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Quantification of methane bubbles ebullition in freshwater reservoirs of temperate zone using sonar working with 120 kHz frequency

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During hydroacoustic vertical surveys of fish, an indispensable amount of gas bubbles have been observed rising from the bottom towards the water surface. Unfortunately, the gas ebullition essentially interferes with acoustic detection of fish, thereby biasing an estimate of fish quantity.
First, to distinguish between fish and bubble echo, comparing acoustic properties of the echoes (e.g. echo shape, echo width, or phase deviation) seemed to be inapplicable. Nevertheless, the difference in the movement 'behavior' (i.e. direction and speed), looks more promising, but it is necessary to obtain the exact position of a sound beam. Furthermore, in case of shallow waters where a horizontally-oriented beam is usually deployed, the method for distinguishing fish and bubbles with the movement behavior is possible, but more complicated to apply due to the boat motion and a different bubble crossing through a beam (i.e. altering position not in a range domain, but in a phase domain of the beam).
Second, when gas bubbles are recognized, a functional regression model of acoustic response to the bubble size can be used to estimate size and volume distribution of bubbles. The experiment with man-made methane bubbles was performed to learn the dependence of acoustic response to the bubble size, and a regression model was created