Geophysical Research Abstracts
Vol. 13, EGU2011-5385-1, 2011
EGU General Assembly 2011

Geo- and thermochronology of Cretaceous intrusions forming peneplains in the Lhasa terrain, southern Tibetan Plateau

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The Tibetan Plateau is composed up of several terranes wedged together in the course of the northwards moving of India during Palaeozoic and Mesozoic time, while south of the plateau part of the Indian plate are merged to the Himalayan range. Most assumptions postulate the collision between India and Asia at 50 to 55 Ma. Nevertheless only few data are available about the uplift and geomorphological development of the Tibetan Plateau. Our main focus lies on the Lhasa terrane (LT) which is the southernmost terrane of Tibet bordered by the Bangong suture in the north and the Indus-Yarlung suture in the south that separates the Asian crust in the north from the Indian crust in the south. Extracting information about the exhumation events since Cretaceous time we focused on the Bangong intrusion complex belonging to the northern plutonic belt which intruded between 130 and 110 Ma and spreads over the LT (Xu et al., 1985; Murphy et al., 1997; Kapp et al., 2005; Leier et al., 2007). Well preserved peneplains are characteristic for the Bangoi intrusion complex. These highly elevated planation surfaces seem to be old geomorphological features preserving an early stage of the morphological evolution of the Tibaten Plateau. LA-ICP-MS U/Pb geochronology of around 20 intrusive rock samples by yield two narrow age groups around 84.6 $\pm$ 1.3 Ma and 117.7 $\pm$ 1.2 Ma. Previous K/Ar ages in the Bangong area scatter from 122 to 50 Ma (Pan et al., 2004). Some of the K/Ar ages significantly post-date the implacement ages, indicating a residence of magmatic bodies at higher temperature regime. Zircon (U-Th)/He ages cluster between 94 and 70 Ma. Apatite fission track and (U-Th)/He thermochronology yield tight age clusters around 64 Ma and 53 Ma, respectively. Fission track length measurements of all FT dated samples give a mean length of about 13.7 $\pm$ 1.4 μm and support a simple cooling history. Field evidences shows that after the Paleogene exhumation and peneplain formation the intrusive body was covered again by an Eocene terrigeneous siliciclastic-evaporitic sequence. This burial however resulted in negligible thermal effect; the temperature of post-Eocene overprint was below 50 °C. With all above mentioned information time – temperature paths with 5 constraints were performed. The narrow resulting apatite (U-Th)/He ages and apatite FT ages mark a period of rapid cooling during Paleocene-Early Eocene. The planation process could took place only after this period of intense exhumation during Middle Eocen times.

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