Studying Marine Life Through Soundscapes

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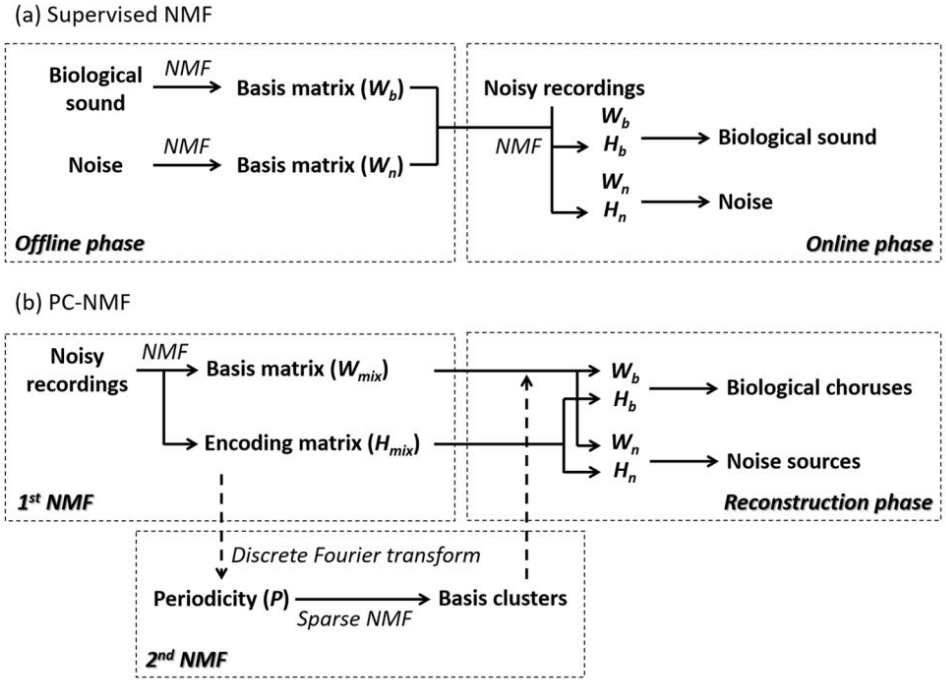
Soundscape Components

- Biophony - sounds generated by animals and organisms (example: fish)
- Geophony - sounds generated by non-animal natural sources (example: rain)
- Anthrophony - sounds generated by humans (example: ships)

Source Separation



Source: https://doi.org/10.1038/s41598-017-04790-7

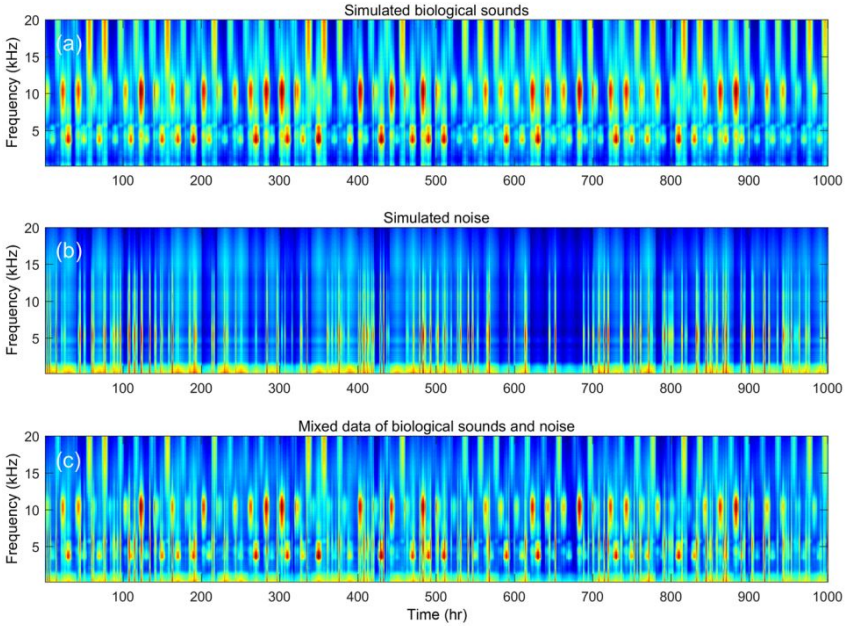
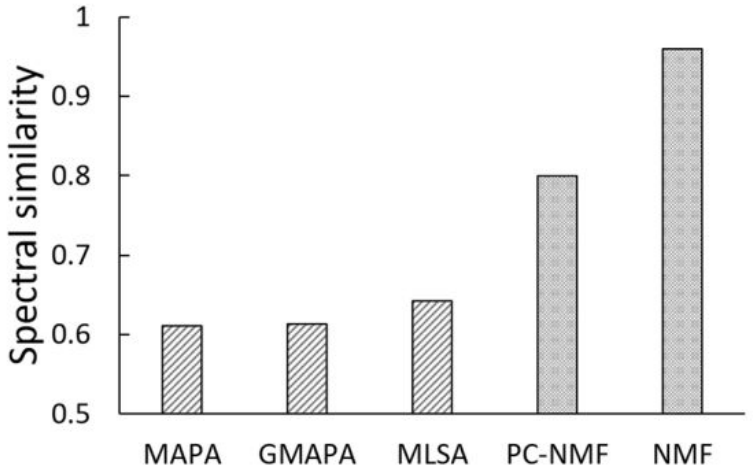


Figure 1. Simulation spectrogram used in this study. (**a**) The combined data of three types of biological sounds; (**b**) the combined data of two different types of noises; (**c**) a mixture of the data from (**a**) and (**b**).



Source: https://doi.org/10.1038/s41598-017-04790-7

Case study of using PC-NMF in ecosystem soundscapes

This technique was used on a soundscape of an ecosystem in Taiwan.

Sources for fish and cetaceans (whales) were separated out from the abiotic noise.

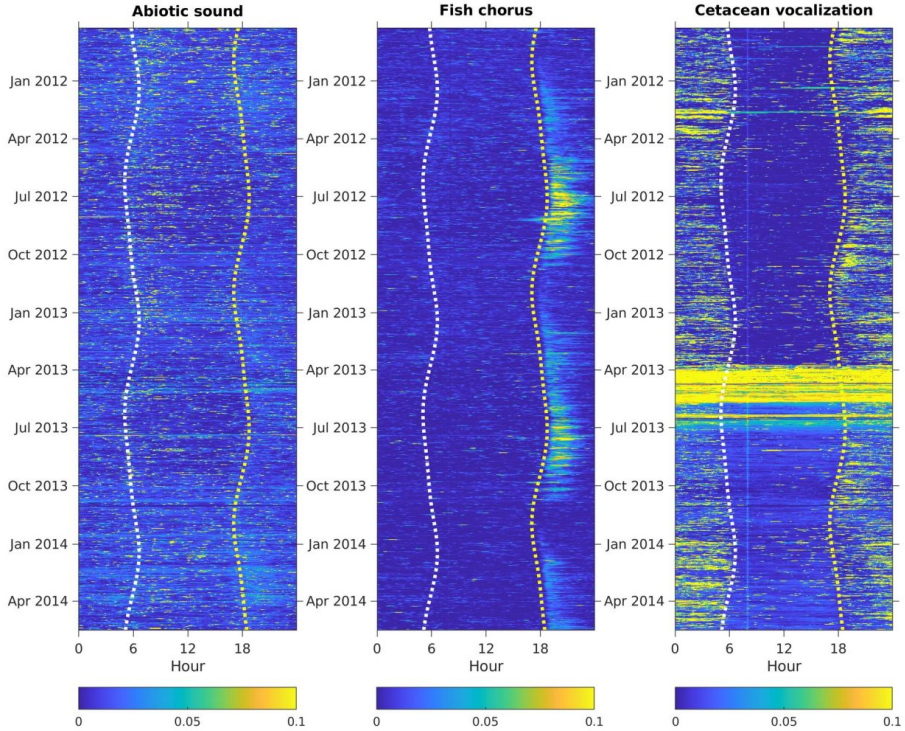
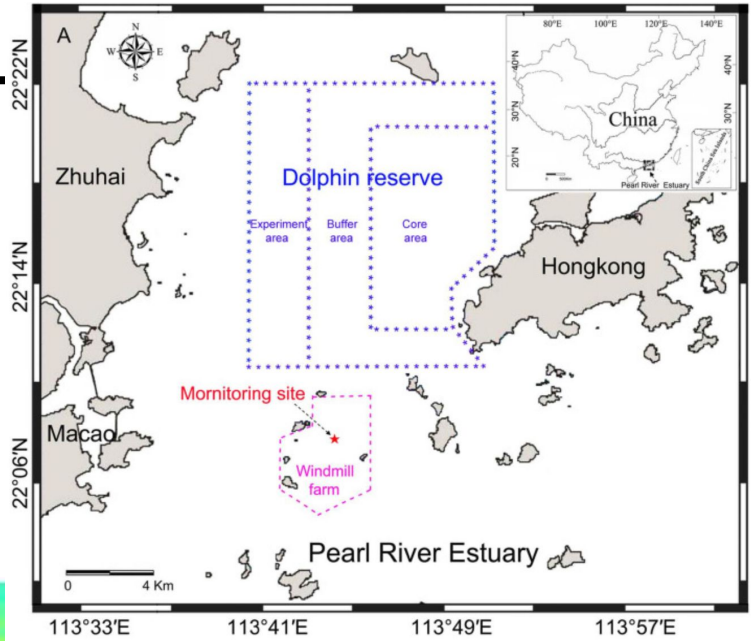
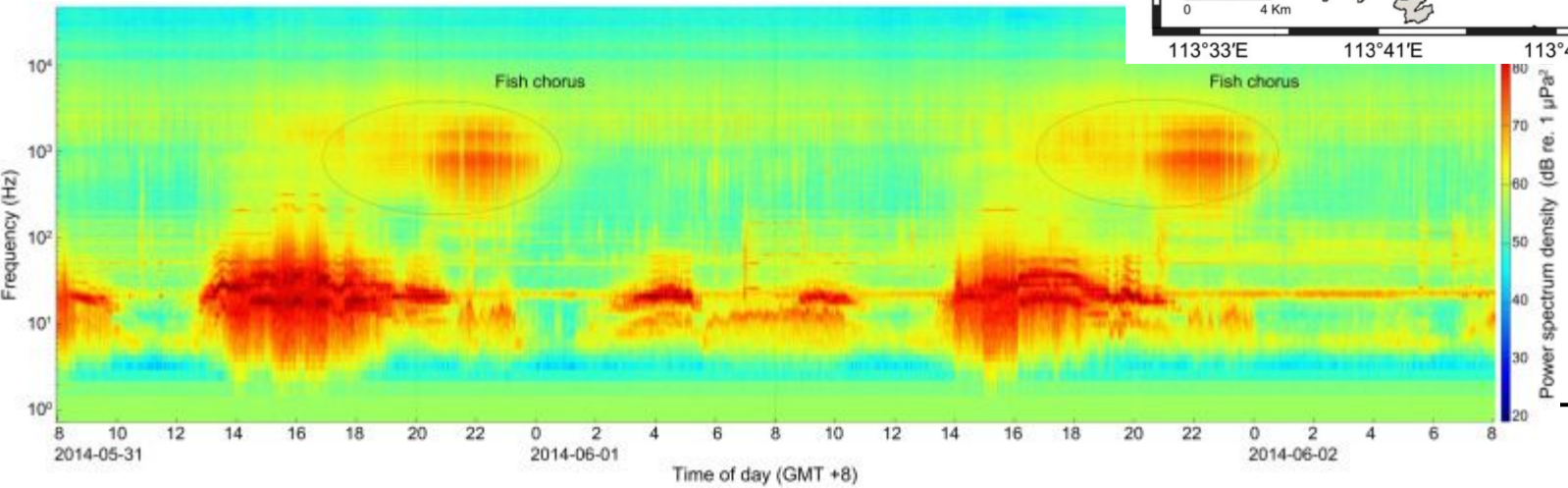


Fig 4. Temporal changes in abiotic sounds, fish choruses, and cetacean vocalizations. The relative amplitudes were normalized to a range between 0 and 1. Seasonal changes in sunrise and sunset are shown as white and yellow dashed lines, respectively.

Source: https://doi.org/10.1371/journal.pcbi.1008698

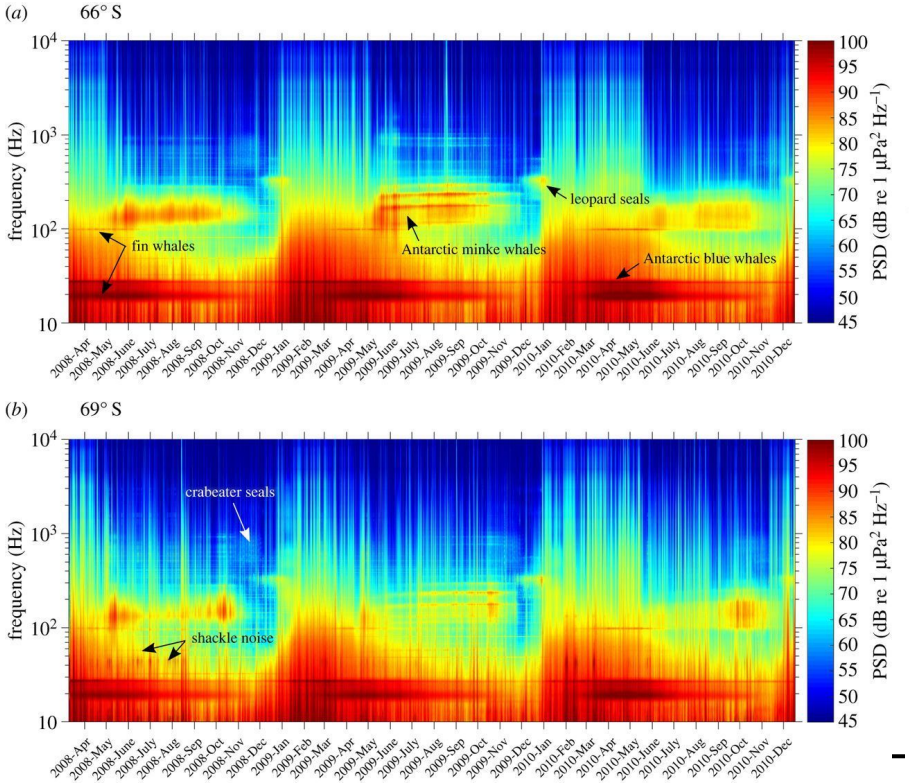
Characterization of habitat in an area near a planned wind farm to compare to post-construction.

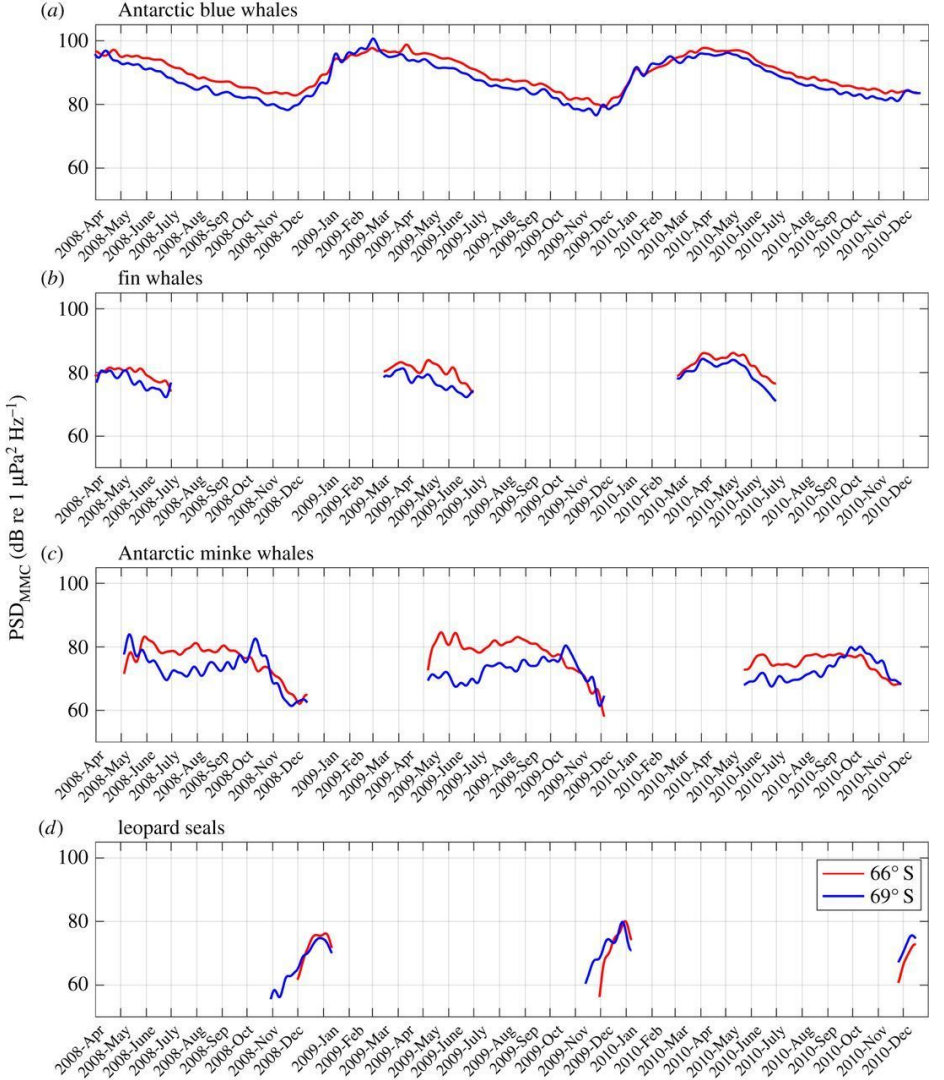




Source: https://doi.org/10.1016/j.marpolbul.2019.02.013

Migration Patterns

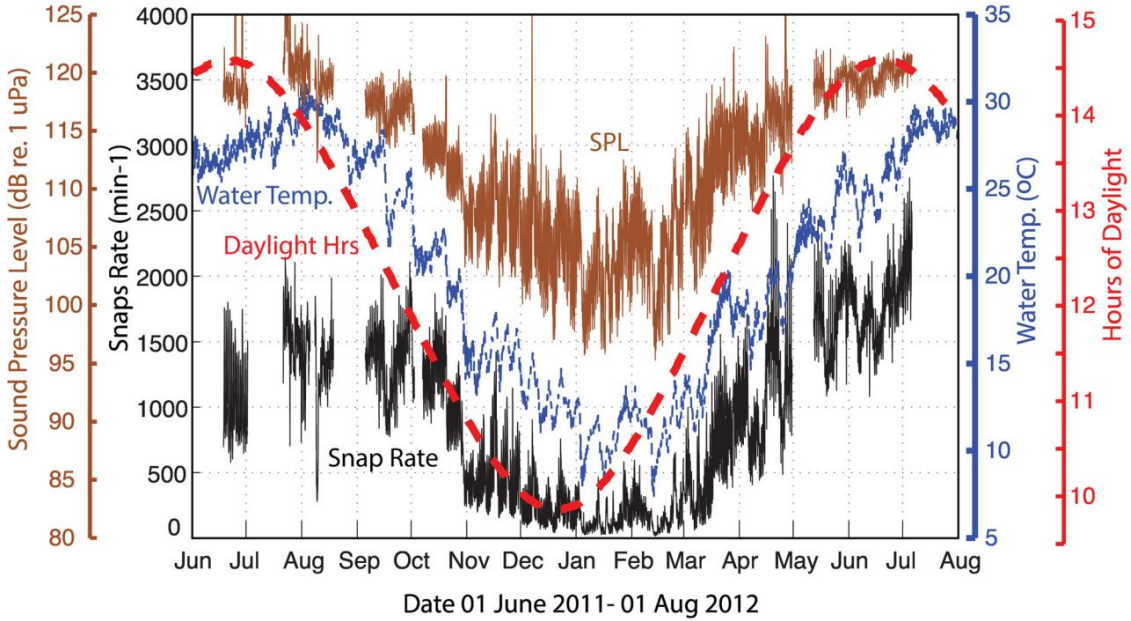




Source: https://doi.org/10.1098/rsos.160370

Shifting Activity Levels of Animals

Soundscape data taken near North Carolina showed the shifting active times of snapping shrimp over the seasons.



Source: https://doi.org/10.1371/journal.pone.0143691

Ocean Biodiversity Listening Project

Site where you can listen to some marine soundscapes:

https://sites.google.com/view/marine-ecoacoustics/projects/biodiversity-listening-project?authuser=0

References

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