GEOTHERMAL MODEL OF GAS HYDRATE ACCUMULATIONS ASSOCIATED WITH SUBMARINE MUD VOLCANOES

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Gas hydrate accumulations associated with submarine mud volcanoes are known in many areas of the Ocean. Three gas hydrate accumulations in submarine mud volcanoes (Haakon Mosby in the Norwegian Sea, Buzdag in the Caspian Sea and Atalante offshore the Barbados Island) are the most extensively studied including geothermal measurements. These accumulations are characterized by axial-symmetric structure, controlled by shape and size of mud volcanic edifice, and formation of the accumulations is conditioned by ascending fluid flow that is the main source of hydrate-forming gas and water. The central parts of the mud volcanoes are also characterized by significant values of subbottom geothermal gradient (from 10.5K/m on the Atalante mud volcano to 30K/m on the Haakon Mosby mud volcano). The geothermal gradient regularly decreases with distance from the mud volcano centres and reaches a normal values outside of the volcanoes. The steady-state model of thermal field of the Haakon Mosby mud volcano was considered. The model was computed on the basis of the finite element method using the available geothermal data. Analysis of this model enabled us to define parameters of gas hydrate stability zone, recognize the shape of gas hydrate accumulation, and estimate the amount of gas transported by mud volcano into sea water during the time of the mud volcano existence (up to 3E10 cub.m). The total amount of methane captured in the gas hydrate accumulation was evaluated (3E8 cub.m). In a similar manner, the estimation for the Buzdag mud volcano is 8E7 cub.m.