Northward lateral cooling of the Himalayan metamorphic nappe in central and eastern Nepal, and uplifting rate of the Everest Massif

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We undertook the Himalayan nappe project, in order to clarify the thermal and tectonic history of the Higher Himalayan Crystalline (HHC) nappe, and the underlying middle Proterozoic Lesser Himalayan sediments (LHS) and overlying the Tethys sediments (TTS) by means of fission track dating of zircons. We obtained 40 zircon fission track (ZFT) ages from the samples collected along a transect of 80 km in length, crossing the Kathmandu nappe in NNE-SSW directions in central Nepal. In addition, 22 ZFT ages were also obtained from the HHC nappe and the LHS between Mt. Everest and the Main Boundary Thrust (MBT) in eastern Nepal.

As the consequence, it was revealed that ZFT ages of both HHC and LHS as a whole become young toward the north from 12-10 Ma at the frontal zone, 8-6 Ma at the middle zone, and to 3-2 Ma at the root zone along both transects. We estimated retreating rate of isotherm line of the lowest annealing temperature of ZFT as 7-8 km/myr, on the basis of FT age distribution on the transect lines. In accordance with the rate, present position of 0 Ma was inferred to be located at around 95 km to the north of the MBT, just below the summit of Himalayan giants. Those results suggest that heat source that has kept the HHC nappe under hot condition for more than 10 myr is ascribed to partially melted middle crust of Tibet, which southern front is located at about 100 km to the north of Himalayan giants.

On the other hand, the Tethys sediments (TTS) cooled earlier than cooling of the underlying HHC and LHS. The FT ages of the uppermost unit indicate 18.2 Ma, and the lower part yielded 9.7 Ma. The former suggests that the TTS cooled earlier than exposing of the HHC, and the latter implies that the basal part of the TTS cooled down below at the same time when the nappe front started to cool.

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