Geophysical Research Abstracts
Vol. 12, EGU2010-6737, 2010
EGU General Assembly 2010

Vibroseismic sounding of mud volcanoes in Taman province, Russia, experiments and mathematical modeling

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The paper presents the results of the full-scaled experimental works of vibroseismic sounding and vibroseismic tomography of the mud volcano Gora Karabetova in Taman mud volcano province (Russia) and results of the mathematical modeling. The mathematical model of a mud volcano with anticlinal structures and the vertical cylindrical channel, leaving on a free surface is constructed, numerical modelling of a full wave field from the surface pointed source in a problem vibroseismic sounding for the chosen model of a volcano is executed. The theoretical seismograms are calculated for various profiles of wave field recording on surfaces. The results of comparison and the analysis of theoretical seismogram and experimental seismogram of vibroseismic sounding are presented. The data processing is done for the full-scaled experimental vibroseismic sounding and vibroseismic tomography of the mud volcano Gora Karabetova carried out with the use of vibrator CV-10/180 and recording system REFTEK. The spectral-time analysis of features of a wave field formation of a vibrating source in a zone of a volcano, processes of attenuation and dispersion of waves in dilatance volcano zone is made. Results of data processing of vibroseismic and magnetotelluric profiling of this volcano are compared.