

Detection of Gas Bubble signals recorded at the OBS Stations by Machine-Learning

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Along the OBS seismograms, the waveforms of gas emission signals exhibit a high-frequency resonant vibration alike the bubble bursting at the free surface of a non-Newtonian fluid. Every single signal is a short-duration event (hereafter termed as “SDE”, <1.0 second). In this study, we shall develop the computer algorithm to detect the SDE signals along the OBS seismograms. Our work carried out in 2018 has been laid on the mathematical matching of the bubble signals. We conclude that even though the bubbles exhibit a specific waveform, the mathematical equation cannot perfectly describe the bubble with all ambient conditions at the seafloor. Our strategy is to adopt the Machine Learning (ML) to identify bubbles by images. In the following years, two phases of our project are designed as (i) Establishing the method to quantify the SDE signals by means of ML modeling: we shall train a neural network model with varied parameters to gain a complete estimation of the bubble signals within our OBS records. (ii) The experiments with OBS instruments will also be used for tests of generating different waveforms in water tanks of the ifremer as well as a constrained offshore area (e.g. lake), to provide referenced waveforms for the SDE or bubble signals.

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