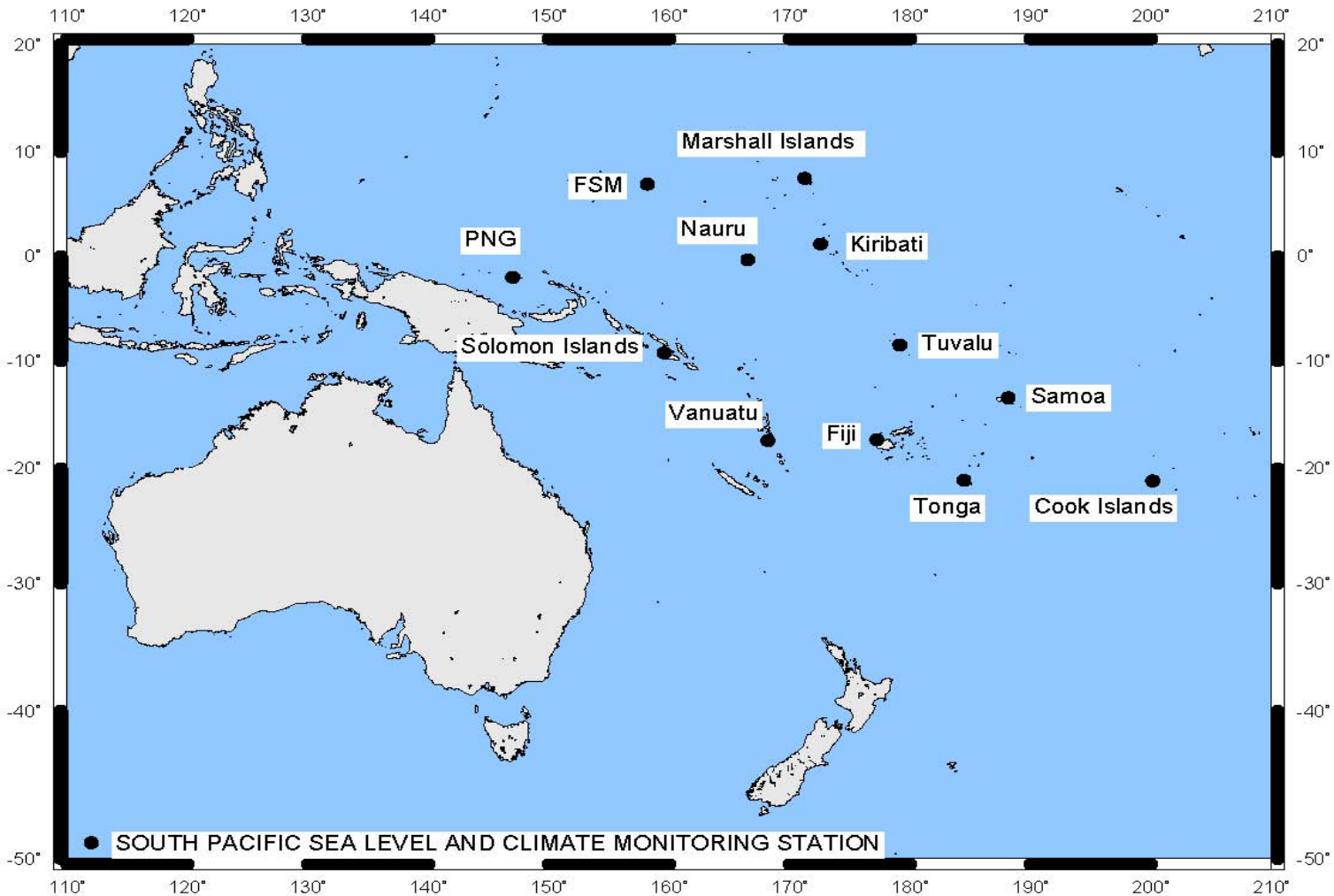
South Pacific Sea Level & Climate Monitoring Project (SPSLCMP Phase IV)

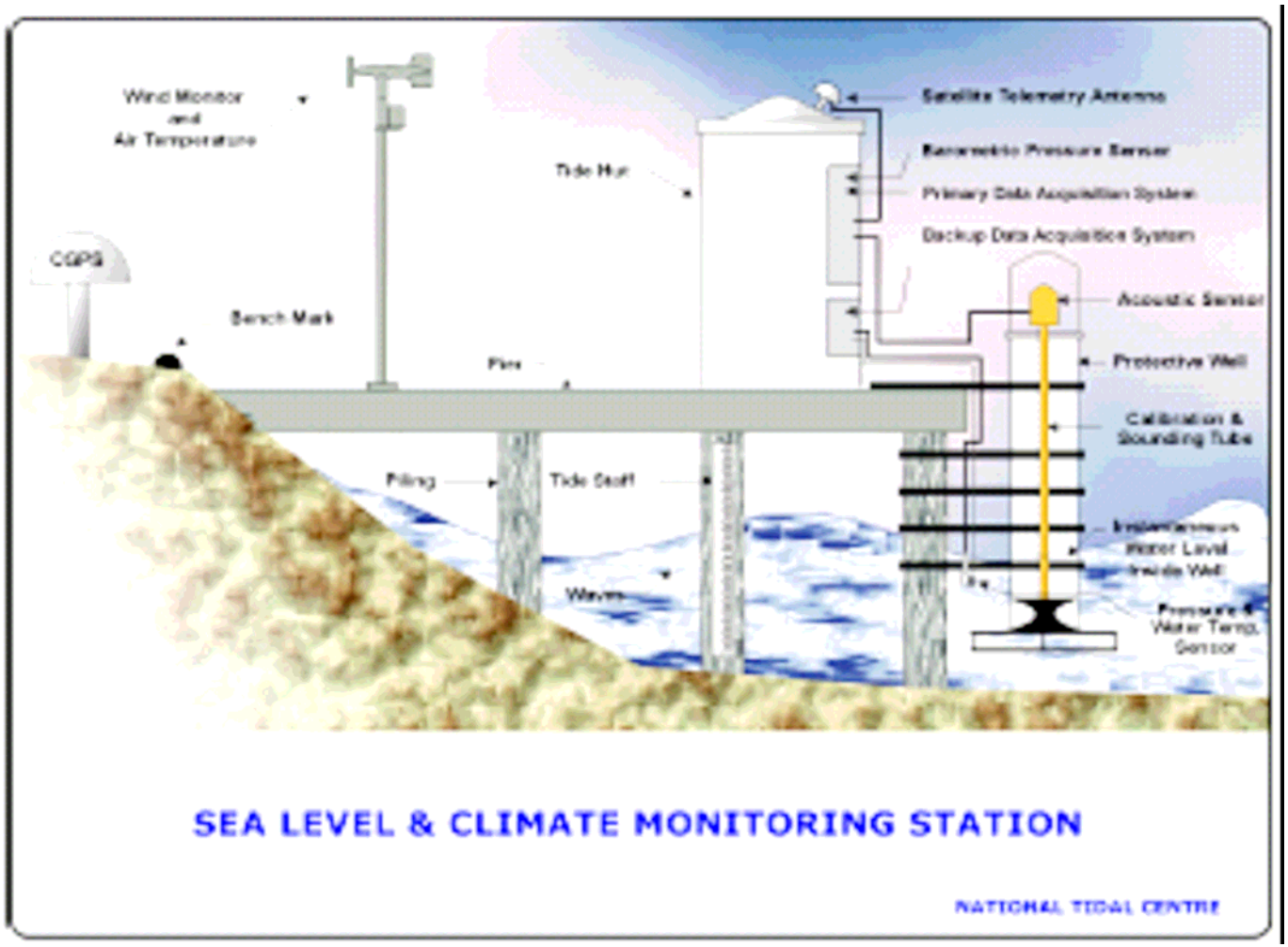
Philip Hall, Project Director

- 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.
- Primary goal is ***"to generate an accurate record of variance in long-term sea level for the South Pacific and to establish methods to make [these] data readily available and usable by Pacific Island Countries".***
- Running for over 15 years and is now in its fourth phase, which commenced on 1 January 2006 and is due to end on 31 December 2010.
- AusAID approved the Project continuing to Phase IV primarily on the basis that a significant investment in resources has been made and the full benefits are yet to be realised.

The SPSLCMP Network



SEAFRAME Station



CGPS Station

Tonga CGPS Hut and Rack

Tuvalu CGPS Pillar

Current Status of the Data Record

- SPSLCMP is a data gathering network that enables us to "monitor" what the sea level in the region is doing today, and to provide data to support the work of meteorologists and climatologists to predict with a moderate-to-high degree of confidence climate variability over the next three to six months.

- Recognised at the outset of the Project that it would be necessary to collect data for more than 19 years (i.e. beyond 2010) in order to confirm sea level trends.

- ***To date, records of sea level have not been collected and archived over enough years to provide a credible indication of trends.***

Current Status of the Data Record

- However, the Project is succeeding in its goal to provide an accurate continuous long-term record of sea level in the Pacific region for partner countries and the international scientific community that enables them to respond to and manage related impacts.
- While the sea level time-series at the present time is too short to make definitive conclusions, the data are being increasingly utilised by National Meteorological Services (NMSs), SOPAC, consultants and policymakers in the region.
- The data are also used by international scientific agencies and organisations in their long range modeling of climate change and its potential impacts, both regionally and internationally.
- ***With its combination of precise levelling, CGPS and highly accurate sea level monitoring, the SPSLCMP is acknowledged in the climate scientific community as one of the best networks in the world.***

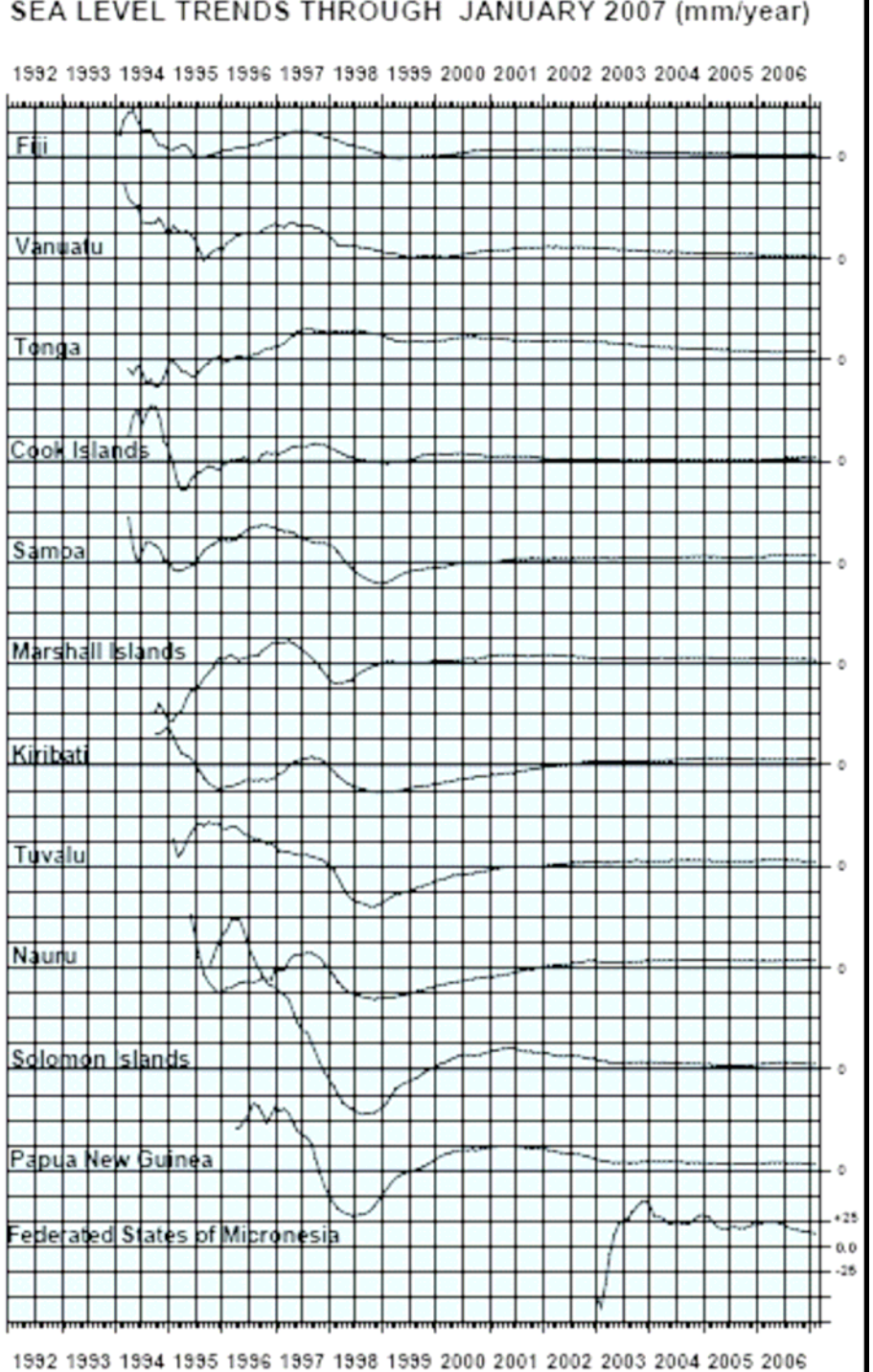
Early Warning for Climate Change Detection

- The network also plays a role in contributing to a regional and international early warning capability for climate change detection.
- The current SEAFRAME sea level trends suggest that we could expect sea level rises of less than 0.5m over the next 50 years. It is possible, however, that the effects of recent accelerations in climate change have not yet started to have a significant contribution to or impact on current sea levels in the South Pacific.
- For example, there is a lag from when the melting of the world's large ice expanses start to have a significant impact on global sea levels, and the SEAFRAME network will enable us to detect the early stages and monitor the ongoing trends of those impacts on sea level change in the South Pacific region.
- The Monthly Data Report, one of a range of information products produced by the Project, is the primary form of SPSLCMP data dissemination and is available via the Project's website, http://www.bom.gov.au/pacificsealevel/. Its content provides users with up-to-date access to the Project's data and is a primary source of information for other organisations climate research and products.

January 2007 Monthly Data Report

- Many SEAFRAME stations detected a small tsunami that was generated from a magnitude Mw8.1 earthquake in the northwest Pacific Ocean east of the Kuril Islands on 13th January 2007. The largest tsunami signal observed was 40cm at Cook Islands.
- The monthly mean sea level at Cook Islands for January 2007 was the highest on record. It occurred in association with a sea level anomaly of +13cm.
- Monthly mean sea level anomalies were mostly lower than normal, although recent increases have resulted in higher than normal sea levels being observed at 4 of the 12 SEAFRAME stations.
- Significant cooling of equatorial Pacific Ocean temperatures through January 2007 indicates El Niño conditions continue to decay. A westerly wind burst and an increase in cloudiness in the west-central equatorial Pacific was observed, but these developments are not expected to re-invigorate El Niño in the coming months.

Recent short-term sea level trends in the Project area based upon SEAFRAME data through January 2007				
Location	**Lat / Long**	**Installation Date**	**Trend (mm/yr)**	**Change from previous month (mm)**
Fiji	17 36’19”S / 177 26’17”E	Oct 1992	+2.9	+0.1
Kiribati	01 21’45”N / 172 55’48”E	Dec 1992	+6.3	-0.1
Vanuatu	17 45’41”S / 168 17’35”E	Jan 1993	+3.1	+0.2
Tonga	21 08’25”S / 175 10’45”W	Jan 1993	+8.2	+0.1
Cook Islands	21 11’58”S / 159 47’10”W	Feb 1993	+3.9	+0.4
Samoa	13 49’09”S / 171 45’21”W	Feb 1993	+6.4	0.0
Tuvalu	08 30’10”S / 179 12’33”E	Mar 1993	+5.5	-0.1
Marshall Islands	07 06’27”N / 171 22’15”E	May 1993	+4.1	-0.1
Nauru	00 31’55”S / 166 54’33”E	Jul 1993	+7.5	-0.3
Solomon Islands	09 25’18”S / 159 57’19”E	Jul 1994	+5.2	-0.2
PNG Manus	02 02’10”S / 147 22’31”E	Sep 1994	+6.6	-0.2
FSM	06 58’42”N / 158 11’50”E	Dec 2001	+13.8	-0.6


SEA LEVEL TRENDS THROUGH JANUARY 2007 (mm/year)
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006
Fiji
Vanuatu
Tonga
Cook Islands
Samoa
Marshall Islands
Kiribati
Tuvalu
Nauru
Solomon Islands
Papua New Guinea
Federated States of Micronesia
+25
0.0
-25
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006

Sea Level & Climate Monitoring In Perspective

- The importance of precise measurements and vertical datum control for long-term sea level monitoring is integral to the SPSLCMP.
- Nevertheless, the data collection program to date has been operating for a relatively short term, and so the trends are still prone to the effects of shorter-term ocean variability (such as El Niño and decadal oscillations).
- As the data sets increase in length, the trend estimates will begin to reflect longer-term change rather than short-term fluctuations although this transition continues for many decades.