Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MIS35-13 Room:201A Time:May 24 12:15-12:30

Mantle wedge structure of the Japan Sea derived from Ocean Bottom Seismometer observation

NAKAHIGASHI, Kazuo[1*] ; YAMADA, Tomoaki[2] ; UEHIRA, Kenji[3] ; MOCHIZUKI, Kimihiro[2] ; SAKAI, Shin'ichi[2] ; SHIOBARA, Hajime[2] ; SHINOHARA, Masanao[2] ; KANAZAWA, Toshihiko[3]

[1]Kobe Univ., [2]ERI, [3]NIED

Subducting hydrous oceanic plate carries water by hydrous minerals into the earth and contributes to a melt generation. Aqueous fluid dehydrated from the subducting oceanic plate plays an important role in magma generation. The Japanese Island are located at subduction zones where the Philippine Sea plate subducts from the southeast beneath the Eurasian plate and the Pacific plate descends from the east beneath the PHS and the Eurasian plates. To understand the water circulation and magmatism, a huge number of seismic tomography studies have been conducted in the Japan Island. However, a regional tomography using the land seismic station data could not reveal the deep seismic structure beneath the Japan Sea. The information of the deep mantle wedge structure is important to understand transportation and circulation of water and melt generation in subduction zones. Therefore, we conducted the repeating long-term seismic observations using Long-term ocean bottom seismometer(LT-OBS)s in the central Japan Sea from 2001 to 2004 and from 2013 to 2014. We apply travel-time tomography method to the regional earthquake and teleseismic arrival-data recorded by LT-OBSs and land stations. We obtained the P and S wave tomographic images down to a depth of 300 km beneath the Japan Sea. The tomographic P-wave image has a high velocity anomaly in the mantle wedge extending down to a depth of approximately 150 km beneath the Yamato Basin. In addition, the resulting tomographic image has three low-velocity anomalies in the mantle wedge. First, an inclined low velocity anomaly approximately parallel to the Pacific slab within the mantle wedge is observed in the around 100 km upper part of the Pacific slab. Second, low velocity anomalies are imaged at a depth of 150 km beneath northeastern Japan and 250 km beneath central Japan. Third, a low velocity zone is imaged from just above the subducting Pacific slab at a depth of 300 km. These low velocity anomalies are interpreted to be represented melt production affected by the fluid dehydrated from Pacific slab. The depth of dehydration from subducting slab is consistent with the results of numerical modeling studies. Our observations suggest that deep dehydration from the Pacific slab occurs at a depth of approximately 300 km and the Pacific plate subduction drives a large-scale upwelling flow beneath the Japan Sea.