°6
For the period 1 July – 31 October 2012**

(15 December 2012)



Part of SWFDDP website banner

1 Overview:

1.1 Introduction:

The meeting of the Regional Subproject Management Team (RSMT) of the RA V Severe Weather Forecasting and Disaster Risk Reduction Demonstration Project (SWFDDP) for the planning of the expansion of the Regional Subproject to include nine South Pacific Islands was held from 1 to 4 November 2010, in Wellington, New Zealand. The meeting report can be found at:

[Meeting of the Regional Subproject Management Team \(RSMT\) of the SWFDDP - South Pacific Islands](#), Wellington, New-Zealand, 1-4 November 2010.

Based on the success of the Pilot phase of the SWFDDP (1 November 2009 to 31 October 2010), it was concluded that the RSMT will implement a full Demonstration Phase with expanded participation, from 1 November 2010 to 31 October 2012.

The Regional Subproject Implementation Plan (RSIP) can be found at:

[Regional Subproject Implementation Plan \(RSIP\) for the full phase of the SWFDDP - South Pacific Islands](#) (pdf).

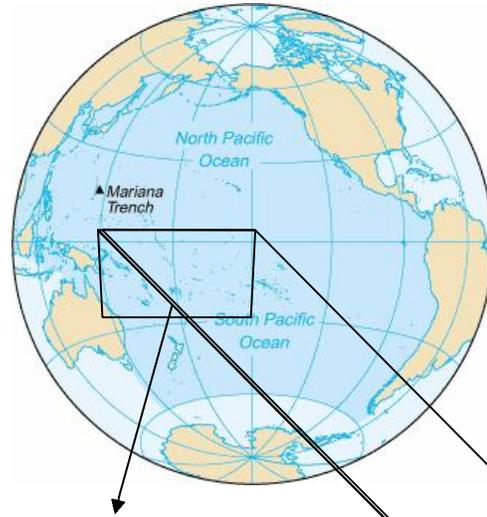
The principles and the goals of the Project were well outlined in section 1.1 of the plan. The Cascading Forecasting Process of global centres providing products through a lead RSMC to NMHSs is described in section 1.2. The overall framework of the Project in RA V is presented in section 1.3.

Full demonstration phase participants:

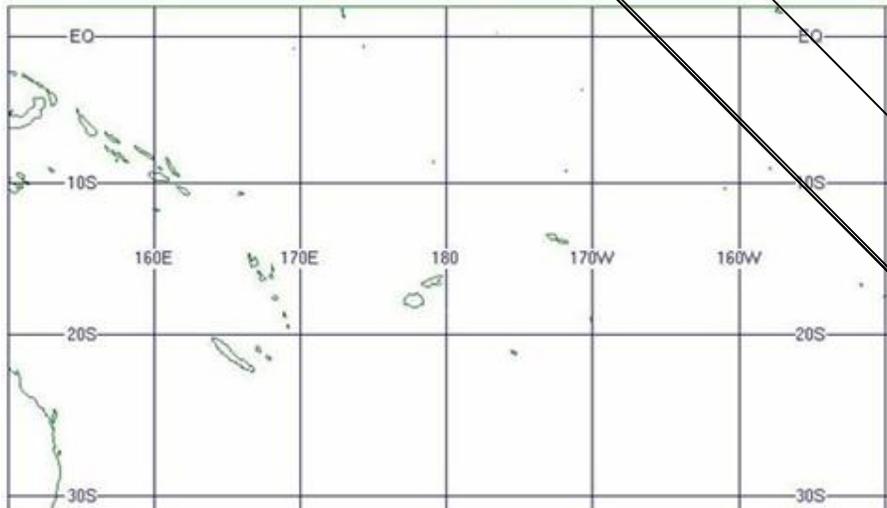
A Pilot phase involving a group of 4 participating countries in 2009/10 (Samoa, Vanuatu, Solomon Islands, and Fiji) was completed on 31 October 2010. It was followed by a full Demonstration phase in 2010/12 which includes the 4 Pilot phase NMHSs plus the following five NMHSs: Cook Islands, Niue, Kiribati, Tonga and Tuvalu.

The Regional centres include: RSMC Wellington as lead RSMC for this Subproject (having responsibility for the development and management of a dedicated project Portal), RSMC Darwin (Geographic), and RSMC Nadi (Activity – Tropical Cyclone Centre (TCC)). Fiji also participates in the project as a NMHS.

The Global centres (ECMWF, UK Met Office, USA and JMA) will continue to participate actively. The Met Office has tailor made products for the area 150E – 120W, 10N – 40S, which is larger than the 'South Pacific window' - 150E - 150W, 2N -30S of the RSMC Wellington Guidance product (see below).

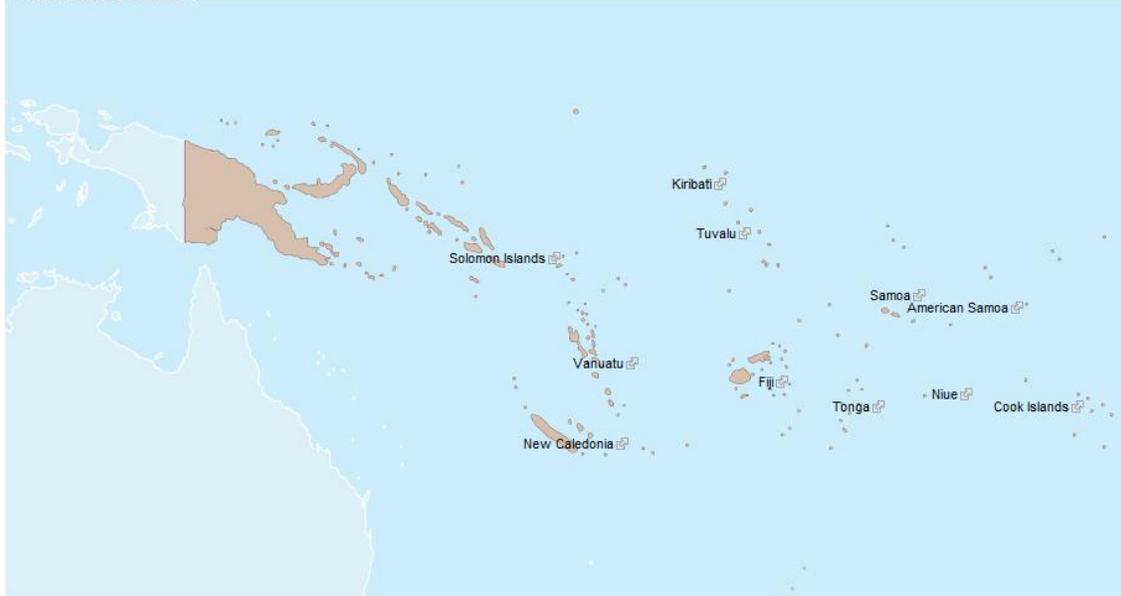


SWFDDP 'South Pacific Window' (subset of the above map)



South Pacific Ocean Map (showing location of participating NMHS)

South Pacific Ocean Map



This sixth Progress Report of the full Demonstration Project spans the period 1 July 2012 to 31 October 2012. There will be another report due at the end of February 2013 prior to the next RSMT meeting. The previous Progress Reports can be found at: <http://www.wmo.int/pages/prog/www/CBS-Reports/DPFS-index.html>.

This progress report compiles and assesses the feedback received from the RSMCs and the NMHSs in order to determine the quality of the guidance provided by RSMC Wellington as well as the quality and applicability of the global and regional products available. The feedback will also be used in order to ascertain the relevance and the quality of the warnings issued and the level of service provided by the NMHSs to the Disaster Management and Civil Protection Authorities (DMCPAs) and the media.

Of the participating countries, Kiribati, Tuvalu, Tonga, Niue and Cook Islands depend on RSMC Nadi for some or all of their forecasts and warnings. This poses a challenge in how such forecasts and/or warnings should be evaluated when they are issued by somebody else. Each country should accept some degree of responsibility for what goes out to their public and any feedback should be passed on to RSMC Nadi. This way it makes sense for each of them to evaluate the forecasts and warnings just as if they had produced them.

Reports¹ and feedback received from participating NMHSs for the period 1 July 2012 – 31 October 2012 (**Boldface**: Pilot phase participants)

Centre/Country	Event report (Appendix H)	Evaluation table(Appendix I)	Verification of warnings	Case studies ³
NMHS Samoa	x	x	²	
NMHS Solomon Is.	x	x	²	
NMHS Vanuatu	x	x	²	
NMHS Fiji	x	x	²	
NMHS Cook Is.	x	x	²	
NMHS Kiribati	x	x	²	
NMHS Niue	x	x	²	
NMHS Tonga	x	x	²	
NMHS Tuvalu	x	x	²	

¹ RSMC Wellington submitted a report describing its activities, major events and South Pacific Guidance evaluation statistics over the period. RSMC Darwin submitted a *report outlining their activities*.

² No NMHS has presented formal verifications of their warnings⁺ yet.

³ No NMHS has presented a case study for the period. Cook Islands presented evidence for a mesoscale rain/wind event in late September.

+ To put things in perspective, most NMHSs don't have a formal warning system in place at the moment, or are just trialling a system.

2. Input from RSMCs and Global centres:

2.1 RSMC Wellington:

As the lead RSMC for this project, Wellington continued to provide a platform (MetConnect Pacific at www.swfddp.metservice.com) for the SWFDDP products. This web site also provides helpful background material and links to global centres, other RSMCs and the NMHSs. Twice daily the RSMC staff produces the RSMC Daily Severe Weather Forecasting Guidance Products, referred to as the "South Pacific Guidance (SPG)" charts.

As agreed in the Implementation Plan, as of 1 December 2010 the threshold criteria used to generate the SPGs were changed. The new criteria provide more realistic thresholds in terms of what ranks as a severe weather event and taking into account the vulnerabilities of low-lying islands. The criteria thresholds for rain, wind and waves were raised to: rain $\geq 100\text{mm}/24\text{hrs}$, winds ≥ 30 knots and waves $\geq 2.5\text{m}$ along and north of 15°S , and $\geq 3.5\text{m}$ south of 15°S .

From 1 July to 31 October 2012, a total of 1230 South Pacific Guidance charts were produced by RSMC Wellington Lead meteorologists and posted on MetConnect Pacific and 82% of these charts contained a combination of one or more of heavy rain, strong wind and large waves. 42% of all charts contained guidance for the Cook Islands while just over 30%, for Fiji and Samoa and 25 to 30%, for Solomon Islands and Vanuatu. Large waves were the dominant guidance, with heavy rain featuring for Solomon Islands, Fiji and Tonga where the South Pacific Convergence Zone (SPCZ) was most active. Note that the dashed line along

15°S on the South Pacific Guidance charts marks the boundary for the change in the wave criteria.

MetConnect Pacific: MetConnect Pacific website and SPG products continued without any hitches throughout the period.

The RSMC Darwin images on MetConnect Pacific were updated twice a day without any hitches throughout the period.

2.2 RSMC Darwin:

RSMC Darwin continued to contribute regional NWP guidance and tropical climate monitoring products during the full Demonstration phase of the SWFDDP-RAV from 1 July to 31 October 2012. Charts and NWP products are available on the RSMC Darwin web site, and a selection of regional NWP products is available directly on the MetConnect Pacific web page.

Work continues to allow access to ACCESS-TC track maps and bulletins via the Met Connect Pacific web site. New rainfall guidance maps are also being developed for the SWFDDP based on a 'poor man's ensemble' (PME) of available global and regional NWP models.

RSMC Darwin is currently conducting a review of its analysis program to determine whether users prefer manual analysis charts, NWP-derived analyses or a 'man-machine' combination. Responses to a request for feedback from forecasters in the Asia-Pacific region reflect a range of views on analysis products.

Upgrade of the Bureau of Meteorology's NWP systems

The upgrade of the ACCESS NWP model suite from APS0 to APS1 (Australian Parallel Suite 1) is progressing. The horizontal resolution of the global model, ACCESS-G, has been increased to 40 km (from 80 km) together with improved physics and an increase in vertical levels from 50 to 70. The tropical model, ACCESS-T, will be decommissioned late in 2012, to be replaced by ACCESS-G and a regional model centred on the Australian continent.

Products that are produced for the SWFDDP from ACCESS-T will be generated from ACCESS-G in 2013. Also the tropical cyclone model ACCESS-TC will be nested within ACCESS-G rather than ACCESS-T. There should be no significant change in the appearance of ACCESS products available to SWFDDP participating countries.

Gridded data and products from ACCESS-TC will continue to be available to the SWFDDP during the upgrade process. Another upgrade of ACCESS-G to a horizontal resolution of 25 km is expected to take place later in 2013.

2.3 RSMC Nadi

2	Vanuatu	1 to 5	Sept	Lamap Malekula 136mm/24hrs, White Grass Airport 198mm/24hrs				√		√	√	Heavy rain was forecast only for the more northern islands of Vanuatu - didn't cover White Grass which is quite a way south. The heavy rain area was dropped 2 days out, but picked up again on the early issue of the 2nd Sept.
3	Kiribati											No events
4	Tuvalu											No events
5	Fiji	11 to 12	Sept	Navua 137mm/24hrs								Localised. No guidance produced for this event.
		22	Sept	Levuka 187mm/24hrs								Localised. No guidance produced for this event.
		26	Sept	Lautoka 177mm/24hrs								Localised. No guidance produced for this event.
		28	Oct	Matei 122mm/24hrs								Localised. No guidance produced for this event.
6	Samoa	9	July			Faleolo easterly 34kt						Localised. No guidance produced for this event.
		19	July			Apia northeast 33kt						Localised. No guidance produced for this event.
		27	July	Matuapa Lefaga (Upolu) 164mm/24hrs								Localised. No guidance produced for this event.
		5	Aug	Sili (Savaii) 114mm/24 hours.								Localised. No guidance produced for this event.
		31 to 1	Aug-Sept	Salani Falealili 115mm/24hrs								Localised. No guidance produced for this event.
7	Tonga	12 to 13	Sept	Nukuleka 63mm/6hrs		Nukuleka 55km/hr		√	√	√	√	Flooding & damaging winds affect Nukuleka village on eastern side of Tongatapu.
		26	Oct	Pangai Lifuka (Ha'apai) 101mm/6hrs		Pangai Lifuka (Ha'apai) 60km/hr		√	√	√	√	Heavy rain guidance only.

8	Niue											No events
9	Cook Islands	13-15	July		Combined southeast 3.5-4.5m	Easterly 30-35kt		√	√	√	√	Low to SE of Niue, area of large waves varied with each model run - so different days were highlighted as affecting the islands each time. No obs/news reports found.
		23	Sept	73mm/6hr Mangaia		Mangaia 60km/hr (est). Rarotonga gusts to 77 km/hr.						Localised. Squall line along a front. No guidance over the Southern Cooks. Two deaths.

The criteria used by participating countries don't necessarily match those used in the production of the South Pacific Guidance (SPG) charts.

3.2 Vanuatu:

A trough of low pressure was over or near Vanuatu from 1 to 5 September 2012.

Heavy rain of 136.4mm was recorded from 2100UTC on 1 Sep 2012 to 2100UTC on 2 Sep 2012 at Lamap Observation Station.

Heavy rain of 197.6mm was recorded on 2100UTC on 2 Sep 2012 to 2100UTC on 3 Sep 2012 at Whitegrass Observation Station, Tanna.

A heavy rainfall warning was issued 6 hours before the onset of the rain. No damage was observed.

3.3 Solomon Islands

Fresh to strong winds (15 to 25 knots) and moderate swells (2.5-3.5m) were expected and observed from 5 to 18 July 2012 over waters of Western, Malaita, Russells, Guadalcanal, Makira, Temotu and Rennell/Bellona. Easterly winds of 12G22kt (Est) were observed at Honiara, Guadalcanal Islands from 0400 UTC on 10 July 2012 to 2300 UTC on 11 July 2012. Easterly 15kt winds were observed at Lata on Santa Cruz Island from 0300 UTC on 11 July 2012 to 0000 UTC on 12 July 2012.

A fresh to strong southeasterly wind and moderate southeast swell warning were issued 12 to 24 hours before onset. Estimated 3m swell and easterly 20 to 30kt winds were reported

over southern Makira. In response to the warning some ships in Honiara cancelled their trips. There was some damage to garden and banana crops.

3.4 Fiji:

A slow moving trough lay over the Fiji group on the 11 and 12 September. Navua Observation Site recorded 136.5mm from 2100 UTC on 10 September 2012 to 2100 UTC on 11 September 2012. No warnings were issued and no significant damages were reported.

A slow moving trough moved over the southern part of Fiji on 22 Sept. Levuka, Ovalau Island recorded 187.1mm from 2100 UTC on 21 Sept 2012 to 2100 UTC on 22 Sept 2012. No warnings were issued and no significant damages were reported.

A trough moved slowly to the west of the Fiji group on 25 Sept. Lautoka Mill recorded 177.0mm from 2100 UTC on 24 Sept 2012 to 2100 UTC on 25 Sept 2012. No warnings were issued and no significant damages were reported.

A southeast wind flow prevailed over Fiji on 28 October 2012. Matei Airport recorded 121.9mm from 2100 UTC on 27 October 2012 to 2100 UTC on 28 October 2012. No warnings were issued and no significant damages were reported.

3.5 Samoa

This period was typically dominated by easterly trade-wind weather caused by ridges of high pressure systems that migrated west to east roughly between latitudes 20 to 30 south. Occasional short wave troughs brought precipitation over the islands and gusty winds in coastal areas.

On 9 July 2012, Faleolo, western Upolu, recorded maximum sustained winds of 26kt and wind gusts of 34kt. No warnings were issued. No damage was reported.

On 19 July 2012 a deep convective cloud (CB) developed to the northeast of Apia in the late afternoon with its downburst maximum winds of 33 knots from the northeast were recorded at Apia. No warnings were issued. No damage was reported.

On 27 July, heavy rain was recorded in the southwest of Upolu. Mataupu Lefaga recorded 164.2 mm from 2000 UTC on 27 to 2000 UTC to 28 July 2012. No warnings were issued. No damage was reported.

On 5 August, heavy rainfall was recorded at Sili, southeast of Savaii, with 113.7mm from 2000 UTC 5 August to 2000 UTC to 6 August 2012. No warnings were issued. No damage was reported.

Heavy rainfall from active convective clouds was observed over highlands and south side of Upolu Island from 31 August to 1 of September 2012. Salani Falealili on Upolu Island (Southeast) recorded 115.0mm from 2000 UTC on the 31 August 2000 UTC to 1 September 2012. No warnings were issued. No damage was reported.

Heavy rainfall event occurred to the northeast of Upolu Island, Saletele Fagaloa on Upolu Island (Northeast) recorded 100.4mm from 2000 UTC on the 18 October to 2000 UTC 19 October 2012. No warnings were issued. No damage was reported.

3.6 Cook Islands:

A meso-scale squall line associated with a frontal system caused heavy rainfall and strong winds on 3 September. Mangaia (C.I.) recorded rainfall of 73.0mm from 1600 UTC to 2200 UTC on 23 September 2012 and estimated maximum winds of 60km/h. A warning was issued 24 hours in advance. The disaster agency invited people to move to higher grounds. Roads, bridges, villages were flooded. **There were 2 deaths.**

3.7 Tuvalu:

No severe weather was observed throughout this period.

3.8 Kiribati:

No severe weather was observed throughout this period.

3.9 Niue:

No severe weather was observed throughout this period. Low rainfall throughout the period has meant the drought watch which has been in effect since June continues.

3.10 Tonga

On 13 September, strong winds and heavy rain were observed due to large convective cells over Tonga. Nukuleka recorded 55km/h winds (maximum) in the period 1400 UTC 12 September to 1900 UTC 13 September. Nukuleka also recorded 63mm in 6 hours of precipitation on 13 September. There was flooding in low lying areas and destructive winds battered the village of Nukuleka to the eastern side of Tongatapu on 13 September damaging houses and vegetation. A strong wind and heavy rainfall advisory was issued 12 hours in advance.

On 26 October, strong winds and heavy rain were observed due to large convective cells over Tonga. Maximum winds of 60km/h, at Pangai Lifuka (Ha'apai) in the period 1300 UTC on 25 October 2012 to 2200 UTC to 26 October 2012 were observed. Also, rainfall of 101mm in 6hrs on 26 October was recorded in the same area. There was flooding in low lying areas which damaged houses and vegetation. A strong wind and heavy rainfall advisory was issued 12 hours in advance.

4. Comments about the SPG and the NWP products.

RSMC Wellington

US Satellite hydro-estimation data are proving useful in estimating how much rainfall has occurred up to the start of the forecast period or an indication of how much might have fallen during an event just completed.

The following statements have appeared in previous reports but still hold true now:

- The UKMO and ECMWF precipitation probability charts continue to give a weak signal at 100mm over 24 hours and a good signal for 50mm. Wellington forecasters rely on both these products, together with the help of pattern recognition, to estimate rainfall totals $\geq 100\text{mm}$ in 24 hours.
- The change in the wind criteria now better matches the guidance produced by UKMO and ECMWF; hence the number of over-forecast strong wind areas remains small. Forecasters continue to rely on local observations to help determine the areal extent of 30kt winds on days one and two.
- Wave guidance continues to appear on the charts in high frequency, but the change in criteria has made a significant difference to the amount of wave guidance south of 15°S . Forecasters continue to access ECMWF wave data specifying each half metre, allowing easier determination of waves $\geq 2.5\text{m}$, north of 15°S and $\geq 3.5\text{m}$, south of 15°S . The model guidance has proved to be very reliable with forecasters picking large wave events from 4 days out.

Fiji

South Pacific Guidance charts were not useful for all 4 reported severe events. These events were localized in nature and though they produced large amounts of precipitation there was no significant damage reported..

Samoa

Samoa made no comments on the SPG charts.

Vanuatu

The South Pacific Guidance continues to be very useful as it gave forecasters a good lead time and confidence regarding the warnings issued. The NWP/Ensemble products were very useful. They have assisted forecasters in preparing three day severe weather outlook for heavy rainfall and winds.

SIMS

The SPG charts provided by RSMC Wellington were very useful for this wind and swell event. NWP/Ensemble products received from ECMWF and ACCESS-T were also very useful. During this event the South Pacific Guidance was given high confidence for a 5 day prediction; they proved to be very accurate and gave much lead time to issue warning. In this event the models used were Access Models (Combined Waves, 10m Winds), ECMWF (EFI, Ensembles), UKMO(Wind and Wave Probability Charts).

Niue

Even though there was no severe weather events in the period, Niue still finds the SPG charts and the NWP guidance very useful especially in regard to prospects for a break in Niue's continuing dry spell

Tuvalu

Though there was no significant severe weather reported in this period, Tuvalu found both the SPG and the model products very useful. The SPG gives a quick heads up and is used as key overview guidance before stating the daily weather forecast process. Tuvalu stills uses occasionally the UKMO products and they have recently started to use the ECMWF and the Darwin products more after the in-country training in early October.

Kiribati

The SPG is useful and gives the forecaster a good heads-up on upcoming significant weather and/or large waves. It should be noted that the islands of northern Kiribati are not covered by the SPG. Ensemble products from the UKMO and the ECMWF are also useful. Kiribati relies on Nadi for its day-to-day forecasts.

Cook Islands

For the September event, the SPG charts didn't contain any guidance and there were no references in the Nadi forecasts-

Tonga

Tonga finds the SPG charts very useful as guidance. It gives the forecasters more confidence when preparing forecasts. The model output is generally very useful but less helpful when there is conflict among the models.

5. Project evaluation against SWFDDP goals:

5.1 To improve the ability of NMHSs to forecast severe weather events

All NMHSs agreed that the SWFDDP products and, in particular, the SPG charts have helped to give NMHSs more confidence about an expected significant weather or wave event. In this period, Niue, Tuvalu and Kiribati experienced no significant events while-Fiji, Samoa and Cook Islands experienced severe local convective events that were not forecast by the SPG.

5.2 To improve the lead time of alerting these events

All NMHSs (who issue warnings) agreed that the SWFDDP products helped them provide a healthy lead time or enabled them to issue warnings which wouldn't have been

issued in the past. The Solomon Islands issued warnings 12-24 hours in advance for the July events. Vanuatu was able to issue warnings 6 hours before the Sept heavy precipitation event and Tonga issued some advice 12 hours in advance of the two severe convective events. Fiji, Samoa and the Cook Islands did not issue warnings in advance of the severe local convective events.

5.3 To improve the interaction of NMHSs with Disaster Management and Civil Protection Authorities (DMCPA) before, during and after severe weather events

Several (Fiji, Niue, Samoa, Kiribati, Niue, Tonga, Cook Islands, and Tuvalu) reported no interactions with their DMCPAs. It should be noted that Niue, Tuvalu and Kiribati reported nil significant weather though this period. In Vanuatu, the NMHS works closely with their DMCPA. SIMS had no direct feedback however the DMCPA issued advice to citizens based on the SIMS warning.

5.4 To identify gaps and areas for improvements

Fiji found it difficult to verify forecasts and warnings. SIMS underlined the importance of building a greater understanding of the models – through the SWFDDP workshops as an example. Tuvalu occasionally found their internet connection slow in accessing the SWFDDP products. Kiribati found that some of the northern Kiribati Islands are not in the area covered by the SPG. SIMS cited lack of experience of some forecasters. Tonga has only 2 trained forecasters and would like more; they found the SWFDDP workshop very useful. Vanuatu found verification particularly difficult especially when there were no observations.

5.5 To improve the skill of products from Global Centres and RSMCs through feedback from NMHSs

Cook Islands found it difficult to forecast severe local events from the products provided. The Solomon Islands principally uses and compares UKMO, ECMWF and RSMC Darwin products. The experimental NWS WRF should be extended to the south to cover more of the Tonga islands.

6. Evaluation of the weather warnings:

6.1 Feedback from the public

Several (Fiji, Niue, Tuvalu, Kiribati, Tonga and Samoa) received no feedback from the public. Vanuatu obtained extensive feedback while SIMS, some public feedback. The Cook Islands Meteorological Service was asked why there was no warning.

6.2 Feedback from the DMCPA's

The Vanuatu National Disaster Management Office is appreciative of the warning service provided by the Vanuatu Meteorology and Geo-Hazards Department (VMGD)

and the close working relationship. Fiji had a meeting with their disaster management office on 28 October. Tuvalu will involve all stakeholders in a workshop in advance of the next cyclone season.

6.3 Feedback from the Media

SIMS and Vanuatu noted that media promptly relayed warnings.

6.4 Objective verification by the NMHSs

There was no objective verification by the NMHSs (Refer to comment underneath table in section 1)

The following is from RMSC Wellington's report:

The following table shows the number of South Pacific Guidance Charts produced from 1 July to 31 October 2012 under the various categories and different countries. A total of 1230 South Pacific Guidance charts were produced by RSMC Wellington Lead meteorologists and posted on MetConnect Pacific and 82% of these charts contained a combination of one or more of heavy rain, strong wind and large waves. 42% of all charts contained guidance for the Cook Islands while just over 30%, for Fiji and Samoa and 25 to 30%, for Solomon Islands and Vanuatu. Large waves were the dominant guidance, with heavy rain featuring for Solomon Islands, Fiji and Tonga where the South Pacific Convergence Zone (SPCZ) was most active.

July-Oct 2012	SWFDDP	Solomon Is	Vanuatu	Kiribati	Tuvalu	Fiji	Samoa	Tonga	Niue	Cook Is
Heavy Rain	450	122	42	2	13	97	4	105	6	59
Strong Wind	85	2	1	0	0	14	0	21	6	11
Large Waves	930	239	268	58	217	296	376	49	23	502
TC References	0	0	0	0	0	0	0	0	0	0
Combination of one or more of the above	1009	347	306	60	225	389	378	150	35	517
Nil sig	221	883	924	1170	1005	841	852	1080	1195	713

A simplified verification spreadsheet was demonstrated to the SWFDDP participating countries during the 2012 in-country training. This will enable individual NMHSs to keep a tally of SPG charts and hits and misses of warnings. At the same time, they are able to calculate the probability of success and false alarm ratio for each event.

7. Case studies:

No case studies were provided.

8. Conclusions:

Only Tuvalu, Niue and Cook Islands submitted their reports by the deadline of 17 November. Tuvalu and Niue had nil significant weather. Fiji was the last one and arrived 4 weeks after the deadline. The reports followed the format prescribed. Samoa made no comments with respect to the SWFDDP goals.

During this reporting period, there were a number of NMHS's that didn't have any interaction with the DMCPA's, media or the public. However, this should be kept in perspective in light of the fact that the period lay outside the cyclone season and three NMHSs reported nil significant events.

Steve Ready attended the 14th WMO RA V Tropical Cyclone Committee meeting in Apia, Samoa from 16 to 20 July 2012.

The NZ MetService completed the last round of SWFDDP in-country training for participating countries, in Niue, on 23 November UTC. Jonathan Tunster conducted 3-5 days' training in Cook Islands, 17-21 September 2012 with the help of Steve Ready; Tuvalu and Tonga, 2-12 October 2012, with Mark Schwarz; Solomon Islands and Vanuatu, 22 October to 2 November 2012 with James Lunny and Niue, 19-23 November 2012, with Lisa Murray covering all aspects of the 'Cascading Process' including a half to full day workshop involving several agencies connected to emergency response. The MetService would like to acknowledge the role of the New Zealand Ministry for the Environment (MfE) and the New Zealand Ministry of Foreign Affairs and Trade (MFAT) in funding the entire SWFDDP in-country training programme. The MetService would also like to acknowledge the support provided by USA NOAA NWS staff in helping with and contributing to components of the training in Samoa and Fiji.

The NMHSs were very appreciative of the opportunity to engage in the in-country training and requested that this type of training be conducted again in the near future.

Some issues need to be discussed such as sustainability of SWFDDP: securing funding for future modifications to MetConnect Pacific; and the next round of in-country training, probably before the 2014/2015 cyclone season.

In the absence of radar and a good network of rain gauges, satellite hydro-estimators provide the only tool for monitoring the environment closely and helping with the forecasting of short period rainfalls.

1. APPENDICES

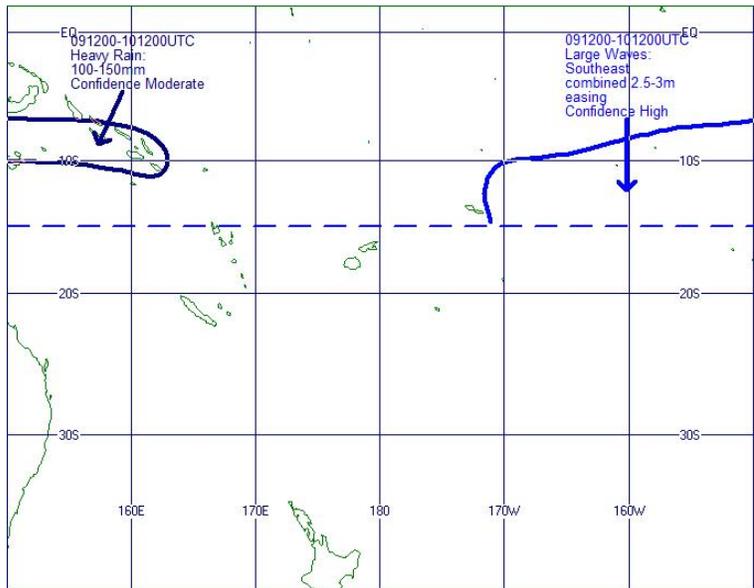
A. Tropical cyclone events

None.

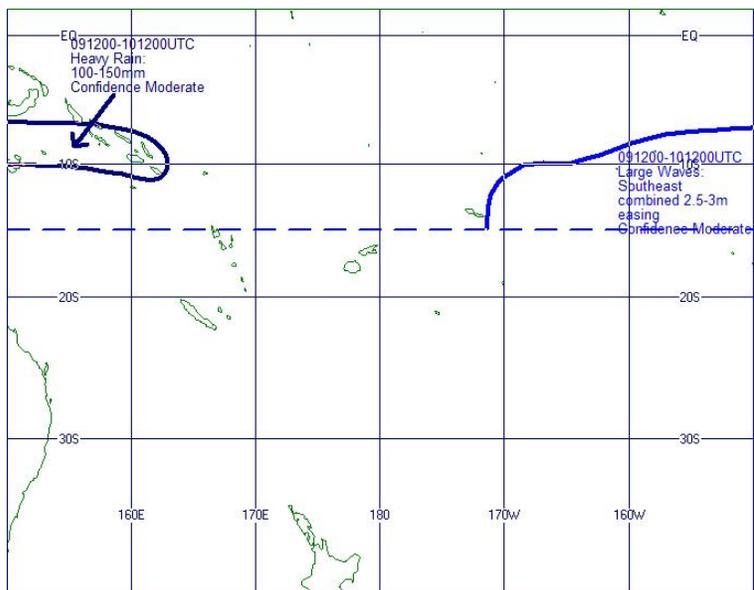
B. Non-tropical cyclone events (3 have been referenced below)

- **HEAVY RAINFALL over the Solomon Islands 10-11 September – 232mm over 24hr recorded at Munda (147mm of that in 6hr).**
Comment: Rainfall at Munda exceeded that of indicated by guidance.

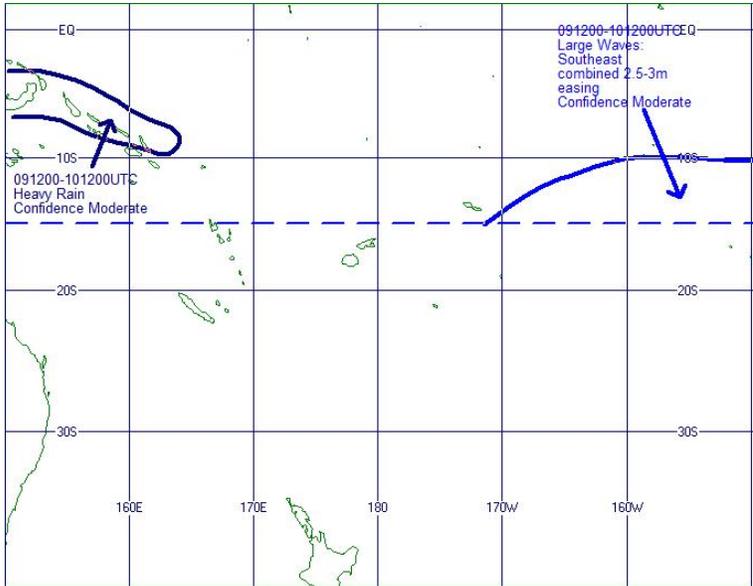
1500 UTC issue on 10-Sept-2012 (starting day for this event)



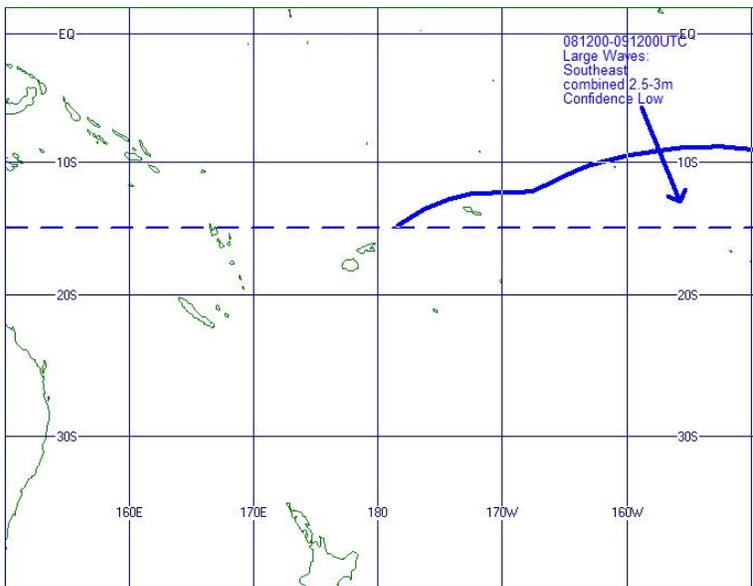
1500 UTC issue on 09-Sept-2012 (day before start of event)



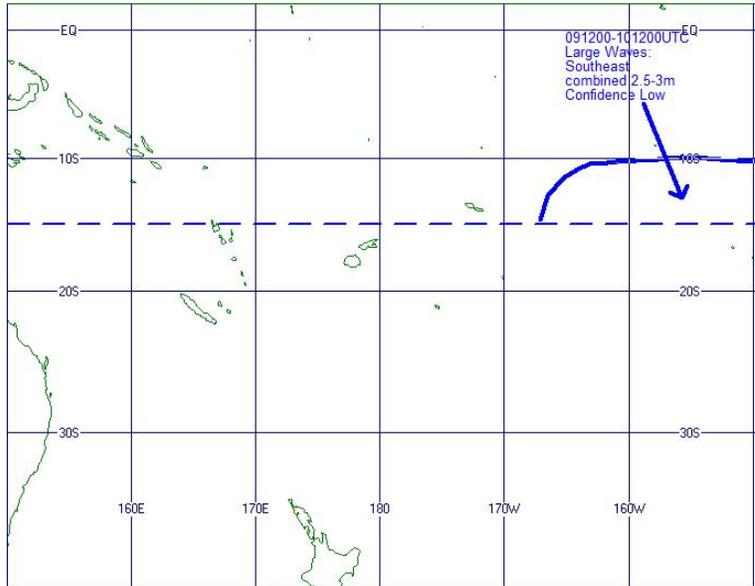
1500 UTC issue on 08-Sept-2012 (2 days before start of event)



1500 UTC issue on 07-Sept-2012 (3 days before start of event)



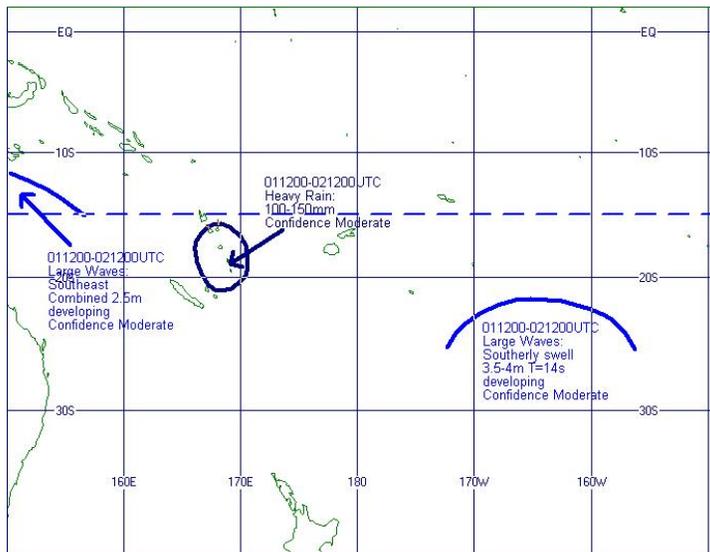
1500 UTC issue on 06-Sept-2012 (4 days before start of event)



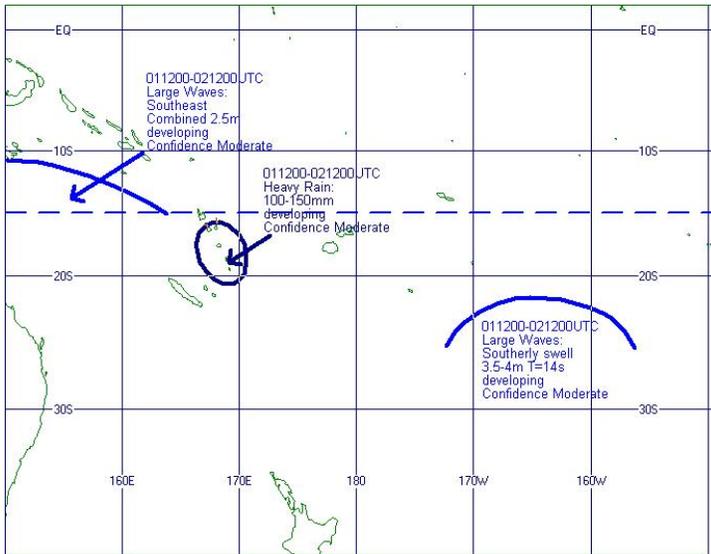
- **HEAVY RAIN for Vanuatu: 2-3 September – Lamap Malekula 136mm/24hr and White Grass 231mm/48hr.**

Comment: Heavy rain area was forecast 4 days in advance, but was dropped for one issue 2 days out before being reinstated. The heavy rain area covered northern Vanuatu but southern areas (including White Grass) were covered only one day out.

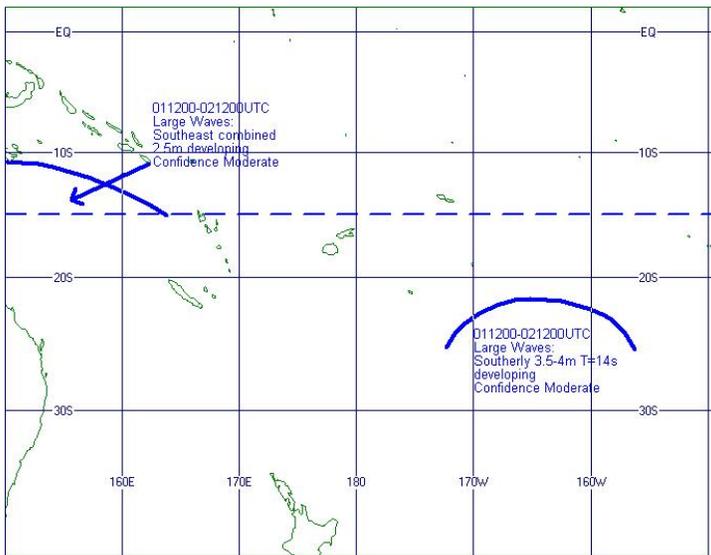
1500 UTC issue on 1-Sept-2012 (starting day for this event)



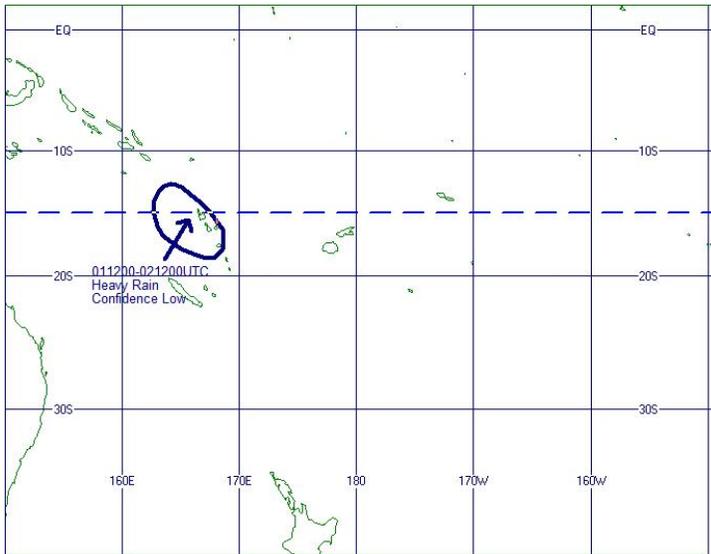
0300 UTC issue on 1-Sept-2012 (1 day before start of event)



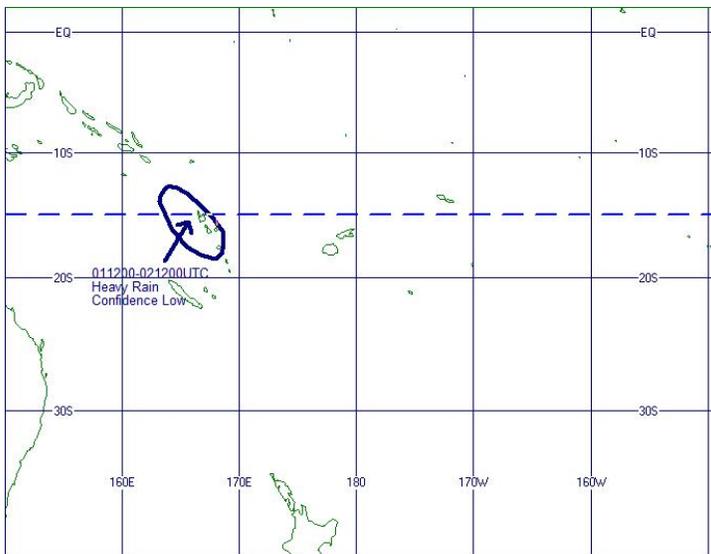
1500 UTC issue on 31-Aug-2012 (1 day before start of event)



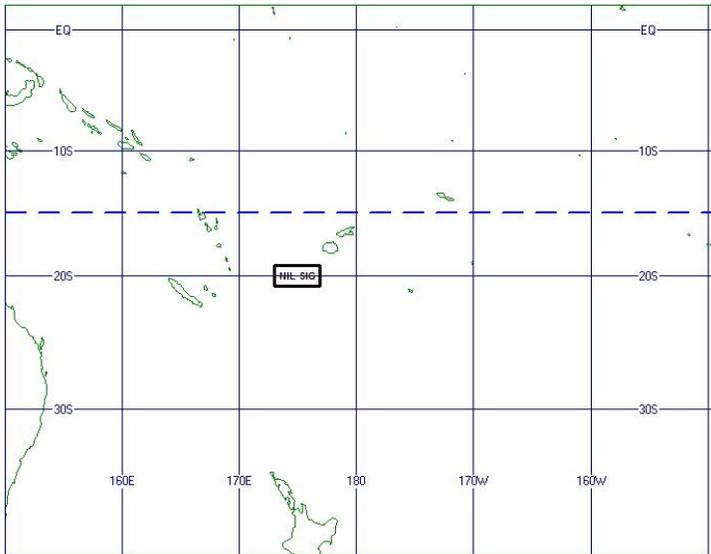
1500 UTC issue on 30-Aug-2012 (2 days before start of event)



1500 UTC issue on 29-Aug-2012 (3 days before start of event)

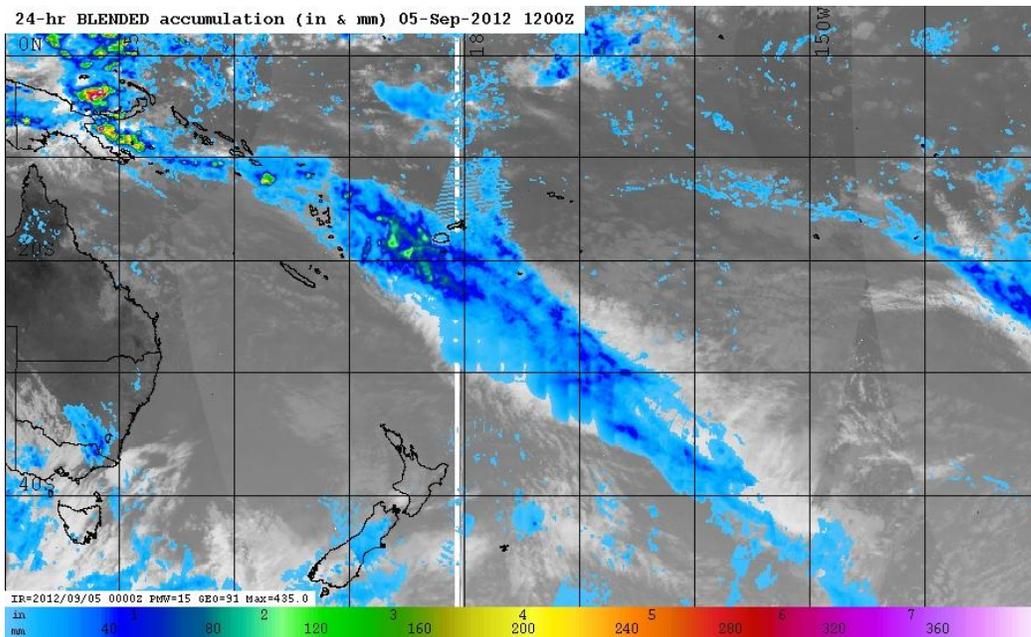


1500 UTC issue on 28-Aug-2012 (4 days before start of event)

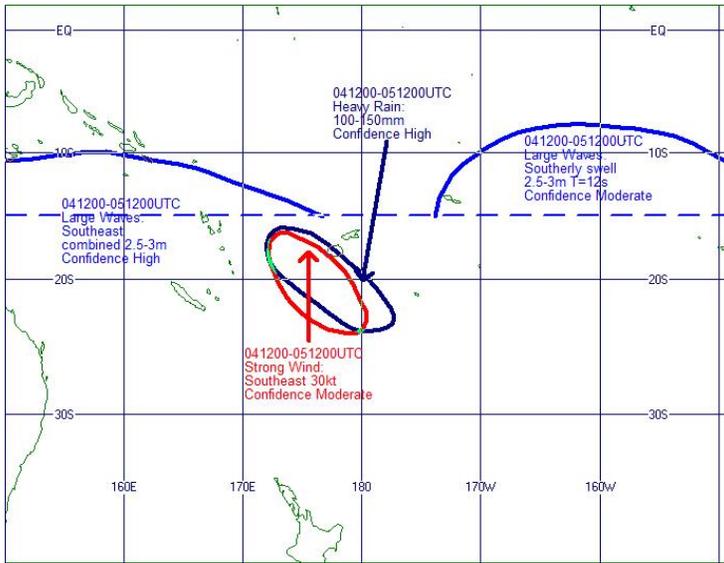


- **HEAVY RAIN and STRONG WIND for Fiji 5 September – Vanua Balavu**
86mm/24hr, ship ob SE33kt at 18.2S, 179.2W

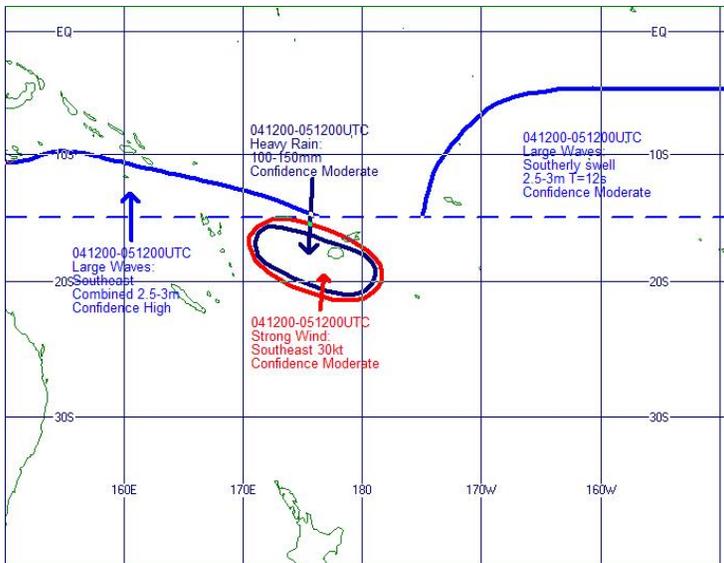
Comment: While we didn't see any obs over 100mm from Viti Levu and southwards, the satellite rain accumulation image showed a band of 120mm+ rain in roughly the area covered by the risk of heavy rain.



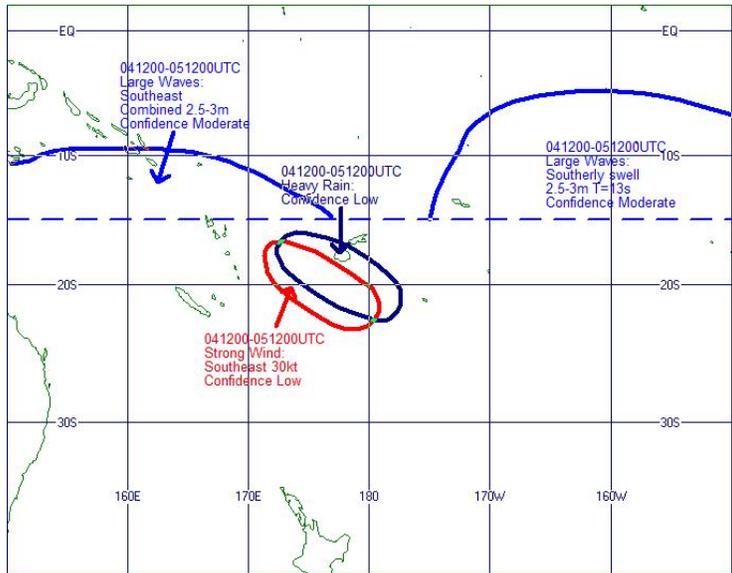
1500 UTC issue on 5-Sept-2012 (starting day for this event)



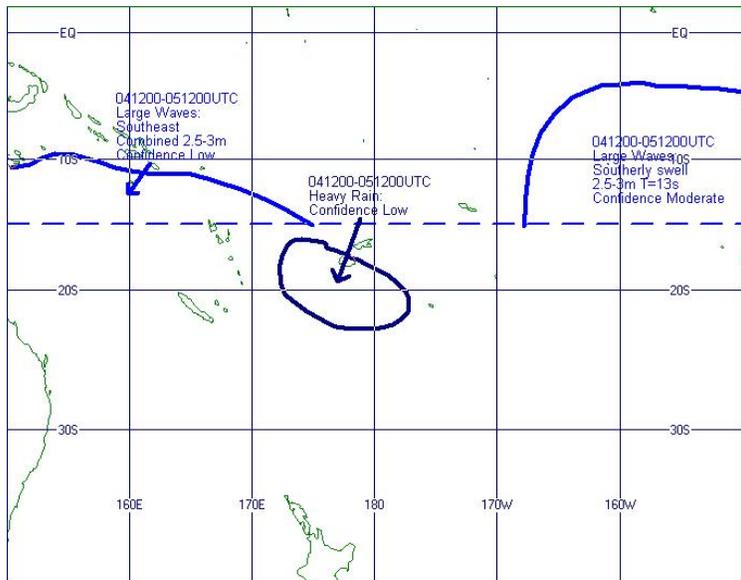
1500 UTC issue on 4-Sept-2012 (1 day before start of event)



1500 UTC issue on 3-Sept-2012 (2 days before start of event)



1500 UTC issue on 2-Sept-2012 (3 days before start of event)



1500 UTC issue on 1-Sept-2012 (4 days before start of event)

