



## Activity and origin of hydrocarbon emission from mud volcanoes in the Gulf of Cadiz

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During the TTR-cruises (1999-2006) on board R/V “Professor Logachev” more than 25 mud volcanoes were discovered and detail investigated. Large set of geophysical and geochemical methods was applied in order to study cold seeps in the Gulf of Cadiz. Basing on these data, relatively active and passive mud volcanoes were distinguished. At the most active volcanoes methane concentration reaches 9700mkM/l. Two gas types were distinguished: dry gas, which is mostly consisting of methane ( $C_1/C_{2+}$  about 300), and wet gas with high concentration of heavy homologues ( $C_1/C_{2+}$  less than 50). Main compound of free gas from pulsate bubbling site at the crater of the Mercator mud volcano is methane with heavy  $\delta^{13}C$  signature (-39,12‰, PDB).  $\delta^{13}C$  of  $CO_2$  is light (-29,02‰, PDB) and shows to the intensive microbial processes of AOM at the uppermost sediments.

The distribution of the  $\delta^{13}C$  of methane from mud breccia with the depth reveals at least two different sources: 1) with  $\delta^{13}C(CH_4)$  is about -39‰, PDB for eastern mud volcanoes (El Araish field, Ginsburg mud volcano) and 2)  $\delta^{13}C(CH_4)$  is about -52‰, PDB for central and western mud volcanoes (Captain Arutynov, Meknes and all deepwater Portuguese mud volcanoes). Calculated possible source rock maturity level shows immature organic matter (terrestrial) for both types, with is good coinciding with mud clasts data. However molecular and isotopic proportion ( $C_1$ ,  $C_2$  and  $C_3$ ) from the Bonjardim, Porto, Ginsburg and Gemini mud volcanoes suggests that migrated gas possible occurs due to secondary cracking of the already formed oil hydrocarbons.