

Relation between the depth of seismogenic layer in the crust and plate subduction

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Commencement of the so-called unified processing of seismic data in JMA from October 1997 and the succeeding establishment of Hi-net as well as the revision of hypocenter determination method in October 2001 by adopting a new travel-time table called 'JMA2001' and a new weighting function have improved accuracy of hypocenters of the JMA catalog greatly. Separating out crust earthquakes we investigated regional variation of the depth of the seismogenic layer in the Japanese islands. Overall characteristics of the depth distribution are summarized as follows (see another paper by Takayama et al. in the same session in this meeting).

1. In northeastern Japan, the seismogenic layer is deep along both coasts of the Pacific Ocean and the Japan Sea.
2. In southwestern Japan, the seismogenic layer is deep in Kanto, Tokai, Kii peninsula, Shikoku and eastern Kyushu where Philippine Sea slab subducts.
3. There is a zone of shallow seismogenic layer from the Tohoku backbone through Chubu alpine area to San-in mountainous region.
4. Along the Median Tectonic Line from Kii peninsula to Shikoku and its extension to the west in Kyushu, the seismogenic layer is shallow.
5. Comparing with mountainous areas, seismogenic layer in lowlands such as the Kanto plain, Nobi plain, Niigata plain and coasts of Seto inland sea is deep.

In this paper we examine relationship between the depth of seismogenic layer in the crust and plate subduction. The feature that both lower and upper planes of the seismogenic layer become deep gradually towards trench is commonly observed in northeastern Japan where the Pacific plate subducts and in southwestern Japan where the Philippine Sea plate subducts. It seems that the tendency starts from areas near the Volcanic Front.

We think temperature distribution in the crust is related to the feature. It is suggested that the feature that the seismogenic layer in plains seems deep relative to that in mountainous areas can also be understood from the same point of view.