

Progress of geodynamics in three dimensions in the twenties century

SUZUKI, Y. Geothermal Research and Development Co.,Ltd.(GERD),Tokyo,Japan.

The geodynamic process was supposed to be confined in the region shallower than 100km or so until 1920's, based on the concept of isostasy, but the discovery of deep earthquake zone in 1935 showed that some process must be resulted from the region deeper than 700km. The deep earthquake zones surrounding the Pacific Ocean dip away from the trenches in front of the island arcs toward continents in general, and was supposed to be a kind of reverse faults(Benioff,1954; Belousov,1968) and correspond to a boundary of convection currents under the Pacific Ocean and island arcs(Holmes,1965). Honda(1942) showed that the stress distribution deduced from the P-wave radiation pattern of deep earthquakes was explained by the upheaval of Asiatic continent block and subsidence of the Pacific Ocean one.

Bemmelen(1965) classified the geodynamic movement into several classes based on horizontal scale, and attributed the megaundation reaching a horizontal extent of 10,000km or so to the movement in the lower mantle attaining 900 to 2,900km in depth. He supposed that the deep earthquake zone in the west Pacific corresponded to gravity sliding plane due to the upheaval of Tibet-Mongolia megaundation. Suzuki et al.(1978) attributed it to the concentration zone of stress and strain due to upheaval of Asiatic continent and subsidence of the Pacific Ocean due to the vertical differential movement at core-mantle boundary.

In 1980's and 1990's, local variation of seismic velocity on the whole mantle was clarified by seismic tomography and true figure of geodynamics in three dimensions will be expected.