



Source-less marine seismic imaging using vessel noise: a feasibility study in the Port of Trieste, north east Italy

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Marine seismic reflection experiments typically use a towed streamer and impulsive acoustic sources (such as airguns, sparkers or boomers) to image sub-seafloor acoustic reflectivity. These sources emit high amplitude, short period signals designed to achieve good resolution and penetration. This causes correspondingly high Peak Sound Levels that can in some cases adversely affect marine fauna and contribute to background ocean noise. In recent years this has led to increasing environmental restrictions on seismic surveying, in addition to the existing operational complexity and cost of using active sources.

We propose an alternative method, suited for shallow sub-seafloor characterisation, that uses the broadband noise generated by the acquisition vessel as the seismic source – eliminating the need for a dedicated active source. We use multichannel streamer recordings to estimate the vessel-generated acoustic wavefield, and cross-correlate this with the raw continuous recordings to produce virtual common shot gathers that are regularly sampled in space, compatible with conventional seismic imaging workflows. Here we present preliminary results of the SLIPSTREAM project, a pilot study conducted in September 2025 in the Port of Trieste, north east Italy, in shallow water (<20 m) using a multi-channel streamer (24 hydrophones spaced at 1 m). The project aimed to assess the feasibility of the source-less approach for research-scale, high-resolution 2-D seismic acquisition. We do this by assessing the quality of geophysical imaging and quantifying the reduction in impact to specific marine fauna that are common in the area, compared to a conventional active source “Boomer” acquisition. We demonstrate that the source-less data is able to image the boundaries and internal structure of several different shallow geological units, with a maximum penetration of around 40 m below the seafloor.

Future experiments will focus on improving the resolution and depth of investigation by controlling the vessel speed, as well as exploring the application of this method with larger vessels in deeper water. The overall goal is to acquire seismic images with sufficient quality for geological interpretation in locations where active sources may be restricted for environmental reasons.