[EE] Evening Poster | S (Solid Earth Sciences) | S-IT Science of the Earth's Interior & Tectonophysics

[S-IT24]Probing the Earth's interior with geophysical observation on seafloor

convener:Daisuke Suetsugu(Department of Deep Earth Structure and Dynamics Research, Japan Agency for Marine-Earth Science and Technology), Guilhem BARRUOL(CNRS, Institut de Physique du Globe de Paris, France), Hitoshi Kawakatsu(東京大学地震研究所, 共同), Douglas Wiens(Washington University in St Louis)

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Most important sites for plate tectonics and mantle dynamics studies (e.g., subduction zones, spreading ridges, and hot spots) are located in oceanic regions. The coverage of seismic stations is concentrated in land areas, which cover only one-third of Earth's surface. Since 1990s, technology for seafloor geophysical instruments to explore deep earth structure have been advanced, such as broadband ocean bottom seismographs (BBOBSs), ocean bottom electro-magnetometers (OBEMs), and pressure gauge, because observation network in oceanic regions is essential for major breakthroughs in Earth sciences. Technical advance in the instruments including cabled realtime seafloor networks have made the seafloor observation more common and reliable, which promotes a number of seafloor observations, both temporary and permanent networks, in the last decade. We call for papers on recent scientific results from such observation projects, including those on crust and mantle structure beneath subduction zones, hot spots, Large Igneous Provinces, and spreading ridges. Technical advances for observation in oceanic regions, including seafloor instruments and drifting float, proposals and plans for innovative observations are also welcome.

[SIT24-P08]Seafloor electromagnetic investigations of the upper mantle of the Mariana back-arc spreading and subduction system

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The Mariana back-arc spreading and subduction system in the western Pacific is an obvious place to image the plate-subduction and the back-arc spreading processes, as it has a well-developed frontal arc, active arc volcanoes, and a slow-spreading back-arc ridge. There still remains unknown mechanisms with related to the release of water from the subducting slab, the subsequent melting of the mantle, and the delivery of melt to the surface in the Marianas system, as well as their relevance to surface processes such as asymmetric back-arc spreading and hydrothermal activities. Two seafloor electromagnetic transects imaging with ocean bottom electro-magnetometers (OBEMs) at the central and the southern Marianas (at 18^{o}N and 13^{o}N, respectively) have clearly unveiled electrical resistivity structures of the upper mantle in each area. The structures and their comparisons place constraints on thermal structure, a region of partial melting and the amount of melt existing within the region, the amount of water and melt in source mantle, and mantle upwelling. One crucial contrast between the two structures is found under the back-arc spreading ridge axis; resistive (>300 ohm-m) in the central Marianas and conductive (10-30 ohm-m) in the southern Marianas. This occurs even though the full spreading rates of the back-arc ridge are almost same (20-40 mm/yr at 18^{o}N and ~45 mm/yr at 13^{o}N, respectively), and provides insights on the amount and distribution of in-situ melt, the mantle upwelling process, and the influence of the plate-subduction on the back-arc spreading process. Implications and comparisons of other structural features will be presented in details.