J164-010 **Room: Ocean B** **Time: May 26 9:45-10:00**

Electrical structure beneath the central Mariana subduction, fore-arc, arc, back-arc system

Tetsuo Matsuno[1]; Nobukazu Seama[2]; Kiyoshi Baba[3]; Tada-nori Goto[4]; Alan Chave[5]; Rob L. Evans[5]; Anthony White[6]; Goran Boren[6]; Asami Yoneda[3]; Graham Heinson[7]; Hisanori Iwamoto[1]; Ryosuke Tsujino[1]; yuta baba[8]; Hisashi Utada[3]; Kiyoshi Suyehiro[4]

[1] Earth and Planetary System Sci.,Kobe Univ; [2] Research Center for Inland Seas, Kobe Univ.; [3] ERI, Univ. of Tokyo; [4] JAMSTEC; [5] WHOI; [6] Flinders Univ.; [7] Sch. Earth & Env. Sci.,Univ. of Adelaide; [8] ERI,Univ. of Tokyo

We have carried out marine magnetotelluric (MT) exploration across the central Mariana area to image comprehensive electrical structure of Mariana subduction, fore-arc, arc, back-arc system extending from the Pacific Ocean to the West Mariana Ridge (remnant arc) through the Marina Trough. The Mariana subduction system is a classic example of trench, intra-oceanic arc, and back-arc system. Our transect, which includes three upwellings of serpentine diapirs, arc volcanism, and back-arc spreading, will address issues of hydration in the mantle wedge from the subducted slab, the property and distribution of subsequent melting, convections in the mantle wedge, formation of the arc-magma and the arc crust through imaging electrical structure. We used ocean bottom electro-magnetometers (OBEMs), ocean bottom electrometers (OBEs), and ocean bottom magnetometers (OBMs) to measure variations of electromagnetic fields on the seafloor. We deployed 33 OBEMs, 7 sets of OBMs and OBEs at 40 sites on 'KAIREI' KR05-17 cruise in December of 2005. We successfully recovered 28 OBEMs, 7 OBMs, and 6 OBEs on 'KAIREI' KR06-12 cruise in September of 2006, and 2 OBEMs on 'KAIREI' KR07-16 cruise in November of 2007. The full length of the transect is about 700km. Site spacing in the fore-arc and Pacific Ocean basin are several tens of kilometers, but in the vicinity of the back-arc spreading center is only a few km.

Available data of the electromagnetic fields at 26 sites obtained in 2005-2007 in addition to those from previous studies (Filloux, 1983; Goto et al., 2003; Baba et al., 2005; Seama et al., 2007) were analyzed. MT responses were obtained from horizontal electromagnetic fields with BIRRP (Chave and Thomson, 2003, 2004) after cleaning up the data. Topographic effects on the MT responses were corrected using a correction equation of Nolasco et al. (1998) and a three-dimensional forward code, FS3D (Baba and Seama, 2002). Two-dimensional electrical structure was imaged with DASOCC inversion (Siripunvaraporn and Egbert, 2000) modified to be adapted to seafloor electromagnetic data and with anisotropic inversion (Rodi and Mackie, 2001; Baba et al., 2006). The electrical structure shows (1) a low resistivity region beneath the trench and the fore-arc extending to a depth of 300km, (2) a layered structure beneath the back-arc basin turning from high to low resistivity downwardly, (3) an asymmetric low resistivity region beneath the back-arc spreading center extending to a depth of 100km, (4) a low resistivity region beneath the volcanic arc extending to a depth of 50km, (5) a low resistivity region beneath the serpentine diapirs in the fore-arc extending to a depth of 30km. Tests for these characteristics by forward modeling show that these characteristics are reliable. These characteristics can be attributed to (1) the existence of the Pacific slab, (2) higher water contents in the mantle wedge and lithosphere thickness beneath the Mariana back-arc basin is about 100km, (3) asymmetric melting region beneath the back-arc spreading center affected by advection in the mantle wedge, (4) low resistivity of the arc crust materials and/or high water contents in them (5) high water contents and/or high porosity of materials beneath the serpentine diapirs.