[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

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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-P07]Toward complete tomography of the Earth’s interior with floating robotic acoustic sensors in the oceans: the EarthScope-Oceans

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The tomography techniques of imaging the earth’s interior have been improved significantly over the past three decades. The resolution of the earth’s interior images, however, has been severely limited by the lack of seismic stations in the oceans that cover the 2/3 of the earth’s surface. The classical approach to improve resolution in oceanic regions is covering the ocean floor with ocean-bottom seismometers, however these observations are of short duration (limited by battery life) and depend on available ship, can only cover a restricted surface at any given time and are very costly. Here we introduce a project ‘EarthScope-Oceans’ to measure seismic signals by deploying floating robotic acoustic sensors (MERMAIDs) that is driven by France, USA, China, UK, Korea and Japan. In the previous Mermaid experiment, these ‘Mermaids’ have recorded teleseismic waves that are crucial to provide resolution for tomographic images of the deep mantle beneath oceanic areas, as well as swarms of earthquakes that are too small to be observed on land, indicative of tectonic motions on oceanic ridges. The data transmission is in quasi-real time by satellites (Iridium). A new version of the Mermaid, of much larger capacity, with a lifetime of five to six years is available for deployment.

We plan to launch more than 30 Mermaids in the Southern Pacific, where contains both complex subduction zones and mantle plumes, in 2018 and 2019. Unique and very precious data from previously un-sampled regions of the South Pacific Ocean that will provide crucial constraints at mid-mantle depths and improve the tomographic images further analogue and numerical geodynamic modeling of mantle plumes based on the robust features of the tomographic images.