

MUD VOLCANOES MODEL BY THE RESULT OF GEOPHYSICAL AND GEOCHEMICAL RESEARCHES

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Measurements have been made of gravitational field, geodetic uplift, regional horizontal tectonic movement, thermal patterns, and radioactivity in the general area of the Lokbatan mud volcano after its explosion on 25 October 2001, as well as in the crater itself. In addition, isotopic variations of methane and ethane are made available and measurements of vitrinite reflectance with depth have also been done.

The results show that there are negative local gravity anomalies (from -2 up to -5 mGal) in zones of mud volcanoes. The calculated field based on the model described shows that in zones of mud volcanoes there is a difference between observed and calculated fields. The extra mass in mud volcano zones is compensated for by introduction of decompaction zones and additional contact boundaries. Comparison of the change of amplitude of movement of the surface with the change of radioactivity along the profile, indicates increased radioactivity in the crater and to the western side, where the differential uplift is largest.

Isotope gas composition shows that gas of the Lokbatan mud volcano has more deep roots as compared to adjacent volcanoes; such deep roots evidently account for its very high frequency of eruptions (approximately every 3-4 years). This explanation supposes, however, that a rather large interval of sedimentary section participates in the process of gas formation (i.e. the volume of gas generation is maximal and the energy resources of gas here are also relatively large). Focuses of mud and gas flow formations are different, with the mud focus being located at a relatively shallow depth compared to that for gas.

The combination of a rapidly filled sedimentary region, with unconsolidated (or deconsolidated) mud occupying a domain at several km depth and bracketed above and below by more competent formations, together with the active horizontal stress variations, as measured by the GPS network, form the basis for the spectacular mud volcano effects in this part of Azerbaijan. In short, it would seem that tectonic "squeezing" of a low strength plastic mud layer from depth through a narrow vent with entrained gas and mud.