Seismic Observation Network and Seismicity of Papua New Guinea

Mr. Norris Kisa Kentuo (2014, Global Seismological Observation Course)
Port Moresby Geophysical Observatory, Geohazards Management Division,
Department of Mineral Policy and Geohazards Management

1. Seismic Observation Network

The Port Moresby Geophysical Observatory (PMGO) is a government institution whose primary responsibility is seismic observation and earthquake and tsunami hazard assessment in PNG. PMGO is a branch of the Geohazards Management Division of the Department of Mineral Policy and Geohazards Management.

Continuous regional seismic observation in PNG commenced in 1957 with the establishment of PMGO. Gradual development of a nationwide network of seismograph and accelerograph stations followed.

A new nationwide seismic network consisting of 10 stations (Figure 1) was established in 2013, funded by European Commission. Each station is equipped with a 3-component short period seismometer and accelerometer. Using the infrastructure of the nation telecommunications carrier, Telikom PNG, data from the network stations are telemetred to the network hub at PMGO.

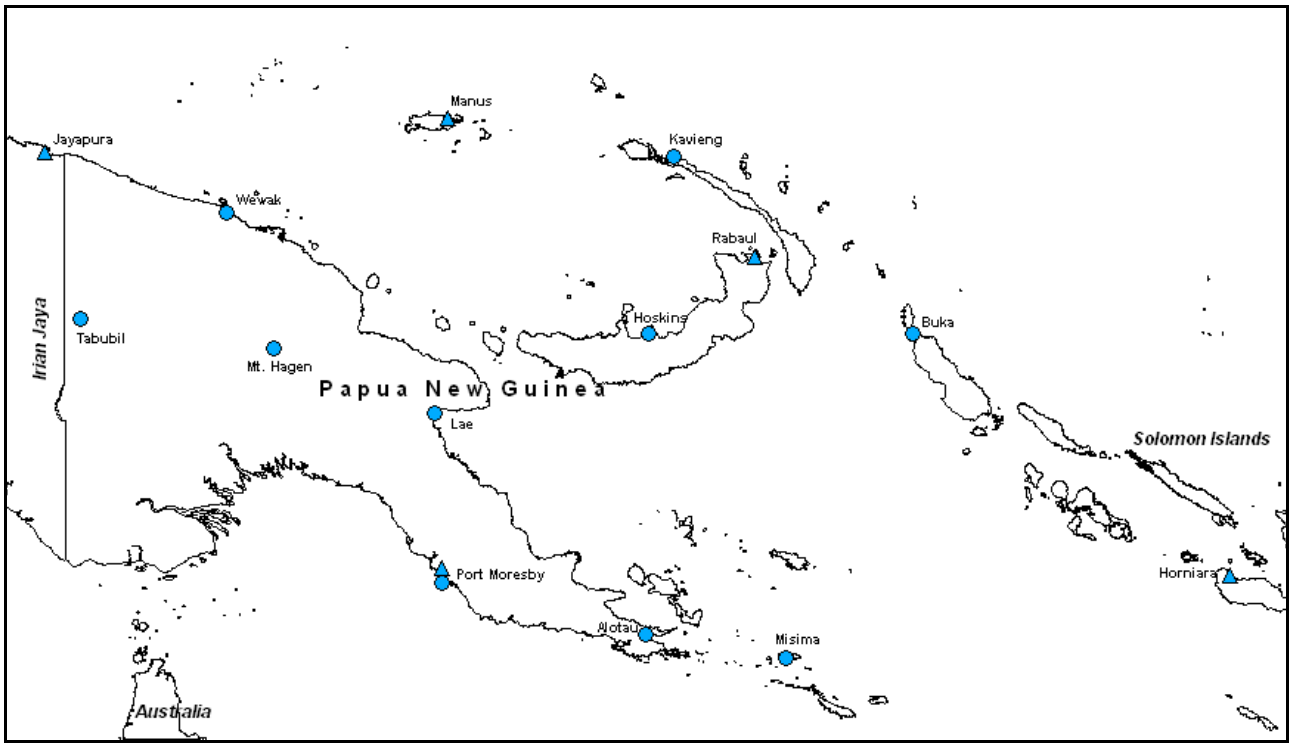

Figure 1. Newly built stations of the PNG seismic network operated by PMGO. Filled circles are new sites. Triangles are the existing regional broadband stations.

Regional seismic monitoring is also conducted with stations of the International Monitoring System (IMS), one of which is located in Port Moresby, the capital of Papua New Guinea. This station, CTBTO auxiliary station 75 (AS75), which is PMG (Figure 2), is also shared by International Research Institute for Seismology (IRIS), United States Geological Survey (USGS) and Pacific Tsunami Warning Centre (PTWC). PMGO is the mandated organization that hosts the PNG National Data Center (NDC).

Processed earthquake data is received at PMGO via internet from USGS-NEIC and Harvard University (CMT data). Regional tsunami warning is received from PTWC and NWPTAC/JMA.

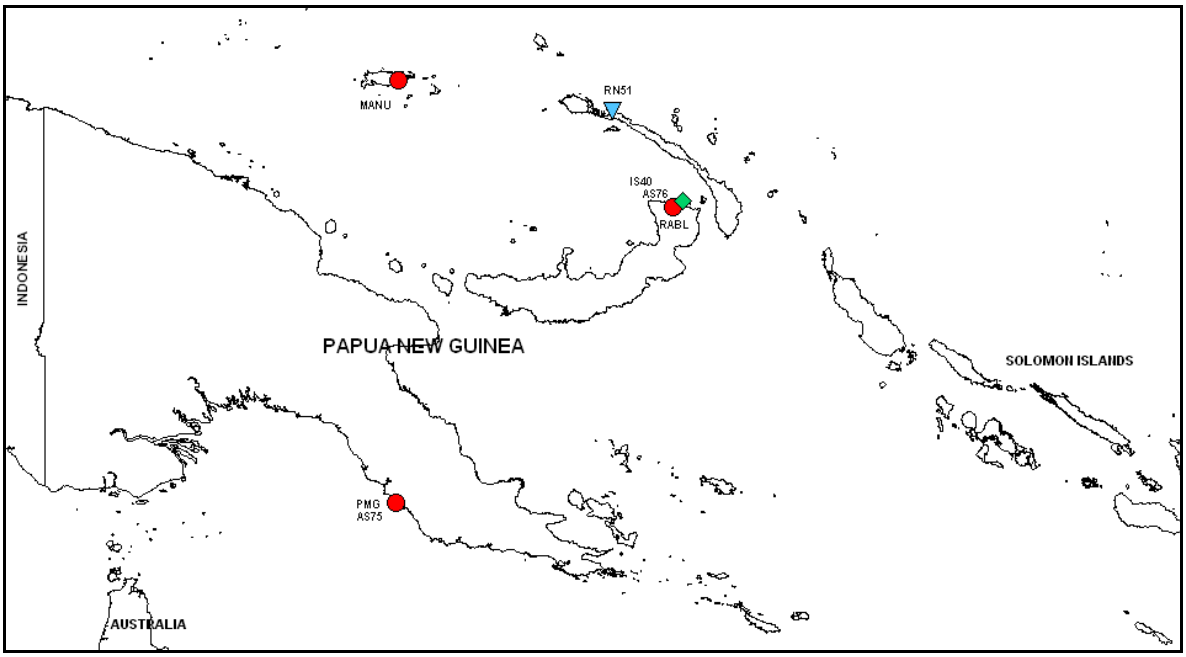

Figure 2. CTBTO/IMS and ATWS stations.
Red circles = seismic stations, Green diamond=infrasound station,
Blue triangle =radionuclide station. The CTBTO stations are RN51, AS76,
AS75& IS40. The ATWS stations are MANU & RABL.

2. Relationship between PMGO and CTBTO/IMS

PMGO has close links with other similar institutions, including the National Earthquake Information Centre (NEIC) of the United States Geological Survey (USGS), the Harvard University Seismological Centre, the Comprehensive nuclear Test-Ban Treaty Organisation (CTBTO), the Global Seismic Network (GSN), the International Research Institute for Seismology (IRIS), the Pacific Tsunami Warning Centre (PTWC), the International Tsunami Information Centre (ITIC), the South Pacific Applied Geoscience Commission (SOPAC), Geoscience Australia (GA) and New Zealand Geological & Nuclear Sciences (NZGNS).

Seismic data and results of analysis are shared freely by PMGO and these organisations in global collaborative efforts to monitor and map the distribution of seismic activity in the PNG region. From these primary surveillance operations stems a number of industry- and community-related applications.

PNG is also a host to two Australian Tsunami Warning System (ATWS) seismic stations, MANU and RABL (Figure 2).

3. Seismicity

On-going seismological studies are revealing the geological structure and dynamics of the PNG region on both large and smaller scales. The boundaries of the lithospheric plates in the PNG region are becoming clearer (Figure 3), although some boundaries remain uncertain. The nature of the processes at the plate boundaries are also being revealed by seismological studies (Anton, Gibson, and McCue, 2008.).

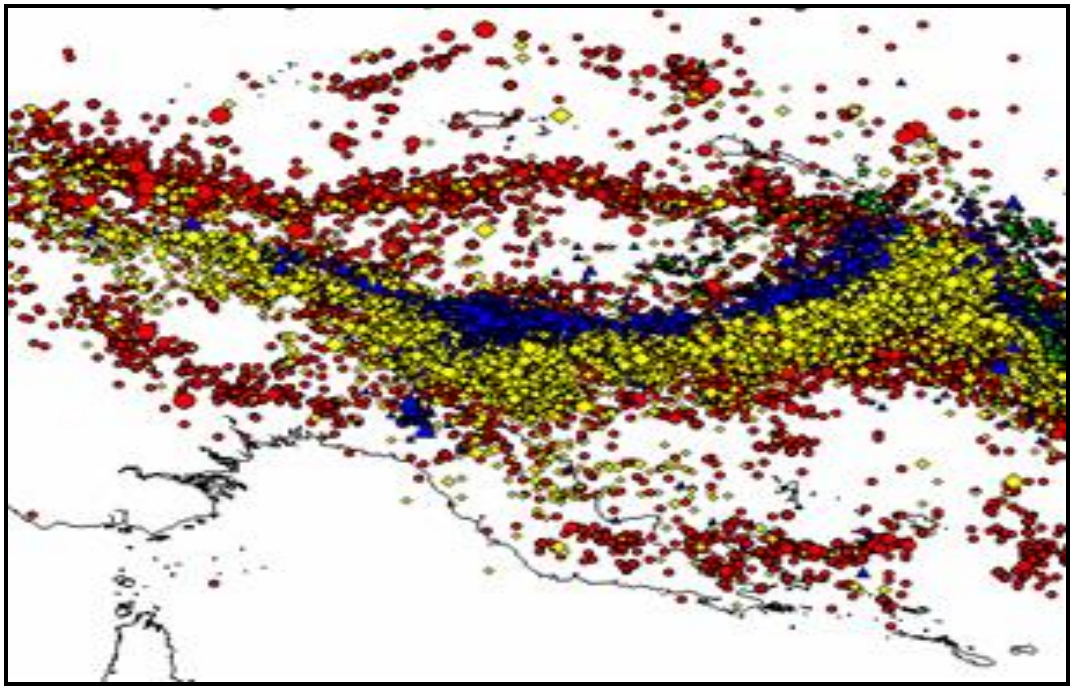

Figure 3. Seismicity of the PNG region in the period 1900 to 2002.
Red circles denote shallow depths (0-39km),
yellow diamonds denote depth range 40-149km,
blue triangles denote 150-299km,
and green stars denote depths of 300km and greater.