Pacific Sea Level and Geodetic Stations for Natural Hazards

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Began in 1991 as an Australian response to concerns raised by the member countries of the South Pacific Forum over the potential impacts of global warming on climate and sea levels in the Pacific.

Australia has been supporting 13 Pacific Island countries (PICs) to measure, record and analyse long-term sea level and land motion for over 25 years. This is known as the Pacific Sea Level and Geodetic Monitoring (PSLGM) project funded by Australian Aid under the Climate and Oceans Support Program in the Pacific (COSPPac).

The sea level data is collected continuously at one or two tide gauges and land motion data is collected continuously at one or two Global Navigation Satellite System (GNSS) stations in each of the 13 PICs.

Primary goal “to generate an accurate record of variance in long-term sea level for the Pacific and to establish methods to make [these] data readily available and usable by Pacific Island Countries.”
Sea Level and Geodetic Monitoring Station

- Wind monitor and air temperature
- GNSS Benchmark
- Satellite telemetry antenna
- Barometric pressure sensor
- Primary data acquisition system
- Acoustic sensor
- Protective well
- Calibration and sounding tube
- Instantaneous water level inside well
- Tide staff
- Radar sensor
- Pressure and water temperature sensor
Sea Level Monitoring Station – Tide Gauge

Kings Wharf, Suva Tide Gauge Station

Queens Wharf, Lautoka Tide Gauge Station
Geodetic Monitoring Station – GNSS CORS

GNSS Hut

GNSS CORS Pillar

Instrument rack – GNSS Hut
PSLGM Project Data & Information


http://oceanportal.spc.int/portal/ocean.html
Project Data & Information – Sea Level

MONTHLY MEAN SEA LEVELS THROUGH OCTOBER 2020 (m)
(The zero line represents mean sea level)

MONTHLY MEAN BAROMETRIC PRESSURES THROUGH OCTOBER 2020 (hPa)

MONTHLY MEAN WATER TEMPERATURES THROUGH OCTOBER 2020 (°C)
Project related Data & Information

METEOROLOGY (CLIMATE)

- Wind Speed & Direction
- Atmospheric Pressure
- Air & Water Temperature
- Sea Levels

Real Time Display – Meteorological Data

GEODETEIC (POSITIONING)

- PNGMBM: 37.688m
- PNG14: 4.580m
- HAT: 1.284m
- MSL: 0.783m
- LAT: 0.064m
- TGZ: 0m
Real Time Data Display – Sea Level

Fiji - Suva. Updated on 11th September 2020, 02:10 UTC

Sea Level
- Actual: 1.604 m
- Predicted: 1.412 m
- Residual: 0.192 m

Weather
- Air Pressure: 1011.3 hPa
- Air Temperature: 27.8°C
- Water Temperature: 25.6°C

Wind
- Current Speed: 9.7 knots
- Current Maximum: 11.7 knots
- Direction: 138°

Wind Direction
- SE

http://www.bom.gov.au/cosppac/rtdd/q1c7o0hj48yu/
High precision survey equipment and Total Station Differential Levelling technique
Vertical motion of Pacific Island tide gauges: combined analysis from GNSS and levelling (GA Record 2020/03) (d28rz98at9flks.cloudfront.net)
Pacific Sea Level and Geodetic Monitoring Project: Levelling & GNSS Monitoring Survey Report

Tarawa, Kiribati, December 2019

Figure 3.1 Wiring diagram depicting the offsets between surveyed marks. The left-hand side shows the height of the GNS CORS pillar (WGS), SCACMAR sensor reference benchmark (left height), KIR12, SCACMAR sensor reference benchmark (new height, KIR12) with respect to the International Terrestrial Reference Frame 2014 at epoch 2010.21. The right-hand side shows the height of KIR12, KIR12, and total stations with respect to tide gauge zero. For more information on total stations, please refer to Pacific Sea Level and Geodetic Monitoring Project File Information and Instructions (ga.gov.au)
Geodetic Monitoring Stations – Data Centre
GNSS COR Station Data – Land Velocity

Samoa (Apia) - GNSS

Variation from average height (m)

Year
Geodetic Reference Frame – Pacific
PSLGM Stations supports Oceanography

- Coastal monitoring
- Development of numerical models
- Coastal hazard assessments and early warning systems
- Risk assessments
Inundation Map In Tokou, Ovalau

Damages: ● None; ● Minor; ● Moderate; ● Severe; ● Destroyed;
Development of Innovative and Tailored Inundation Forecast Systems

Fiji Met Service now issues impact-based forecasts

User-focused communication, 24 May:
Impact-based forecasting, that includes hazard and vulnerability information

“There is very high chance that the waves riding on top the high tide can over wash into the vegetation line, causing inundation on coastal low-lying areas.”

“Similarly for those using Queens Road along Coral Coast should remain alert for occasional over wash of roads during high tides this weekend.”

Offshore wave forecast

Water Level forecast at the shore

Inundation Forecast
Thank You