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M.Z.Yusifov and P.D.Rabinowitz, Texas A&M University, College Station, TX

Seismic Interpretation and Classification of Mud Volcanoes of the South Caspian Basin, Offshore Azerbaijan

Understanding the nature of mud volcanism, mechanisms of formation, types of eruptions and their relationship to the hydrocarbon systems provides important information about subsurface conditions and geological processes within the South Caspian Basin.

A 2D seismic grid in southeastern offshore Azerbaijan is used to define the areal distribution of mud volcanoes and to make a classification of the mud volcanoes based on characteristic seismic features. As a result detailed database for each determined mud volcano is constructed. Analysis of different parameters from this database shows that there is a high concentration of mud volcanoes at the southern part of the study area. It is coincides with the distribution of the structures within the basin. Mud volcanoes with low relief (several tens of meters) are mainly concentrated in the northeast. Conversely, mud volcanoes with large vertical relief (greater than 200 m) are clustered in the southwest part of the basin. Mud Volcano development in the South Caspian Basin is generally linked to faults, which in some instances are detached at the basement level. By using interpreted seismic surfaces it is possible to determine relative time of mud flows from the mud volcanoes. Timing of mud flows reveals to the actual activity of the mud volcanoes and it gives valuable information about possible mechanism of mud volcanism within the South Caspian Basin.

Previous studies of the onshore Mud Volcanoes in Azerbaijan and the results from current work conclude that Mud Volcano formation within the South Caspian Basin is mainly controlled by tectonic forces and overpressured sediments. Mud volcano activity is not always related to the Maykop organic reach shale succession. It can occur at shallow depths by pressure breakthrough from any stratigraphic zone.