Geophysical Research Abstracts, Vol. 9, 00729, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00729
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A deformation-based criteria for identifying the MCT in the north western part of the Kathmandu nappe, Central Nepal

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Located in the central Himalayan collisional wedge, the Kathmandu nappe is a >100 km broad re-entrant (or "salient", an apparent half window) in the regional (otherwise N-dipping) tectonostratigraphy. The tectonostratigraphic package includes the orogen-wide renowned Main Central Thrust (MCT), regarded by many as the main (i.e. crustal-scale) thrust-kinematics deformation zone in the Himalaya that, regionally, juxtaposes the Lesser Himalaya (footwall) with the Higher Himalaya (hanging wall). The entire re-entrant feature has syn-formal architecture (the Mahabharat Synform) thereby the regional tectonostratigraphic foliation is S-dipping on the northern flank. Differing interpretations question (1) whether the MCT (either the main deformation belt OR some lithostratigraphic contact) continues along strike (and cuts across), or runs parallel with, the re- entrant and (2) whether the MCT is really the key crustal thrust in the Himalaya (e.g. based upon detrital provenance geochronological arguments).

To address these questions, nine swath profiles across the nappe have been chosen to identify the timing and amount of strain associated with major lithospheric thrusting around the Kathmandu Nappe by using field mapping, structural surveying and detailed microstructural kinematic and strain analyses in addition to geochemistry and U-Pb and Rb-Sr geochronology & geochronometry. We report here 2 of these profiles; around the Galchi area - Mahesh & Belkhu rivers (Area 1; ca.10 km), and the Malekhu area - Galaudi, Malekhu, Gomati, and Charaundi rivers (Area 2; ca.10 km). Both are in the NW portion of the re-entrant where foliation is S-dipping. The zone of contact

between the Nawakot Complex (local member of the Lesser Himalaya) and Kathmandu Complex (local member of the Higher Himalaya) is observed by us to a 300-400m thick zone of thrust deformation. Visible intensity of strain gradually decreases away from the core of this main thrust zone. Deformation-related microstructures vary with the local protolith. For example, in Area 1, the western margin of the Sheopuri (granitic) gneiss forms stretched and flattened sheets and fingers within quartzite and schist of the Kathmandu Complex. These gneisses are marked by mature dynamic recrystallisation. In all Kathmandu Complex rocks within 500 m of the hanging wall, a range of monoclinic geometry asymmetry mica micro-domains, quartz micro-ribbon features, and syn-kinematic garnets (restricted to $<$500m of lowest hanging wall) all preserve dramatic rotation history and demonstrate consistent thrust kinematics. Within the Nawakot Complex, although the intensity of strain is less spectacular than in the hangingwall, kinematic indicators again consistently demonstrate thrust sense. In both Areas, the main thrust zone also clearly marks change in metamorphic grade from the coarsely crystalline, garnetiferous biotite schist of the Kathmandu Complex to the rocks of the Nawakot Complex (dominantly metasedimentary quartzite, phyllite, slate, limestone, and dolomite that are devoid of garnet). Metamorphism within the Nawakot Complex is usually only chlorite grade, however in Area 1, the grade of metamorphism ranges from chlorite grade (lower in the footwall) to garnet grade up towards the main thrust zone. Although the grade of metamorphism is different in these two areas (Area 1 = sillimanite, Area 2 = garnet), the visible strain and characteristics of deformation in the vicinity of the thrust are consistent

Our mapped main thrust zone belt is therefore unquestionably a product of significant, protracted high strain at mid and upper crustal conditions. The petrography, metamorphism and nature of strain history of both the hanging wall and footwall rocks is strikingly consistent with descriptions of the MCT from elsewhere. We therefore conclude that our thrust belt is the local MCT. Consequently, the Katmandu Nappe is required to be an MCT trace re-entrant.