

Offshore assessment of minerals in deep-sea sediments from the TAG-area (26°N, 44°W)

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Global needs for minerals have been growing rapidly. This requires efforts to locate resources through appropriate exploration strategies. We are working on renewed approaches to deep-sea mineral exploration, via mineralogy and geochemistry of seafloor sediments, obtained in near-real time (minutes-to-hours), in a cost-effective way [1].

During the six-week oceanographic expedition “Meteor-127”, in the TAG area of the Mid-Atlantic ridge (26°N, 44°W), sediments were collected by gravity coring. The identification of mineral phases in 96 cored samples was performed efficiently, in near-real time, by portable X-ray diffractometer (MiniFlex II, Rigaku). We are validating and refining the offshore results with onshore determinations. Mineralogical analysis of carbonated ooze sediments was conducted after applying the optimized sequential extraction method with acetate buffer at pH 5.0, to remove carbonates.

Besides the main mineral fractions, including calcite, quartz and sulfides (pyrite, chalcopyrite and sphalerite), abundant iron oxides (goethite, hematite and magnetite) were detected and their identification was controlled by the carbonate removal step. Birnessite and Zn-paratacamite were confirmed in sediments from hydrothermally active zones.

After validation of results, we concluded that offshore XRD-analysis can provide immediate, high-quality results of value in mineral exploration.

[1] German, Hannington and Petersen (2016) *Chem. Geol.* 420, 114-126.

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