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Fault rocks from seismogenic depths in exhumed subduction prisms: Pasagshak Point, Kodiak Island, AK.

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Most argillaceous mélanges of exhumed accretionary prisms are interpreted as produced along subduction thrusts. However, though the most destructive earthquakes occur along subduction thrusts, fault surfaces that produced large earthquakes have been difficult to identify. So far, only the presence of solidified frictional melts (pseudotachylytes), which are rare in mélange terranes, seems to satisfy the strictest criteria for ancient seismicity. We may investigate fossil evidences of seismic deformation by analyzing accretionary thrust faults that have been active at seismogenic depths.

In the Kodiak accretionary complex of Alaska, representing the exhumed analogue of the modern Aleutian margin, décollement-system thrust faults are preserved in several accreted units. Ambient conditions during faulting were 12–14 km in depth and 230–260 ^{o}C. The Paleocene Ghost Rock Fm outcropping at Pasagshak Point is a map-scale mélange primarily comprised of variably continuous massive sandstones, fine bedded turbidites and rare greenstones, in a variably disrupted argillitic matrix. Four episodes of localized shear in the mélange have been mapped as approximately 15 m thick bands of highly sheared cataclasites: these layers can be followed continuously accross distances of kms. Extreme strain localization in three of the cataclastic shear

zones occurs as tens of cm-thick planar to irregular beds of dark grey to black ultrafine-grained fault rocks that crosscut and locally intrude the shear zones. The best-exposed ultrafine fault rock crops out at the sharp boundary between the shear zone and an overlying 3-10 m thick massive sandstone unit. The black fault rock is harder than surrounding rocks and consists of vitreous bands alternated with granular horizons that rework the glassy layers.

We are providing here a detailed description of microstructure and geochemistry of these complex fault rocks. Despite the black rocks have been exhumed from seismogenic depths, possibly recording episodes of seismic slip, and although preliminary analyses suggested they are the product of frictional melting, our new data after a second field campaign are ambiguous. The textures found might be the product of different coseismic processes as frictional melting or gouge fluidization, or a combination of the two.