

The Oldest Array: Japan-Korea Pacific Array collaboration to study the lithosphere-asthenosphere system below the oldest part of the Pacific Ocean

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There remain a lot of unresolved problems that limit our understanding of the physical nature of the lithosphere-asthenosphere system (LAS), although nearly 60 years have passed since the concept of plate tectonics was born. In-situ measurement of the physical property distributions in the mantle by seafloor geophysical array observations in all over the age will be one of the keys to reveal these problems, and the Pacific Array concept has been proposed. The Pacific Array has been launched in 2018, by deployments of two seafloor arrays, one by a US group and the other by a Japan-Korea collaboration. In this presentation, the scientific perspective and the observation report of the latter are shown. We selected the oldest part (the mean age of about 170 Ma) of the Pacific Basin for the first deployment of the Pacific Array. In the study area, the seafloor isochron suggested by magnetic lineations is seen to converge to a small triangle which shows the shape of the Pacific plate when it was born in the middle Jurassic. One of the scientific purposes of this Oldest array is to reveal the early evolution of the Pacific LAS by estimating the anisotropic seismic structure from analysis of the BBOBS data. We also intend to examine the relation between the seafloor depths and mantle geotherms that might be recorded in the mantle to answer the long-lasting question why older seafloors are flat.

The deployment cruise was conducted from October 30 to November 9, 2018, by R/V Isabu (Korea Institute of Ocean Science and Technology: KIOST), started from and returned to Guam, USA. 12 sets of broad-band ocean bottom seismometers (BBOBSs) and 7 sets of ocean bottom electro-magnetometers (OBEMs) were deployed in the study area. The recovery cruise was performed between October 26 and November 9, 2019, by using another KIOST's R/V Onnuri, with the same route of the deployment. Although the weather and sea condition during the recovery cruise was severe, all BBOBSs and OBEMs were recovered with healthy data, except one BBOBS that was troubled in the deployment with the broadband sensor unit and recorded the DPG data only. Preliminary analysis results both of seismic and electro-magnetic data are individually presented in this meeting by Takehi Isse and Hogyum Kim, respectively.

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