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Fine Structure of shallow Gas Occurrences in the Southwestern Baltic Sea in the Light of multifrequency seismic Data

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Since 2000, several expeditions with R/V Heincke had been carried out to the Mecklenburger Bay and northeast of Rügen Island in the Baltic Sea as part of geophysics student courses. Different acoustic and seismic survey methods have been used to image the shallow and deeper sub-sea floor, namely with acoustic systems as side scan sonar, parametric echosounder, boomer as well as with watergun and GI Gun as seismic sources. Data were recorded with a 100 m long, 16-channel analog streamer.

A specific focus was given to the processes in the Holocene sediment cover, which varies in thickness from less than 1 m to more than 20 meters in the regions investigated. Two areas, in the Mecklenburger Bay and northeast of Rügen Island, had been chosen for detailed studies of reflectivity and seismic signature of gas zones as a function of frequency, ranging from appx. 50 Hz to more than 2000 Hz.

Reflections from gas zones appear mostly diffuse, which may indicate either a vertical distribution of scattering gas bubbles or strong backscatter from the top of the gas zone. Seismic velocities and amplitudes were analyzed to determine the character of gas charge and to estimate total gas volume. Furthermore, the detection of gas in general and the location precision of the top of the gas zone will be investigated as a function of wavelength, resp. source frequency.