Discovery of active hydrothermal vent fields along the Central Indian Ridge, 8°S-16°S

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Plume investigation along the middle part of Central Indian Ridge between 8°S and 16°S revealed that several hydrothermal plumes were formed on ultramafic massifs of asymmetrical part of ridge related to detachment faults as well as basaltic outcrops at axial volcanic zone and rift valley wall. During the seafloor observation targeted to several plume locations along spreading segment of CIR, we identified several new hydrothermal vent fields. Chimney clusters were found at the topographic depression parallel to the spreading axis, associated with the formation of ocean core complex (OCC), on western flank of segment 1. Although inactive chimneys are dominant, multi-proxy plume signals indicate possible presence of high temperature venting on segment 1. Another two hydrothermal fields were found on typical abyssal hill of symmetrical section at distances of 6 km and 9 km from the ridge axis of segment 2, respectively. Particle-poor and low metals and CH4 concentrations in both hydrothermal fields indicate formation of low temperature, diffuse venting. An active vent field with abundant benthic organisms was found at the summit of OCC on segment 3. The active vent field is characterized by significant ORP and CH4 anomalies with little or no increase of particle and dissolved metals. Another ultramafic hosted vent field is found on slope of OCC at offset between two sub-segments in segment 4. Occurrence of active and inactive chimney cluster and high particle and metal concentrations in plume water indicate formation of high-temperature venting. Inactive chimneys and hydrothermally altered sediments were identified at rift wall of northern part of segment 5. Although only inactive chimneys were observed during camera tow, plume signals from the hydrocast suggest basaltic hosted high-temperature venting. Discovery of multiple active hydrothermal vent fields along the CIR will provide important insights on understanding diversity of hydrothermal systems of the less-known Indian Ocean.