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Constraints on the initiation of normal faulting across the Yarlung Tsangpo suture zone, from the Lopu Gangri range, southern Tibet.

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The timing for initiation of extension(s) phase(s) of the Tibetan Plateau places important constraints on geodynamic models for the India-Asia collision system including those for which mid-crustal channel flow is suggested. We report initial results of an investigation of a NW-SE trending normal fault system that cuts the Yarlung Tsangpo suture zone (YTSZ) in southern central Tibet.

Lopu Gangri (29˚50'00.06"N 084˚36'34.85E) is the highest (7098m) peak on an isolated mountain range on the northern extremity of the Tethyan Himalayan series. The summit is located 150 km north of the main Annapurna range in the Himalaya and 55 km to east of Zhongba, which lies at the head of the Thakkola graben. The range is characterized by an antiformal metamorphic culmination of Paleozoic metasediments (Niuku anticline of Ding et al., 2005). The NE flank of the Lopu Gangri range is bounded by an active NW–SE normal fault with a minimum vertical offset of 2 km. A zone of partly gneissic granodiorites crops out adjacent to the YTSZ at the northern extent and highest part of the range. Other lithologies present in the region include choloritic schists, marble, gnt-sill $\pm$ mica schists from which a Middle Eocene 40Ar/39Ar age spectrum of 41 $\pm$ 2 Ma has been reported Ding et al. (2005). These are intruded by an early Eocene leucogranite (Ding et al., 2005).

Gneissic granodiorites that crop out in the footwall of the fault were sampled over a vertical interval of >500 m to assess their cooling history in relation with their top to the NE normal fabric. SHRIMP U/Pb dating suggests early Eocene emplacement at ca 48 Ma, while Ar/Ar dating of micas and amphibole indicates cooling below 450˚C by 19 Ma with a major cooling of the overall section at 13-14 Ma. However, K-feldspars from the most deformed middle part of the section can be interpreted as indicating much younger ages at ca 4 Ma. This suggests that normal faulting may have occurred in two phases, at ca 13 Ma and ca 4 Ma. Results of on-going zircon and apatite (U–Th)/He age dating will also be reported. These results can be compared with those recently reported from the Kung Co pluton 450 km to the ESE in the Tethyan Himalaya. This 22 Ma old north Himalayan granite was exhumed in two phases at 15 – 8 Ma and since less than 4 Ma, The last phase being associated with the still active N-S normal fault (Mahéo et al., 2007, EPSL).

The pattern and timing of extension in Tibet appears much more complicated than a single phase of E-W extension associated with Neogene South Tibetan magmatism.

Ding, L., et al. (2005), Paleocene–Eocene record of ophiolite obduction and initial India-Asia collision, south central Tibet, Tectonics, 24, TC3001, doi:3010.1029/2004TC001729.

Maheo G., Valli F., Leloup P. H., Lacassin R., Arnaud N., Paquette J., Louis, Fernandez A., Haibing L., K.A. F., and Tapponnier P. (2007), Post 4 Ma initiation of normal faulting in southern Tibet. Constraints from the Kung Co half-graben. Earth and Planetary Science Letters 256, 233-243.