

Pseudotachylytes generated in the Tongbei-Dabie ultra-high pressure metamorphic belt, China and their significances for seismo-tectonics

¹LIN, A. ²SUN, Z. and ²YANG, Z. ¹Faculty of Science, Kobe University, Kobe, Japan; ²The Institute of Geomechanics, Chinese Academy Geological Sciences, Beijing, China

This study presents an example of the pseudotachylytes generated in the regimes from brittle to plastic shearing domains in the Precambrian Dabie-Tongbei high pressure metamorphic belt which is a collisional orogenic zone between the North China and Yangtz (South China) continental blocks. Two types of pseudotachylytes are observed in the Dahezhe ductile shear zone of the Tongbei-Dabie orogenic belt, southwest Henan Province: one type associated with the cataclasite (C-Pt) cut the foliation of mylonite as injected complex networks and the other type is interlayered and associated with the mylonite (M-Pt). The microstructural and EPMA X-ray mapping analyses show that the extreme shear flow of the M-Pt is attested by elongated porphyroclasts of quartz and feldspar and layered fine-grained matrix in which the dynamic recrystallization accompanying ductile deformation has been widely formed. In contrast to the C-Pt, most of quartz porphyroclasts within the M-Pt are elongated and flattened along the foliation plane.

The occurrences and microstructures suggest that the C-Pt formed in the brittle regime (<15 km), and the M-Pt was generated in the plastic shearing regime (>15km). The coeval presence of the two types of pseudotachylytes indicates that cyclic seismic slips occurred in the same shear zone from brittle to plastic shearing regimes in the Tongbei-Dabie collisional orogenic belt. The study of the two types of pseudotachylytes found in the Dahezhen shear zone in the ultra-high pressure metamorphic belt, therefore, will provide important information for understanding the seismic rupture process for continental-type earthquakes occurred during the collision and uplift in the brittle to plastic shearing regimes.