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Earthquakes and Tsunami along the western margin of the Bering Sea, Kamchatka, Russia

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Over the last about 20 years, the Bering coast of Kamchatka was not considered as an area with a high level of earthquakes and tsunami risks, despite the 1969 Mw 7.7 tsunamigenic earthquake near the Ozernoi Peninsula. However, the 1991 Khailinskoe (Mw 6.6) earthquake in the southern part of the Koryakia, and especially the 2006 Olytorskoe earthquake (Mw 7.6) had raised the public and scientific concern about the possibility of large (including tsunamigenic) earthquakes in this area.

The western Bering Sea overlies a tectonically complex region. The plate boundaries in this region are not well established. During 1998-2003 field seasons we studied paleotsunami deposits along the southwestern coasts of the Bering Sea. In this area we have documented evidence for 12-15 tsunami during about 4500 years. We suppose that most of these events were produced by local earthquakes with w $\sim$7.5$\pm$0.5 (Bourgeois et al., 2006). Possibly, by kinematics, they are underwater analogues of the Olytorskoe Mw 7.6 earthquake of April 20, 2006 in Koryakia (Pinegina, Konstantinova, 2006; Pinegina, Kozhurin, 2010).

In 2009-2010 we extended the paleoseismological investigation to the west and northwest coast of the Bering Sea. A number of active faults, deforming late Pleistocene-Holocene marine terraces were identified. These faults, probably, have a submarine continuation in the Bering Sea. Slip along these faults may generate tsunamigenic earthquakes. Based on our data, the recurrence interval of slips along a single active fault may be as long as several thousands to $\sim$10 thousands of years. The recurrence interval of tsunami (with runup >5 m) at the different parts of the Bering Sea coast vary, in average, from 125 years up to $\sim$1000 years.

The analysis of historical seismicity (1937-2010) clearly shows that possible tsunamigenic zones may be 1) at the western shelf of Komandorsky basin, its slope and foot; 2) at the western end of the Aleutian Island Arc; 3) at the extension of active faults of the Stolbovskaya depression in the Pokaty canyon; 4) at the continuation of active structures of Koriaksky highland in the Litke Strait. These last two zones are less clearly pronounced in the modern seismicity, and were identified mostly by our paleoseismological study.

References

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