Erosion of the seabed surface as a trigger for the evolution of sub-bottom accumulations of gas hydrates

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The effect of rapid erosion of the seabed surface on the evolution of gas hydrates in the underlying layers of the seabed has been studied using mathematical modeling using modern experimental data. The dynamics of the movements of glaciers and icebergs in the northern seas in some cases leads to the plowing of iceberg keels of the surface layers of marine sediments. In these cases, observed emissions of gases detected by different methods during plowing and dredging of the bottom are possible. But the process of plowing the iceberg keel of the surface layers of the seabed can also trigger the process of decomposition of gas hydrates in the underlying deeper layers of sediments. Under what conditions this process develops and what can be the quantitative characteristics of such a process and the speed and time of its development in this paper are investigated by methods of mathematical modeling. The thermal conductivity equation and the piezo conductivity equation were solved numerically and analytically together using representative values of the input parameters. The determining role of the pore pressure and temperature gradient in sediments up to the moment of plowing is quantitatively illustrated, i.e. possible potential conditions for initiating the decomposition of gas hydrates in the deep zones of the sedimentary layer by the plowing process on the surface are determined. The cases of the erosion process have also been studied, which do not lead to the decomposition of the bottom gas hydrates, but only lead to an increase in the zone of thermobaric stability of gas hydrates in the seabed. It is also shown how the hydrate decomposition process initiated by the movement of an iceberg (glacier) causes gas filtration to the bottom surface and observed underwater methane flares, in some cases posing a serious danger to underwater work or research.