



Sedimentation in the Cenozoic Thakkhola-Mustang Graben (central Nepal)

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The Thakkhola-Mustang Graben of central Nepal represents the Cenozoic extensional tectonic phase of the Tibetan Plateau and the whole Himalaya. It is located on the northern side of the Dhaulagiri and Annapurna Ranges and south of the Yarlung Tsangpo Suture Zone. The graben is an asymmetrical basin containing thick (more than 850m) continental debris. Stratigraphically, the graben sediments are divided into four formations, namely the Tetang Formation, the Thakkhola Formation, the Sammargaon Formation and the Marpha Formation. The oldest sedimentary units are the Tetang and Thakkhola formations (Miocene) while the Sammargaon and the Marpha formations lying disconformably above these formations represent younger units (Plio-Pleistocene). The Thakkhola and Tetang formations are separated by a low-angled ($\sim 5^\circ$) angular unconformity (Fort et al. 1982). Although the stratigraphy of the area is well established by different authors (Fort et al., 1982; Garzzone et al., 1999) the paleoclimatic and depositional environment of this graben is still unrevealed.

To address this problem, field mapping, construction of columnar sections, measurement of imbricated pebbles were carried out in the field while measurement of CaCO_3 concentration and the x-ray diffraction analysis of possible paleosols were done in the lab. Columnar sections were prepared in different localities of all the Formations. Pebble imbrications were measured in imbricate conglomerate beds and the composition of the grains were identified. Samples of lacustrine limestone and paleosols were collected. The percentage of CaCO_3 of the limestone of different horizons of different formations ranges from 24-95. Some paleosols are rich in CaCO_3 (up to 48) while some paleosols are devoid of CaCO_3 . X-ray diffraction analysis shows all of the paleosols consists of quartz, calcite, muscovite, and chlorite whereas halite and clay

minerals are present in some samples.

A variety of sedimentary environments are recognized including alluvial fan, lacustrine, braided river and glacio-fluvial. Most of the paleocurrent data from imbricated conglomerate beds in the Thakkhola Fm indicate southward paleoflow whereas the paleocurrent data of the Tetang Fm show mainly westward paleoflow. Small braided river systems were dominating in the initial deposition of the Tetang Fm but later lacustrine environment was widespread. The Thakkhola Fm is composed of gravels with braided fluvial deposits but lacustrine deposits are present in different level of the succession. The Sammargaon Formation is associated with glacial moraines and is interpreted to be a glacio-fluvial package whereas the Marpha Fm is interpreted as a glaciolacustrine deposits.

References:

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