

3D distribution and seismic attributes of methane hydrate BSRs in the Kumano Basin - Nankai Trough and derived heat flow

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3D seismic reflection data acquired on the Kumano forearc basin to guide the NanTroSEIZE drilling project on the Nankai accretionary prism reveal a high amplitude bottom simulating reflector (BSR) interpreted as marking a phase transition between methane hydrate and free gas in the pore space of both accreted and forearc sediments. Other evidences of fluid migration are identified with shale diapirs and flat spots rising across basin sediment reflectors. Detailed 3D mapping of the BSR shows lateral variations of the reflection pattern in terms of continuity, amplitude, and other seismic attributes, as well as the possible occurrence of a paleo-BSR. We also determine the depth of the hydrate-gas phase boundary in order to estimate the geothermal gradient and hence the heat-flow through the accretionary prism which overlies the downgoing plate. It offers information about active processes occurring in the accretionary prism. The results suggest a model of the Kumano Basin with important fluid migration processes and possible trapping of small amounts of methane under parts of the BSR. The hypothesis of a paleo-BSR that reflects the uplift of the base of the hydrate stability zone caused by recent motion along a Mega-splay fault is supported by the estimated heat flux values.