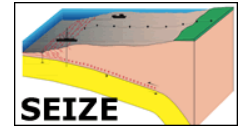


World's Thickest Seismogenic Fault Rock from a Subduction Complex, Kodiak Islands, Alaska



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We have discovered the thickest seismogenic fault rock known from a subduction complex. These paleoseimogenic indicators comprise a series of decimeter-thick, dense, black rocks crosscut a 10s of m-thick cataclasites, which in turn cut a classical mélangé. We know that these black fault rocks are seismogenic because they include intervals with igneous textures (pseudotachylytes) that are seamlessly intercalated with highly comminuted ultracataclasite. These black fault rocks also show structures indicative of fluidization at very low viscosities.

The seismogenic fault rocks are very low porosity, homogenous with respect to the enclosing cataclasite, and sufficiently thick to be distinct in borehole resistivity imaging. Thus, they could be identified in borehole logs. Secondly, the microscopic and ultramicroscopic textures of the seismogenic fault rocks, in both the melted and comminuted states, are distinct from those of the enclosing cataclasite and mélangé. Their textures could be identified from borehole cuttings. These seismogenic fault rocks occur in a series of abandoned décollements, of the Kodiak accretionary complex of Alaska. These rocks were underplated beneath the accretionary prism 60 my ago, at 12-15 km depth and ~ 270° C.

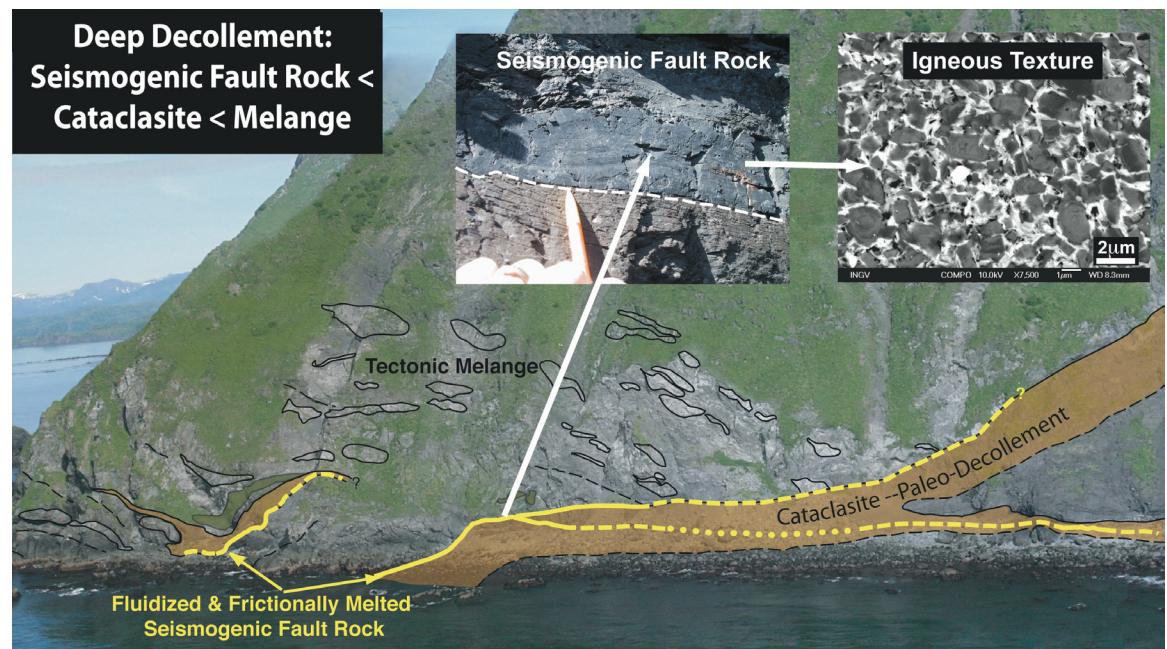


Figure: Deep Decollement: Seismogenic fault rock with zones of igneous texture is enclosed in a cataclasite (finely comminuted shale-sandstone sequence), which is in turn encased in a classic subduction zone melange. In addition to evidence for melting,

seismogenic fault rock shows fluidized textures suggesting low viscosities. The seismogenic fault rock may be decimeter-thick. Cataclasite represents a paleo-decollement. Sequences of seismogenic fault rock and cataclasite show lateral thrust ramps and are successively stacked suggesting underplating. Thrust motion is directly out of the plane of the photo: top towards the viewer and bottom away.

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