

# Pseudotachylyte of the Nobeoka Thrust

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## Introduction

Pseudotachylyte has rarely reported from plate boundary rocks, such as metamorphic rocks and sedimentary rocks in accretionary complex, in contrast to many works on intracontinental rocks. All pseudotachylytes in accretionary complex are exposed as the fragments within faults, which suggest that these faults moved several times in the past. In this time, we discovered a planer pseudotachylyte from the shear zone in the hanging-wall of Nobeoka Thrust. The Nobeoka Thrust is remarked in relation to large earthquakes in subduction zone because it is a good on-land analogue of a splay fault bifurcated from the plate boundary decollement in the upper part of seismogenic zone in the Nankai Trough.

## Occurrence of outcrop and microscopic observation

Pseudotachylyte is found in the core of a fracture plane whose sense of shear (top-to-the SSE-ward slip) is the same as the Nobeoka Thrust within the thickness of 1mm. It cuts the foliation of phyllite at an angle of about 30 degrees with smooth, sharp boundary. We observed flow and injection texture under the microscope. Besides, the core of fracture plane shows no later deformation which suggests that pseudotachylyte was generated by a single fault event.

## SEM image observation

Pseudotachylyte accompanies ultracataclasite in the edge, and their boundaries are partly clear and the others obscure. Pseudotachylyte is characterized by homogeneous matrix with fragments of quartz, calcite, and Fe-rich spherule which may have formed by oxidation of Fe during the melt quenched event. Ratio of fragments versus matrix is 0-10 percent. Quartz and calcite fragments show embayment texture. The fragments display an increase in grain size with distance up from the base. We could also find the melt suggestive textures: injection to ultracataclasite, and a number of minute rutile grains attached to quartz fragment.

## XRD analysis and EPMA analysis

X-ray diffraction pattern represents a broad band of 12-42 degrees C in 2 theta. These analyses indicate that most of pseudotachylyte is crystal, but partly amorphous. XRD data revealed that the most part of pseudotachylyte matrix is composed of palygorskite. Chemical composition of palygorskite  $[Al_2FeVSi_8O_{20}(OH)_2(OH_2)4Mg(H_2O)_4]$  indicates that the glass was primarily formed from illite, and chlorite in host rock, and then partially devitrified.

## Conclusion

Observation and analysis on shear planes in the hanging-wall of the Nobeoka Thrust revealed that pseudotachylyte was generated by a single high-speed shear accompanied by frictional melting. Maximum temperature beyond at least 740 degrees C is assumed from remarkable embayment of calcite and quartz grains.