Significant late Jurassic counterclockwise rotations of the Yanshiping region, east North Qiangtang terrane, implication on Lhasa - Qiangtang initial collision

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The Tibetan Plateau consists of multiple terranes, such as, from north to south, including the Qilian-Qaidam, Songpan-Ganzi, Qiangtang, Lhasa terranes, etc. These terranes have amalgamated from south to Eurasia one after another during different periods; and finally, the Cenozoic continuous indentation of India into Eurasia has produced this present largest and highest plateau in the world.

As a natural laboratory of geodynamics and mountain building of intra-continental collision, much of the work has been done on the mechanisms and kinematics of India-Asia collision and the processes of plateau uplift. The work has established basic understanding on the evolution of the Tibetan Plateau, though debates still remain. Little work has been carried out on the evolution of the "proto-Tibet". Knowledge of the evolution of "proto-Tibet" would provide comprehensive understanding on the evolution of the Tibetan Plateau.

We present here detailed paleomagnetic rotation study on four middle-late Jurassic formations in the Town of Yanshiping, east North Qiangtang terrane, central Tibet. The four formations are, from lower to upper, the Quemocuo, Buqu, Xiali and Suowa Fms, which are layers of sandstones, limestones, sandstones and limestones, respectively. A total of ~100 sites of ~1200 paleomagnetic samples have been collected. After performing thermal and/or AF demagnetization treatments, principle component analyses were utilized to obtain characteristic magnetization (ChRM) directions. These ChRM directions, some are obviously remagnetized, some pass field test and believed to be primary directions.

These primary directions yield D_s = 335.3°, I_s = 29.4°, α_{95} = 16.3°, N = 11 for the Quemocuo Fm., D_s = 331.3°, I_s = 34.7°, α_{95} = 4.6°, N = 23 for the Buqu Fm., D_s = 321.3°, I_s = 39.2°, α_{95} = 14.9°, N = 7 for the Xiali Fm., and D_s = 2.0°, Is = 43.5°, α_{95} = 21.2°, N = 4 for the Suowa Fm. The results indicate insignificant (possibly slightly clockwise) rotations among the Quemocuo, Buqu and Xilia Fms., but significant counterclockwise rotations from the Xialia to Suowa Fms. Combined with other geological evidences, this apparent transition from insignificant rotations to significant counterclockwise rotations during the Xiali Fm. might indicate the initial collision of the Lhasa and Qiantang terranes during the period.

Key words: Late Jurassic, Qiangtang, CCW rotations, Lhasa-Qiangtang collision