Proposed Studentship

Lakes, rivers and faults: Understanding the topographic and structural evolution of central Sulawesi, Indonesia, using high-resolution digital elevation data

Supervisor(s): Ian M. Watkinson

Project Description:

Project background: Sulawesi lies within the complex triple junction between the Eurasian, Pacific/Philippine Sea and Australian plates. A record of high strain-rate post-Miocene to Recent deformation is preserved by the island's geology, structure and topography. The central part of the island is characterised by high relief, isolated intermontane lacustrine basins, some dry (e.g. Bada, Besoa, Mahalona), some containing modern lakes (e.g. Lindu, Poso, Matano). Surrounded by steep-sided, forested mountains and narrow gorges, the basins' isolation has contributed to Sulawesi's great endemic biodiversity and linguistic variety (~80 languages). Connecting the basins to each other and ultimately to the coast is a contorted system of drainage that shows abundant evidence for tectonic control, including drainage reversals, captures, over- and under-sized valleys and tectonically-dammed lakes. Major active fault systems such as the Palu-Koro and Matano faults as well as smaller strike-slip and extensional faults bound the basins and appear to be a significant influence on topographic evolution. Seismicity, GPS studies and preliminary tectonic geomorphology studies indicate that many of the faults in central Sulawesi are active and capable of causing rapid topographic change.

Project aims and approach This project aims to understand the post-Miocene to Recent paleo-topography and paleo-drainage of Sulawesi, and to identify and reconstruct fault activity. It will utilise high resolution (12.5 m) digital elevation data, from which modern drainage and active faults will be extracted. Using the drainage as a starting point, a series of paleo-drainage and paleo-topographic models will be produced, then linked to faults to build a kinematic evolution model. The project will be dominated by remote sensing and GIS approaches, though there is potential to include field-based observations and paleoseismology should funding allow. This project also has potential to develop interdisciplinary themes of biodiversity, local climate change and sociology, should the student wish.

References:

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Applicants are requested to send an additional copy of their CV directly to the lead supervisor of the project in which they are interested. Please also contact the supervisor if you have any questions about the project itself