



## **Paleomagnetism of Cretaceous Oceanic Red Beds (CORBs) from Gyangze, northern Tethys Himalaya: Evidence for Intra-oceanic Subduction System and Southern Paleolatitude Limit for the Lhasa Block**

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In the northern Tethys Himalaya, sporadically distributed Cretaceous oceanic red beds (CORBs, the Chuangde Formation) have been described. The sequence was interpreted to be firstly deposited in the outer continental shelf and upper slope, and later slumped into deep basin. Based on this model, and paleomagnetic data of shallow water deposits from the southern Tethys Himalaya, the CORBs were derived from the northern tip of the passive margin of the greater India. If so, the CORBs would provide more accurate record of the northern extent of the greater India, which is an important parameter for estimating the initial time of India-Asia continental collision and the amount of crustal shortening. The well studied and most accessible section is located in the Chuangde village, about 40km east from the Gyangze city. The formation is about 25m thick, ranging from 84 to 75Ma in age according to fossil records of planktonic foraminiferal species. The lower and upper parts are 2 and 5 meter thick marlstones, respectively, and the middle section is dominated by shale with a few layers of centimeter scale marlstones. Fifty cores were collected from the marlstones of the section, and for the purpose of fold test, 30 more cores were collected from the upper part of the formation from a second section located in the Pulong village, ~3km to the northeast of the Chuangde village. All samples were subject to stepwise thermal demagnetization. About 60% of the samples yielded interpretable demagnetization results. The bottom of the upper part of the formation show reversed high temperature component, and the rest of the upper part and the lower part show normal polarity. The Chuangde section data failed reversal test, because the normal polarity direction is likely not fully resolved from overprint component. However, the well resolved reversal direction from the Chuangde village and the normal direction from Pulong pass both reversal and fold tests. The mean paleomagnetic data indicate a paleolatitude of  $10\pm 2$  degree north, ~2000 km distance from the southern Tethys Himalaya. Therefore, the formation is not deposited near the greater Indian continental margins. Based on recent plate tectonic reconstruction, the CORBs are very likely formed within a back-arc basin between the equatorial intra-oceanic subduction system and the Asian continental margin. Due to coeval development of abundant red beds in the Lhasa block, the characteristic pigments of hematite born in the CORBs are likely of terrestrial origin. In addition, the new data indicate that the Lhasa block is unlikely to be at low paleolatitude in the Late Cretaceous and Tertiary as some of the paleomagnetic results show.