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Co-seismic water-rock interaction recorded in Pasagshak Point thrust, Kodiak accretionary complex, Alaska

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A pseudotachylyte-like ultra-fine grained black fault rock (BFR) has discovered from Pasagshak Point thrust, Ghost Rocks formation, Kodiak Island, Alaska (Rowe et al., 2005). It is very different from pseudotachylytes in Shimanto accretionary complex (Ikesawa et al., 2003; Kitamura et al., 2 005; Okamoto et al., 2006; Mukoyoshi et al., 2006; Ujiie et al., 2007) in the aspect of its occurrences: i.e. large thickness (up to 20cm), lack of mineral veins, variety of mixing pattern with surrounding random and foliated cataclasite. Rowe et al. (submitted) and Meneghini et al. (2010) have explored meso-scale deformational features and microfabrics, respectively, and concluded that the BFR had been formed by ancient seismic events occurred in plate boundary decollement at seismogenic depths (temperatures approximately 240 to 260 C).

In this study, we have performed analyses of whole-rock trace element concentrations and $^{87}Sr/^{86}Sr$ ratios of BFRs, cataclasites, and host rocks on the basis of detailed structural analyses. Enrichment in Sr, depletions in Rb and Cs in comparison with host rocks suggest that the BFR have suffered high-temperature water-rock interactions larger than 350 C (Ishikawa et al., 2008). Positive Li anomaly and low $^{87}Sr/^{86}Sr$ ratio of BFR imply that surrounding fluid was enriched in Li and ^{86}Sr. Rb-Sr isochron plot might suggest that Rb-Sr age was reset due to mechanochemical generation of plagioclase microcrystals. Intense water-rock interactions in spite of the lack of mineral veins would affect sealing and earthquake preparation processes in seismic cycles. Kodiak BFRs present new pattern of water-rock interaction at seismogenic depth of subduction zones.

Keywords: Kodiak accretionary comprex, decollement, water-rock interacton, seismogenic zone, earthquake, fault rock