



OBS development for long term observation in the Marmara Sea, NW Turkey

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We have carried out a collaboration study between Japan and Turkey since 2013, which is one of SATREPS projects, “Earthquake and Tsunami Disaster Mitigation in The Marmara Region and Disaster Education in Turkey”. The main objective of this project is to reduce risk brought by earthquakes and tsunamis. In particular, the North Anatolian Fault system runs through the Marmara sea and it is expected that the seismic gap exists there according to past seismic studies. The details of seismicity distribution in the Marmara Sea is, however, still insufficient to construct fault model along the active faults. Therefore, we prepare ten ocean bottom seismographs (OBSs) to realize long term observation. We aim to identify size and depth of seismogenic zones using micro seismicity. In addition, we need to cover relative broad area from off-shore Istanbul city to the western end of the Marmara Sea. To clear these conditions, OBS specifications we need are high dynamic range and low instrument noise to observe micro seismicity, low electrical consumption to realize long term observation of over one year, high cost performance to cover the broad area for OBS installation, low cost implementation, and good operability to treat by relatively small number of persons.

All items, which are three components velocity sensor, batteries, a recorder, a GPS receiver, a transponder and its transducer to control OBS retrieval, a flasher and a beacon, are installed in the 17 inches glass sphere. The natural frequency of the velocity sensor is 4.5 Hz and the frequency range of our OBS is from 4.5 Hz to 250 Hz. Data sampling is selectable among 100 Hz, 250 Hz and 500 Hz. Because our OBS is deployed by free fall, accuracy of the OBS clock is essentially one of important factors, and it is less than 0.1 ppm. And the resolution of A/D conversion performed on the recorder is 24 bit and we keep the dynamic range of over 135 dB. These data is stored on a semiconductor memory and the capacity is over 300 days with 100 Hz sampling observation. We adopted noncontact charge using lithium ion batteries to reduce implementation cost. And we can charge batteries and transfer stored data without opening glass sphere. All parameters of each OBS are controlled using wireless LAN. In this presentation, we introduce details of OBS development for Japan-Turkey project.