Pressure Coring a Gulf of Mexico Deep-Water Turbidite Gas Hydrate Reservoir: The UT-GOM2-1 Hydrate Pressure Coring Expedition

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Abstract

The UT-GOM2-1 Pressure Coring Expedition recovered cores at near in-situ formation pressures from a gas hydrate reservoir composed of sandy silt and clayey silt beds in Green Canyon Block 955 (GC 955) in the deepwater Gulf of Mexico. The millimeter- to meter-scale thick beds were deposited on the levee of a turbidite channel. The hydrate saturation (the volume fraction of the pore space occupied by hydrate) in the sandy silts ranges from 79 to 93% and there is little to no hydrate in the clayey silt. Gas from the hydrates is composed of nearly pure methane with less than 200 parts per million (ppm) C2-C5 components. The $\delta^{13}C$ values from the gas are depleted (-60 to -65 ‰ VPDB). We interpret that the gasses were largely generated by primary microbial biogenesis but that low concentrations of C3-C5 gases record at least trace thermogenic components. The in situ pore water salinity is very close to that of seawater. This suggests that the hydrate reservoir formed slowly enough, or long enough ago, so that any excess salinity generated during hydrate formation has diffused away. Because the sandy silt deposits have high hydrate concentration and high intrinsic permeability, they may represent a class of reservoir that can be economically developed. Results from this expedition will inform a new generation of reservoir simulation models that will illuminate how these reservoirs might be best produced.