Methane, sulfide and oxygen fluxes at methane and brine seeps of the Nile Deep Sea Fan (Eastern Mediterranean)

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The Nile deep sea fan (NDSF) of the Eastern Mediterranean hosts a huge number of active seep structures, which have only been discovered very recently. Here we have, for the first time, investigated the in situ benthic oxygen consumption and methane turnover at different seep systems of the eastern and central provinces of the NDSF in water depths of 1000-3000 m. The expedition BIONIL (M70/2) with RV Meteor and ROV QUEST (Marum) contributes to the DFG/BMBF Geotechnologien program MUMM and to the ESF EUROCORES project MEDIFLUX.

For our investigations several *in situ* instruments were used and combined with on board biogeochemical analyses: a microprofiler system measuring O_2, H_2S, pH and T in micrometer resolution, a benthic chamber to measure oxygen consumption and sulfide export, as well as a newly developed instrument for sulfate reduction rate measurements (INSINC). The study focused on 3 different types of seep systems – the gas emitting center of the Amon mud volcano, the mud/brine seep at the outer rim of Amon, as well as the large carbonate pavements in the central province of the NDSF characterized by low fluid flow rates.

At cold seeps, the presence of bacterial mats indicates high methane and sulfide fluxes often also linked to high oxygen consumption rates. The three systems investigated here were characterized by very different types of bacterial mats, namely a Beggiatoa type (Amon center), a Thiomargarita type (Amon flank) and an Arcobacter type (carbonate pavements). Here we compare flux rates (methane, sulfide, oxygen) as well as microbial turnover rates of these different mat communities and investigate their link to fluid flow velocity and other environmental parameters.

Geochemical characteristics of Selenium-rich silicalite formation in Ziyang, Southern Qinling, China

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A sediment formation, composed of siliceous rocks, mud stone/shale or callys and carbonate and siltstone, has been identified for enrichment of organic matter and bacterium-alga microbe. We define this specific formation as "silicalite formation". This paper aims to study the geochemical characteristics of selenium-rich silicalite formation in Ziyang.

The study area located in the Southern Qinling of China (lower Cambrian in peripheral margins of the Yangtze Block), is known for selenium-rich in rock, and occurred serious selenium-poisoning symptom in the 1960's. Concerns on health problem and mineral resource of Se, the selenium-rich silicalite formation in this area has attracted scientific interests.

The selenium-rich siliceous rocks are important component of the Cambrian silicalite formation of Ziyang in the north of Daba region, which is characterized by hydrothermal sedimentation. Cherts are characterized by elevated concnetrations of SiO_2, Se, Ba, Cu, Ni, V, As, Sb, U but lower MgO and Al_2O_3. The ratio of U/Th>1 , plots for Al-Fe-Mn and Fe-Mn-(Cu+Co+Ni) triangle diagrams, and correlations for P-Y, Zr-Cr and U-Th, all suggest hydrothermally sedimentary origin. The REE patterns show negative Ce and positive Eu anomalies. The isotopic compositions of silicon and oxygen are both similar with the hydrothermal origin. The temperature of hot water is about 78.6ºC-126.20ºC and suggests deep-water reservoir of siliceous rock sedimentation. The silicon-rich hydrothermal liquid contributed to enrichment of selenium in the study area.

In conclusion, further study of the forming environment and metallogenic characteristics of the selenium-rich silicalite formation is of great significance for both Se-related ore minerals and health interests.

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