

Geothermal investigation of the thickness of gas hydrate stability zone in the north continental margin of the South China Sea

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The search of unconventional energy resources has emerged as the focus of energy issue worldwide, given the increasing shortage of the fossil fuels. As a potential energy resource, gas hydrate exists only in the condition of high pressure and low temperature, mainly distributing in the sediments of the seafloor in the continental margins and the permafrost zones in land. The accurate determination of this thickness of gas hydrate stability zone is essential yet challenging in the assessment of the exploration potential. The majority of previous studies obtain this thickness by detecting the bottom simulating reflectors (BSRs) layer on the seismic profiles. The phase equilibrium between hydrate stable state with its temperature and pressure provides an opportunity to acquire the thickness with geothermal method. Based on the latest geothermal dataset available, we determined the thickness of the gas hydrate stability zone in the northern continental margin of the South China Sea. Our results demonstrate that the thicknesses of gas hydrate stability zone vary greatly in different areas of the northern margin of the South China Sea. The thickness mainly concentrates on 200~300 meters and distributes in the southwestern and eastern areas with belt-like shape. In addition, the thickness of hydrate stability zone is found to be large where the heat flow is relatively lower. The thickness increases with the increase of the water depth, but it tends to stay steady when the water depth larger than 3000 meters. These results are of significance for assessing the resource potential of gas hydrate in the South China Sea.

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