Geophysical Research Abstracts
Vol. 18, EGU2016-10698, 2016
EGU General Assembly 2016

Structure and Dynamics of the Southeast Indian Ridge, 129°E to 140°E, and Off-axis Volcanism: Preliminary Results of the STORM Cruise

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We present observations of the South-East Indian Ridge (SEIR) collected during the STORM cruise (South Tasmania Ocean Ridge and Mantle) on the N/O L'Atalante early 2015. The SEIR between Australia and Antarctica displays large variations of axial morphology despite an almost constant intermediate spreading rate. The Australia-Antarctic Discordance (AAD) between 120°E and 128°E is a section of the mid-ocean ridge where the magma budget is abnormally low, and which marks the boundary between Indian and Pacific mantle domains with distinct geochemical isotopic compositions. The STORM project focuses on the area east of the discordance from 128 to 140°E, where gravity highs observed on satellite-derived maps of the flanks of the SEIR reveal numerous volcanic seamounts. A major objective of the STORM cruise was to test the hypothesis of a mantle flow from the Pacific to the Indian domains. We collected multibeam bathymetry and magnetic data between 136 and 138°E to map off-axis volcanic ridges up to 10 Ma-old crust. We mapped the SEIR axis between 129 and 140°E, and the northern part of the George V transform fault. We collected rock samples on seamounts and in the transform fault, basaltic glass samples along the ridge axis, and near-bottom samples and in-situ measurements in the water column. Our observations reveal that the off-axis seamounts form near the SEIR axis, are not associated to off-axis deformation of the ocean floor, and are often located near the traces of ridge axis discontinuities. We also observe a general shallowing of the ridge axis from the AAD to the George V TF and the presence of robust axial segments near the transform fault. Our new data allow us to describe the complex evolution of the transform fault system. They also permit to locate new hydrothermal systems along the ridge axis.