Deep low-frequency earthquakes beneath the Japan arc--occurring field and forcal mechanisms--

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Under the Japan arc, 'Deep Low Frequency earthquakes' are occurring. The meaning of 'Deep Low Frequency earthquakes (DLF)' is that such events have very low dominant frequency against those magnitude, and occur at the depth around the Moho boundary which is much deeper than the seismogenic zone. These events sometimes have large amplitude later phases. Such events have been reported mainly beneath the volcanic front. These characters led us to the qualitative argument suggesting the relationship between the source process and the magma movement. But now we have some reports that such events are occurring other area. This means that to elucidate the source dynamics of DLF will be the key for deeper understanding of the lower crust dynamics. We report the first step for trying to construct the quantitative physical model of DLF's source dynamics.

We use two processes to make it. First, to estimate the physical environment of the field where DLF are occurring, we investigate the hypocenters of these events, and compare with the Curie point depth contour in the Japan arc. (Result) We find that the hypocenters are almost all within the Moho boundary to lower crust. As an exception, in the Kii peninsula, DLF events are occurring within the upper boundary of the subducting slab to the mantle wedge. There is a positive correlation between the depths of DLF hypocenter and the Curie point depths. This result suggests that the temperature highly affects to the occurring mechanism of DLF.

Second, to estimate the source dynamics of DLF, we elucidate the source mechanism for some events. DLF has the characteristics that later phase which has large amplitude longs. It means that forcal mechanism cannot explain the waveform completely. But the forcal mechanism represents the force couple, then important information such as relationship between the mechanism and regional stress field, geometry of the source, and so on. We analyze five DLF events, occurring in Akita, Hida, Kyoto, Aso and Sakura-jima. Then the result is that almost all P-axis direction show good agreement with those of shallow earthquakes. These results correspond to the past studies. In other words, the forcal mechanisms of DLF reflect regional stress field of each area.