OBS and MCS experiments at chaotic terrain, the Australian-Antarctic Discordance: Preliminary report of KH01-3 Leg 3

KH01-3 Seismic Team Shinohara Masanao, KH01-3-3 Onboard Sicentific Team OKINO Kyoko, # Tomoaki Yamada[1]

[1] ERI, Univ. of Tokyo

*KH01-3 Seismic Team
Masanao Shinohara, Kimihiro Mochizuki, Kazuo Nakahigashi (ERI, Univ. of Tokyo), David M. Christie (Oregon State Univ.) and Chiaki Igarashi (ORI, Univ. of Tokyo)

A seismic refraction and reflection experiment was conducted on the Australian Antarctic Discordance (AAD) using R/V Hakuho-maru during February of 2002. We will report summary of the observation and preliminary results.

The AAD is located along the Southeast Indian ridge (SEIR) between 120 degree E and 128 degree E, and there are 5 sections denoted as B1 - B5, which are separated by first order discontinuities. The AAD has a unique feature of the world's ocean. While there are several examples of mid-ocean ridges which are shallower than expected from spreading rate due to hotspot influence, the AAD is the only example where the ridge is significantly deeper than expected from spreading rate (74 mm/yr full rate). The AAD provides the opportunity to determine what factors other than spreading rate control axial topography, too. The AAD and the neighboring SEIR are spreading at the same rate, and yet the AAD segment has a median valley, while the SEIR segment has an axial high. In recent studies, the AAD has been characterized by chaotic seafloor reflecting a weak magma supply from underlying cold mantle for 30 million year. During the last 3-4 million years, however, a source of increased magma supply, coincident with the known Indian-Pacific mantle isotopic boundary, has propagated into the eastern AAD, displacing the chaotic terrain and replacing it with normal seafloor. This boundary is between the section B4 and the section B5. The seafloor of the B4 is unusually chaotic, dominated by irregular shallow blocks that are separated by irregular, deep valleys and typically bounded by orthogonal, axis-parallel and axis-perpendicular scarps up to 1600 m high while the B5 is normal morphology dominated by typical axis-parallel abyssal hills. The only previous seismic experiment on the AAD was carried out in the B5, and the crustal and uppermost mantle structure of chaotic area is not known yet. We carried out the seismic experiments to obtain detailed crustal and uppermost mantle structure in the chaotic area, section B4 of the AAD. The main profile is perpendicular to the ridge axis through the spreading center and has a length of 100km. Five Ocean Bottom Seismometers (OBSs) were deployed at an interval of 20 km on the main profile and we did an aigun-OBS experiment. All OBS was recovered. For making passive source, we used two airguns with a 17-liter and a 20-liter chamber. The air pressure was set at 1500 lb/IN2G, and airguns were shot every 20 or 60 seconds. We performed another seismic survey using a 24 channel analogue hydrophone streamer (MCS) was performed on the main profile and additional five profiles.