

## Organic Compounds in Ejected Rocks of Mud Volcanoes as Geological Indicators - A Case Study from Dashgil, Duvanny, and Bulla Island (Azerbaijan)

Ulrich Berner<sup>1</sup>, Georg Scheeder<sup>1</sup> and Ulviya Movsumova<sup>2</sup>

<sup>1</sup> Federal Institute for Geosciences and Natural Resources, Hannover, Germany

<sup>2</sup> Geology Institute of the Azerbaijan National Academy of Sciences, Baku, Azerbaijan

Mud volcanoes are prominent geological features of Azerbaijan. The mud of volcano cones of Dashgil, Duvanny Island, and Bulla Island located above or close to hydrocarbon reservoirs. Numerous rock fragments have been ejected through mud volcano activities at these sites, which we use for organic geochemical investigations that involved biomarker investigations and carbon isotope analyses. We compare the findings from the surface with published data of reservoir fillings.

The amounts of extractable hydrocarbons in relation to organic carbon contents indicate that the rock ejects are impregnated by hydrocarbons. All hydrocarbons have been affected by secondary alterations that most likely involved biodegradation as the n-alkanes have been removed to a large extent. Despite of biodegradation, environmental and maturity sensitive biomarkers could be identified. C27- to C29-sterane isomers suggest a dominance of aquatic organic matter. However, oleanane is present in all samples suggesting a contribution of angiosperms. In addition, the canonical variable derived from carbon isotope ratios of the aliphatic and aromatic fractions and ratios of C31-22R- over C30-hopane indicate a lacustrine depositional environment. Carbon isotope ratios of aliphatic and aromatic fractions are compatible to published data of source rocks of the Middle to Upper Maikop Formation (Upper Oligocene to Lower Miocene).

Sterane maturity parameters indicate that the hydrocarbons of the impregnations might have been generated from a narrow maturity range, which corresponds to the initial stage of hydrocarbon generation (0.5 to 0.7 %-VReq.). The biomarker maturities obtained from the ejected rock samples are compatible with the maturities determined from published stable carbon isotope data of reservoir gases (methane to propane) using the model of Berner et al. (1997). A regional maturity trend with slightly increasing maturities from Dashgil to the other sites is obvious from biomarker analyses and the published data of reservoir gases, and compatible to the observed differences of the reservoir fillings.