Middelfart Listening Station – a successful story of a joint effort between multiple stakeholders

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Introduction

In spring 2017 a collaborative project was launched between Seiche Ltd., Aarhus University, Nature Park Lillebælt and the Middelfart municipality to design and install a live seabed-to-land hydrophone system for both research and public outreach purposes. The hydrophones were placed in the proximity of an artificial reef in Little Belt, Denmark. The reef is part of the Nature Park Lillebælt, an area with one of the highest densities of harbour porpoises in Europe. It is also one of the three vessel routes into and out of the Baltic Sea, and so represents a substantial source of anthropogenic underwater noise.
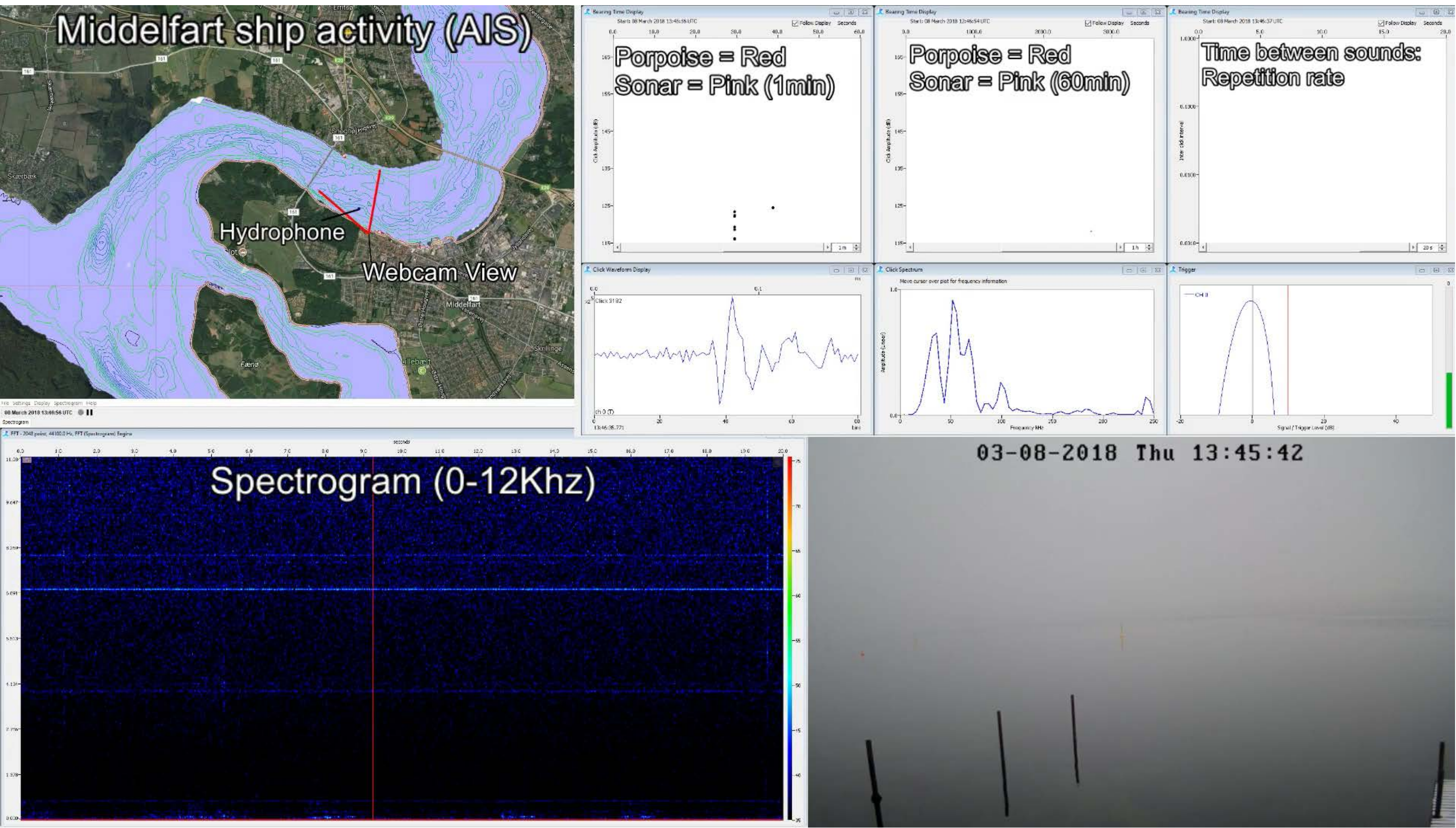
This live, acoustic monitoring station consists of two hydrophones and underwater cameras on a pyramidal frame, set on the seabed in 12 m depth of water; a 200-m cable to the land-based signal processing equipment; internet connection; a webcam overlooking the surface of the reef area; and an AIS receiver. A public exhibition is open at all times on the adjacent waterfront and displays a live feed of harbor porpoise detections and noise measurements, webcam pictures and AIS tracks of the ship traffic. All information is also transmitted to a live YouTube channel. Live audio is streamed from the system, in which harbour porpoise echolocation is transformed to audible frequencies and mixed with the ambient soundscape of passing vessels, etc.

The main purpose of this collaboration is to create an online platform for public awareness and conservation of harbour porpoises; to collect data on harbor porpoise utilization of the artificial reef; and to investigate the potential effects of vessel noise on porpoise behaviour. Here we present the structure and outcome of the online platform.
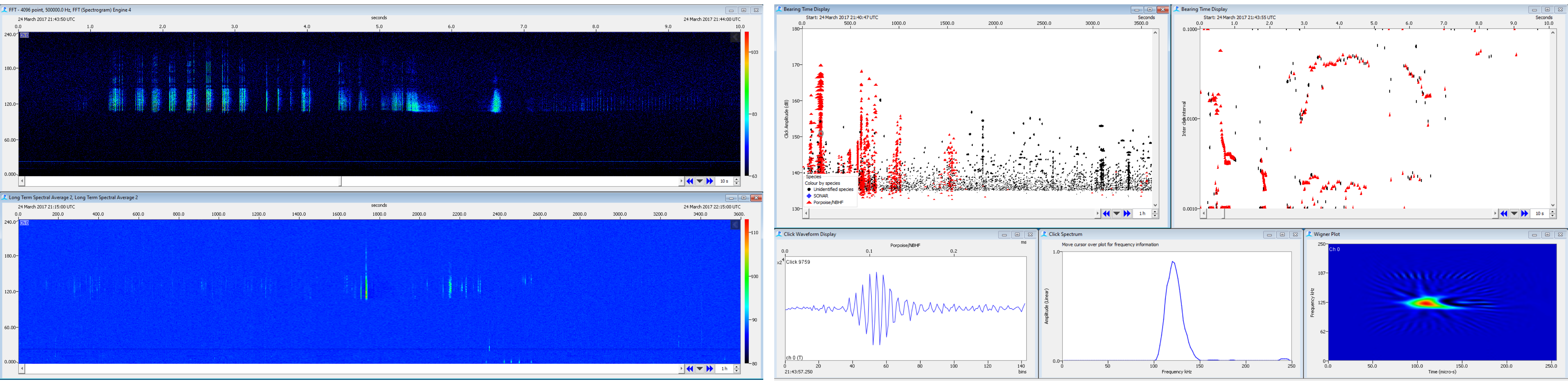

Top left; location of PAM station in Little Belt. Top right; divers preparing for the deployment of the station. Bottom left; PAM station and cable on land prior to deployment. Middle and bottom right; public exhibition on land.

PAM Middelfart Online live stream

http://bios.au.dk/om-instituttet/organisation/havpattedyrforskning/projekter/lyt-til-marsvin/

Harbour Porpoise click data (example)

Left: LTSA shows 1-h in the lower panel and a 10-s spectrogram zoomed in on clicks in the top panel. Right: Click detector from Pamguard Viewer (time v amplitude, time v ICI window and waveform/spectrum characteristics and wigner plot of one selected click.

Future Plans

❖ A network of Listening Stations providing publicly-accessible underwater sound, and a powerful tool for the long-term monitoring of marine mammals and the ambient soundscape.
❖ Underwater Video – mounting u/w cameras on the listening station to be able to visually document the present and behavior of the porpoises in the vicinity of the listening station(artificial reef). The video stream will be added to our web broadcast.
❖ Oceanographic sensors – collaboration with oceanographers will help understand factors that affect porpoise behaviour at Middelfart. For example, current and salinity measurements will help us plot water mass movements through the Little Belt.
❖ Localizing array – the hydrophone array could be expanded so that we can track harbour porpoise movements in the vicinity of the Listening Station and throughout the water column.