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Acoustic mapping of shallow water gas releases using shipborne multibeam systems

Peter Urban, Kevin Köser, Tim Weiß, and Jens Greinert

GEOMAR Helmholtz Centre for Ocean Research Kiel, Department of Marine Biogeochemistry, Germany (purban@geomar.de)

Water column imaging (WCI) shipborne multibeam systems are effective tools for investigating marine free gas (bubble) release. Like single- and splitbeam systems they are very sensitive towards gas bubbles in the water column, and have the advantage of the wide swath opening angle, 120° or more allowing a better mapping and possible 3D investigations of targets in the water column. On the downside, WCI data are degraded by specific noise from side-lobe effects and are usually not calibrated for target backscattering strength analysis. Most approaches so far concentrated on manual investigations of bubbles in the water column data. Such investigations allow the detection of bubble streams (flares) and make it possible to get an impression about the strength of detected flares/the gas release. Because of the subjective character of these investigations it is difficult to understand how well an area has been investigated by a flare mapping survey and subjective impressions about flare strength can easily be fooled by the many acoustic effects multibeam systems create. Here we present a semi-automated approach that uses the behavior of bubble streams in varying water currents to detect and map their exact source positions. The focus of the method is application of objective rules for flare detection, which makes it possible to extract information about the quality of the seepage mapping survey, perform automated noise reduction and create acoustic maps with quality discriminators indicating how well an area has been mapped.