

Cooling and uprift of Ladakh Himalayas

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The timing of uprift of Himalayas is an important Geochronological issue which is related to the onset of glacial-interglacial cycles as well as of present monsoon. The present study investigated the ages of Ladakh Batholith in northwest Himalaya by K-Ar and by ESR dating methods.

The biotite age of K-Ar method was obtained to be about 50 Ma. This age probably represents the igneous activities associated with subduction caused by the collision of Indian and Eurasian continents.

Quartz grains were extracted from the same sample to apply ESR (electron spin resonance) dating method. Eight aliquots of about 100 mg were prepared to have eight different gamma ray doses. ESR signal intensities were measured for these aliquots. By extrapolating the enhancement of the signals by the gamma rays to the zero ordinate, the natural accumulated doses were obtained. Natural dose rate was obtained from the U, Th and K concentrations of the sample. The natural accumulated doses were divided by the dose rate to deduce the ESR ages. An ESR age, for a sample taken at an elevation of 3600 m, was obtained to be about 500 ka from the Al center, an electronic hole associated with Al ion replacing Si site, while another age, for the same sample, was about 800 ka from the Ti center, an electron associated with Ti ion replacing Si site. On the other hand, no ages were obtained for a sample taken at an elevation of 5400 m because of the saturation of the ESR intensities, i.e. no enhancement by gamma ray irradiation.

The Ladakh Batholith was uprifted up to the present elevation after its formation by the igneous activity, due to the collision of the continents. The ESR ages should correspond to the respective closure temperatures as the rock body has been cooled down with uprifting. The closure temperatures of ESR ages were reported to be several tens of degree centigrade by Toyoda and Ikeya (1991). The corresponding depth should be several km, considering the geothermal gradient. The process and the velocity of the uprifting will be discussed in the presentation.