

Deep Focus Earthquakes of the Kuril-Okhotsk Region

Polets A.Y.

The Institute of Marine Geology and Geophysics Far East Branch of the Russian Academy of Sciences,
Yuzhno-Sakhalinsk, Russia

e-mail: polec84@mail.ru

On The Earth, the earthquake depth distribution is uneven. Earthquakes are concentrated at some depths, while at others they are absent or rare. The sources of almost all deep-focus earthquakes are located in the circum-Pacific seismic belt. A comparative analysis of the distribution of deep-focus earthquakes in the Northern and Southern Hemispheres shows that there are more deep-focus earthquakes in the Southern Hemisphere than in the Northern Hemisphere. The processes in the mantle apparently occur differently in the Northern and Southern hemispheres of the Earth, and the heterogeneity of seismicity indicates a different rate of these processes.

To date, in the Northern Hemisphere, the most large deep-focus earthquakes have been registered in the Kuril-Okhotsk region. The epicenters of deep-focus earthquakes in the Kuril-Kamchatka seismic focal zone extend from the western coast of Kamchatka to the intersection in Primorye with the Izu-Bonin deep-focus earthquake zone [3].

The paper considers the possible relationship between seismicity in the deep and upper parts of the seismogenic zone. For the first time, the Japanese seismologist K. Mogi [2, 5] paid attention to the relationship between deep-focus and shallow-focus earthquakes; a similar relationship was also noted in [1, 4]. The increasing of deep seismic activity before crustal earthquakes and the appearance of a strong shock after the deep activation is important evidence for the connection between deep-focus and shallow-focus strong earthquakes according to K. Mogi. The increase in seismicity can be considered as one of the precursors of large small-focus earthquakes.

For example, It can be regarded the largest deep-focus earthquakes in the Sea of Okhotsk on July 5, 2008 ($M_w = 7.7$), August 14, 2012 ($M_w = 7.7$), May 24, 2013 ($M_w = 8.3$) and reaction to them in the form of distant foreshocks and aftershocks in areas of the Kuril-Kamchatka subduction zone many hundreds of kilometers away.