Unexplained Geologic Features within the Hydrate Stability Zone, Upper Slope Mississippi Canyon, Northern Gulf of Mexico

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ABSTRACT

The upper continental slope of the Mississippi Canyon, southern Gulf of Mexico, in a region of dynamic geologic activity, contains numerous geologic features that cannot be explained through conventional geologic theories. High-resolution seismic and other geophysical data have been obtained to better understand these features. These data portray numerous small faults and mounds. Similar features believed to form where the faults both relieve overburden pressure and provide pathways for gas hydrate were recovered in a nearby core (MD02-2569) on the same cruise. Seismic profiles of the dissociation of gas hydrate was found in a 28.35m core (MD02-2570) recovered from this site. The presence of gas hydrates in the area was found in the form of gas hydrate crystals. With greater heat-flow possibly representing “open faults” conducting geo-thermal fluids to the seafloor. Gas hydrate is very likely present in the area and can be detected through heat-flow surveys. The upper continental slope, Mississippi Canyon, northern Gulf of Mexico, is a region characterized by dynamic geology, including subsidence, uplift, and prograding. It contains producing gas fields, salt ridges, hydrate formations exposed on the seafloor, and an interpreted geologic history spanning at most, Upper Pleistocene time, and possibly as brief as a single Holocene-glacial couplet.

RESULTS:

In this study, about 30km of data acquired with the Huntec system and about 11km acquired with a Deep-Tow Boomer system show both homogeneity and heterogeneity of reflector characteristics in the upper slope environment. Both the shallowest and the deepest of the prominent AWOZs appear to be related to the presence of gas hydrates. Although ground-truthing is sparce, biostratigraphic and sedimentologic evidence from a single piston core interpretation in the same physiographic province, appears to represent an interval of, at most, Upper Pleistocene time, and possibly as brief as a single Holocene-glacial couplet. The entire sequence, by analogy with a 28.35m core from the western Mississippi Canyon area, during the summer of 1998, may represent a history for this geologically complex area.

REFERENCES:


CONCLUSIONS:

Evaluation of multiple sets of high-resolution seismic data and short-offset geophysical profiles further supports the presence of gas hydrates in the study area. Gas hydrates appear to be associated with small faults and mounds. Gas hydrates are formed where the faults both relieve overburden pressure and provide pathways for hydrate formation. Gas hydrates are very likely present in the area and can be detected through heat-flow surveys. Gas hydrate is very likely present in the area and can be detected through heat-flow surveys. Gas hydrate is very likely present in the area and can be detected through heat-flow surveys.