G123-P001 **Room: Poster Session Hall** **Time: May 16**

Evidence of channel flow on the basis of Pressure-Temperature-Time paths of metamorphic rocks in far-eastern Nepal

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A series of large-scale intracontinental faults, which are splayed off from northward dipping decollment, have played a major role in exhumation process of metamorphic rocks in Himalaya (ex. underplating model: Bollinger et al., 2006). Recently, it has become recognized that not only large-scale faults but also midcrustal channel flows greatly contribute to exhumation of the Himalayan metamorphic rocks (ex. Jamieson et al., 2004). In this study, metamorphic pressure-temperature (P-T) profile and P-T path across the far-eastern Nepal Himalaya (Tamor-Ghunsa section) have been investigated with K-Ar biotite geochronology and zircon spectroscopy in order to discuss the tectonics of metamorphic rocks.

The high-grade Higher Himalayan Crystallines (HHCS) of structurally upper level is separated from the low-grade Lesser Himalayan Sequences (LHS) of lower level, bounded by the Main Central Thrust (MCT). The MCT zone is a brittle-ductile shear zone. In the Tamor-Ghunsa section, metamorphic foliations in the HHCS mostly strike NW-SE and dip NE at moderate angles. Mineral lineation of sillimanite plunges NNE to E at moderate angles.

The discontinuity in P-T paths has been inferred from garnet growth zoning across the MCT. A sample collected from the sequence in the footwall of the MCT shows a nearly isothermal pressure increase path, whereas the path from a sample in the hanging wall indicates a P-T path of increasing both pressure and temperature with moderate dP/dT slope, followed by a path of increasing temperature and decreasing pressure. The P-T path discontinuity across the MCT could be explained by the tectonic assembly of rocks that reach peak pressure and temperature at different location within orogens. Considering the occurrences of cordierite corona surrounding garnet rim in cordierite-bearing gneisses, the gneisses are expected to experience an isothermal decompression path at retrograde stage.

The garnet-biotite thermometric results of metapelites show progressive increase of temperature upward from the MCT zone to the lower HHCS (ca. 610 to 740^{o}C), and roughly isothermal conditions at high temperature in the middle-upper HHCS. In contrast, metamorphic pressure profile inferred from garnet-biotite-quartz-plagioclase barometry shows peak pressure just above the MCT, which decreases to become nearly constant with increasing structural level.

The K-Ar biotite age determination has been performed to characterize the cooling history of six gneisses along the Tamor-Ghunsa section. These cooling ages show a wide range spanning between 9-27 Ma. In cathodoluminescence images, matrix zircon grains from their gneisses generally have a detrital core showing a well oscillatory zoning and a thin overgrown rim, which probably formed during magmatic crystal growth and high temperature metamorphism, respectively.

The clockwise P-T path from the lowest HHCS suggests that the rock experienced the exhumation at a rapid rate that is impossible to reach thermal stability. This trend is consistent with a clockwise P-T path inferred from channel flow models (ex. Jamieson et al., 2004) rather than a hairpin-type P-T path from underplating models (ex. Bollinger et al., 2006). On the other hand, concerning peak temperatures, channel flow models predict the excess and shortage of heat in the lower and upper structural levels, respectively, as compared to natural observations. One of the main reasons for the discrepancies could be that the current channel flow models do not take into account heat advection due to melt or fluid migration.

Bollinger et al., 2006, Earth and Planetary Science Letters, 244, 58-71; Jamieson et al., 2004, Journal of Geophysical Research, 109, B06407, 1-24.