

Upper mantle electrical resistivity structure beneath the Southwest Indian Ridge 37°E

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The Southwest Indian Ridge (SWIR) is expected to be interacted with the dynamics of the mantle, for example melt production and thermal structure, through specific mechanisms to the ultraslow spreading ridge system. In addition, the mantle near the SWIR 37°E may be influenced by the mantle upwelling producing the Marion hotspot due to its proximity at present and in the past. To reveal the mantle dynamics of the region by the electrical resistivity that is largely sensitive to melt and water contents and temperature, a marine electromagnetic experiment was carried out on a subsegment of the SWIR at 37°E. The subsegment is not magmatically active as revealed by geophysical surface surveys but may be within an area of high melt production as inferred from the existence of nearby magmatically active segments, an extensive gravity anomaly low, local high axial topography, and rock chemical compositions such as local low Na₈. Seven ocean bottom electromagnetometers were deployed along a ~110 km profile across the SWIR axis at 37°E to acquire time variations of the electromagnetic field at the sampling rate of 1 minute for almost one year (from January to December in 2008). Almost all of the acquired time variations data are useful, and they have been processed for a magnetotelluric analysis. The range of frequency of the processed data suggests that the analysis will give an image of the electrical resistivity structure of the upper mantle at depths of a few tenths to a few hundred kilometers. We will present a resultant 2-D electrical resistivity structure to discuss melt and water contents and the thermal structure in the upper mantle. We will also examine possible off-profile 3-D structures related to the SWIR segment structure and the Marion hotspot.