Analysis of seafloor electromagnetic data collected through stagnant slab project

Kiyoshi Baba[1]; Tada-nori Goto[2]; Takafumi Kasaya[2]; Takeo Ichikita[3]; Takao Koyama[1]; Hisayoshi Shimizu[1]; Noriko Tada[1]; Makoto Uyeshima[4]; Hisashi Utada[1]

[1] ERI, Univ. of Tokyo; [2] JAMSTEC; [3] TIERRA TECNICA Ltd.; [4] ERI, Univ. Tokyo

We have run a seafloor electromagnetic survey project in Philippine Sea in order to image deep mantle slab stagnating in the transition zone and surrounding mantle in three dimensions. Seafloor observations at every 500 km or so is necessary to resolve the geometry of the slab because existing data sets are based on the observations by land geomagnetic stations and submarine cables, which are distributed coarsely and unevenly. Although it is difficult to establish a bunch of nearly parmanent observation stations at seafloor, iterative maneuver observations using ocean bottom electromagnetometers (OBEMs) can acquire the data required to probe down to the mantle transition zone.

The project iterates one-year-long deployment three times. Earthquake Research Institute, University of Tokyo and Institute for Research on Earth Evolution (IFREE), Japan Agency for Marine-Earth Science and Technology (JAMSTEC) have resourced the project with the OBEMs. We have already done the first and second phases and acquired good data from 11 sites and 12 sites, respectively. The third phase is now running at 14 sites and will end in December, 2008. The data will ultimately be collected from total 18 sites; The three years data collection will be achieved in seven sites of these.

The time series data obtained by the first and second phases have been processed based on MT method. The MT resposnes were estimated in the period range of from about 300 to 60,000 seconds. The GDS responses are also estimated in the range of about 1,000 to 1,000,000 seconds. The GDS responses at the periods longer than 100,000 seconds are grately improved compared with that obtained in the last year, as the result of the data accumulation for two years. Further improvement is expected after compeletion of the third phase observation. The features of the MT and GDS responses may be classified by basins composing the Philippine Sea plate. 3D forward modeling study suggests that some of these features are explained by land-ocean distribution and seafloor topography.