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Investigation of Inner Structure Dynamics and Environmental Impacts of Mud Volcanoes

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Mud volcanoes are one of the geological hazards widely found around the globe including China (Xinjiang Uigur Autonomous Region) and Russia (South Federal Okrug). Their eruptions have significant environmental impacts, eruptions produce large amounts of greenhouse gases (mainly radiatively strongest methane) and aerosols and impose damage for environment. Mud volcanoes fields in Taman –Kerch area, situated at the strait between Azov and Black seas, South Russia occupy one of the largest are at the globe. So one of the hypothesis relates absence of life bellow 200 m in the Black Sea to mud volcanoes activity in the region. Mud volcanoes have complex inner structure: they are non-homogenous, often include angular or rock clasts of various lithological types derived from walls of conduits trough which gas-liquid mixture flows. Eruptions may be violent or slow, which is determined by their inner structure. Conduits may be deep up to 15 km. So study of recent and potential dynamics of inner structure, related eruptions and ecological consequences of eruptions can be rather challenging and complicated. We use experiments and analytical tools to describe past, recent and potential inner structure of mud volcanoes at Taman Peninsula, South Russia. . Siesmic vibrators CB - 10/100 and registering complexes RefTek -125 A were

used for mud volcanoes case study Karabetova Gora and Shuro. Mathematical and software tools for interpretation of waves dynamics recorded during vibration experiments were developed for investigation of inner structure of mud volcanoes. Besides an application of statistical and correlation packages for processing of wave propagation time series, original 3-D model of mud volcano was designed by Siberian Scientific Computing Centre which allow to reconstruct 3-D structure of inner non homogeneities in mud volcano. This generalised experimental and analytical methodology can be applied elsewhere including China.

Key words: Geological hazards, mud volcano, seismic wave propagation, 3-D modelling of inner structure of geological objects

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