Thrusting, Normal Faulting and High Himalayan Leucogranite Relationships in Central Himalaya

TALK

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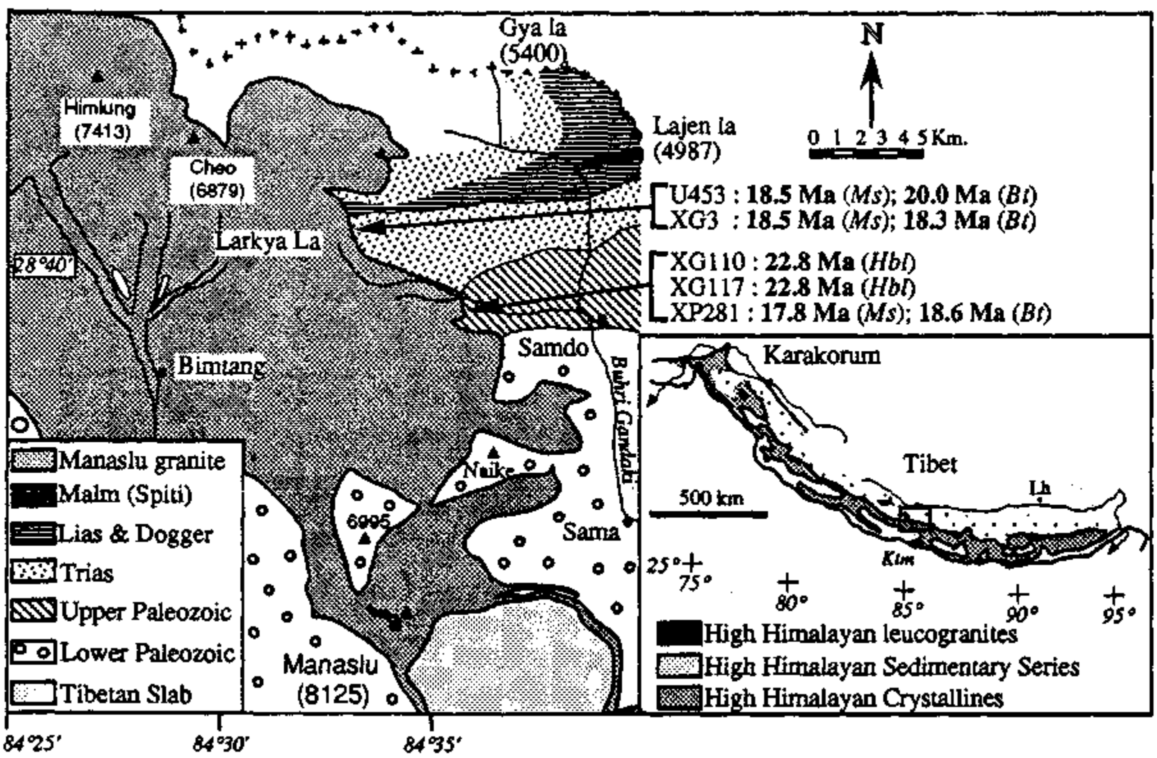
The late Oligocene-early Miocene orogenic evolution of the Central Himalaya is dominated by the development of the Main Central Thrust and the contemporaneous movement of the South Tibetan Detachment system (STDS) at the top of the High Himalayan Crystalline (Pêcher et al., 1991; Burchfiel et al., 1992). In this structural regime, the High Himalayan leucogranites are emplaced at the hanging wall of the STDS.

Structural, metamorphic and geochemical data in the Manaslu area provide new contraints for the evolution of the High Himalaya.

In a previous study (Guillot et al., 1991) we emphasised the great depth of emplacement of the Manaslu leucogranite based on thermo-barometrical estimations in the contact auréole. It suggests the extension towards the south of the North Himalayan nappes, for a minimum of 70 km and a minimum thickness of 7 to 10 km during Miocene time.

Structural investigations in and around the pluton (Guillot et al., 1993) indicate that the emplacement of the pluton is related to tension gash system opened during the dextral wrenching of the South Tibet.



Geological sketch maps showing the study area in Central Himalaya and a simplified map of the Manaslu pluton with sample localities and 40Ar/39Ar ages in the upper contact auréole. Lh : Lhassa, Ktm : Kathmandu

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A geochemical contouring of the massif allows us to confirm the structural and magnetic scheme. The model of emplacement of the Manaslu granite could be extended to other High Himalayan leucogranites, like the pods of the Suru valley in Ladakh (Gapais et al., 1992), the Badrinath-Gangotri pluton in Garhwal (Scaillet et al., submitted) or the lenses of the Nyalam area (Burg et al., 1984), as a consequence of the beginning of the eastward extrusion of Tibet.

New $^{40}Ar/^{39}Ar$ data from the contact auréole of the Manaslu indicate that intrusion was active at least prior to 23 Ma and support the 25 Ma interpretation of the monazite reported by Deniel et al. (1987) for the crystallization age of the pluton. These data require that the STDS was active several million years earlier than in the Everest region (Hodges, 1992) and suggest an important movement along this zone between 25 and 20 Ma in the central part of the Himalaya.

Evidence of rapid cooling in the upper part of the pluton and in the contact auréole at around 18 Ma may indicate a second phase of extension dominated by movement on normal faults structurally above the STDS.

The understanding of the Himalayan leucogranite behavior appears very important in the knowledge of the Himalayan orogenic evolution : on the example of the Manaslu massif in Central Nepal we suggest the evolution of the strain pattern, with no evidence of lateral extrusion before 25 Ma, then with obvious extension from 25 to 20 Ma followed by a tectonic denudation of the High Himalayan beginning at around 18 Ma. The uplift of the High Himalaya recorded in sedimentary strata in the Bengal fan (Amano & Taira, 1992) and the rapid cooling of the Gandese belt at around 20 Ma (Harrison et al., 1992) also support the hypothesis of an important Miocene extensional event.

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