

4. Weekly Report SO271 (INDEX 2019)

18.-24. Nov. 2019



24.11.2019

The last week cruise SO271 (INDEX2019) focused mainly on the exploration of unusual ridge segments for potential sulfide sites in the western half of the license cluster #05. We used the sensor sled SOPHI, the HOMESIDE sled for high-resolution bathymetry and ROPOS dives for site characterization. The KAIMANA sulfide area, identified during INDEX2018, is hosted by exhumed oceanic lithosphere (gabbros, gabbro-norites and pyroxenites) while regular oceanic basalts are missing. The sulfide fields are strongly fault-bounded and occur about 10km from the CIR and SWIR spreading axes, respectively. There is very little, if any, evidence for off-axis heat sources to run the hydrothermal convection cell which would be a necessary prerequisite to form sulfide enrichments. As a consequence, we checked several exhumed crustal areas according to their structural control for potential sulfide mineralization. All of them are characterized by relictic gabbro-noritic and pyroxenite compositions, associated serpentinization and low-temperature overprint but lack distinct indications for hydrothermal alteration or sulfide mineralization.

We also intensified our petrological sampling program in the area of the Rodrigues Triple Junction (RTJ). The RTJ is migrating eastward and marks a boundary between an unusual cold underlying mantle with a low melt supply underneath the Southwest Indian Ridge and warmer mantle underlying the Southeast/Central Indian Ridges. Tectonic processes clearly predominate over magmatic extension along the tip of the southwest Indian Ridge. Evidences for magmatic heat flow, potentially indicated by young volcanic cones are largely missing, but structures along the easternmost SWIR and the southernmost CIR were sampled for the first time to check for young volcanism and axial heat source characterization. We indeed identified young porphyritic basalts at the easternmost tip of the SWIR that puts some constraints on the current understanding of the RTJ and indicates young heat sources for the potential formation of sulfide mineralization.

The program also included the first sediment core sampling and heat flow measurements in a deeper basin at the western rim of the license area for environmental base line studies. The entire region of the license area is covered by

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only 26 heat flow measurements with another eleven originating from the INDEX program. The identification of water masses was supplemented by a deep station (4818m) in the easternmost SWIR and this site was also surveyed with the multinet for planktonic diversity. An ADCP mooring for current measurements close to the KAIREI field was recovered for the second time and will be redeployed before we continue our exploration work in cluster #06.

The weather conditions are very good and all cruise participants are busy with their sample and data acquisition. We all cross our fingers for new sulfide findings in the coming week.

Very best regards from R/V SONNE,

Dr. Ulrich Schwarz-Schampera, Chief Scientist

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More information about SO271 (INDEX2019) at

https://www.bgr.bund.de/DE/Themen/MarineRohstoffforschung/Meeresforschung/INDEX2019-Logbuch/aktuelles_node.html

<https://www.planeterde.de/logbuecher/fs-sonne-port-louis/metallsulfid-und-schwarze-raucher>

<https://www.youtube.com/watch?v=JFVe-1NqOMI&feature=youtu.be>

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Recovery of volcanic glass samples from a wax corer.