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Global study of great (M>= 7) deep focus seismic events having regard to the May 24, 2013 Mw 8.3 earthquake the Sea of Okhotsk, Russia

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Distribution of great seismic events M >= 7.0 and consequently the released seismic energy along the Earth radius is of bimodal character. 90% of the great seismic events, which are responsible for the most of energy released, occur relatively close to the Earth's surface, at an average depth of 50 km. The vast majority of remaining 10% is associated with seismic events that occur very deep, an average of 580-590 km, above the border between transition zone and lower mantle (660 km). These very deep earthquakes (depth >= 500 km) differ significantly from the shallow events. For the study of the distribution of M >= 7.0 earthquakes and their radiated energy a catalogue was completed for the time-interval between 1900 and 2013.

Examination of the source zones in which both shallow and deep M >= 7.0 earthquakes occur shows that linear distribution of deep earthquakes is considerably shorter than that found for the shallow earthquakes, which determine the length of the zone. The position of very deep ($\geq$ 500 km) earthquakes foci show where the down going lithosperic plates conflict with the upper boundary of lower mantle, and where they probably cross it. This passage generates compression - elongation inside the slab. A comparison of temporal distribution of shallow and deep seismic events of a given source zone suggests that there is no direct relationship in the distribution of these two different earthquake activities.

The largest of these great deep earthquakes, the May 24, 2013 Mw 8.3 earthquake the Sea of Okhotsk, was preceded by an earthquake swarm, which consists 58 M >= 5 events and occurred between May 15 and 24, 2013 in the higher part of the sinking slab east of Kamchatka. The aftershock activity after the Okhotsk Sea earthquake was moderate: twelve events with magnitudes above M 4 were observed till June 27. These events determine a fault area (2.64x104 km2) similar to the case of a shallow M 8.3 event. The effect of Okhotsk Sea was felt throughout Russia. The scientists of Institute of Physics of the Earth, Russian Academy of Sciences interpreted the hundreds of notifications of Moscow residents in terms of local geology.