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Physical modeling experiments with the close dry suffosion.

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Presented are the results of the next series of physical modeling experiments with the close dry suffosion. The results of the previous series of the experiments (A. Kamshilin, E. Volkova, and all, 2005) have shown that the method of geo-electric monitoring with the “equipotential installation” will allow to control the origin of the suffosion. During several years, in seismically active and landslide regions, we conducted field observations using this method. A methodological particularity of these observations was that spatial-temporal variations of the configuration of the artificially generated electrical field in the Earth were measured instead of the traditional parameter - apparent resistance (ρ_k). It was achieved by placing electrode sensors on the eqiupotential line of the initial field (obviously, in this case, formally, ρ_k**=0**).

During the observations, quasiperiodic oscillations (“equipotential line breathing”) with the main periods of about 24, 12 and 8 hours were registered. Amplitudes of the oscillations with the different periods varied with the time. This behavior (regime) corresponded to the “quiet” condition of the medium (the uppermost layer of the earth’s crust).

We assumed that the observed oscillations were generated by deformations caused by the earth-tidal variations and diurnal temperature changes. This assumption was verified during the modeling experiments in the lab.

As before, the experiments were made at the experimental equipment of the **STATE ENTERPRISE "ANTIKARST AND COASTAL PROTECTION",** Dzershinsk, Nizhny Novgorod Region, Russia.

A chamber (95 x 74 x 30 sm^3) was filled with sand. At a definite moment, after the bottom of the chamber started gradually opening, an enclosed cavity was formed in the chamber due to the sand spilling out through the partially opened bottom (the cavity did not appear on the surface of the sand.) A two-dimensional eqiupotential geo-electrical installation and a tidal tilt-meter (ÍÈ-3, designed in IFE RAS) were placed on the surface of the sand.

In the result of the experiment, the following was established:

1. The cavity in the sand was registered by both, the geo-electrical installation and by the tidal tilt-meter

2. Based on the data registered by the tidal tilt-meter, the formation of the cavity was preceded by the deformation of the surface of the sand in the chamber

3. The two-dimensional eqiupotential geo-electrical device was able to register the spatio-temporal development of the deformational process, as well. Calculations have shown that sensitivity EEI is sufficient for registration of deformations from lunisolar tides.

Diurnal and semidiurnal variations of the eqiupotential lines observed in the field could be indeed generated by the deformation of the earth's surface.

If the previous statement is correct, the temperature and tidal wave variations could be used as calibration signals.

In this case, changes of amplitudes of the electrical signals will indicate the changes of tensometrical sensitivity and, therefore, the physical condition of the medium.

The above results should be verified using greater models and registering electrical, tidal, atmospheric pressure and temperature parameters. Electrical and tidal data gathered during continuous long-period field observations should be compared with the results of the modeling.

With today's achievements in digital registration and data processing, it could be done during several field seasons.

References

A. Kamshilin, E. Volkova, O. Kuzichkin and N. Kalinkina. The results of physical modeling experiments with the close dry suffosion. Abstract, EGU05-A-06746, 2005

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