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Climate, climate variability and change of Papua New Guinea

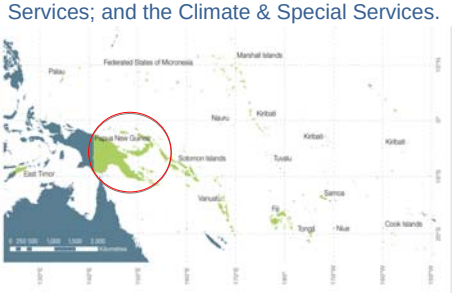
Introduction

Papua New Guinea (PNG) covers the region of longitudes 140º E -157º E and from the equator to about latitude 12º S. It comprises more than 700 islands ranging in height from sea level to 4500m. PNG National Weather Service operates a small meteorological service by international standards comprising chiefly of three main divisions: Forecasting & Warning; Facilities, Observations & Support Services; and the Climate & Special Services.

A village completely destroyed by tropical cyclone Guba in 2008.

Sweet potato tubers unable to bear fruit as a result of 97/98 El Niño induced drought.

A coastal village being flooded during La Niña in 1998.



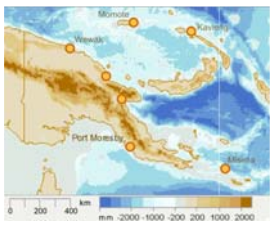


Figure 1: Location of Papua New Guinea (above), its geography and positions of stations analyzed (right).

Data availability and homogeneity

Five stations with high quality rainfall and temperature datasets were analyzed (Table 1 and Figure 1). These stations were sub-divided into three regions; North, South and Mainland. Homogeneity tests were carried out on all the monthly datasets and some homogeneities were identified but unhomogenised data are used here. For the most part this poster will show results for two stations: Port Moresby (south region) and Kavieng (north).

Station Name	Lon (E)	Lat (S)	Rainfall record	Temp record
Port Moresby (South)	147.2º	9.45º	01-09	70-09
Kavieng (North)	150.8º	2.58º	16-09	73-09
Momote (North)	147.4º	2.05º	51-09	68-09
Wewak (Mainland)	143.7º	3.58º	56-09	73-09
Misima (South)	152.8º	10.67º	73-09	76-09

Table 1: Data availability for PNG stations

Figure 2: Annual cycles of rainfall and temperature at Port Moresby (top) and Kavieng (bottom). For each month of the year average rainfall is shown for ENSO neutral (blue), El Niño (red) and La Niña (green) years.

Climate Drivers

The main climate drivers for PNG are the El Niño - Southern Oscillation (ENSO), the West Pacific Monsoon and to a lesser extent the position of the South Pacific Convergence Zone (SPCZ). The influence of ENSO on rainfall is stronger in the Southern and Mainland than the Northern regions. Thus the impacts of El Niño and La Niña are more evident in these two regions as seen in Figure 2 – the main impact of El Niño is a late start to the monsoon season. The positioning of the SPCZ also influences the climate of the Southern region.

Seasonal Cycles

The monthly mean rainfall in Figure 2 shows the wet season from Nov-Apr and the dry season from May-Oct. Rainfall seasonality is weak in all locations except for Port Moresby. Being located in the tropics, it is not surprising to see very little variation in the maximum and minimum temperatures.

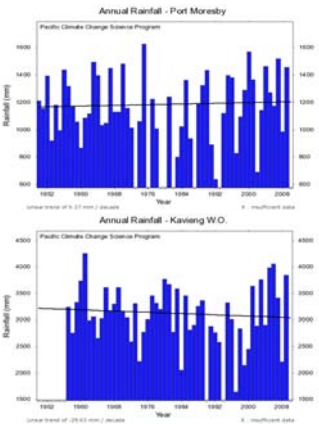


Figure 3: Annual rainfall and linear trends in Port Moresby (top) and Kavieng (bottom).

Observed inter-annual variability and trends

The inter-annual variability in rainfall varies greatly across the regions. The trends in Figure 3 and Table 2 show all regions to have increasing rainfall during the wet season since 1950 (such as Port Moresby) except the Northern region which had significant decreases (Kavieng). However, the Northern region showed significant increases in rainfall during the dry season. Temperature on the other hand (see Table 2) showed warming trends in both the maximum and minimum temperatures across the regions with higher increases in the night time temperatures.

Table 2: Linear trends and standard deviations in wet season (Nov-Apr) rainfall and temperatures for Port Moresby and Kavieng.

			Trend Values		Std. Dev.
			1950-09	1970-09	
NOV-APR RAIN FALL	Port Moresby	Tmean	0.23	0.22	2.5
		Tmin	0.31	0.27	1.0
		Tmax	0.14	0.16	4.7
		Rain	-3.80	17.85	98.2
	Kavieng	Tmean	0.30	0.29	0.6
		Tmin	0.33	0.31	0.7
		Tmax	0.32	0.31	0.6
		Rain	-94.28	-118.47	119.2

Impacts and extremes

Tropical cyclones, floods, droughts, tsunamis and sea level rise are the main extreme events that affect the country. PNG on average receives one tropical cyclone during each season from Nov-April. Furthermore, being located close to the warmest oceans found anywhere on earth, PNG is susceptible to ENSO related impacts such as floods, droughts and frosts.

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