



Sediment and fluid migration in mud volcanoes: Dashgil-Bakhar area, Azerbaijan

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On-going fieldwork and geochemical studies of mud and fluids from four mud volcanoes in the Dashgil-Bakhar area in Azerbaijan aims at understanding both the eruptive and dormant stages of mud volcanoes. Particular focus is on constraining the eruptive processes in the source region and the conduit zone, and the hydrogeology of the seep activity between eruptive events. The fieldwork is a part of an integrated field, modeling and theoretical research project of modern and ancient piercement structures in sedimentary basins. Mud volcanic eruptions in Azerbaijan normally last for less than a few days, and are characterized by vigorous ejection of mud breccias, hydrocarbon fluids (liquids, gases), and water. The dormant period activity ranges from quiet to vigorous flow of mud and fluids. In both cases, the driving force of the system appears to be dominantly methane of thermogenic origin. Eruption events are accompanied by active tectonics and sometimes graben formation. Subsidence and caldera formation leads to extensive faulting even during the dormant stage. Geochemical analyses of expelled waters during the dormant stage show a wide range in solute concentrations, suggesting the existence of a complex plumbing system. The expelled waters represents complex mixtures of deep and shallow waters, with chemistries affected by processes like mineral dehydration, adsorption and desorption on clay minerals, mineral precipitation and dissolution, redox reactions, decomposition of organic material, and microbial-driven processes. The salinity of expelled waters, expressed as the Cl concentration, is as high as 35,000 ppm, exceeding both seawater concentration and oil reservoir brines. Main and trace element composition suggest that the fluids have a deep origin mixing with meteoric waters. This is consistent with a deep-seated origin

(>5 km) of the extrusive mud breccias.