ACTIVE FAULTING IN CENTRAL SULAWESI (EASTERN INDONESIA)

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In the framework of the GEODYSSEA program (an EU-ASEAN program of SE Asia GPS survey) a subprogram was set up to study the active tectonics of the Central Sulawesi fault system, in eastern Indonesia. This system consists of complex distributed left-lateral strike-slip fault zones located within a triple junction area between three tectonic plates: the Pacific, Indo-Australian, and Eurasian plates. Seismicity in Central Sulawesi documents shallow earthquakes located on and around the Central Sulawesi faults. To characterise the active fault trace geometry and to localise the high seismic potentiality zones, we analyse SPOT images covering Sulawesi. This analysis shows, from west to east, the occurrence of two major active fault zones: The NNW-trending Palu-Koro and the WNW-trending Matano fault zones. However, deformations are distributed on three fault zones in the east-central part and SE arm of Sulawesi. The northernmost segments of the Palu-Koro zone appears geomorphologically more active and bounds the western part of Palu basin. Study of the Palu-Koro segments evidences late Quaternary left-lateral geomorphologic feature offsets ranged between 50 and 600 m (streams, alluvial fans, etc.), as well as faceted spurs, shutter ridges and 300-400 m high triangular and trapezoidal facets. The western edge of the Palu basin is controlled by a N-trending 2000-2500 m high escarpments. The significant dip-slip component of the Present-day faulting is confirmed by Quaternary uplifted marine and alluvial terraces that reach up to 200 m high. Thus, these geomorphologic characters evidence combined strike-slip and normal faulting for the Palu-Koro fault Present-day activity. This transtensional tectonic regime has been confirmed by the fault slip-vector analyses. We perform an along strike survey of the Sulawesi faults analysing and dating fault offsets to subsequently determine fault long-term slip-rate. Datings were done using the U/Th and ESR methods on the offset marine terraces. In addition, fission track analysis applied on granodiorites which form the escarpment should constrain the vertical slip rate. To define precisely the Late Quaternary seismic history, we excavated seven trenches across the North Palu-Koro fault zone which exposed paleosoils and colluvial wedges in fault contact with a poorly weathered alluvial bedrock. This indicates the occurrence of seismic event during the Late Quaternary, even if the seismic history did not report any earthquake around the Palu zone.

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