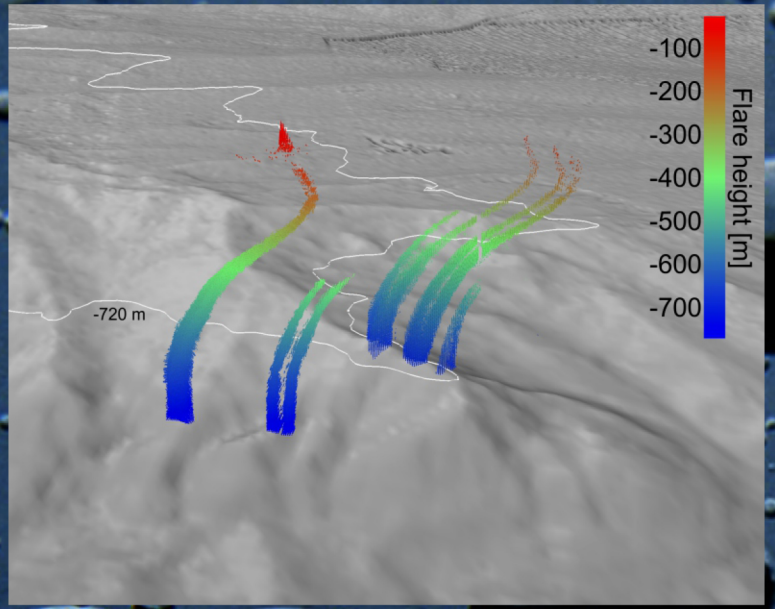
# Hydroacoustic Imaging of Methane Bubbles




An acoustic image of gas bubbles rising through the water column of the eastern Black Sea. The seafloor relief is shown in grey.

With the growing awareness of changing climate, efforts are made to distinguish between anthropogenic and natural sources of climate relevant gases such as methane. It is thought that natural geologic sources emit significant quantities of methane to the atmosphere. While emissions from terrestrial sources can be quantified relatively easy, the fate of marine, especially deep-sea, methane emissions is uncertain. In my PhD project I use various techniques to detect and quantify deep-sea hydrocarbon emissions to the hydrosphere and atmosphere.

One technique is acoustic imaging of methane bubble emissions from the seabed (so called ‚flares') using multibeam echosounders. Multibeam echosounders are normally used for mapping the seafloor relief. Echosounders transmit acoustic pulses to the water column which are reflected by the seafloor. Knowing the sound velocity in water and the time the pulse traveled to the seafloor and back, the water depth can be calculated. If, however, gas bubbles rise through the water column, they cause acoustic 'disturbances'. Free gas acts as a strong reflector due to the impedance contrast between gas and water. These strong reflections make bubbles visible in the acoustic data.

I use this information to assess the fate of rising gas bubbles in the water column and to draw conclusions about physical factors affecting bubble lifetime and their potential to contribute to shallow-water and atmospheric methane concentrations.

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