

AUV-based exploration of the TAG segment at 26°N, Mid-Atlantic Ridge: implications for resource assessment and metal fluxes

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Seafloor massive sulfides (SMS) along mid-ocean ridges are often seen as a possible future contribution to a secure metal supply for global human needs. There are, however, currently several orders of magnitude between resources estimates based on observations at the seafloor and those based on calculated metal fluxes. In order to provide realistic resource estimates, we need to understand how much of the metal that is released by high-temperature fluid convection over a given length of a ridge axis and over a specific geological time frame is actually deposited as massive sulfides. In a recent AUV survey performed within the EU-FP7 project „Blue Mining“ we covered 47 km² along the TAG segment of the Mid-Atlantic Ridge to address these segment-scale questions and to test regional exploration technologies.

During the survey a combination of high-resolution (2m and 50cm resolution) bathymetric, magnetic as well as self-potential data has been acquired covering the well known active TAG mound as well as a number of inactive sulfide occurrences. Ground-truthing of targets, defined based on the AUV data, was performed by visual inspection and surface sampling and allowed to establish a set of criteria for target recognition. During the cruise a number of new discoveries of hydrothermal mounds were made in the area. By calculating the volume of all the inactive mounds above the surrounding seafloor and by using estimates for the density, a first assessment of the metal potential and the metal fluxes of an entire slow-spreading mid-ocean ridge is possible. However, a resource potential statement requires additional geochemical information and drilling.

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