Thermal history of the Shimanto Belt analyzed by fission-track length distributions of apatite -Rapid exhumation since 7 Ma-

Komei Arata[1]; Noriko Hasebe[2]

[1] Earth Science, Kanazawa Univ.; [2] K-INET, Kanazawa Univ.

The fission-track (FT) method using apatite provides a thermal history of a rock at a temperature regime of around 100 degrees C, useful to discuss uplift and denudation erosion processes of upper crustal rocks.

Apatite FT ages of the Shimanto Belt in south-east Shikoku were reported as about 10 Ma and interpreted to represent the Miocene exhumation induced by the rapid subduction of the Philippine Sea Plate due to the opening of Japan Sea, or the underplating of a mass of sediment probably supplied from Miocene igneous activities (Hasebe et al., 1993, 1997). However, because the FT ages depend on the number of counted tracks, they often show apparent ages which don't reflect any thermal events. This study aims to measure FT length distributions to discuss a detailed uplift process of the Shimanto accretionary prism. First, to overcome the experimental difficulties arising from low FT densities in apatite from the Shimanto Belt, apatite etching condition is investigated to increase the number of measurable tracks. Afterwards, track lengths are measured and thermal histories are examined using obtained track length distributions and reported FT ages.

As a result, bimodal track length distributions were obtained. A modeling of the data using HeFTy (programmed by Ketcham, 2006) show that these samples are best interpreted to have experienced a thermal event which did not erase all the existing tracks completely and undergone the cooling from 110-145 C at 7-2 Ma to ˜20 C at present. Uplift and erosion would be responsible for this cooing because no heat source attributable is found in the studied area. Calculated uplift rate is 0.7-2.5 m/kyr under the assumption of the surface temperature being 20 C and the thermal gradient 20 C/km. This uplift and erosion rate is concordant to the mean uplift rate around Muroto peninsula in the last six thousands years estimated geomorhpologically (Maemoku, 2001). The start of cooling (exhumation) may correspond to the re-start of the subduction of the Philippine Sea Plate at about 6 Ma (Kamata, 1999).