Large-scale ramp structures in the Precambrian layered limestones, west of Beijing, China

Jingpeng Hong*, Takao Miyata* and Wooseok Kim*

Received July 4, 2008. Accepted September 10, 2008.

* Department of Earth and Planetary Sciences, Graduate School of Science, Kobe University

Corresponding author; T. Miyata, miyata@kobe-u.ac.jp

Large-scale ramp structures are found in the thick-bedded limestones of the Proterozoic Wumishan Formation (1350–1250 Ma), west of Beijing, China. We briefly report these structures in understanding the constrictive deformation in the North China Block. These structures combine with the detachments, ramp faults (at Loc.1; $N39^{\circ}38'24.1''$, $E115^{\circ}36'12.6''$), and the ramp anticline (at Loc.2; $N39^{\circ}38'36.6''$, $E115^{\circ}37'08.2''$). The Wumishan Formation has an accumulative thickness of about 3,000m and commonly yields stromatolites. Geomorphologically, the hill is composed of the hard limestones having the elevation of 300–500 m from the valley.

Acknowledgements

We wish to thank Prof. Jiafu Qi (China Petroleum University) for giving useful geological information, and Profs. Tsuyoshi Toyoshima (Niigata University) and Akihiro Kano (Kyushu University) for their constructive reviews.

Reference

Beijing Geological Bureau, 1990, Beijing Geological Map, 1:100,000, Beijing Geological Bureau.

Fig. 1. Simplified geologic map of the western area of Beijing, China (modified after Beijing Geological Bureau, 1990). CAO: Central-East Asian Orogen, NCB: North China Block, SCB: South China Block, Solid square: Study area

Fig. 2. a) Photograph of ramp structures in the thick-bedded limestones (Wumishan Formation) at Loc. 1. The bedding of the limestone is $N30^{\circ}W/40^{\circ}SW$ (strike/dip) at site A. The detachment can be found along the nearly-flat limestone at site B. b) Photograph of the detachment at site B. The 20-cm-wide fracture zone is recognized along the detachment plane. The striation and Riedel shears (Y and P shears) of the detachment indicate northeastward thrusting. Y; Displacement shear, P; Thrust shear. A width of the pen is 1 cm.

(↑) **Fig. 3.** Photograph (a) and sketch (b) showing a ramp fault and anticline at Loc. 2. C and D; Sites of the measurement of striations on the ramp fault. (c) Upper hemisphere equal area projection showing the striations on fault plane of the ramp fault and axis of the anticline. The mean slip direction of the hanging wall is south-eastward.

(↑) **Fig. 4.** Photograph of the outcrop (site C in Fig. 3a) showing the low-angle thrust fault, and the locality of the hand specimen (E) within its fault core. The scale bar is 50 cm.

(→) **Fig. 5.** Photomicrograph (crossed polarized light) of microstructures on X-Z section within the fault breccia at site E in Fig. 4 along the low-angle thrust fault. Y; Displacement shear, R; Riedel shear, P; Thrust shear, and T; Tensile fracture. The scale bar is 1 mm.