Agenda Item 16.3: Coastal Inundation Forecasting in Fiji and Tuvalu

SPREP
Secretariat of the Pacific Regional Environment Programme

WORLD METEOROLOGICAL ORGANIZATION

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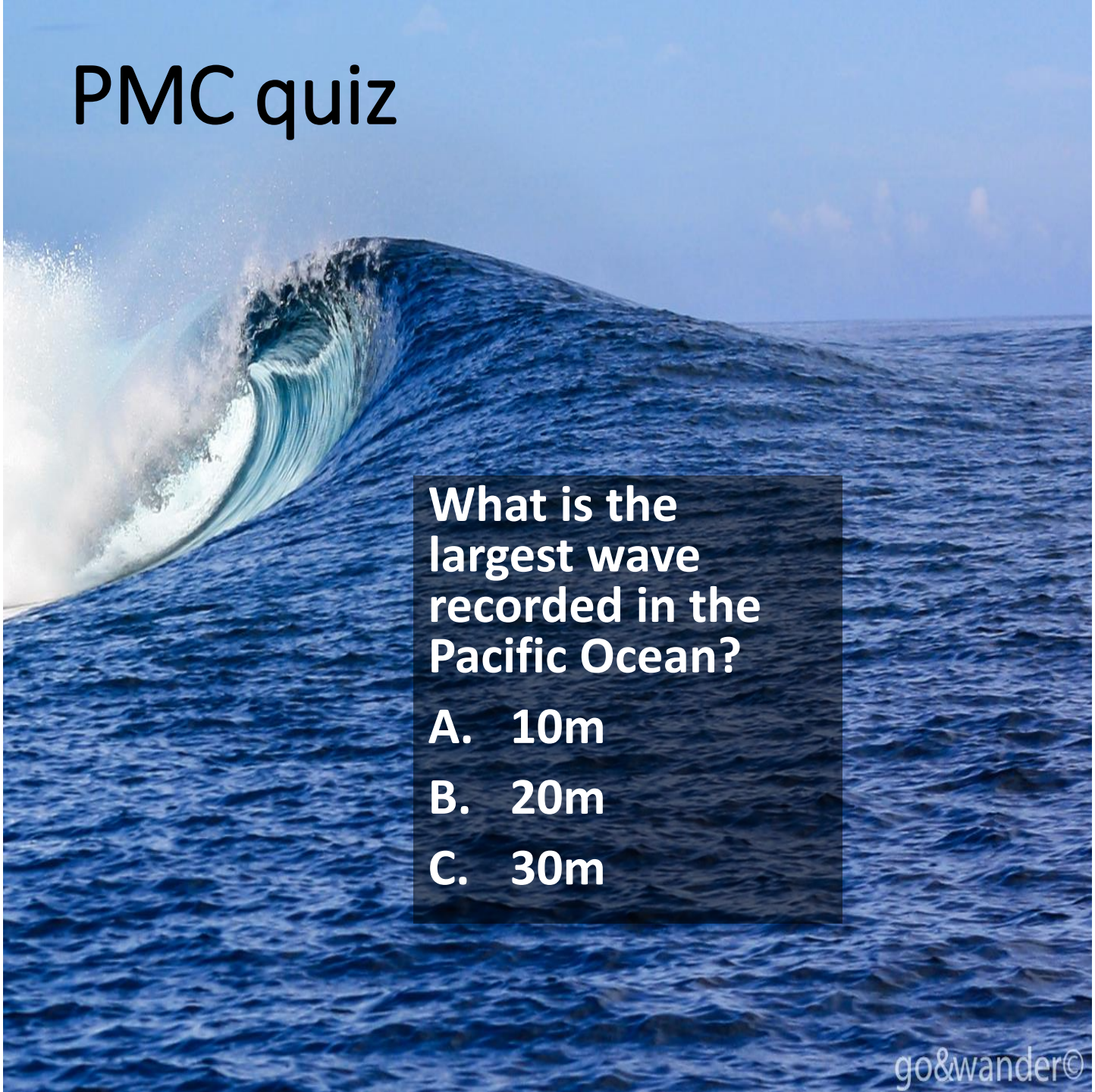
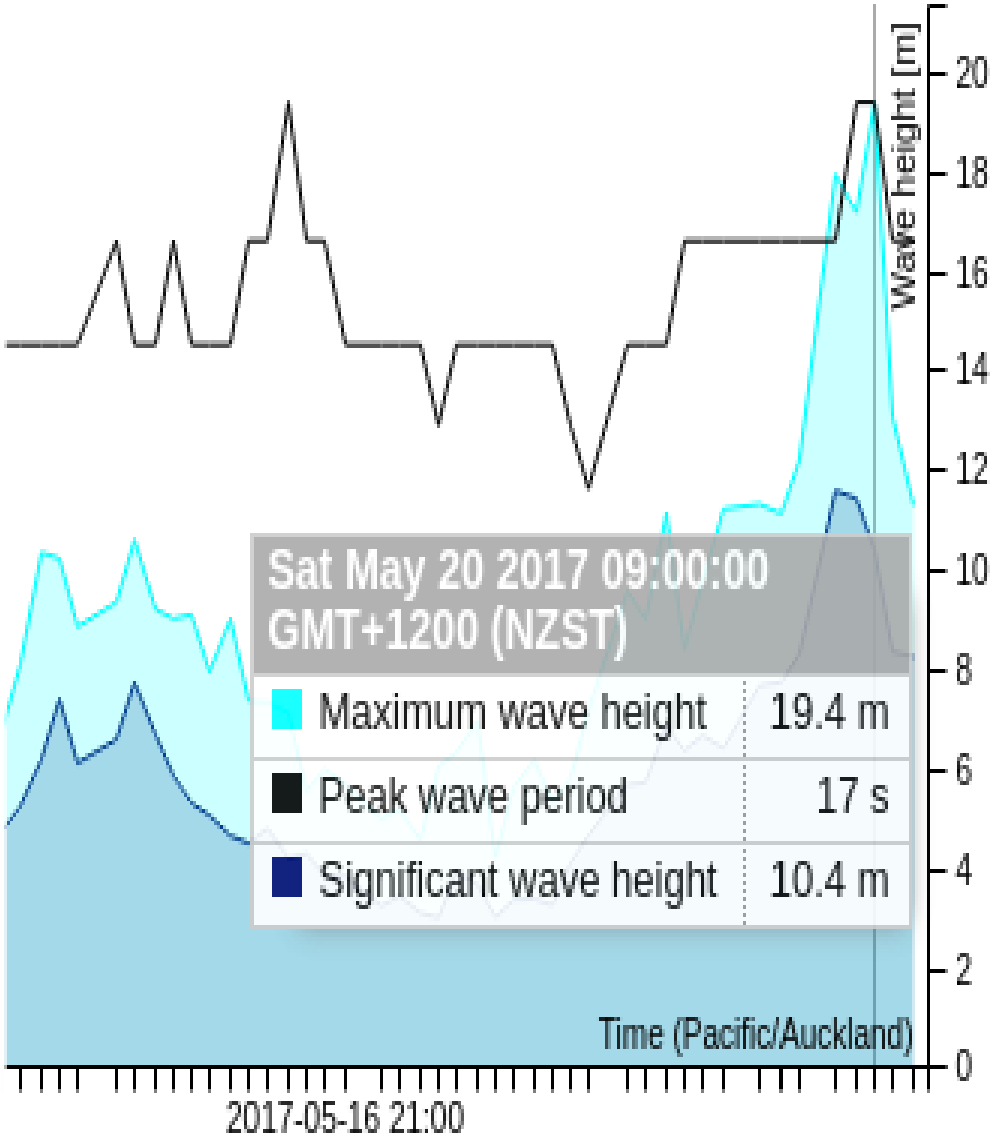
Sustainable Pacific development through science, knowledge and innovation

PMC quiz


What is the largest wave recorded in the Pacific Ocean?
A. 10m
B. 20m
C. 30m
go&wander©

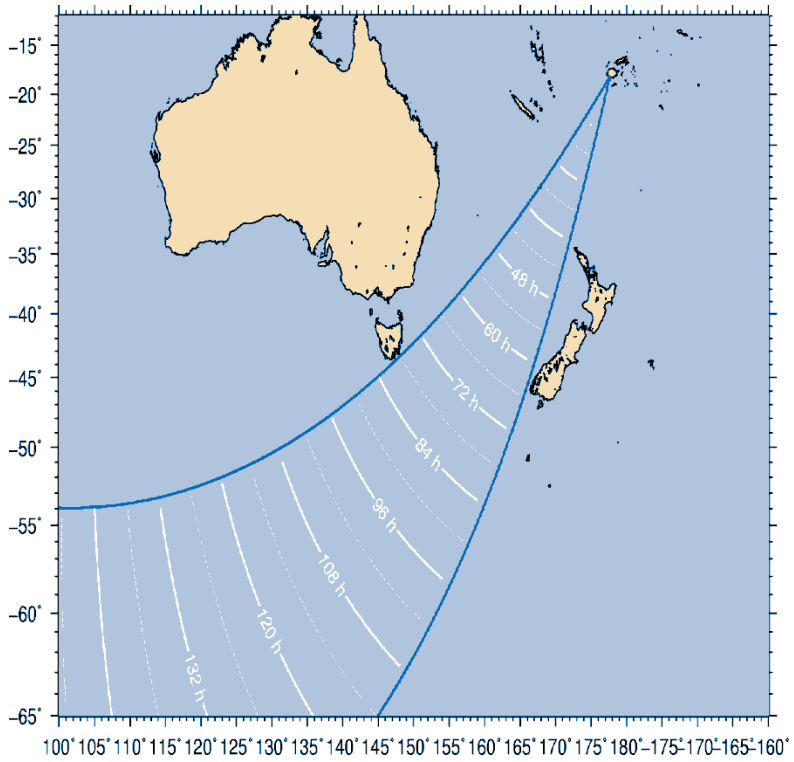


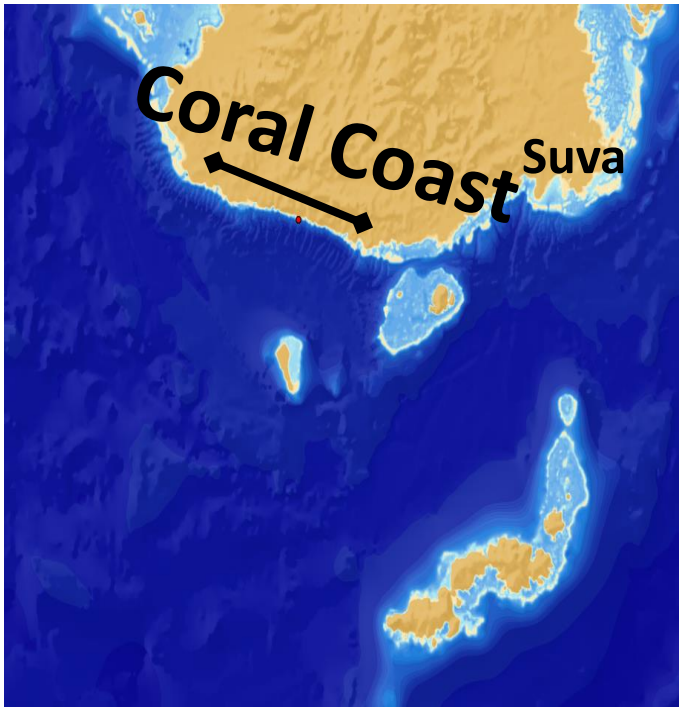
Moored in a water depth of 150m south of NZ, this is the world's southern-most wave buoy moored in the open ocean.

On 20 May 2017 the wave buoy in the Southern Ocean recorded a **19.4m** wave.

Source: www.metocean.

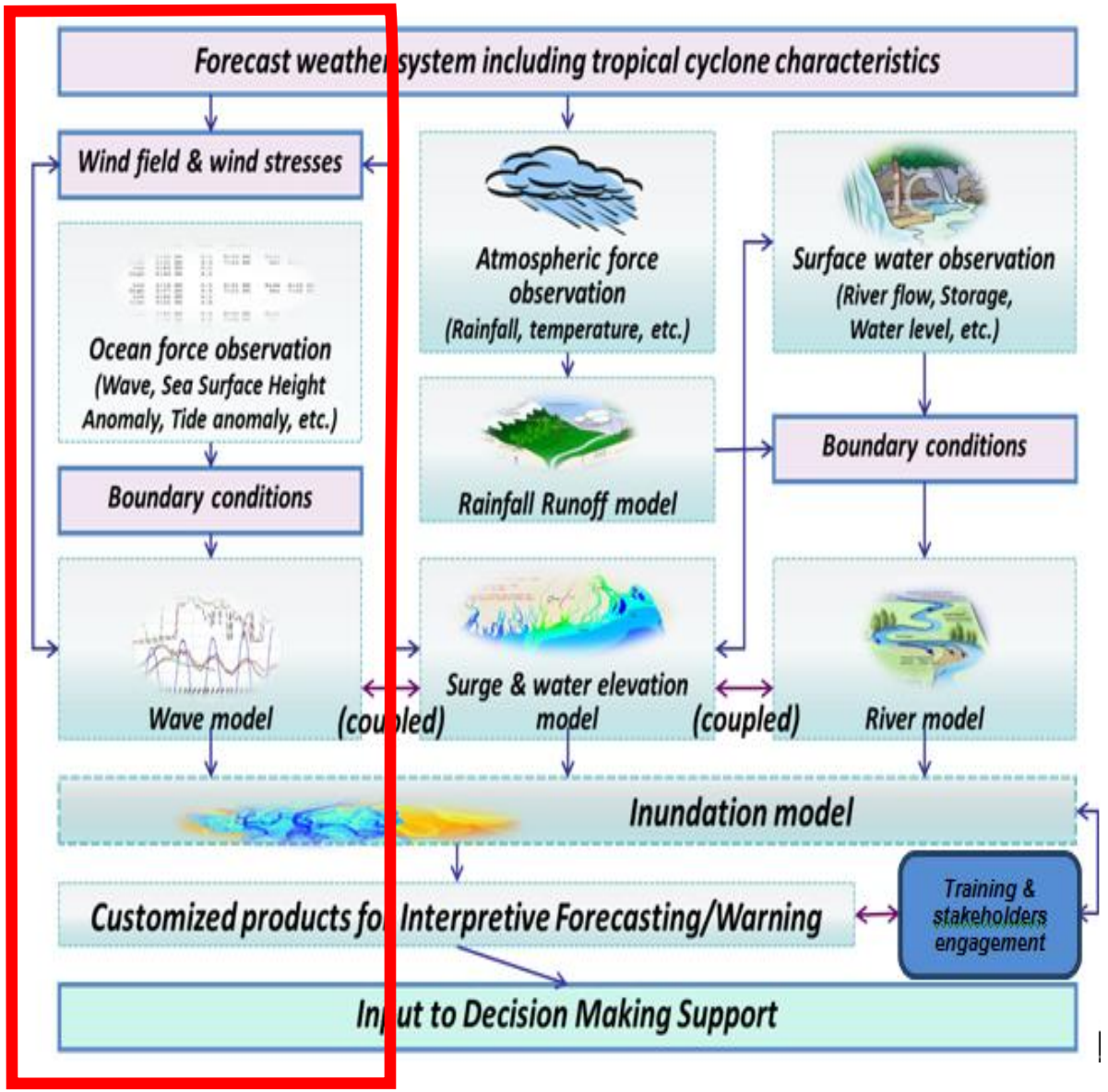
swell waves


−15°
−20°
−25°
−30°
−35°
−40°
−45°
−50°
−55°
−60°
−65°
48 h
60 h
72 h
84 h
96 h
108 h
120 h
132 h
100° 105° 110° 115° 120° 125° 130° 135° 140° 145° 150° 155° 160° 165° 170° 175° 180° −175° −170° −165° −160°


Coral Coast
Suva

Coastal Inundation Forecasting Demonstration Project Fiji (CIFDP-FJ)

Source: JCOMM Technical Report no. 74



Korea Meteorological Administration

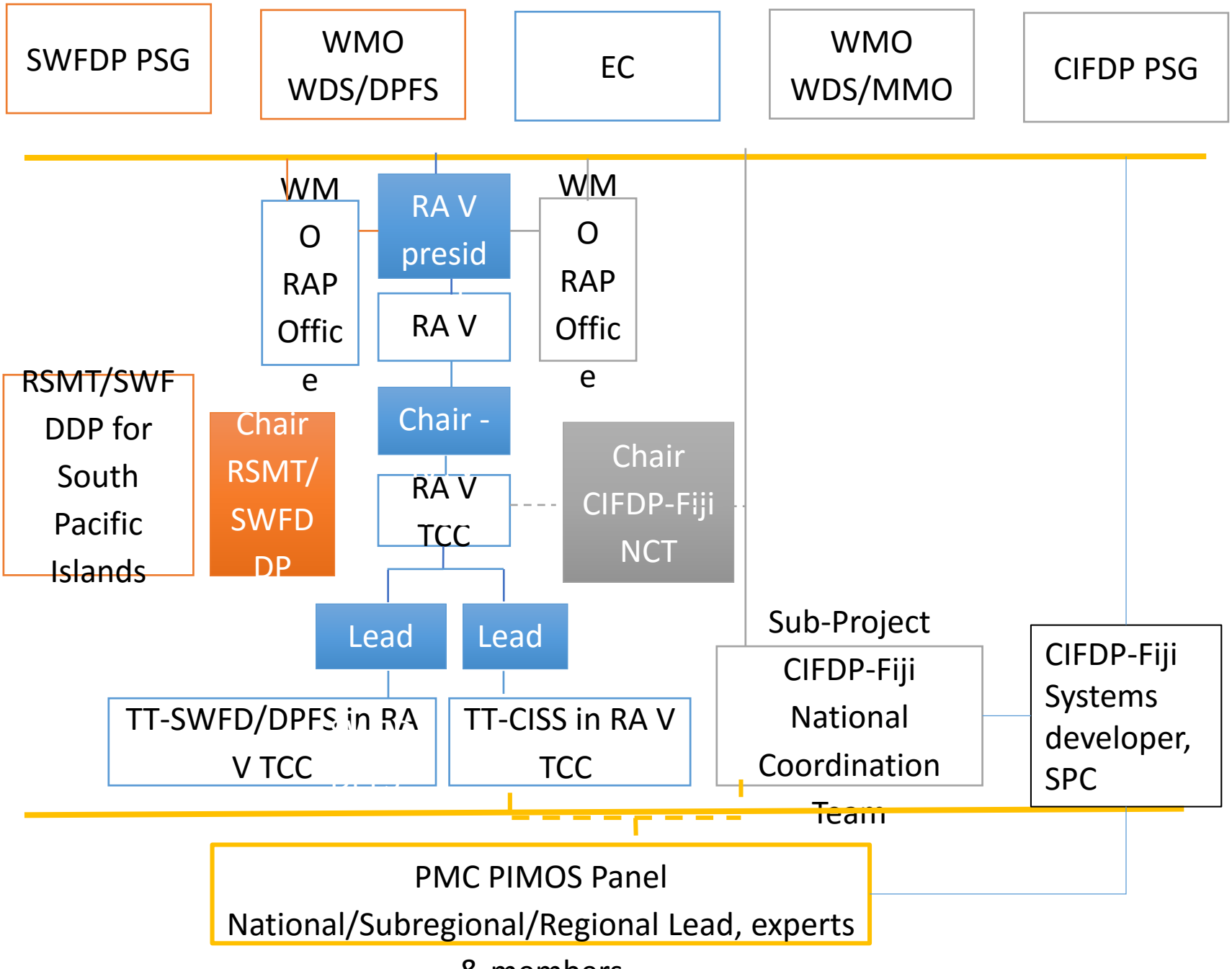
WORLD METEOROLOGICAL ORGANIZATION

Fiji Meteorological S
RSMC Nadi

Australian Government
Department of Foreign Affairs and Trade

NEW ZEALAND FOREIGN AFFAIRS & TRADE

KFW
Bank aus Verantwortung


SWFDP PSG
WMO WDS/DPFS
EC
WMO WDS/MMO
CIFDP PSG
WM
O
RAP
Offic
e
RA V
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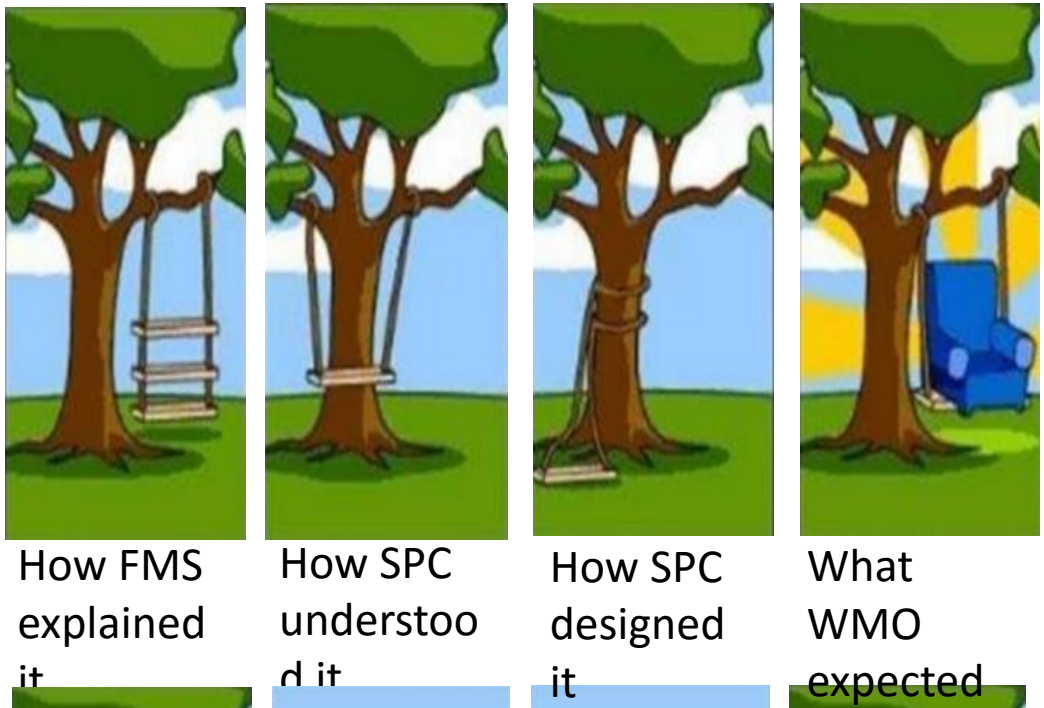
WM
O
RAP
Offic
e
RA V
Chair -
RSMT/SWF DDP for South Pacific Islands
Chair RSMT/ SWFD DP
RA V TCC
Chair CIFDP-Fiji NCT
Lead
Lead
Sub-Project
CIFDP-Fiji National Coordination
CIFDP-Fiji Systems developer, SPC
TT-SWFD/DPFS in RA V TCC
TT-CISS in RA V TCC
Team
PMC PIMOS Panel
National/Subregional/Regional Lead, experts

- The main focus of the CIFDP-FJ is to **develop a forecasting and warning systems for coastal inundation,** and
- answers the call of the PMMM-1 to **support implementation of impact-based MHEWS.**



Inside the inundation forecasting system:
creating the right database and making it sing …

I. Preparation phase

1. Create 800,000 probable scenarios (paramaters: Hs, Tp, Dp, TWL)

2. Select 300 representative cases (Maximum Dissimilarity Algorithm)

3. Compute max water level for each 300 selected scenarios (Xbeach-GPU)

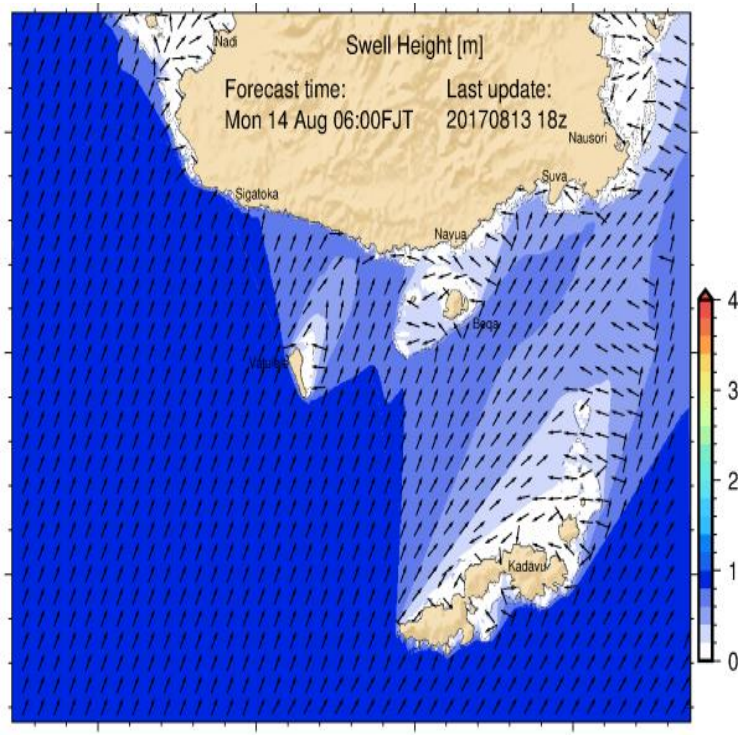
II. Operational phase

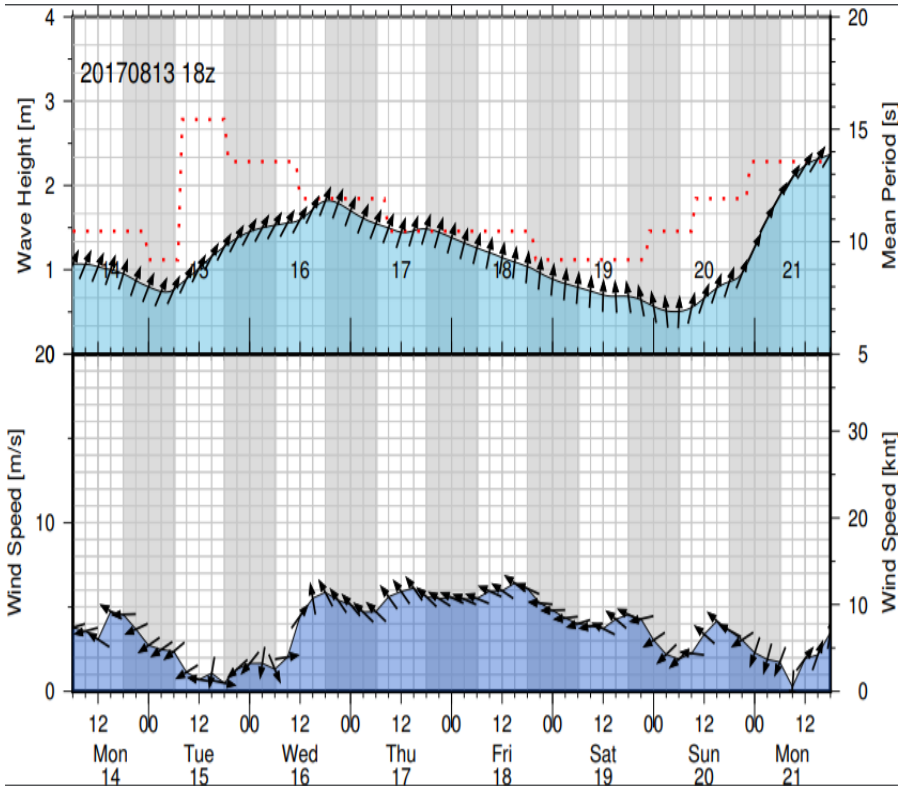
4. Reconstruct max and mean water levels as well as inundation depths using simulated scenarios (Radial Basis Function)

Extended methodology from Camus et al. 2011 and Rueda et al. 2014

South West Fiji wave forecast – Testing phase

- Swan wave model run 4 times daily 00z 06z 12z 18z
- 4 output locations (Suva, Maui Bay, Tavarua, Mango Bay)
- Great feedback from ocean enthusiast. (390 page views recorded in 6 month)





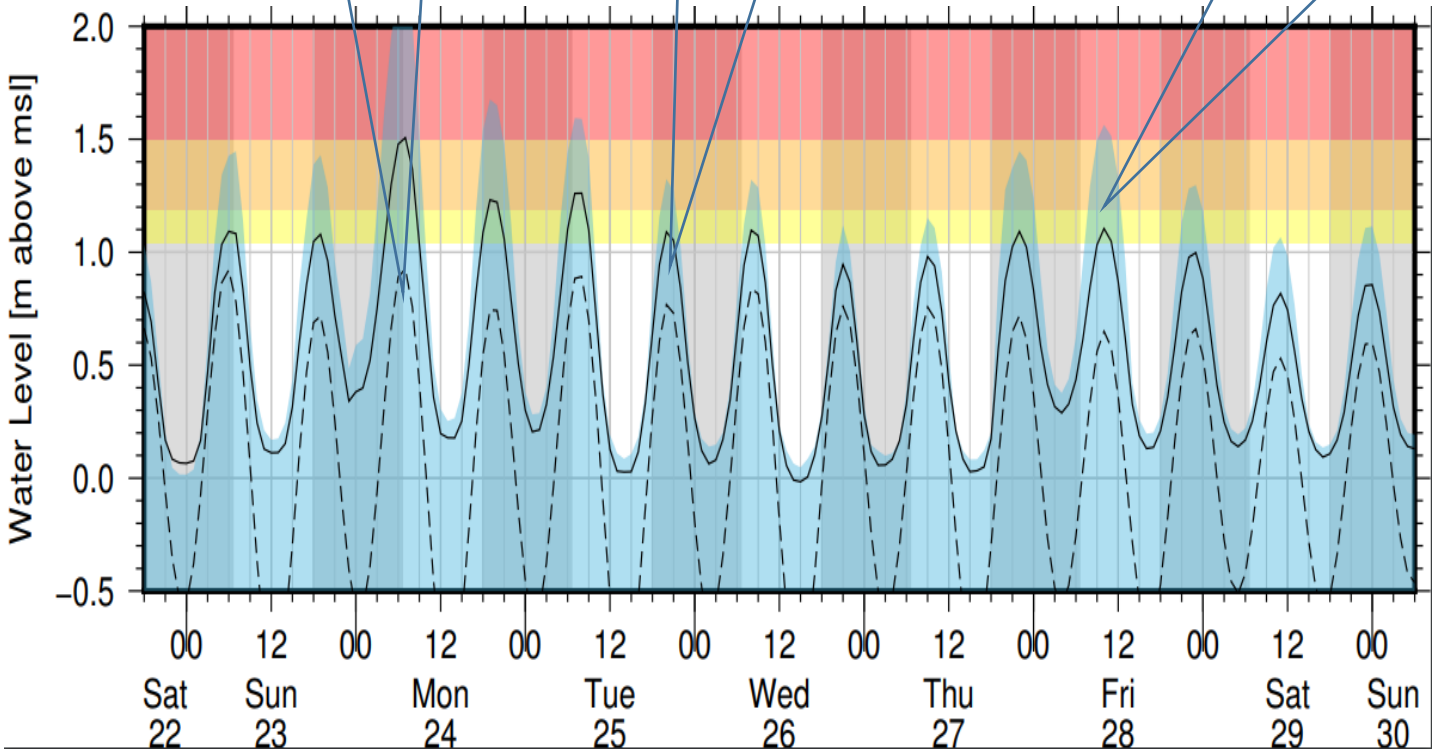
http://wacop.gsd.spc.int/Fiji_Forecast.html

Water level forecast, Maui Bay (23/7/17)

Dashed line: Offshore water level

Black line: mean water level inside the reef

Blue shaded area: maximum water level at the beach



(red) 99th percentile
(orange) 95th percentile
(yellow) 90th percentile

http://phpstack-15188-38272-117120.cloudwaysapps.com/Forecast/Ma

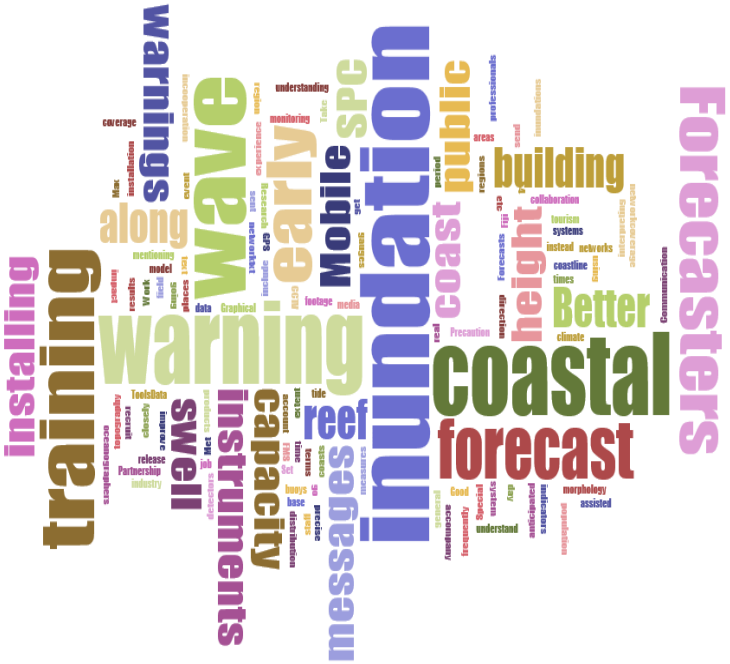
Early lessons learnt

- Less is more: don't build a system that is too complicated and not sustainable. **Use look up tables.**
- Account for uncertainty: single-track deterministic approaches are inaccurate. Do data mining during a storm. **Look up tables.**
- Focus on more collaborative ways of working together: **Look up people.**

Recommendation

The Meeting is invited to:

- **Note** the need to improve technical capacity and knowledge-base in order to build resilience against coastal hazards and marine inundation in the region;
- **Recognise** the significant contribution that SPC and numerous partners have made to develop tools supporting coastal MHEWS;
- **Request** the PIMOS panel to support the existing collaborative approach and to work with interested NMHSs to replicate and upscale the implementation of MHEWS and impact forecasting for coastal areas.



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