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Marine magnetotelluric survey across the Southwest Indian Ridge 37°E

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We have conducted marine magnetotelluric (MT) survey across the Southwest Indian Ridge 37°E to provide an electrical resistivity structure image of mantle beneath the spreading axis. The Southwest Indian Ridge 37°E shows ultra slow spreading (full spreading rate is 15 mm/yr), with asymmetric morphology (Sato et al., 2008). The Marion hotspot locates in the south of the spreading axis and could interact with the spreading system. The survey was carried out with ocean bottom electro-magnetometers (OBEMs) measuring the time variation of electromagnetic fields induced in the Earth by ionospheric currents. We deployed 7 OBEMs at 7 sites during the KH07-4 Hakuho-maru cruise in January 2008, and recovered all of them during the 27th Umitaka-maru Cruise in December 2008. The full length of the survey line is about 110km. Sites spacing was approximately 10 km in the vicinity of the spreading center, but the spacing was coarser at the both ends (30km). The observations were made from 19 January 2008 up to the recovery. Electric and magnetic time series were cleaned and processed into MT response functions (apparent resistivity and phase), using a bounded influence algorithm with remote reference (Chave and Thomson, 2003, 2004). Topographic effects on the apparent resistivity and phase data were corrected, based on the equation of Nolasco et al. (1998), using correction tensors which were modeled with a three-dimensional forward code (Baba and Seama, 2002). The nonlinear conjugate gradient inversion algorithm, which seeks regularized solutions (Rodi and Mackie, 2001), was used to find an optimal two-dimensional electrical resistivity structure. At this meeting, we will show the 2-D resistivity structure model beneath the spreading axis, which will provide geophysical constraints on issues of the nature and distribution of melting beneath the ultra slow spreading system with a hot spot. Furthermore, the results will be compared with results from the MELT experiment at the southern East Pacific Rise to identify differences in the upwelling dynamics operating beneath the spreading axis between ultra slow spreading and fast spreading.