Late Orogenic Extension in the High Himalaya The Thakkhola Hemi-Graben (Nepal)

POSTER

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The Thakkhola hemi-graben is located at the northern side of the Nepalese High Himalaya (Dhaulagiri and Annapurna Ranges). It is filled with thick (900 m) detritical series of probably Plio-Pleistocenous age (Tetang and Thakkhola formations) *(1)*.

Several fault systems are recognized in the Mesozoic formations, which constitutes the basement of the southern part of the Thakkhola hemi-graben :

- **a N020-N040 system**, set of plurikilometric normal faults of regional extension, which are well exposed in the western part of the basin. The fault planes dip 80 to 85° to the east, with striae pitching 15° to 30° to the north. These faults are associated with sinistral oblique-slip ones. The amplitude of the displacement decrease from north to south : it varies from 4 km (vertical slip) and 8 km (horizontal slip) at the north to some tens of meters 50 km to the south.

- **others fault systems** are recognized : N180-170, N070-090, N115, N150-160° normal and strike-slip faults. These faults are subvertical, with minor vertical slip.

Four directions of extension are recognized :

- a WNW-ESE which fits with the Thakkhola hemi-graben formation with N020-040 normal faults,
- a N-S, with N150-160 normal faults,
- a NE-SW, with N150-160 normal faults,
- and a W-E, with N180-170 normal faults.

Two directions of compression :

- a NNW-SSE to N-S with N020-040 sinistral and N150-160 dextral strike-slip faults,;
- a E-W with N020-040 dextral and N120-150 sinistral strike-slip faults.

(1) FORT M, FREYTET P. and COLCHEN M. (1982).

In conclusion :

The superposition of the several striae assemblage on a same fault plane reveal a polyphasic faulting in extension and compression alternately.

The disconformity between the Thakkhola fm. and the mesozoic fm. of the basement, both folded and faulted, is the indication that a part of this faulting predates the Thakkhola hemi-graben formation.

Concerning this hemi-graben, is proposed the following chronology of the faulting from the Late Paleogene to the present time :

1) a WNW-ESE extension characterized by N020-040 normal faults ;
2) a NW-SE to N-S compression with the N020-040 sinistral strike-slip faults and N150-160 dextral strike-slip faults ;
3) a ENE-WSW to E-W compression with the N020-040 dextral and N070-090 sinistral strike-slip faults ;
4) a E-W extension with the N180-160 normal faults observed in the Thakkhola fm. and the Quaternary fm.

This faulting is in keeping with the geodynamic evolution of the northern himalayan domains, consequence of the continental hypercollision between India and Asia :

- the extension of the upper plate above the North Himalayan shear zone ;
- the Miocene dextral shearing between Himalaya and Tibet.

References :

ARMIJO *and al.* 1986, BRUNEL 1983, BURG 1983, FORT 1993, FORT *and al.* 1982, MERCIER J.L. 1984, MOLNAR *and al.* 1975, PECHER *and al.* 1991, TAPPONNIER *and al.* 1977.

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