

# **Australian Tsunami Detection Network**

## **GLOSS Technical Workshop**

**5<sup>th</sup> June 2007**

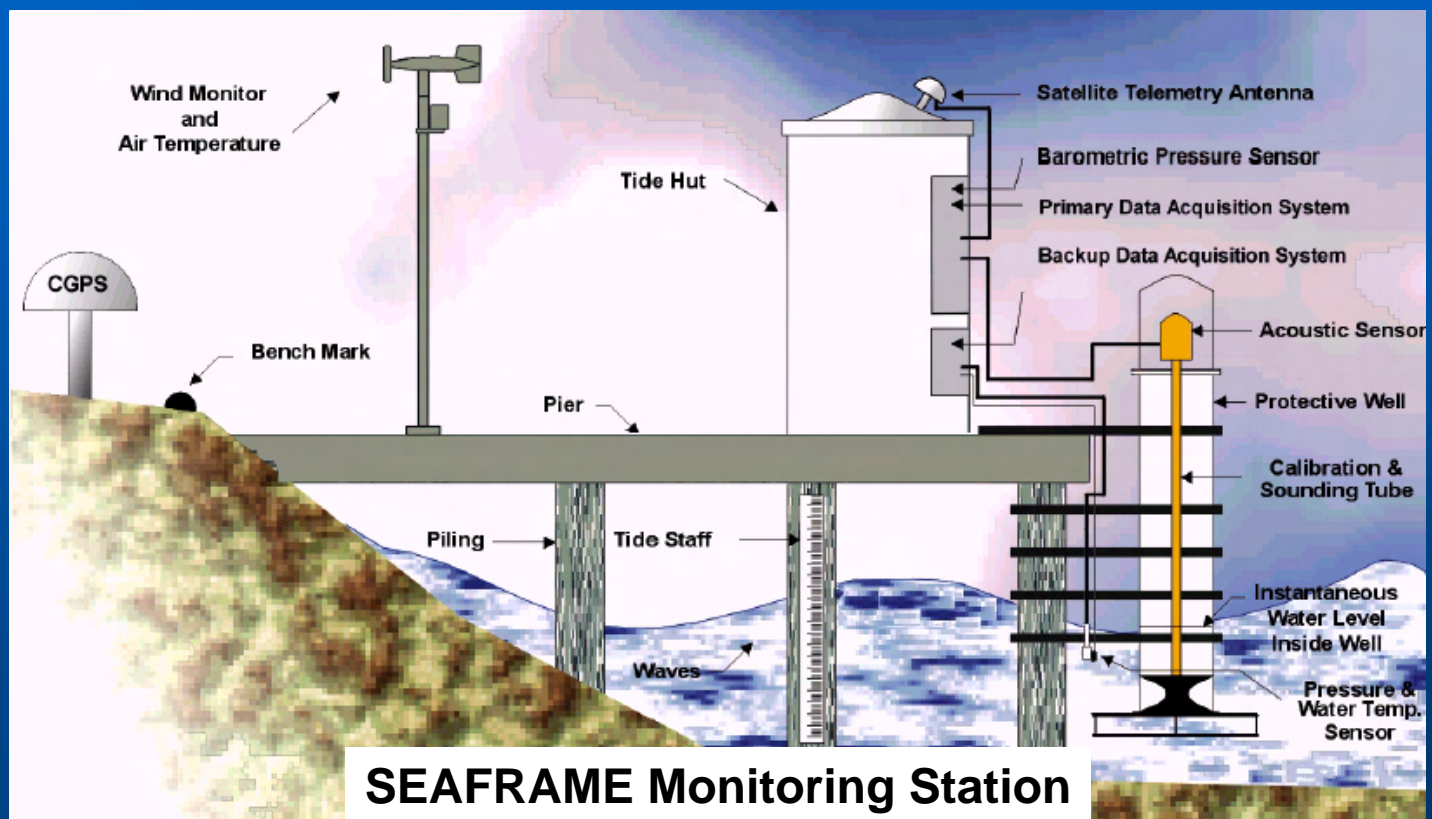
**Paris**

**Bill Mitchell**

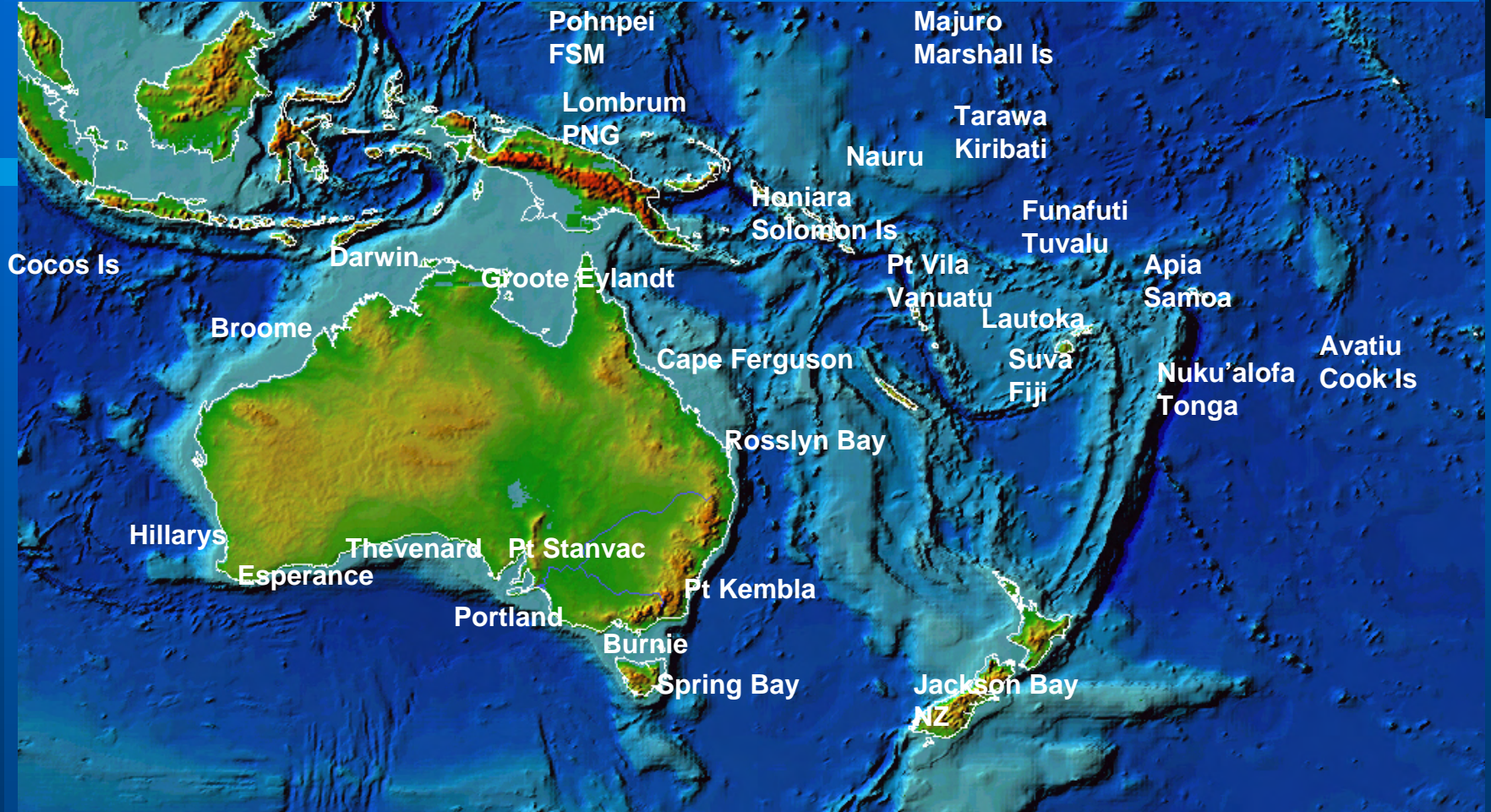
**National Tidal Centre  
Bureau of Meteorology**

# Australian and South West Pacific Sea Level Monitoring Projects

## Instrumentation



# SEAFRAME sites in Australia and the Southwest Pacific



# Output Data before Sumatra Tsunami

## SEAFRAME

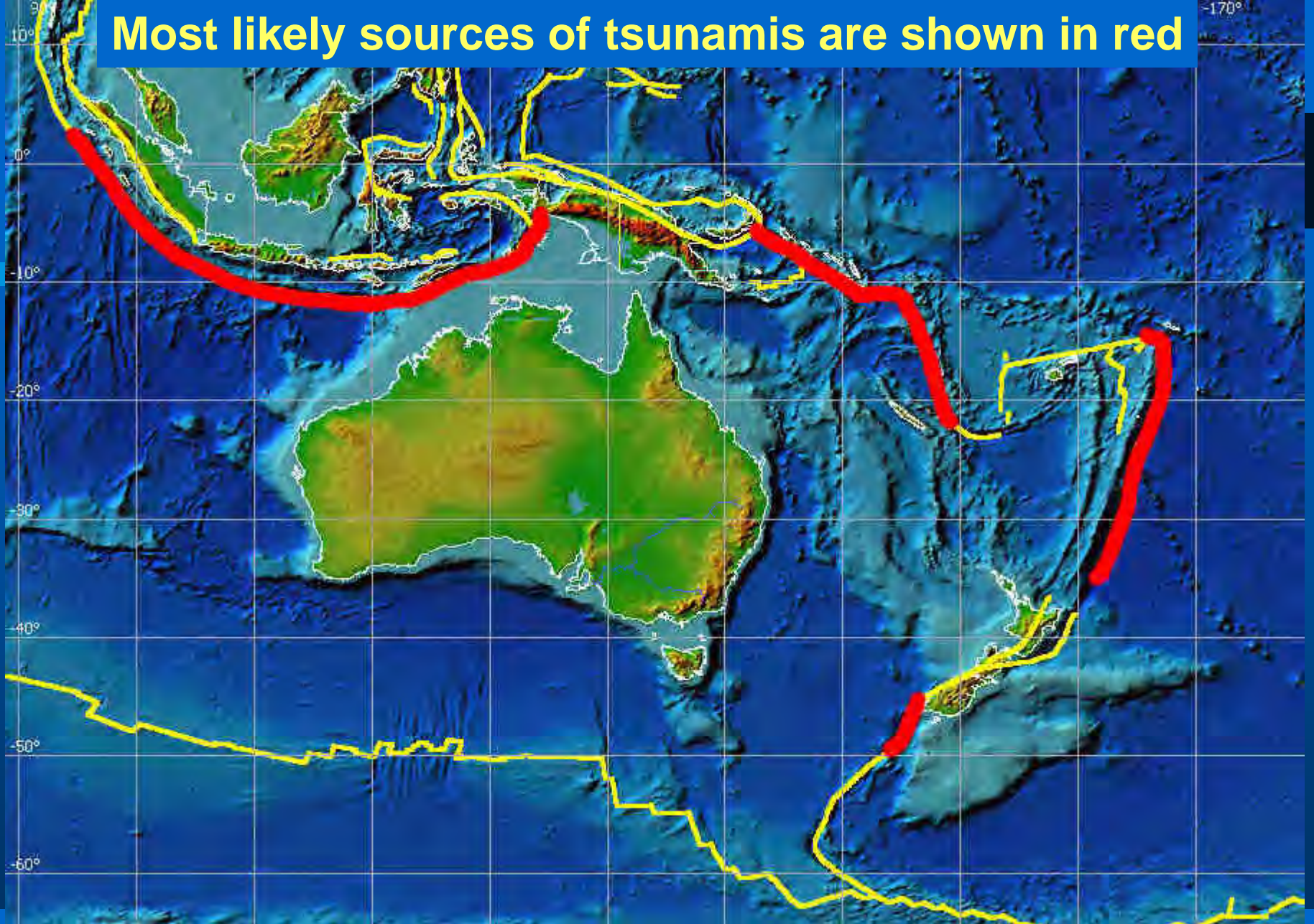
All of the following are available locally via Realtime Display and either globally transmitted hourly via GTS or automatically downloaded daily via dialup modem

- sealevel from acoustic sensor every 6 minutes
- sealevel from water pressure sensor every 6 minutes
- wind speed and direction every hour
- maximum wind gust every hour
- air temperature every hour
- water temperature every hour
- barometric pressure every hour

Available manually via dialup modem

- sealevel averaged every minute for tsunami studies
- all of the above plus gauge diagnostics

**Most likely sources of tsunamis are shown in red**



**National Tidal Centre  
Bureau of Meteorology**

# SIGNIFICANT AUSTRALIAN TSUNAMIS

## • Indonesian Arc

### Observed Tsunami

1977 Sumbawa earthquake (Ms 7.9)	6 m	Cape Leveque
1994 East Java earthquake (Ms 7.2)	4 m	NW Cape
1883 Krakatoa volcano	1.8 m	Geraldton
2004 North Sumatra earthquake (Mw 9.0)	1.5 m	Geraldton *

## • Pacific Rim

1868 Chile earthquake (Ms 8.8)	1.2 m	Sydney *
1960 Chile earthquake (Ms 8.6)	1.7 m	Eden *
1964 Alaska earthquake (Ms 8.4)	0.2 m	Sydney *

## • South Pacific Islands

2004 Macquarie Is earthquake (Mw 8.1)	0.2 m	Spring Bay *
1989 Macquarie Is earthquake (Ms 8.3)	0.3 m	Tasmania *
1998 Balleney Is earthquake (Ms 7.9)	0.2 m	Portland *
1995 Loyalty Is earthquake (Ms 7.7)	0.4 m	Crowdy Head *

\* tide gauge recording

# CASE STUDY – 19 AUG 1977

## Ms 7.9 Earthquake South of Sumbawa

Earthquake: Ms 7.9 06:08 UTC

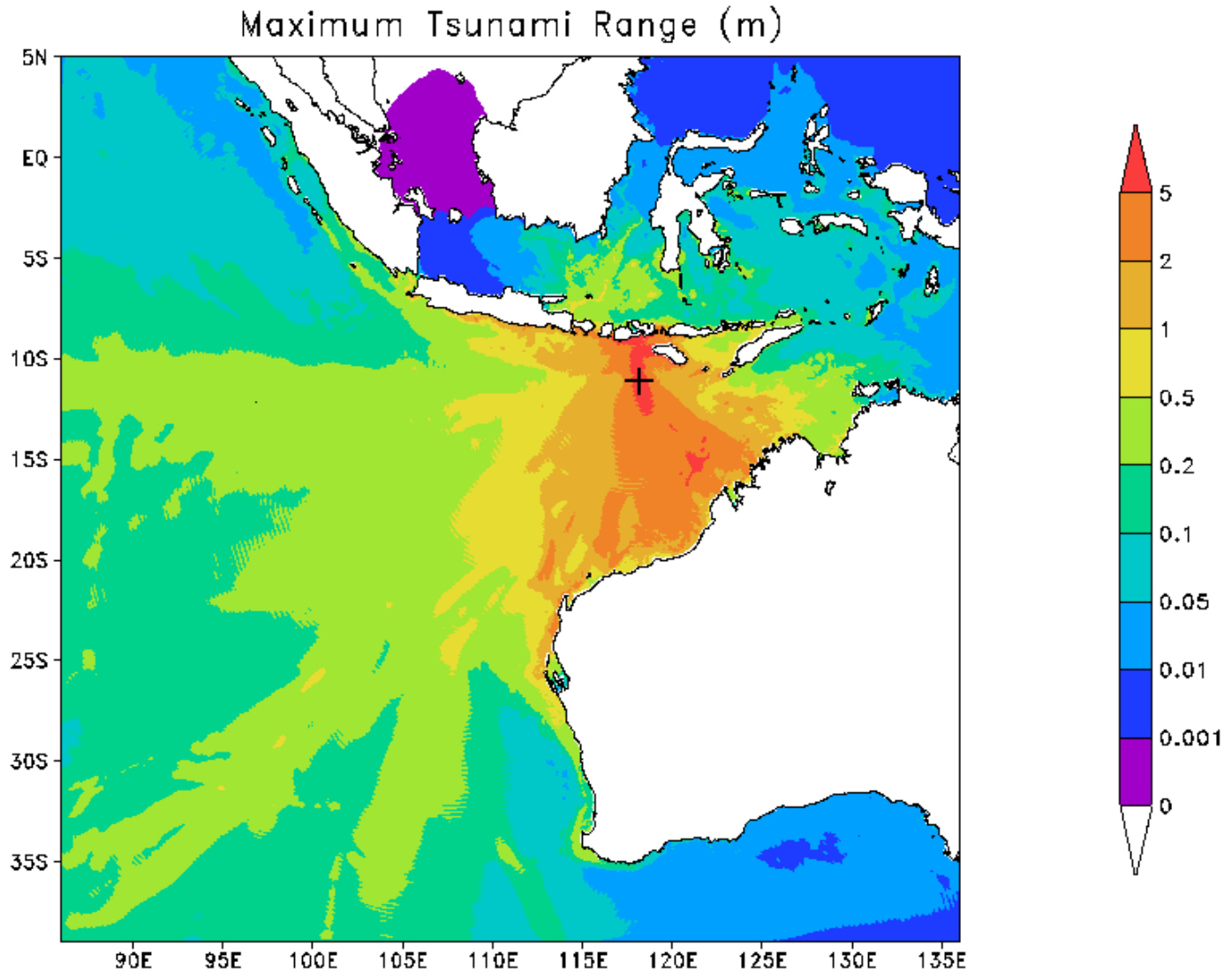
Indonesia: ~ 150 people dead or missing

Cape Leveque: 6m wave reported by lighthouse keeper

Barrow Island: 4 m waves reported by rock fisherman

Port Hedland: 1.5 m waves reported by ship

Cable Beach : People fled from large wave



# CASE STUDY – 19 AUG 1977

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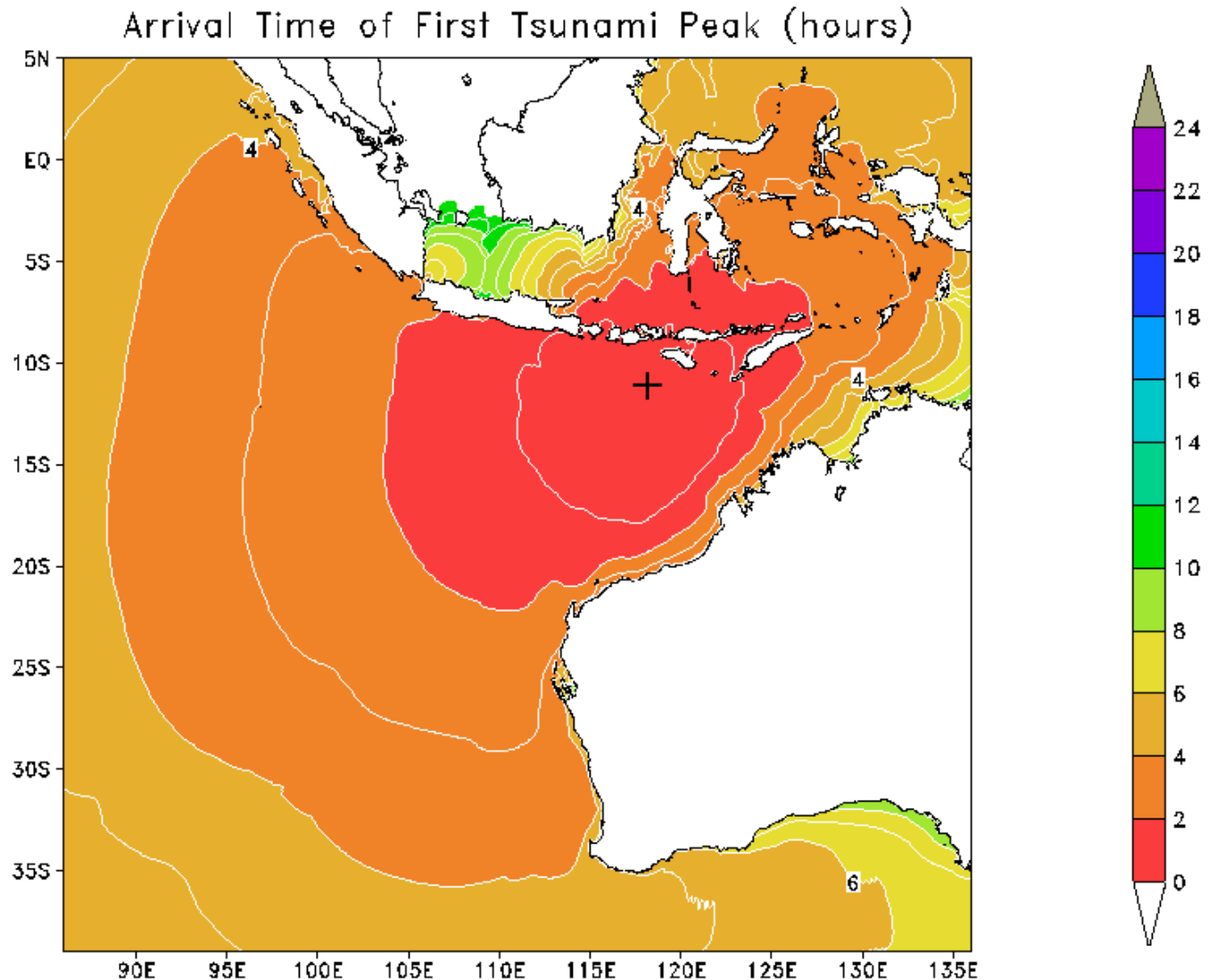
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# TSUNAMI TRAVEL TIME INFORMATION

Tsunami Information Bulletin (PTWC)



Tsunami Travel Time Software

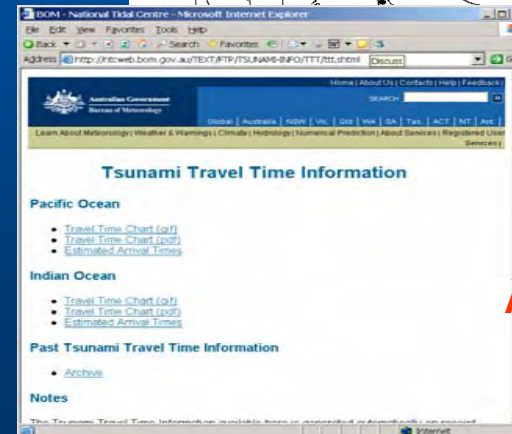
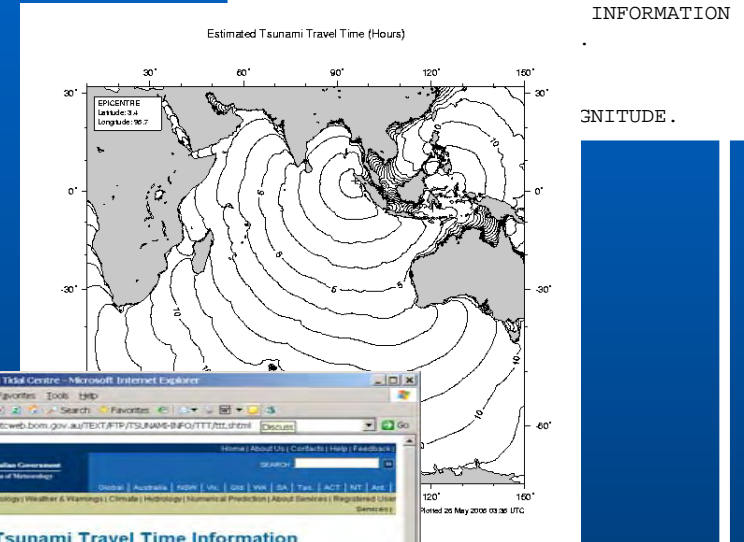
- Travel Time Charts
- Estimated Arrival Times
- SEAFRAMES
- Population Centres



Upload to BoM Intranet

TSUNAMI BULLETIN NUMBER 002  
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS  
ISSUED AT 0204Z 26 DEC 2004

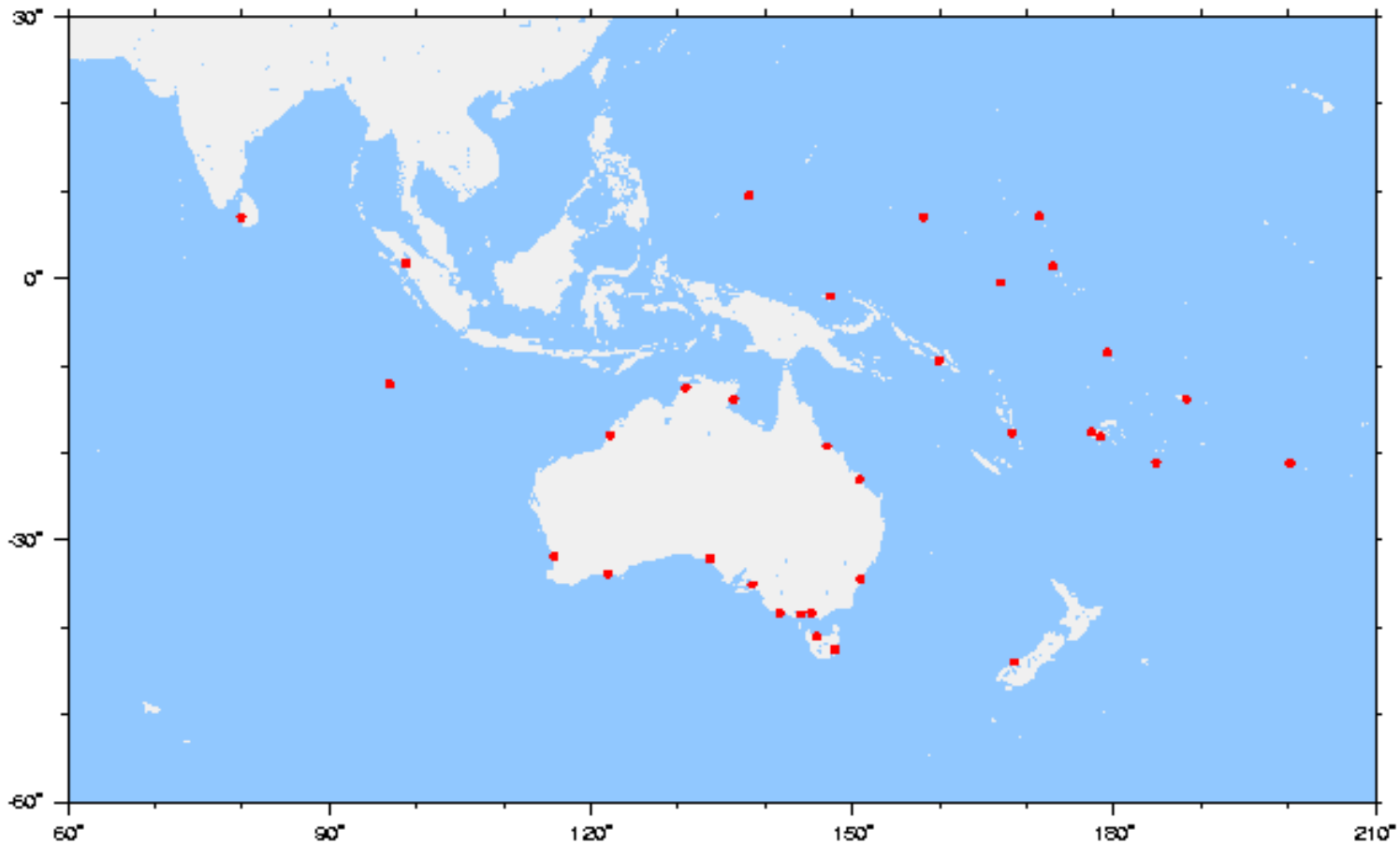
THIS BULLETIN IS FOR ALL AREAS OF THE  
PACIFIC BASIN EXCEPT  
ALASKA - BRITISH COLUMBIA - WASHINGTON  
- OREGON - CALIFORNIA.



Automated System  
~ 2- 3 mins

National Tidal Centre  
Bureau of Meteorology





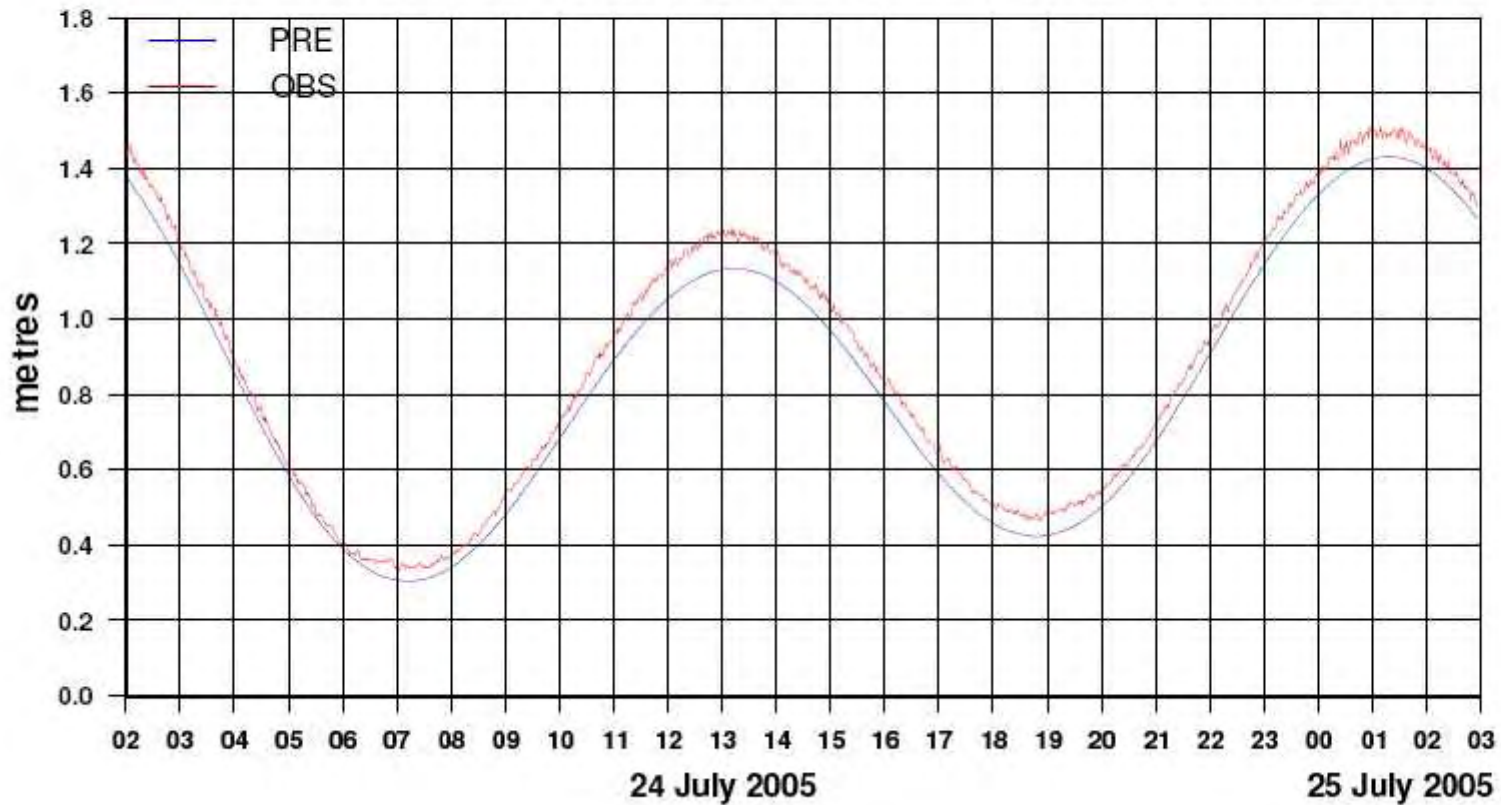
**Current Australian near real time capability via automated satellite and downloads**

**National Tidal Centre  
Bureau of Meteorology**

# COCOS ISLANDS - LAST 24 HOURS

LAT 12° 7.0' N LONG 96° 53.5' E

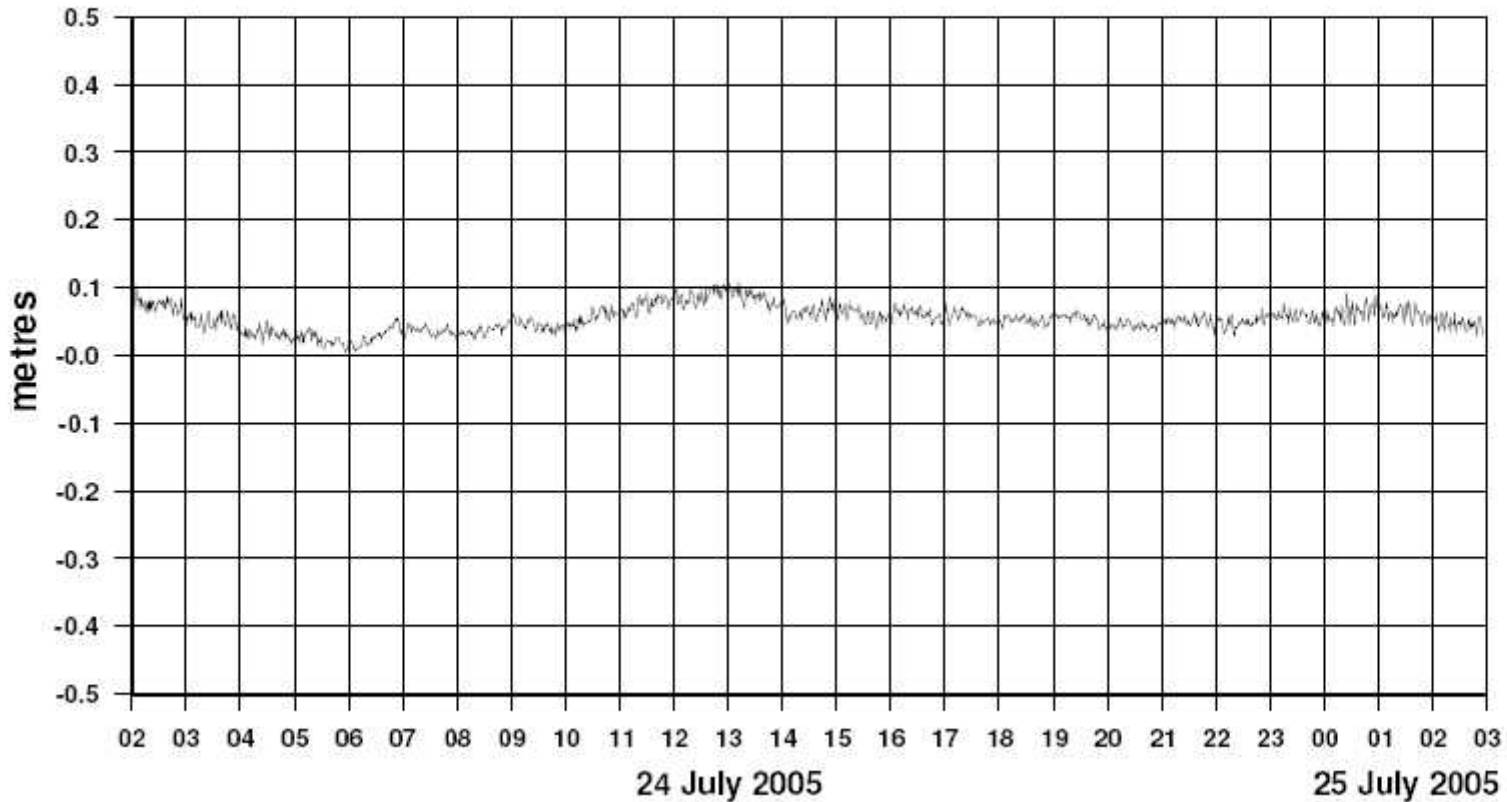
ONE MINUTE OBSERVATIONS & PREDICTIONS TO 02:56 25 JUL 2005 UTC



# COCOS ISLANDS - LAST 24 HOURS

LAT 12° 7.0' N LONG 96° 53.5' E

ONE MINUTE RESIDUALS TO 02:56 25 JUL 2005 UTC



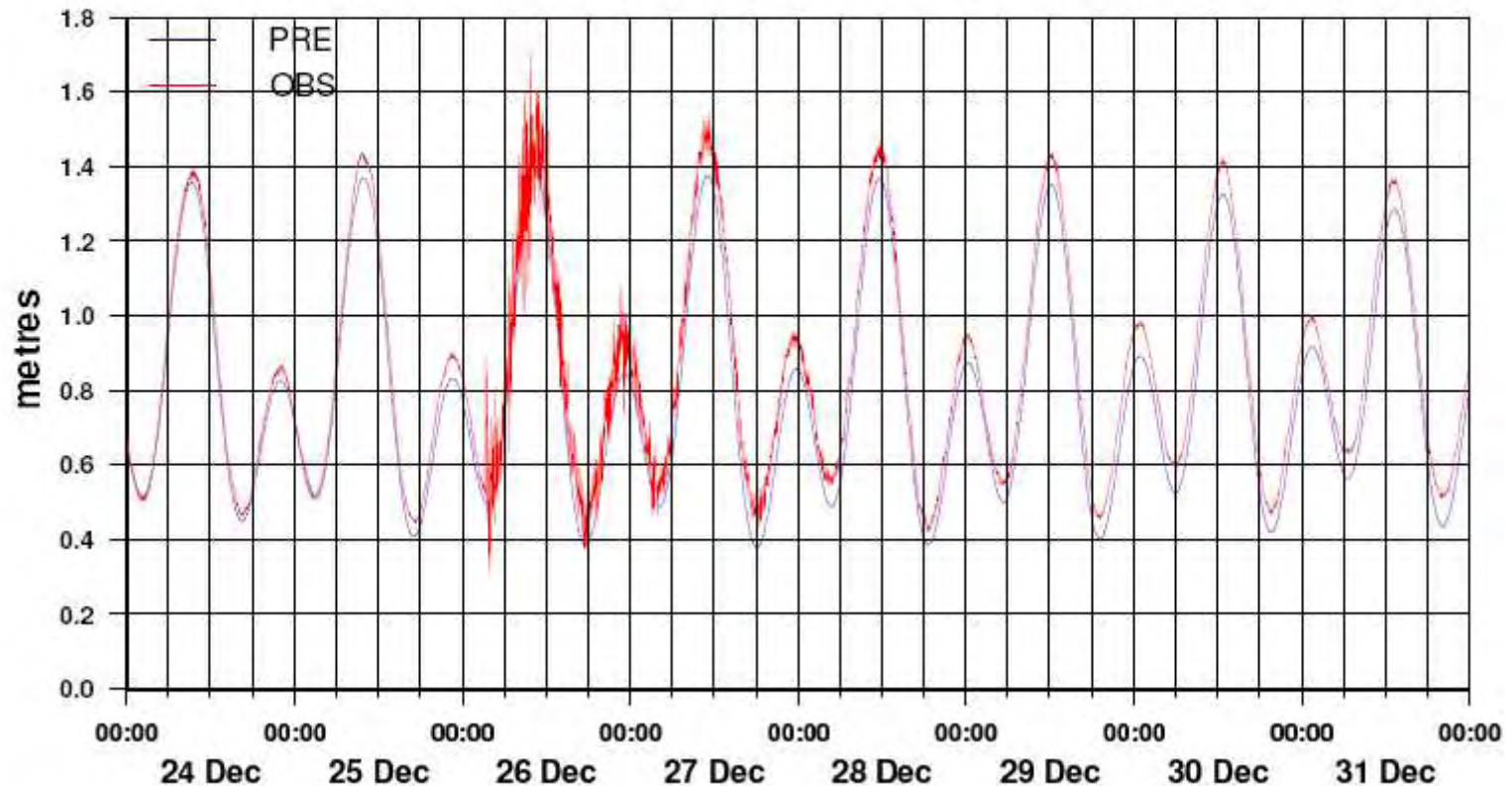
National Tidal Centre - Bureau of Meteorology

Plotted 25 Jul 2005 02:58 UTC

# COCOS ISLANDS - 8 DAY PLOT

LAT 12° 7.0' N LONG 96° 53.5' E

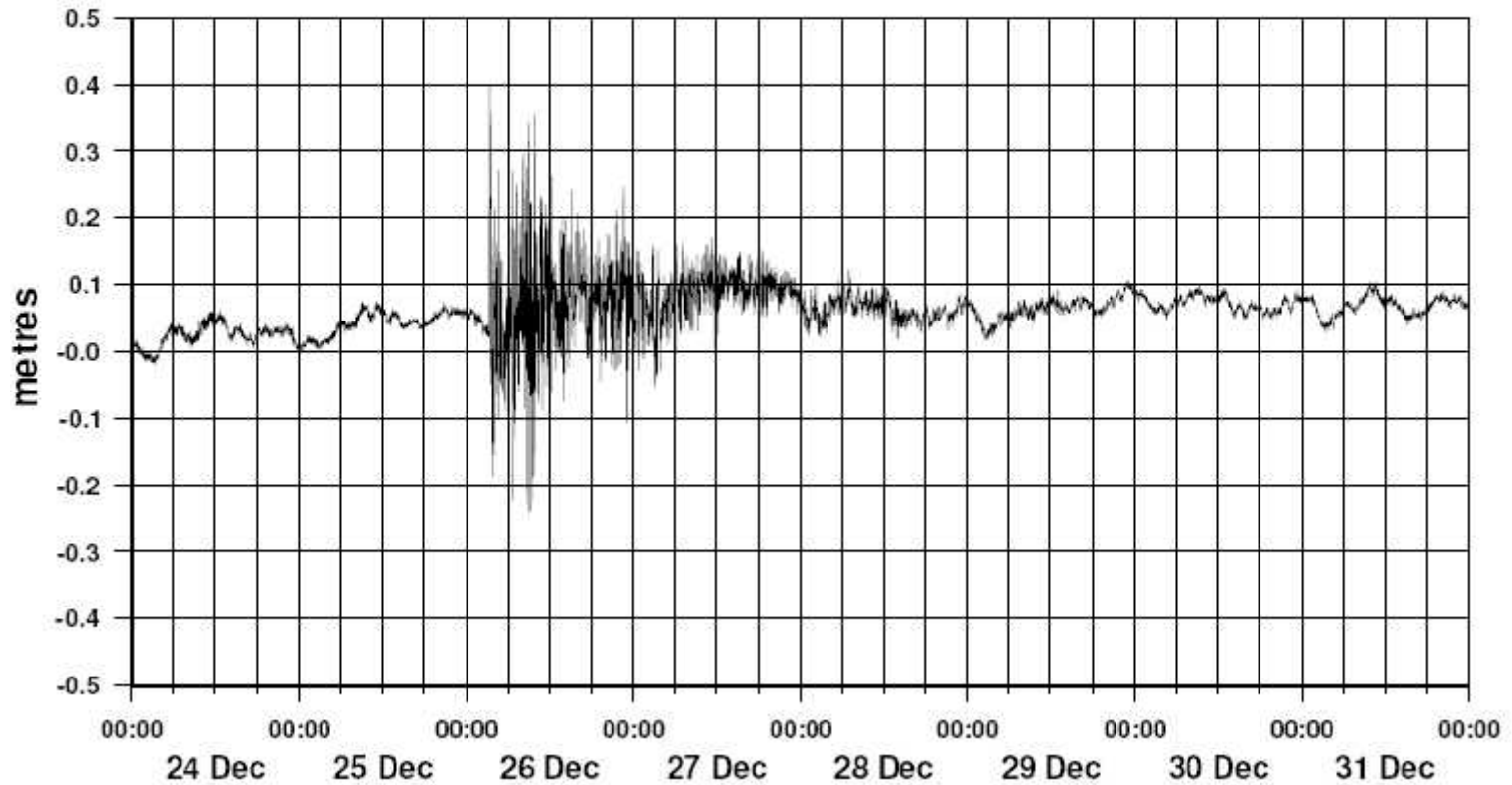
ONE MINUTE OBSERVATIONS & PREDICTIONS TO 23:59 31 DEC 2004 UTC



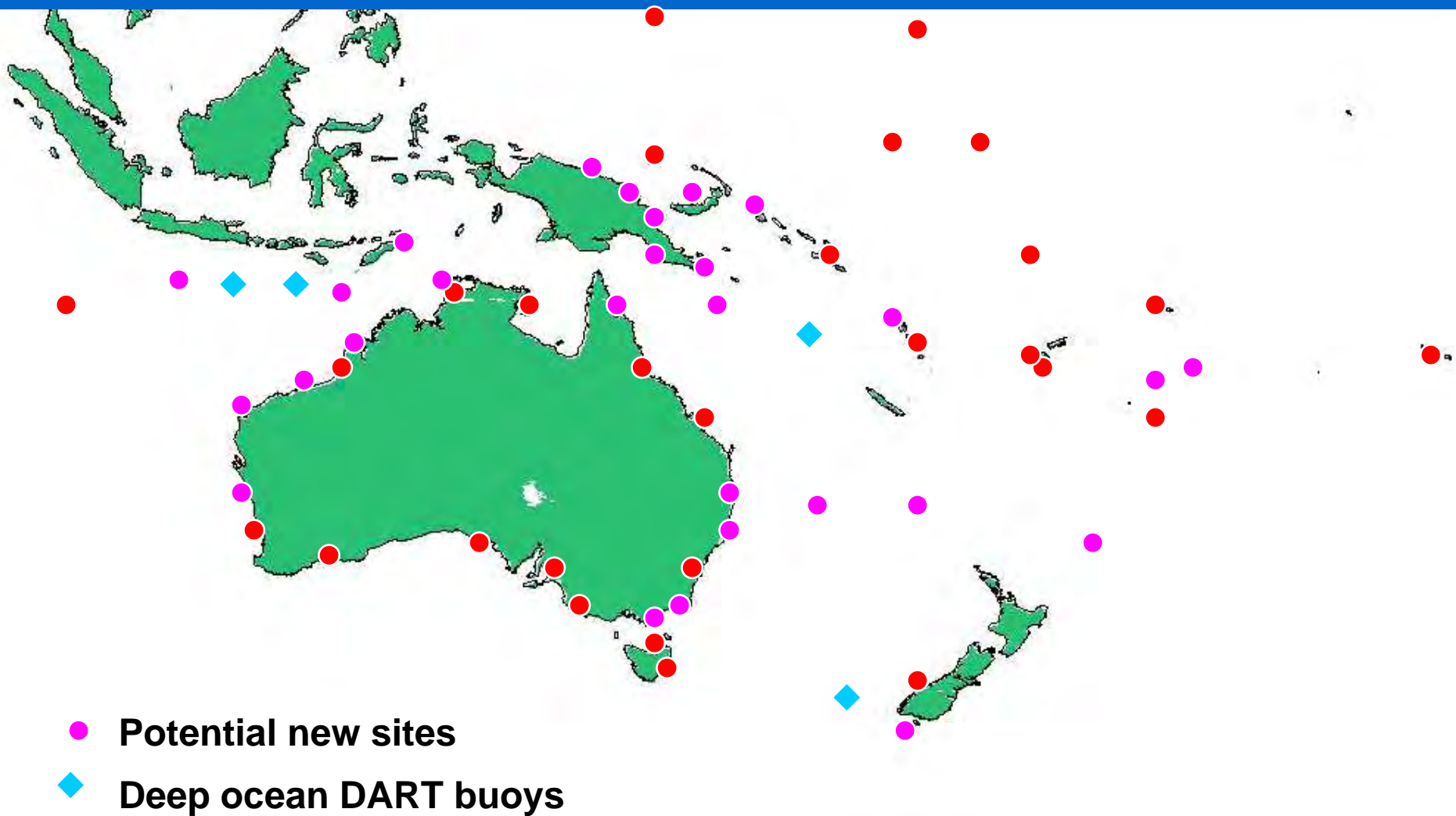
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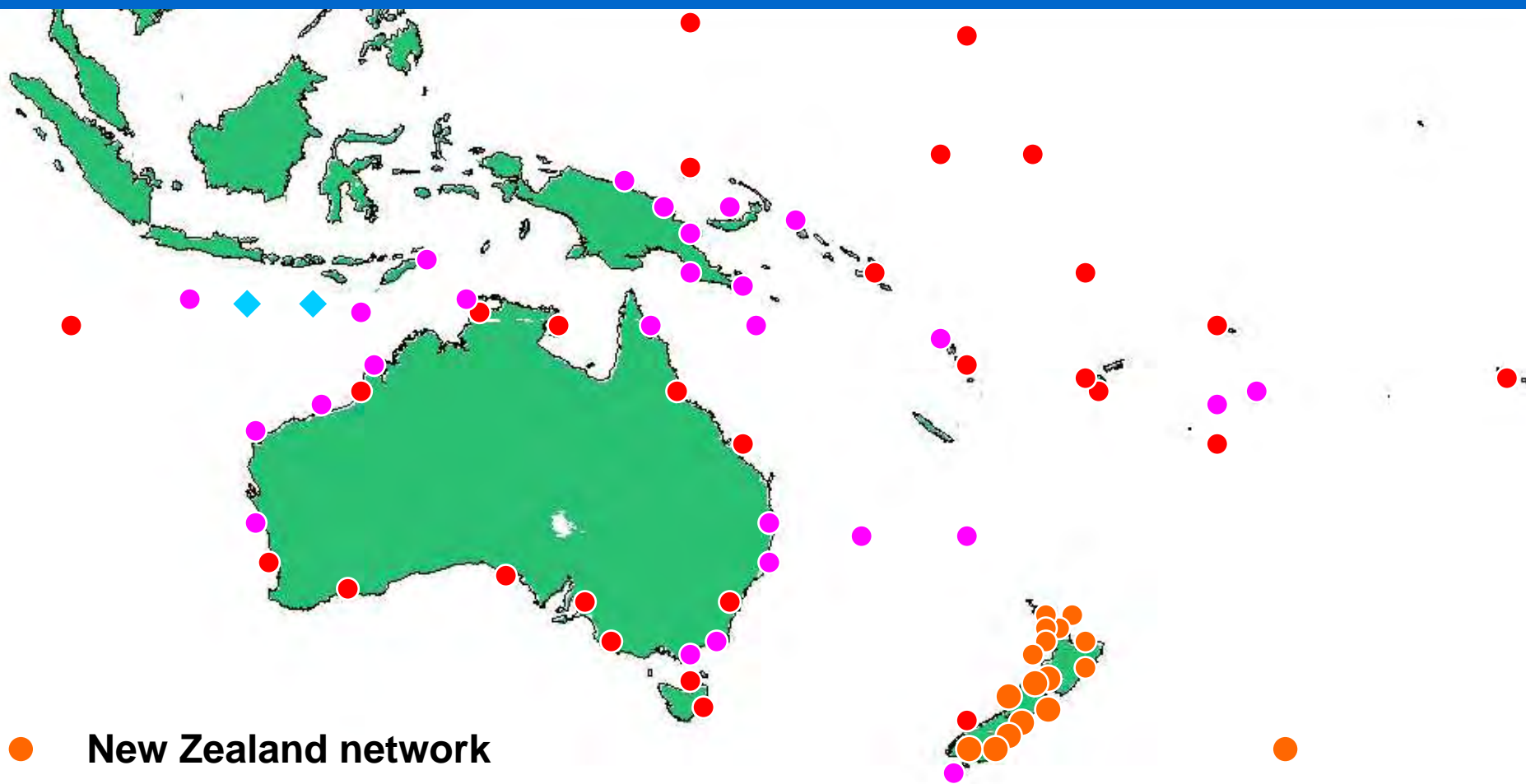
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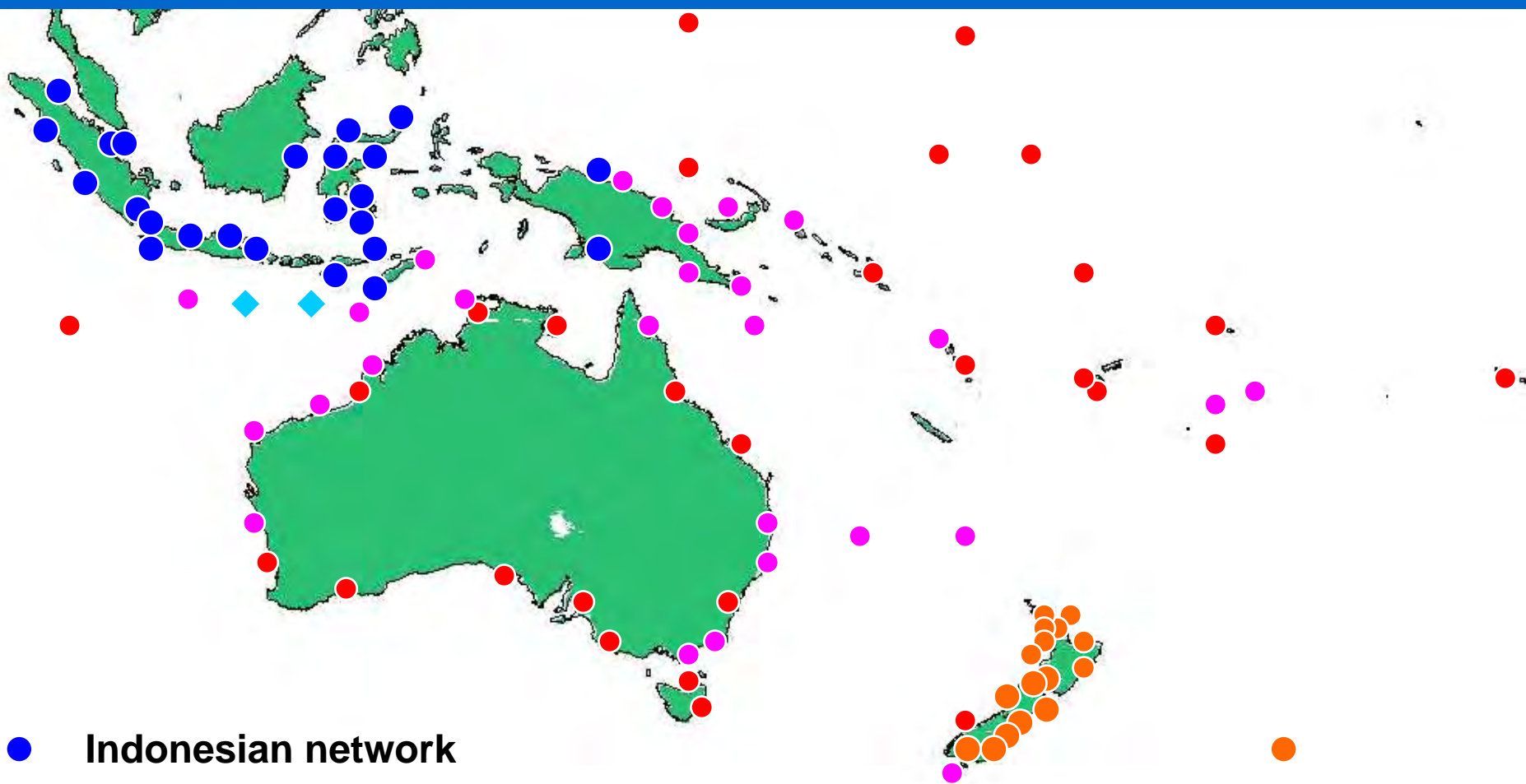
# Potential sites for tsunami enabled gauges with real time accessibility Australian and South West Pacific network



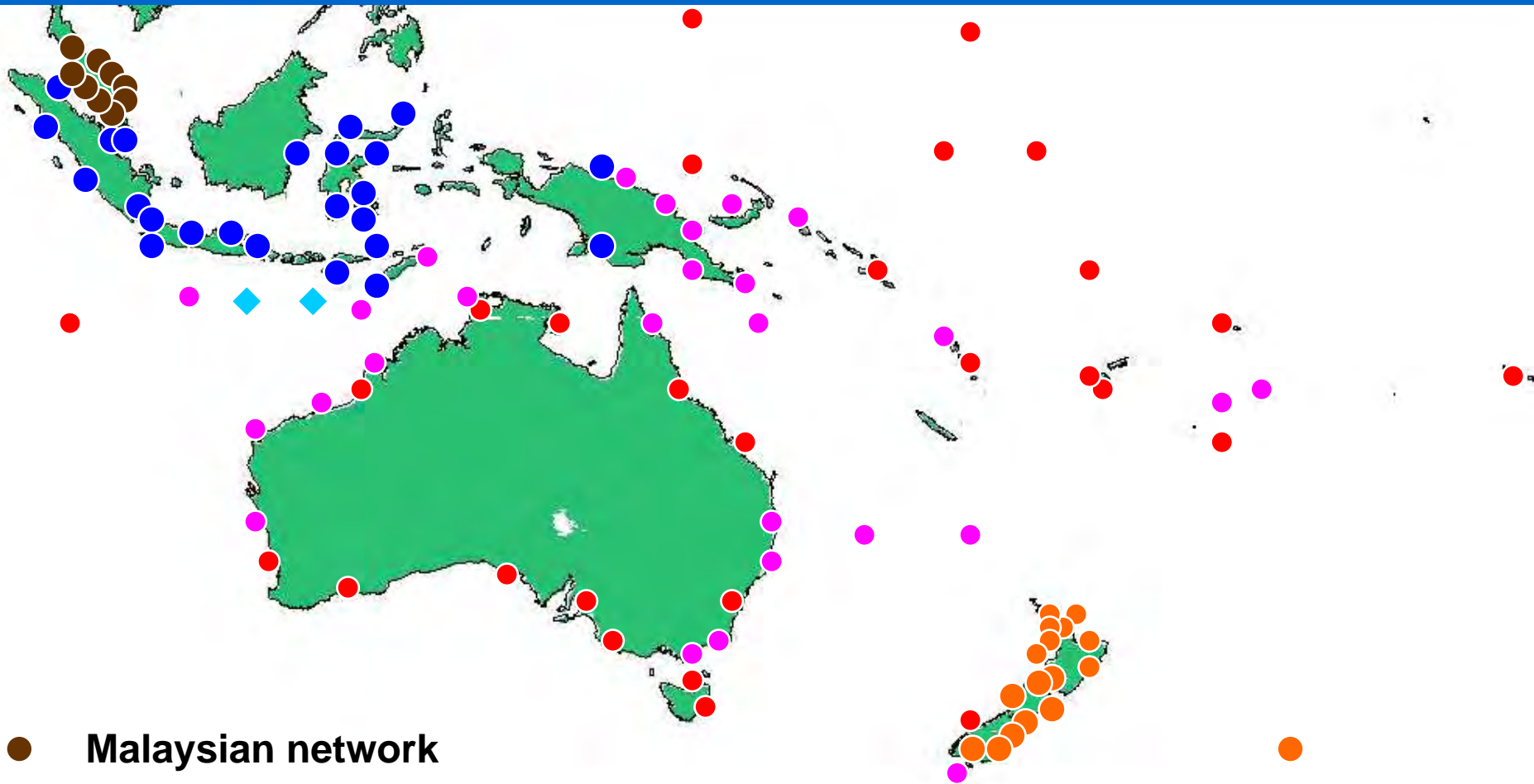
# Additional sites for tsunami enabled gauges with real time accessibility



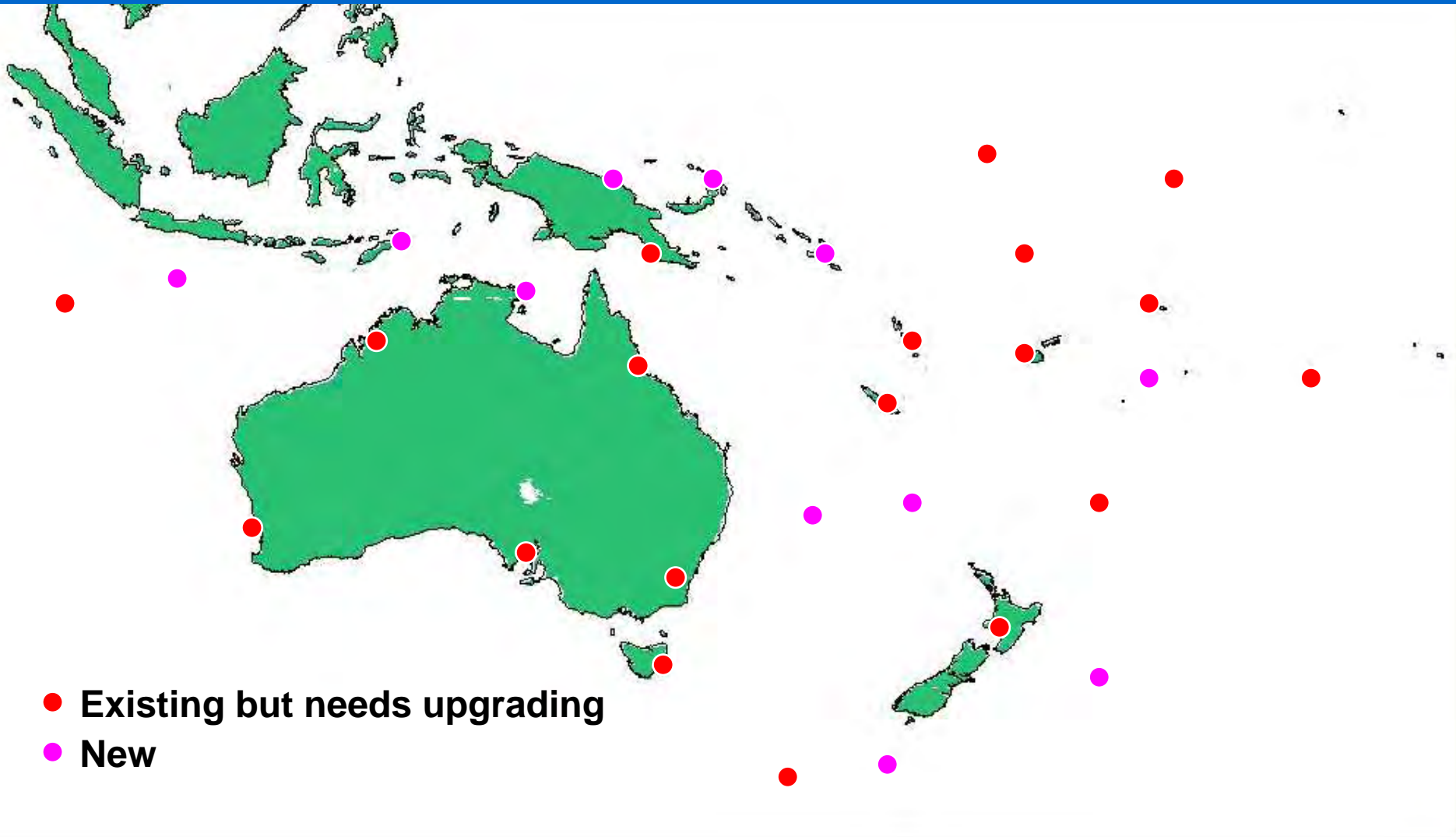
# Additional sites for tsunami enabled gauges with real time accessibility



# Additional sites for tsunami enabled gauges with real time accessibility



# Australian potential seismograph network



## Output now

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One minute sea levels every minute from 22 stations accessible via GTS every 3 minutes and via registered user pages updated every 5 and 10 minutes. This will be updated to every minute shortly and be increased to about 60 stations when about 30 new stations become online.

Satellite telephone links for duplex communications.

CDMA currently where available but this will be changed to nextG shortly where available.

Remote (Pacific) stations also have Thiss MiniT terminals which transmit every minute via C Band satellite at a cost of ~\$300AUD/month.