A104

Seismic Source Characterization for PSHA in the Solomon Islands

○Calvin QWANA, Shinichi MATSUSHIMA, Fumiaki NAGASHIMA.

Seismic Source characterization plays a dominating role in the outcome of Probabilistic Seismic Hazard Analysis (PSHA) studies. This necessitates a thorough accounting of seismic source utilities such as the magnitude range, and spatial, and temporal distribution of seismic events. In regions like the Solomon Islands, where there is generally limited information available on active faults and other geologic structures, this is a necessary undertaking. This study focuses on the seismic source characterization for the Solomon Islands, by identifying the potential seismic source as finite fault sources in the subduction zones and the transition zone as the plate boundaries between the Indo-Australian plate and the Pacific plate, as well as the seismic source zones of background seismicity within the studied area bounded by 153°E to 168°E and 3°S to 13°S (Fig. 1). The region is known for its tectonic complexity features, geology, high rate of tectonic plate movement and presence of doublet earthquakes of large magnitudes (7≤M). Fault sources are defined according to the location of the source, the focal mechanism of the source, the Coordinate of fault beginning and ending points, the Dip Angle, and the Rake angle. The seismotectonic region is divided into four seismic source zone segments: namely (I) the Bougainville Segment, (II) the New Georgia, (III) the Guadalcanal-Makira Segment, and (IV) the Santa-Cruz segment. Earthquake catalogs for each source zone segment are analyzed for magnitude completeness and their Gutenberg-Richter b-values relationship. Seismic parameter b for each seismogenic segment was then estimated using a maximum likelihood method respectively, and the mean annual activity rate, maximum possible magnitude (M_{max}), for the four seismic segments is evaluated. The estimated b-values were later used to evaluate the seismic activity on the segments. The result of this source characterization for the finite faults of M>7 and background seismicity from each of the four seismic source zones used as inputs for Probabilistic Seismic Hazard analysis for the Solomon Islands.

Keywords: Solomon Islands, active faults, seismic source zone segments, Seismic source characterization, tectonic movements, geological tectonic.

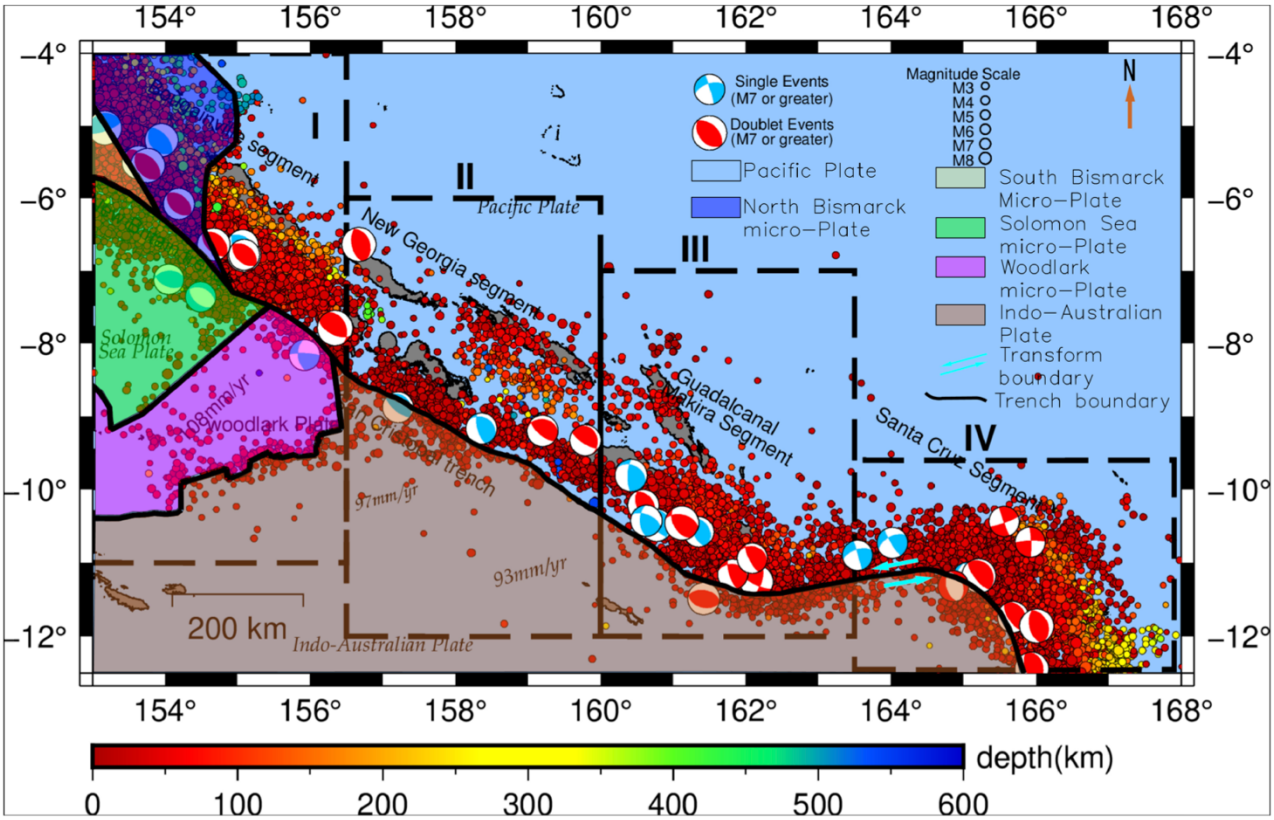

Fig. 1 The relatively young Indo-Australian Plate (brown) is moving Northeast at 6cm/year with variation along the boundary as it dives beneath the Pacific Plate. The Epicenters of magnitude 3≤M<7 delineated along the boundary (black solid line). The colored beach balls denote the location and mechanism of M≥7 events. The major rectangles are segments, The color regions are micro-plates in the region while brown and blue represent the Indo-Australian Plate and the Pacific Plate the two major tectonic plates in the region, and the green arrows are the transform boundary zone.