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Ecological monitoring using underwater acoustics

The objective is to 1) monitor how the increase of anthropogenic activities is affecting polar underwater soundscapes by changing habitat usage, and 2) provide long-term acoustic dataset to describe and quantify the features of soundscape contributors such as benthic species, marine mammals, wave noise, ice sounds, and cruise ships.

In order to monitor how anthropogenic changes is impacting polar ecosystems, the first step is to identify, describe and quantify the features of soundscape contributors. Since 2013, underwater acoustic recorders have been deployed up to several months in several locations of the Arctic (Spitzbergen (2013, 2018-2020), Greenland (2015, 2016)).

Figure 1. Acoustic recorder deployed by divers at 10m depth close to Kongsfjordneset point.

Data are used to describe the soundscape :
- Benthic fauna sounds,
- Marine mammals vocalizations,
- Ice sounds,
- Wind/wave noise,
- Boat noise (cruise ships).

Quantitative Soundscape Metrics include:
- Overall sound levels : Long-term term spectral averages are computed in several frequency bands.
- Sound pressure level and sound exposure level in decidecade bands , sound pressure kurtosis.
- Seasonal patterns in the acoustic data are investigated by analyzing daily median band levels in several frequency bands.
- Full acoustic dataset (since 2013) is stored at DATARMOR supercomputer facility in IFREMER research center in Brest

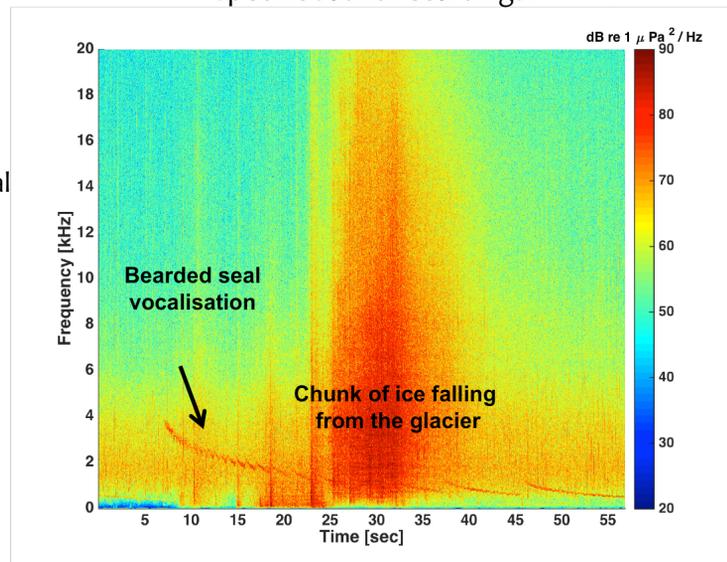Short drifting acoustic deployment for specific sound recordings:

Figure 2. Ice sounds and seal vocalisations close to London Glacier.