

GAS HYDRATE STABILITY ZONE MODEL & METHANE SEEPS OF THE NORTH BULGARIAN OFFSHORE

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Objectives

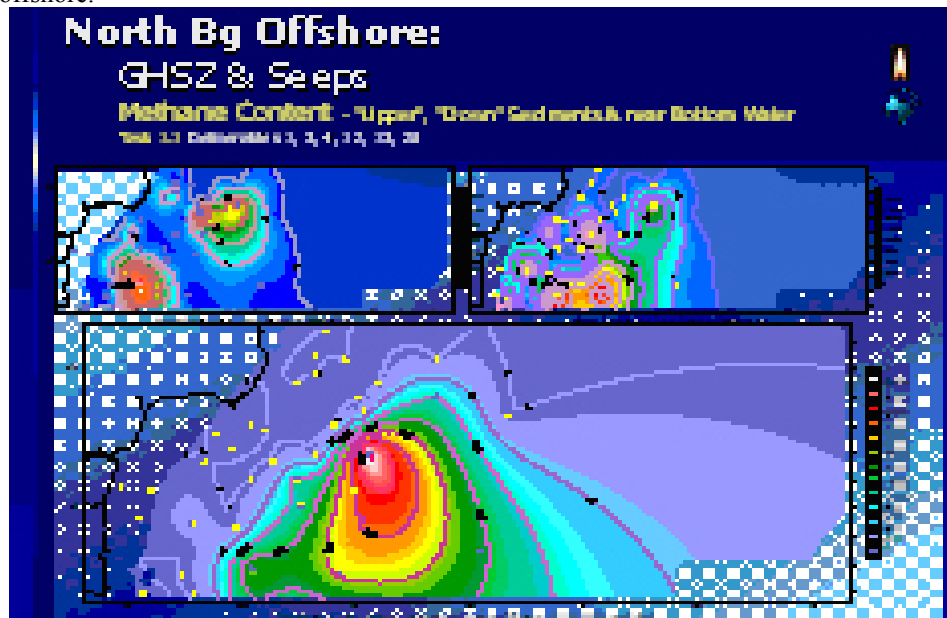
A model for detail evaluation of the gas hydrate (GH) stability zone (SZ) and potential deposits of methane is created. The special features of the model are:

- Dense grid with step 1 nautical mile for detail visualization of morphological effects;
- Realize methods for planar data density increase from correlation with the seafloor morphology;
- 3D models of methane and his homologues consider realistic hydrocarbon mixes;
- Create a 3D model of salinity and hydrogen-sulfide distributions of sediments pore waters from Deep Sea Drilling Project data;
- Imply climate and sea level change models (in this work from the last Valdai glaciation).

An analysis of the existing data and knowledge gives preference to biochemical nature of methane but anomalous increase of its content is result of intensive microbiological processes in areas of catagenetic components migration. The existence of such fluid streams is indicated by heat flow anomalies, acoustic anomalies, gas concentrations in water, potential submarine discharge zones and mud volcanoes areas, etc.

Context

The approach, theory and 3/4D models input data are described. The model is ran for the northern part of the Bulgarian offshore.



Results

The sediment volume of the GHSZ was estimated to be 4,490 km³ – 4.5-5.3% of the Black Sea MHSZ (85,310 to 100,280 km³). The GH content is 632 km³ in the case of pure biogenic gas and 865 km³ if the gas is only thermogenic or about 0.63-0.86.10¹² m³ of GH. The most used gas expanding factor of 140 results that from (88-121).10¹² m³ of gas, mainly methane could exists in the GHs. Even in the areas of the greatest prospect GHs are spotty spread and occur in discrete accumulations. It is consider that about 10% of the GHSZ may actually contain GHs (Ginsburg, Soloviev, 1994). Thus the real amount is closure to values (9-12).10¹² m³.

This volumes present 18-33% from model estimations for methane in the Black Sea GHs - (40-50).10¹² m³ which means that Bulgarian part (~10% of the basin area) is with notably appropriate conditions for GHs formation and the explorations are economically perspective.

Conclusions

Arguments for the connection seeps-GHs are their locations in plan; morphological position of the seeps, fresh slumping which could be result from GH instability. Thus the location of the gas seepages and the boundary of GHSZ is an evidence for GH existence in the Bulgarian offshore.

Most perspective is the area between water depths of 1,000 and 1,500 m where the average values of GHSZ thickness have a maximum (400 m). There the total effect of all factors is most suitable for GHs existence.

The model results could be a side in the dispute about “Noah Flood”.

Supported by the EC 5/6FP projects: CRIMEA - EVK2-2001-00104 (Contribution of High-Intensity Gas Seeps in the Black Sea to Methane Emission in the Atmosphere; <http://www.crimea-info.org>); EUROSEISMIC – EVR1-CT-2001-20004 (European Marine Seismic Metadata & Information Centre; <http://www.eu-seased.net>); CESUM-BS - ICA1-1999-70075 (Centre for Sustainable Development and Management of the Black Sea Region; <http://www.io-bas.bg/cesum-bs>).

