



Global distribution of gas hydrates in marine sediments: application of a general transfer function

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Many of the recently published estimates of the global inventory of marine methane hydrate are based on simplified diagenetic models, which were run for each grid point of a homogeneous grid of the seafloor. Since this is a very complex and time-consuming method, which may also be limited by data availability, we invented a simple transfer function, which calculates the amount of gas hydrates based on easily accessible data. The transfer function was derived from a large set of systematic runs of a numerical diagenetic model covering the wide range of environmental conditions that are typically met along the continental margins. An exhaustive parameter analysis established that the formation of gas hydrates from biogenic methane production can be sufficiently described by the total organic carbon accumulation rate and the thickness of the gas hydrate stability zone (Marquardt et al., submitted). The resulting transfer function was applied to available global datasets of 1x1-degree resolution in order to derive global estimates of the distribution and total inventory of gas hydrates. The global grids include the seafloor bathymetry, TOC input (Seiter et al., 2004), bottom water temperature, and geothermal gradient estimated from heat flow (Hamza et al., 2008). The global amount of gas hydrate is predicted to be about 2400 Gt of C and is in good agreement with previously published results (e.g. Archer et al., 2009). So far, our calculations do not consider any thermogenic methane, but only microbially produced and hence, represent only a minimum estimate of the gas hydrate budget.

References:

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