

Fossil earthquake recorded by pseudotachylytes and two textural types of cataclasites from northern Langhovde in the Lützow-Holm Complex, East Antarctica

Tsuyoshi Toyoshima¹, Ippei Kitano², Masahiro Ishikawa³, Takuma Kator¹ and Tomokazu Hokada⁴

¹*Niigata University*

²*Kyushu University*

³*Yokohama National University*

⁴*National Institute of Polar Research*

Pseudotachylytes were found north of Mt. Futago (Futago-yama) of northern Langhovde in the Lützow-Holm Bay region, which are called Futago-yama pseudotachylyte (Futago-yama PST). The Futago-yama PST is associated with an NNE-SSW trending main fault (Futago-yama Fault) that moderately dips east and is more than 660 meters long. The Futago-yama Fault is parallel to gneissosity of surrounding rocks. The Futago-yama Fault and PST are alongside the eastern margin of an NNE-WWS trending granitic mylonite zone (Futago-yama mylonite zone). The Futago-yama mylonite zone, which has been derived from a granitic sheet, was formed under reverse shear movement. The Futago-yama Fault, which consists of pseudotachylytes, cataclasites, and minor echelon faults, was formed under normal shear movement. The Futago-yama PST has recorded a seismic event, and has not been deformed after the earthquake. Therefore, the Futago-yama PST is expected to have recorded deformation processes preparatory to earthquake faulting. The pre-seismic deformation may have been recorded in cataclasites of the Futago-yama Fault.

There are two textural types of cataclasites of the Futago-yama fault: foliated and non-foliated (random-fabric) cataclasites. Foliated cataclasites consist of alternating fractured monomineralic aggregates of quartz, plagioclase, biotite, and hornblende. Biotite grains in the foliated cataclasites exhibit complex kink bands, (001) cleavage separation, cleavage-steps, and mica fish, and are strongly elongated. However, biotite grains in the random-fabric cataclasites develop kink bands less than those from the foliated cataclasites, are less elongated and do not show (001) cleavage-steps and mica-fish. Monomineralic fractured aggregates are also often observed in the wall rocks of foliated cataclasites, but not in those of the random-fabric cataclasites and their wall rocks. Pervasive calcite precipitation is frequently observed in random-fabric cataclasite, especially random-fabric ultra-cataclasite core, but less occurs in the foliated cataclasites. The Futago-yama PST occurs along foliated ultra-cataclasite, which is a fault core of foliated cataclasite zone, but is not observed in the random-fabric cataclasite zone. The Futago-yama PST cut strong foliation of ultracataclasites and cataclasites of the foliated cataclasite zone. From these facts, it can be considered that the developmental processes of the foliated cataclasite, especially deformation processes of biotite grains from kinking to cleavage slip indicate processes of seismic preparation and acceleration. Pervasive calcite precipitation at fault core in the random-fabric cataclasite zone may indicate hydraulic fracturing induced seismicity.