



Low- and high- salinity fluids but equally high CH₄ fluxes at eastern Mediterranean Anaximander and Nile mud expulsion structures

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Eastern Mediterranean mud expulsion structures at Anaximander area and Nile fan have been sampled for the integrated study of fluid systems and Gas Hydrate (GH) occurrence. The active top part of Anaximander mud volcanoes is usually characterized by fluids of reduced salinities (~10 permil), whereas structures in the Nile area have fluids of near-normal salinity to brine composition (> 300 permil). The low salinity waters are mainly associated to deep dewatering during smectite-illite transition, whereas the high salinities are related to dissolution of underlying Messinian evaporates.

While the salinity of the advecting fluids is dramatically different between the two areas, the measured methane concentrations are similarly high ranging from 1 to 3 mM for Anaximander and from 1.5 to 3.5 mM for the Nile area. In addition, in both areas but in particular that of the Nile, major expulsions of gas occur into the water column (see Mastalerz et al., this meeting).

In the Anaximander area low sub-bottomwater temperatures occur associated to GH decomposing during recovery, whereas in particular the Cheops and Chefren mud volcanoes in the Nile area have enhanced salinities and temperatures being 150 permil and 57°C at Chefren and > 300 permil and 37 / 25°C at Cheops. The latter two mud volcanoes situated inside the large Menes Caldera, 8 km diameter, have a distinct chimney-like brine/mud pit. Using 3 adapted ME-CTD casts inside these muddy brine

structures, the liquid mud has been sampled for gas, and has been centrifuged and filtered for further geochemical analyses. Furthermore, we took a piston and gravity core. At both sites, the profiles are rather constant with depth and do not differ between cores and accompanying brine-CTD's. The depth of the brine is approximately 300 meters at Chefren and 10 meters at Cheops, which needs to be compared to a 80 m depth of the Menes Caldera itself. Concurring with the enhanced temperatures, the Si concentration in the cores has higher values at Chefren (500-600 μM) and lower values at Cheops (300 μM). Hydrogensulfide was found in higher concentrations in the central cores of Chefren MV (up to 1.5 mM), and only in minor amount at Cheops.

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