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Gas hydrate quantification: A general function allowing for regional conditions to estimate 2D–gas hydrate inventories by means of combined geochemical and geophysical modelling.

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Marine gas hydrate inventories have been estimated so far either by the use of available pore water data (usually restricted to ODP drill sites) or by the interpretation of seismic records. However, the results derived from these two methods very often revealed significant differences in terms of quantity and distribution for identical locations.

Within the project HYDRA a complementary approach has been developed using geochemical reactive-transport models and geophysical rock physics modelling to quantify regional GH inventories. From geochemical transport-reaction models constrained on DSDP/ ODP drill Sites 685, 1230, 1233, 1040, 1041 and 1043 (Costa Rica, Peru and Chile) a simplified general transfer-function has been derived. Applying that general function requires incorporation of regional parameters i.e. water depth, sediment thickness, sedimentation rate, thermal gradient and organic carbon- (POC) and anaerobic methane oxidation- (AOM) data. AOM, POC and sedimentation were obtained from sediments and pore water from gravity cores. Seismic interpretation yields both the thermal gradient and the sediment thickness. Therefore a velocity analysis calculating the seismic velocities v_p and v_s from the elastic moduli and the rock density (effective medium theory), planar information of sediment thickness, and the thermal

gradient has been applied. Imprecise parameters in the geophysical model (e.g. porosity) were adjusted with the geochemical model in order to maintain two coherent and valid models.

The project aims at the accurate estimation of margin-wide gas hydrate inventories. First results including a 2D-distribution along the seismic profile BGR99-44 across ODP sites 1040 and 1041 on the continental slope will be presented. As the gas hydrate zone widens with increasing sediment thickness and a subsiding BSR the formation potential of gas hydrate increases significantly. Integration of the GH bearing sediments along the profile and subsequent extrapolation onto 1 km of continental margin yield a potential of 31.4 10^{12} g CH_4 / km.

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