

LOCATING THE MAIN CENTRAL THRUST OF THE HIMALAYAN OROGEN: RESULTS FROM THE MELAMCHI RIVER TRAVERSE OF CENTRAL NEPAL

ABSTRACT

The Main Central thrust (MCT) is the major thrust fault of many east-west oriented faults in the Himalayan Orogen. These faults are responsible for over one-hundred kilometers of crustal shortening as the Indian plate has pushed under the Eurasia plate to form the Himalaya. The MCT is a ductile shear zone marking the fault boundary between generally crystalline rocks of the Greater Himalayan sequence (GHS) to the north from generally low-grade to unmetamorphosed rocks of the Lesser Himalayan sequence (LHS) to the south. In many places however complications make this boundary hard to identify. The central Nepal Himalaya is one of these complicated areas because the rocks here do not contrast with one another strongly. This study focuses on detrital zircon U-Pb geochronology of three rock samples along a traverse of the Melamchi river valley that span the presumed location of the MCT in this area. The zircon U-Pb ages from these samples should be able to distinguish between Late Proterozoic to Paleozoic Greater Himalayan rocks from Proterozoic Lesser Himalayan rocks. Samples' locations were determined by regional lithology, stratigraphy, and structural deformation indicative of a major thrust fault. Samples were collected from outcrops using sledgehammers and chisels, and were pulverized into powder by hand using steel pestle and mortar. Hand panning concentrated zircon in the heavy fraction. Zircons were then mounted with standards at SDSU and analyzed by Laser Ablation Multi-collector ICP Mass Spectrometry at the University of Arizona LaserChron Center. Zircon U-Pb ages from the three samples (MCT1, MCT2, and MCT3) were plotted on relative age-probability diagrams for visual comparison with one another. All three samples are similar to another with age-probability peak ages between 1100 Ma - 750 Ma indicating an affinity with GHS rocks. The Kolmogorov-Smirnov statistic was used to compare the age distributions under the null hypothesis that the samples are drawn from the same distribution. Comparison of each pair of samples using the K-S test yields P-values that are all >0.5 indicating that these grains could have been randomly sampled from the same population. The results of this study indicate that the location of the MCT is to the south of the area where these samples were collected. Further sampling and mapping is necessary to accurately map the location of the MCT across the Melamchi river valley in central Nepal Himalaya.