World Meteorological Organization

Weather • Climate • Water

Improving climate services: lessons learned from the Pacific region

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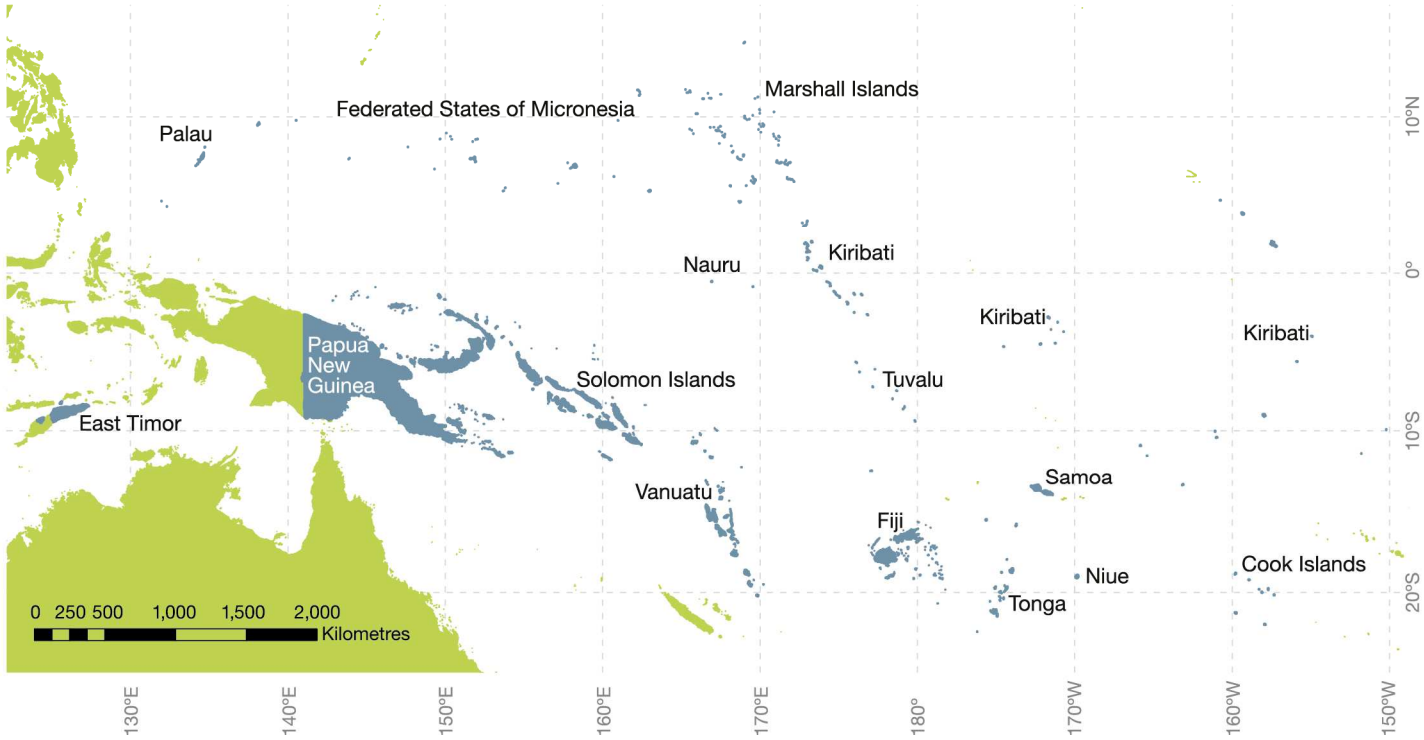
Australian Bureau of Meteorology

A brief history of Pacific region climate projects

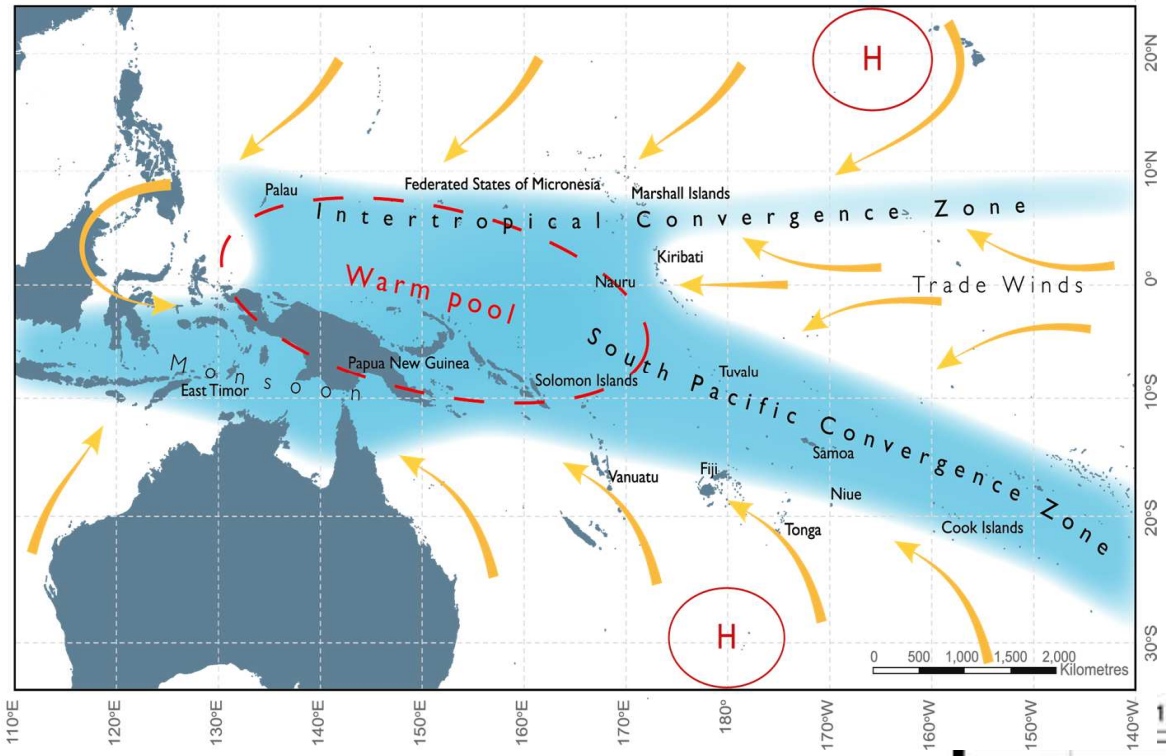
- APN series of regional climate workshops – hosted by Australia and New Zealand 1998-2003
- Pacific Islands Climate Prediction Project (PI-CPP) – followed by Climate and Oceans Support Program in the Pacific (COSPPac)
- Pacific Climate Change Science Program (PCCSP) followed by Pacific-Australia Climate Change Science Adaptation and Planning Program (PACCSAP)

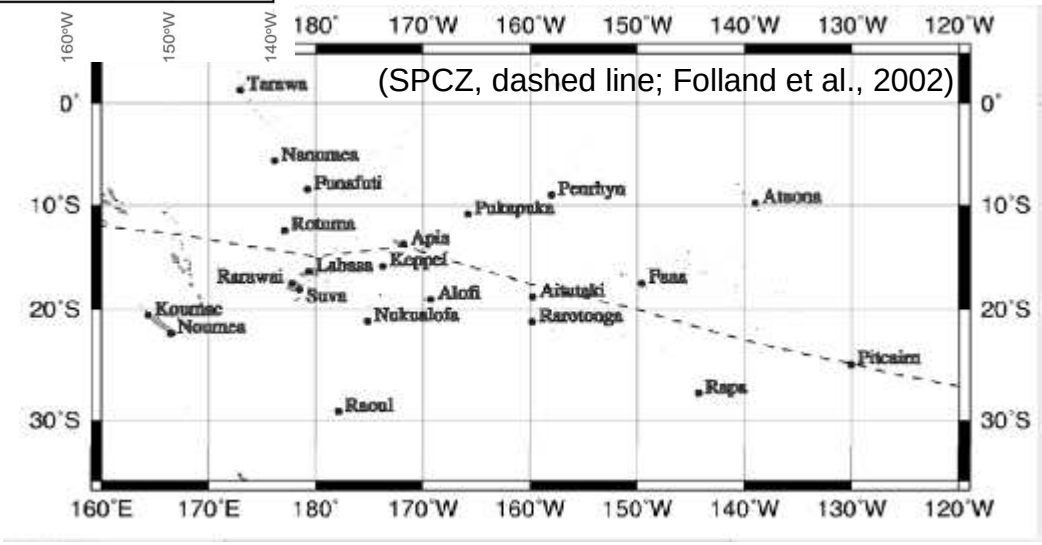
COSPPac and PACCSAP largely funded by Australian foreign aid programs: budget ~A$15-20M per year

Regions covered by the projects



Climate features in the Western Pacific





The Pacific-Australia Climate Change Science and Adaptation Planning Program

Objective: To develop the capacity of Pacific Island country scientists, decision-makers and planners to access and apply information and tools to identify and develop in-country adaptation responses.

Some key issues for many Pacific countries

- Many countries have high levels of vulnerability (low GDP, exposed to tropical cyclone risk, exposed to sea level rise etc.)
- High levels of interannual climate variability in some parts of region
- Most countries have small populations: small NMSs, limited infrastructure (IT, observations, communications etc.)

Some objectives of the projects

- To advance scientific knowledge and fill knowledge gaps with respect to climate variability and climate change in the Pacific region
- To provide tools to support locally-based scientists and decision-makers
- To build local capacity in climate monitoring, prediction and applications

Making information locally available and accessible

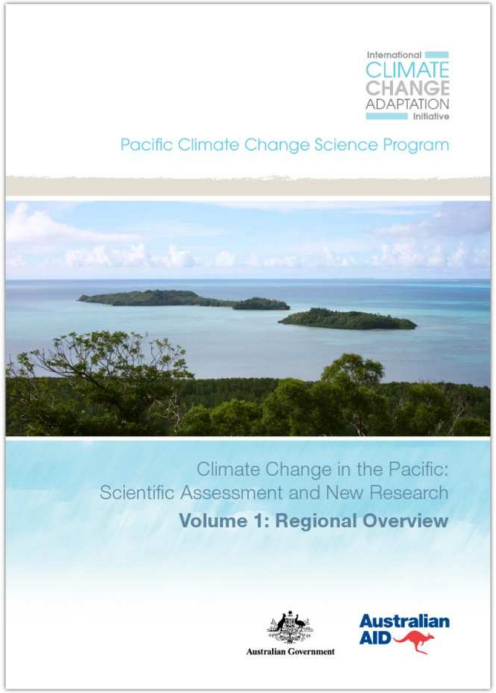
Tools are intended to be relatively simple:

- accessible with standard off-the-shelf computer technology
- no programming expertise required
- resilient to slow internet connections, unreliable power etc.

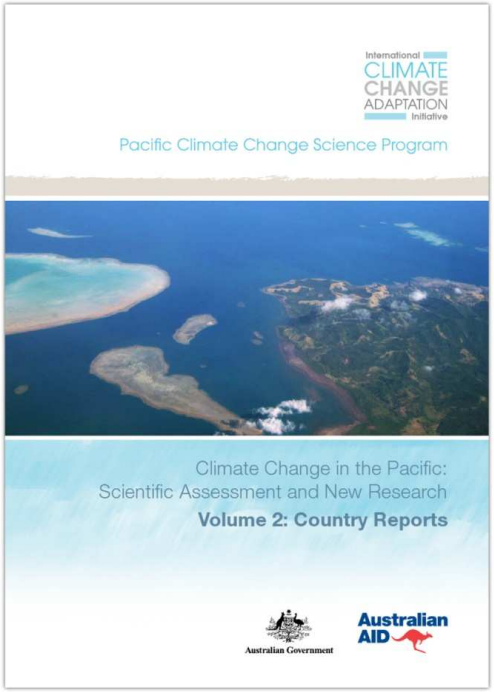
Information also made available in an accessible form (e.g. translated into local languages)

Climate Science – A big step forwards

Volume 1: Regional Overview



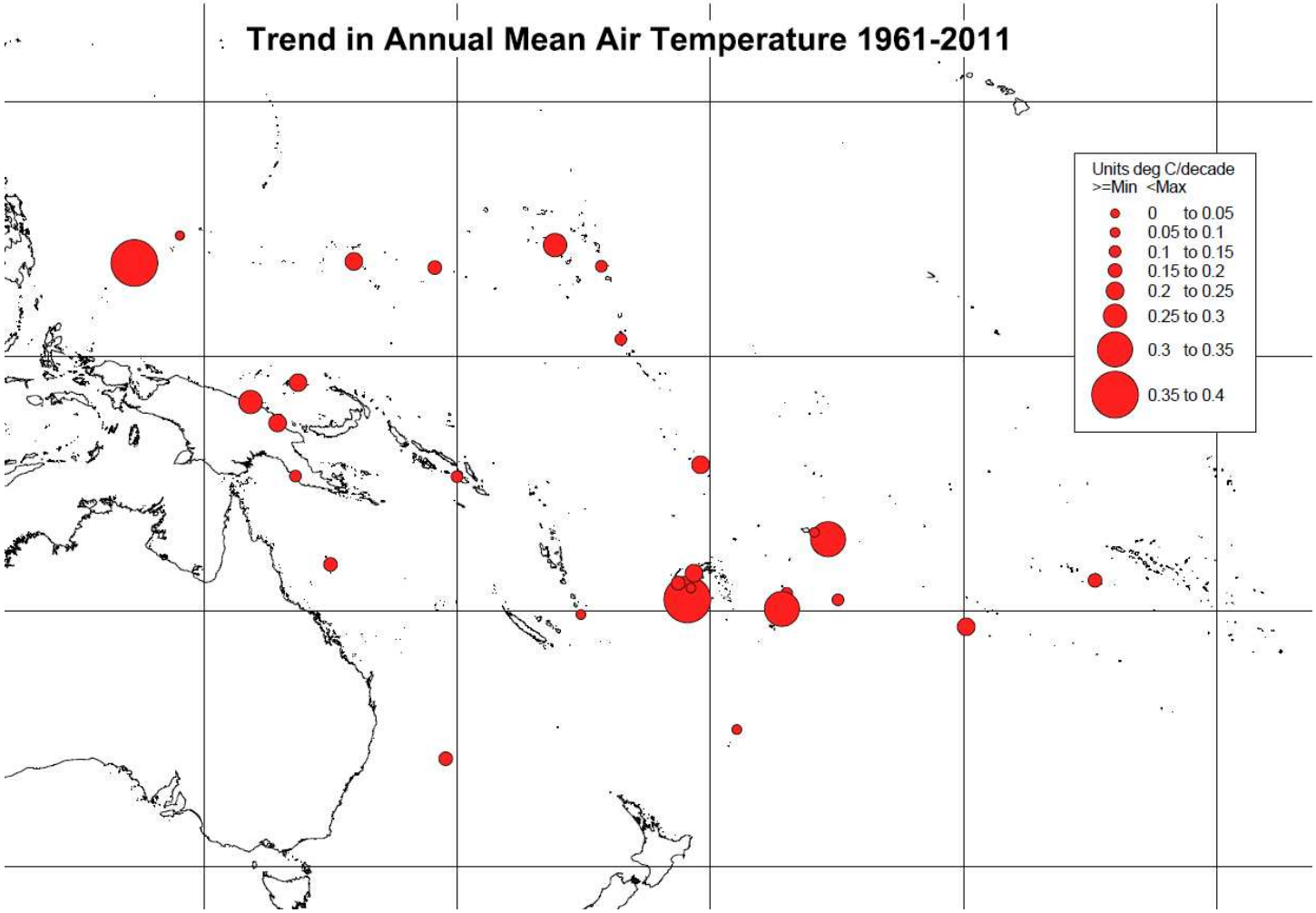
Volume 2: Country Reports



Over 6000 copies distributed so far

www.pacificclimatechangescience.org

Trends in mean air temperature from 1961



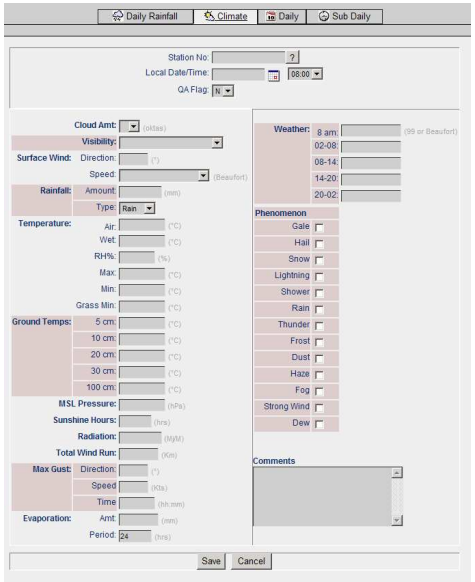
Advances in climate change science

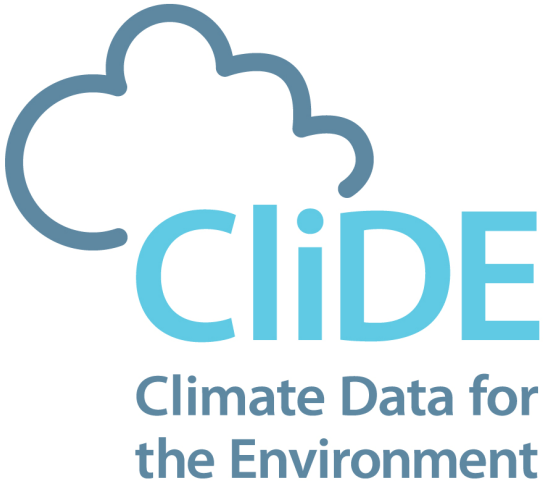
- Past and recent climate change
  - Strong warming, with variability in rainfall
  - Significant increases in extreme events – heatwaves, hot nights
  - Still too soon to be confidence about trends in tropical cyclones and extreme rainfall
- The El Niño – Southern Oscillation
  - Improved understanding of ENSO impacts in all partner countries (journal paper)
  - Investigation of how ENSO and its impacts will change under global warming
  - Improved confidence in projections
- South Pacific Convergence Zone
  - Significantly bolstered understanding of how the SPCZ affects the Pacific islands countries, how it responds to ENSO, how it is represented in climate models and how it will change in the future
  - Several journal articles, including one in Nature
  - First ever workshop on SPCZ in Samoa in 2010

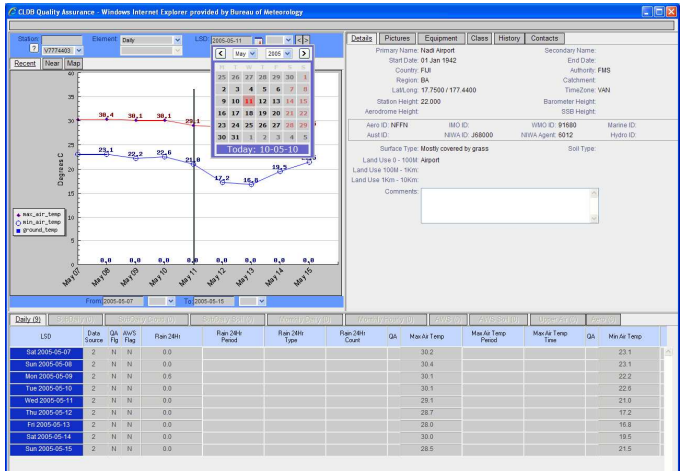
Some of the key tools

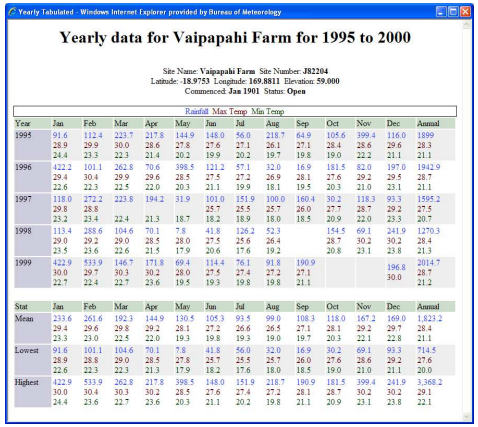
- Local climate change projections: http://www.pacificclimatefutures.net/
- Pacific Climate Change Data Portal: http://www.bom.gov.au/climate/pccsp/
- Pacific Tropical Cyclone Data Portal: http://www.bom.gov.au/cyclone/history/tracks/
- Online Climate Outlook Forum: http://www.bom.gov.au/cosppac/comp/ocof/index.shtml
- Ocean Portal: http://www.bom.gov.au/cosppac/comp/ocean-portal/index.shtml

CliDE - climate database to manage data



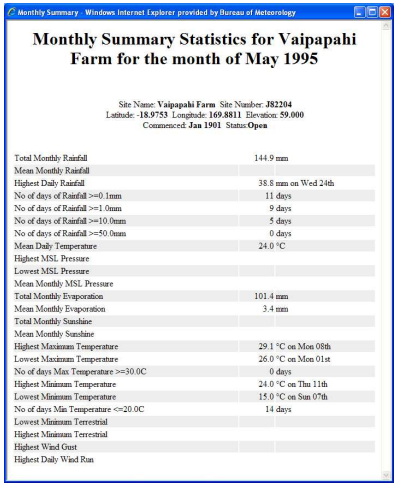




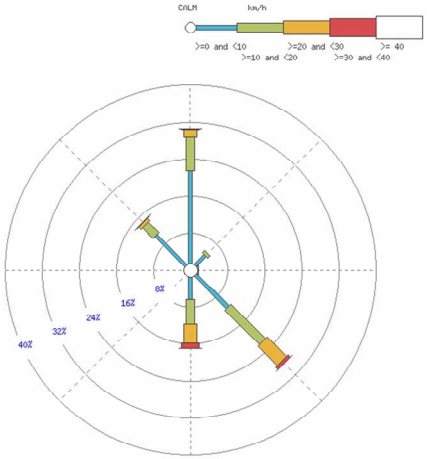


Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1995	91.6	112.4	223.7	217.8	144.9	148.0	56.0	218.7	64.9	105.6	399.4	116.0	1899
	28.9	29.9	30.0	28.6	27.8	27.6	27.1	26.1	27.1	28.4	28.6	29.6	28.3
	24.4	23.3	22.3	21.4	20.2	19.9	20.2	19.7	19.8	19.0	22.2	21.1	21.1
1996	422.2	101.1	262.8	70.6	398.5	121.2	57.1	32.0	16.9	181.5	82.0	197.0	1942.9
	29.4	30.4	29.9	29.6	28.5	27.5	27.2	26.9	28.1	27.6	29.2	29.5	28.7
	22.6	22.3	22.5	22.0	20.3	21.1	19.9	18.1	19.5	20.3	21.0	23.1	21.1
1997	118.0	272.2	223.8	194.2	31.9	101.0	151.9	100.0	160.4	30.2	118.3	93.3	1595.2
	29.8	28.8				25.7	25.5	25.7	26.0	27.7	28.7	29.2	27.5
	23.2	23.4	22.4	21.3	18.7	18.2	18.9	18.0	18.5	20.9	22.0	23.3	20.7
1998	113.4	288.6	104.6	70.1	7.8	41.8	126.2	52.3		154.5	69.1	241.9	1270.3
	29.0	29.2	29.0	28.5	28.0	27.5	25.6	26.4		28.7	30.2	30.2	28.4
	23.5	23.6	22.6	21.5	17.9	20.6	17.6	19.2		20.8	23.1	23.8	21.3
1999	422.9	533.9	146.7	171.8	69.4	114.4	76.1	91.8	190.9			196.8	2014.7
	30.0	29.7	30.3	30.2	28.0	27.5	27.4	27.2	27.1			30.0	28.7
	22.7	22.4	22.7	23.6	19.5	19.3	19.8	19.8	21.1				21.2

Stat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	233.6	261.6	192.3	144.9	130.5	105.3	93.5	99.0	108.3	118.0	167.2	169.0	1,823.2
	29.4	29.6	29.8	29.2	28.1	27.2	26.6	26.5	27.1	28.1	29.2	29.7	28.4
	23.3	23.0	22.5	22.0	19.3	19.8	19.3	19.0	19.7	20.3	22.1	22.8	21.1
Lowest	91.6	101.1	104.6	70.1	7.8	41.8	56.0	32.0	16.9	30.2	69.1	93.3	714.5
	28.9	28.8	29.0	28.5	27.8	25.7	25.5	25.7	26.0	27.6	28.6	29.2	27.6
	22.6	22.3	22.3	21.3	17.9	18.2	17.6	18.0	18.5	19.0	21.0	21.1	20.0
Highest	422.9	533.9	262.8	217.8	398.5	148.0	151.9	218.7	190.9	181.5	399.4	241.9	3,368.2
	30.0	30.4	30.3	30.2	28.5	27.6	27.4	27.2	28.1	28.7	30.2	30.2	29.1
	24.4	23.6	22.7	23.6	20.3	21.1	20.2	19.8	21.1	20.9	23.1	23.8	22.1



Total Monthly Rainfall	144.9 mm
Mean Monthly Rainfall	
Highest Daily Rainfall	38.8 mm on Wed 24th
No of days of Rainfall >=0.1mm	11 days
No of days of Rainfall >=1.0mm	9 days
No of days of Rainfall >=10.0mm	5 days
No of days of Rainfall >=50.0mm	0 days
Mean Daily Temperature	24.0 °C
Highest MSL Pressure	
Lowest MSL Pressure	
Mean Monthly MSL Pressure	
Total Monthly Evaporation	101.4 mm
Mean Monthly Evaporation	3.4 mm
Total Monthly Sunshine	
Mean Monthly Sunshine	
Highest Maximum Temperature	29.1 °C on Mon 08th
Lowest Maximum Temperature	26.0 °C on Mon 01st
No of days Max Temperature >=30.0C	0 days
Highest Minimum Temperature	24.0 °C on Thu 11th
Lowest Minimum Temperature	15.0 °C on Sun 07th
No of days Min Temperature <=20.0C	14 days
Lowest Minimum Terrestrial	
Highest Minimum Terrestrial	
Highest Wind Gust	
Highest Daily Wind Run	

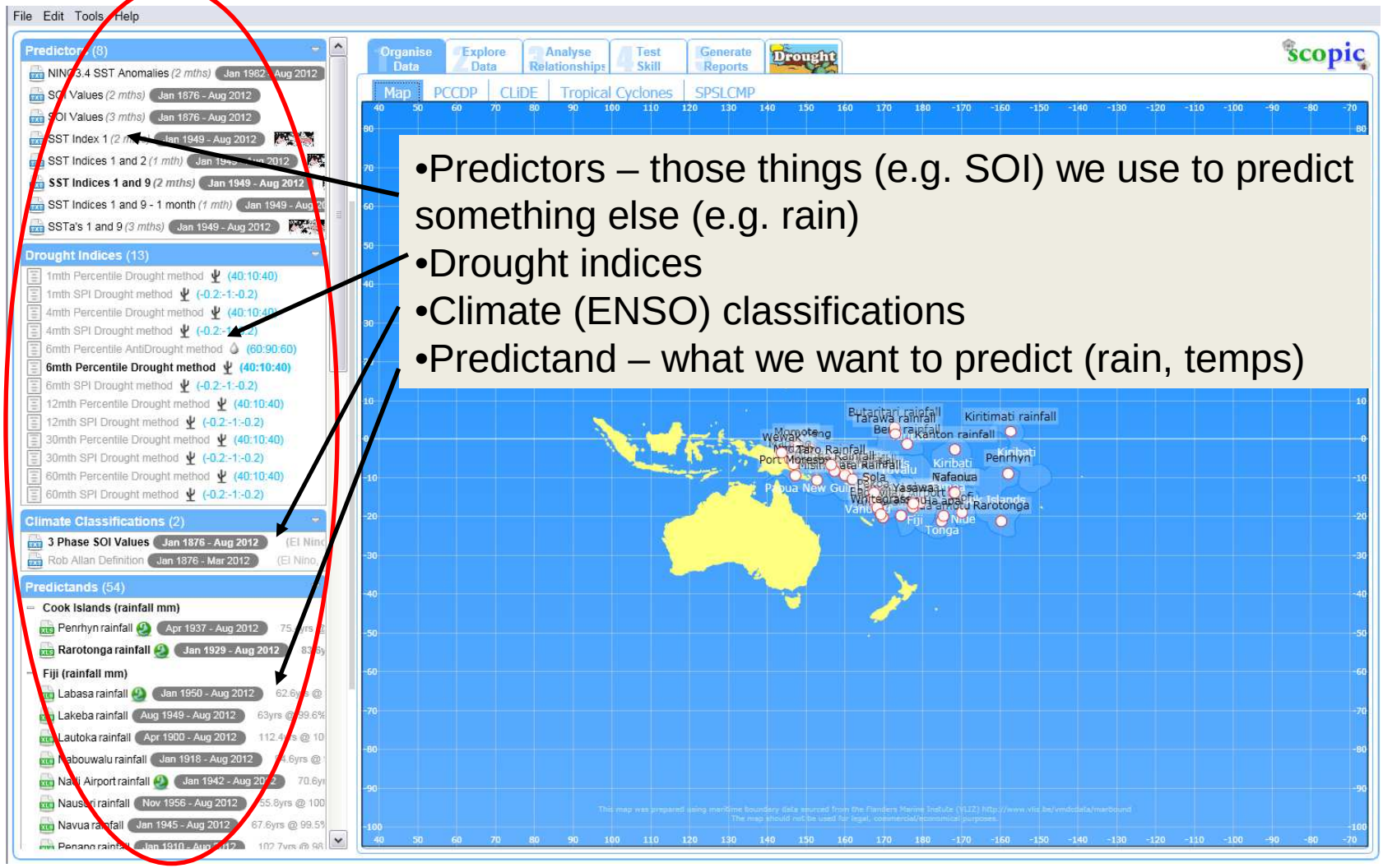


Why was CliDE developed??

- Many of the Pacific countries were/are using spreadsheets and other ad-hoc digital recording mechanisms to electronically store their data
- Lack of quality control and validation tools
- Lack of a suitable replacement for CLICOM
- CliDE provides an excellent medium to:
  - Upload digital data from other agencies
  - Upload data kept in spreadsheet
  - Key-enter from observation books

Data rescue is an important component of this project.

SCOPIC version 3.0



Other projects under development

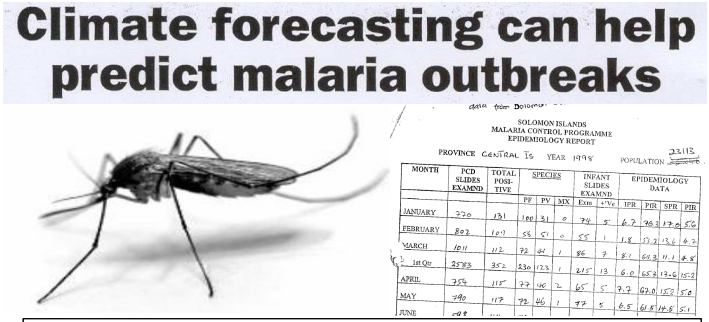
- Seasonal prediction of sea level anomalies
- Seasonal prediction of extreme ocean temperatures (and impacts such as coral bleaching).

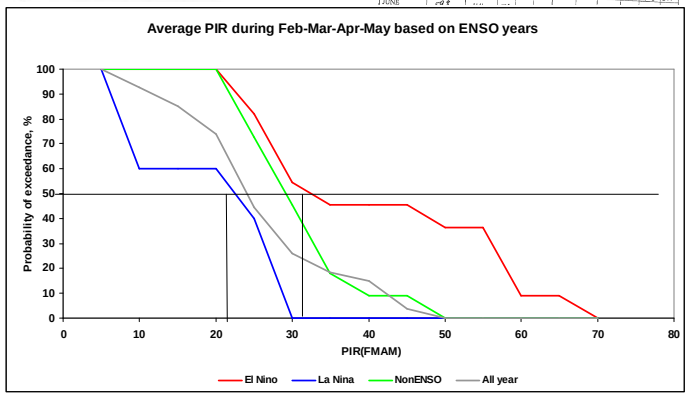
Application projects related to seasonal climate prediction

- Water management
- Renewable energy (e.g. hydropower in Samoa)
- Agriculture (e.g. drought forecasting in PNG)
- Health (e.g. malaria incidence prediction in Solomon Islands)

COSPPac Demonstration Project: Malaria in the Solomon Islands

- Investigate the link between climate variability and malaria incidence in the Solomon Islands.
- Peak malaria season: February → May
- Year-to-year changes in malaria incidence found to be related to ENSO phase.
- El Nino (drier than normal years) correlated to higher malaria incidence in peak season.
- Drier than normal malaria season results in lower streamflows and more stagnant water → More breeding habitats for mosquitoes.
- It is expected that this correlation will form the basis of a malaria early warning system.





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Thank you for your attention