



Provenance analysis of Neogene sediments in the Thakkhola-Mustang Graben (central Nepal)

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The Thakkhola-Mustang Graben, which reflects Neogene extensional tectonics in the Tibetan Plateau and Himalaya, lies north of the Dhaulagiri-Annapurna ranges and south of the Yarlung-Tsangpo Suture Zone. The regional geology of the basin is dominated by a basement of Tibetan-Tethys sedimentary rocks of Paleozoic and Mesozoic ages, unconformably overlain by continental debris (more than 850 m) of Neogene to Quaternary age (Fort et al., 1982; Yoshida et al., 1984). Stratigraphically, the graben sediments have been divided into four formations; the Miocene Tetang and Thakkhola formations, disconformably overlain by the Plio-Pleistocene Sammargaon and Marpha formations. In the present study, the sediment provenance and the nature of the source rocks have been investigated.

Field mapping, logging of 22 profiles, measurement of pebble imbrication and lithology in all possible beds and heavy mineral sampling (50 samples) were carried out. Paleocurrent data from imbricated pebbles (no other palaeocurrent indicators were seen) in the western part of the graben shows SE-directed flow while in the eastern part it shows a SSW transport. Sandstone, mudstone, quartzite and granite clasts are dominant in the Ghiling, Chaile and Dhakmar sections on the western side while carbonate clasts are dominant in the Tetang and Dhinkyo Khola sections in the southeastern part of the basin. Tourmaline, staurolite, zircon, garnet and apatite constitute a significant proportion of the heavy-minerals whereas epidote, andalusite, kyanite, chloritoid, hornblende, chrome-spinel, rutile and amphibole are less common.

Paleocurrent data of imbricated conglomerates in all formations of the basin show a southward flow direction of the Kaligandaki River. All the paleocurrent data and composition analysis of the conglomerates in the northwestern part of the basin (Dhi and Tange) of the Thakkhola Formation suggest that the clasts were derived from Mesozoic rocks to the east. Mostly Paleozoic clasts, with some Mesozoic and a small proportion of granite are dominant in the Ghiling, Dhakmar and Chaile sections, suggesting a province from the west and north. The conglomerates of the Tetang Formation comprise mostly Mesozoic rocks with an eastern provenance, consistent with the paleocurrent directions. Minerals from low to high grade metamorphic source rocks are reflected in the heavy mineral assemblages. The presence of chrome-spinel indicates the existence of ophiolitic complexes in the source area.

References:

Fort, M., Freytet, P., Colchen, M., 1982, Structural and sedimentological evolution of the Thakkhola Mustang Graben (Nepal Himalaya). *Z. für Geomorph. Suppl.* Bd 42, pp. 75-98.

Yoshida, M., Igarashi, Y., Arita, K., Hayashi, D., Sharma, T., 1984. Magnetostratigraphy and pollen analytic studies of the Takmar series, Nepal Himalayas, *Journal of Nepal Geol. Soc.* pp. 101-120 (Special Issue).