



Approaching hydrate and free gas distribution at the SUGAR-Site location in the Danube Delta

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Gas hydrates did receive a lot of attention over the last decades when investigating their potential to serve as a possible source for Methane production. Among other world-wide programs the German SUGAR project sets out to investigate the entire chain from exploitation to production in Europe. Therefore research in the scope of the SUGAR project sets out to investigate a site in European EEZ for the detailed studies of hydrate and gas distribution in a permeable sediment matrix. Among others one aim of the project is to provide in situ samples of natural methane hydrate for further investigations by MEBO drilling. The Danube paleo-delta with its ancient canyon and levee systems was chosen as a possible candidate for hydrate formation within the available drilling range of 200 m below seafloor.

In order to decide on the best drilling location cruise MSM34 (Bialas et al., 2014) of the German RV MARIA S MERIAN set out to acquire geophysical, geological and geochemical datasets for assessment of the hydrate content within the Danube paleo-delta, Black Sea. The Black Sea is well known for a significant gas content in the sedimentary column. Reports on observations of bottom simulating reflectors (BSR) by Popescu et al. (2007) and others indicate that free gas and hydrate occurrence can be expected within the ancient passive channel levee systems. A variety of inverted reflection events within the gas hydrate stability zone (GHSZ) were observed within the drilling range of MEBO and chosen for further investigation. Here we report on combined seismic investigations of high-resolution 2D & 3D multichannel seismic (MCS) acquisition accompanied by four component Ocean-Bottom-Seismometer (OBS) observations.

P- and converted S-wave arrivals within the OBS datasets were analysed to provide overall velocity depth models. Due to the limited length of profiles the majority of OBS events are caused by near vertical reflections. While P-wave events have a significant lateral coverage, converted S-waves do image a much narrower part of the subsurface only because of their low velocities. Therefore detailed modelling of small-scale structural anomalies imaged with MCS data within the GHSZ were undertaken in order to look for promising targets of MEBO drilling. An estimate of the expected hydrate and gas content is provided by comparison with published laboratory studies.

Bialas, J., Klaucke, I. and Haeckel, M., 2014. FS MARIA S. MERIAN Fahrtbericht MSM-34 1&2 SUGAR Site, GEOMAR, Kiel.

Popescu, I., Lericolais, G., Panin, N., De Batist, M. and Gillet, H., 2007. Seismic expression of gas and gas hydrates across the western Black Sea. *Geo-Marine Letters*, 27(2): 173-183.