

Influence of cosmic factors on mud volcanic activity of the Earth

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Abstract. In this work, the influence of various cosmic factors (gravitational influence of the Moon and the Sun, solar activity, the Earth's rotation) on mud volcanic activity was analyzed for the first time. The analysis was carried out mainly on the example of mud volcanoes in Azerbaijan, for which there is the largest and most complete catalog of eruptions (431 events over almost 210 years). It has been found that the activity of mud volcanoes can increase after syzygial tides, when the Earth is in line with the Moon and the Sun (their tidal forces are summed up in this case). The response of mud volcanoes to the tidal influence of the Moon is delayed by 5–10 days. It is also found that the number of mud volcanic eruptions is distributed unevenly throughout the year with maximums in March–June and September–October. The presence of these maximums may be due to a change in the distance between the Sun and the Earth and variations in solar tidal forces during the periods of perihelion and aphelion. At the same time, the response of mud volcanoes to the tidal influence of the Sun is delayed by several months and is quite strongly extended in time. It was revealed that there are fluctuations in mud volcanic activity with a period of 14–20 years, which do not coincide with the cycles of solar activity (with periods of 11 and 22 years), although some researchers talk about a connection between solar and mud volcanic activity. It is possible that the indicated fluctuations in mud volcanic activity are related to the main harmonic of the Earth's nutation (18.6 years). It is shown that the maximum number of mud volcanoes on the Earth falls on the latitudinal belts of 30–45° N and 10–15° N (about 22 and 46 % of the total number of volcanoes, respectively). In the southern hemisphere, the largest number of volcanoes (about 3 % of their total number) is located within the boundaries of 5–10° S.

Keywords:

mud volcanoes, geodynamic processes, cosmic factors, Sun, Moon, tidal forces, solar activity

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