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# The occurrence and the microstructure of ”high-T pseudotachylyte” fault system in the Balmuccia peridotite massif, N. Italy

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The origin of fault-related pseudotachylytes is often thought to represent a quenched melt produced by frictional melting of rocks during seismic faulting (i.e. earthquakes). Peridotite-derived ultramafic pseudotachylyte is, though its occurrence is rare, particularly important because it may provide with important information on seismogenic processes of mantle earthquakes in the light of material-based approach. The first occurrence of such ultramafic pseudotachylyte was reported from Balmuccia peridotite massif in northern Italy (Obata & Karato, 1995; Tectonophysics). The sample contains typical textures of pseudotachylyte, such as quench crystals of olivine and clinopyroxene, interstitial glasses and amygdales (i.e., relics of former bubbles), suggesting its unumbiguous melt origin.

There is another type of fault-vein ultramylonite that is thought to have been derived from former ultramafic pseudotachylyte as reported from the same Balmuccia peridotite by Ueda et al.(2008, Geology), and it is called ”high-temperature pseudotachylyte”. The injection vein structure deviating from the fault vein that contains mylonitized ”pseudotachylyte” suggests its melt origin, though this mylonitized ”pseudotachylyte” (matrix grain size less than 1 micron) is holocrystalline and has no clear textural evidences that suggest the melt origin. The lack of typical quench texture or glasses is thought to be the result of relatively high ambient temperatures retarding effective quenching. The mineral assemblage of the matrix of the ”pseudotachylyte” is olivne-orthopyroxene-clinopyroxene-spinel-(with or without plagioclase) and with minor amounts of amphibole, dolomite but without chlorite, which indicates the recrystallization pressure-temperature conditions around 600-800 degree C and 0.7-1.1GPa (Ueda et al., 2008). Some part of wall-forming peridotite of the ”pseudotachylyte” fault vein have been strongly deformed and recrystallized to form mylonite, indicating some activity of plastic deformation process just before the occurrence of an earthquake (Jin et al., 1998, Journal of Structural Geology).

Though a certain extent of observation had conducted as mentioned above, further information from field observation was needed to clarify the relationship between ultramafic pseudotachylyte having quench textures and the mylonitized ”pseudotachylyte” because it is difficult to decipher, only from observation of hand specimens, the deformation texture of the ”pseudotachylyte” into individual deformation processes due to the superposition of deformation from seismic frictional melting to post seismic plastic shear on a single fault vein. In this poster, we present a result of a field observation conducted in summer 2008 in the Balmuccia massif and the results of our preliminary microstructural observations of newly collected samples by means of optics and SEM. In the outcrop, fault-vein system including the ”pseudotachylyte” was found out to be more extensive than ever thought. This fault system is classified into distinct sets of faults by their appearance and crosscutting relationships. The fault set including the ”pseudotachylyte” was the oldest in generation. Compared to younger sets of faults, the ”pseudotachylyte” veins exhibit features such as convex relief and light-colored thin lineament on weathered surface.

An attempt is made to reconstruct the formation process of the ”pseudotachylyte”-bearing fault veins on the basis of the field and microstructure observation.