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SUBDUCTION-ZONE BEHAVIOR BACKED OUT OF TSUNAMI DEPOSITS, KAMCHATKA, FAR EASTERN RUSSIA

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For nearly ten years on Kamchatka, our team of geoscientists has been collecting data on tsunami deposits, both historical and pre-historical. Abundant Holocene tephra on Kamchatka permit constraints on the timing of both historical and prehistoric tsunamis, which we take as proxies for subduction-zone earthquakes. Millennial-scale histories are one goal of these studies (e.g., Pinegina and Bourgeois, 2003; Pinegina et al., 2003a&b). Another goal is enhanced investigation of historical tsunamis (as catalogued by Zayakin and Luchinina, 1987; plus 1997 Krontoskoye), both to generate benchmarks for older tsunami deposits, and also, as shown below, to elucidate earthquake-tsunami linkages during these remote, recent events.

1969 Ozernoi earthquake and tsunami

On 22 November 1969, 23:09:35 GMT (locally midday, 23 November), an earthquake jolted the Ozernoi Peninsula, with local shaking of 7-8 MM (Fedotov and Gusev, 1973). The epicenter was located at 57.8oN, 163.6oE, just off the Ozernoi Peninsula. Fedotov and Gusev (1973) interpreted this earthquake as an oblique slip event with a significant component of left strike slip, but as early as 1975, it had been reinterpreted as a thrust fault (Cormier, 1975), based on data from global and Canadian seismograph networks. Using body waveform analysis, Daughton (1990) also found a thrust fault-plane solution, striking N50o-80oE and dipping 5o-10oNW, and assigned a moment magnitude of 7.8. Various magnitude for this earthquake have been published (7.3-7.8); a tsunami magnitude $M_t=7.7$ based on the tsunami height at Hawaii is consistent with a moment magnitude of 7.7-7.8.

The 1969 Ozernoi earthquake was followed by a tsunami with local runup reported to be 5-7 m from the village of Ivashka south around the Ozernoi Peninsula to the Ozernaya River, and a local maximum of 10-15 m south of Cape Ozernoi (Olkhovaya River) (Zayakin, 1981). Runup was 1-3 m north to Lavrova Bay and southeast to Bering Island, and the tsunami was recorded on tide gages in the town of Ust'-Kamchatsk and faintly in Petropavlovsk-Kamchatskiy. Based on the presence of tsunami deposits above the 1964 Shiveluch tephra or the 1956 Bezymianny tephra, we have expanded the runup catalogue for this event to all our field sites in the southwest Bering Sea. Moreover, we have evidence of post-1956 subsidence at the northern and southern extremes of the Ozernoi Peninsula, which we interpret to be co-seismic with 1969 event.