



3-D magnetostratigraphy of the Guide Basin, Qinghai Province, NE Tibet

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Basins in NE Tibet and surroundings, containing Neogene clastic molasse-type sediments, are excellent targets for magnetostratigraphy, because the dating of sediment accumulation and deformation may reveal interesting aspects of the crustal deformation north of the India-Asia collision zone. We report here on the magnetostratigraphy of some seven detailed sections sampled in the Guide Basin in Qinghai Province, China (around 36.1N, 101.4E). Two sections contain early Miocene and late Oligocene strata, as indicated by fossils and provisional magnetic reversal records, whereas five younger sections yield late Miocene and Pliocene ages. The latter constitute a three-dimensional, triangular “fence-diagram” situation that illustrates the northward thickening and coarsening of the sedimentary strata, indicating the sediment supply directions away from the northerly mountain ranges of the Qinghai Nan Shan and Laji Shan. The youngest strata (apart from Loess) are Olduvai in age, after which degradation of the basin sequences due to Yellow River incision replaced a previous long-term aggradation stage that appears to have lasted more or less continuously from the late Oligocene to the early Pleistocene. The dual-polarity magnetizations are typically nicely antipodal, but reveal inclinations that are too shallow, undoubtedly because of post-depositional inclination flattening. Six S-verging thrust faults cut the strata, and are active at successively later times going from north to south. A regionally ubiquitous coarse-conglomerate influx occurred 3.6 – 2.6 Ma throughout NE Tibet and adjacent areas. The late Miocene and younger directions show formation-mean declinations between 354 and 7 degrees, whereas three early Miocene and late Oligocene mean declinations range from 31 to 44 degrees. This in-

dicates that a rotation of some 24 degrees or more took place during the middle part of the Miocene (approximately 11 – 17 Ma). No rotations occurred, in that time, in the Xining, Longzhong, and Linxia basins to the northeast and east of the Guide Basin; however, a rotation of similar magnitude is documented by Dupont-Nivet et al. (2004, JGR 109 (B4)) for pre-Miocene (>29 Ma) time. Collectively, these results show that the basins in NE Tibet had independently evolving structural histories.