Therefore, from south to north, one advances into progressively higher structural levels. However, from lowest structural levels of the Lesser Himalayan sequence (LHS) in the south, to the top of the Greater Himalayan sequence (GHS) in the north, the peak metamorphic temperatures increase rather than opposite. In the LHS, this consists dominantly of slates and quartzites, the metamorphic grade ranges from lower to upper greenschist facies conditions. Index metamorphic minerals show this but quantitative thermobarometry is lacking and difficult to do because of absence of suitable mineral assemblages

In this study we apply Raman spectroscopy on carbonaceous material from samples of slates collected from the LHS in the eastern Bhutan. The 18 samples are evenly distributed between the Main Boundary thrust (MBT) at the base, and the Main Central thrust (MCT) at the top. The preliminary results indicate a progressive increase of temperature from south to north. In addition, we observe two jumps in temperature. One in the middle of the LHS is probably due to a younger thrust within the LHS, the Ramgarh thrust. Second temperature jump is across the MCT separating the LHS and the GHS. The latter jump is determined by combining the Raman spectroscopy data and the published data based on thermobarometry.

These are the first quantitative temperature data for the LHS in the eastern Himalaya; only one equivalent study exists in the central Nepal. In the forthcoming study the temperature gradient across the LHS will be calculated, and the throw along the Ramgarh thrust and MCT estimated. These data combined will be compared to the field data from Nepal and to the predictions of numerical models and will thus help elucidate the most likely mechanism of the formation of the inverted metamorphic gradient of the Himalaya.

Inverted metamorphic gradient across the Lesser Himalayan Sequence in eastern Bhutan: Raman spectroscopy on carbonaceous material

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[Poster]

One of the confusing features of the Himalayan Orogen is the inverted metamorphic temperature gradient. Along the orogen the dominant foliation, the lithotectonic units, and the main structures separating them dip dominantly to the north.

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