

## Anthropogenic noise in the sea: the Mediterranean Sea versus ocean basins

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### INTRODUCTION

In the 21st century, man-made noise in the ocean has increased significantly which affects or hinders vital communication of marine mammals. Globally, changes of ocean noise levels are rather poorly mapped.

### METHODS/DATA

Noise in the ocean has been monitored as a byproduct at IMS stations of the CTBTO. Elsewhere, as at ocean gateways or in marginal seas, little is known about the soundscape, but seismological data of opportunity may allow an assessment.

START

### RESULTS

In the Mediterranean Sea and near Gibraltar – ocean noise levels – especially at 30 to 100 Hz - are significantly increase by 20 to 30 dB when compared to the open oceans in the vicinity of IMS sites.

### CONCLUSION

Extreme noise levels in marginal seas masks communication of marine mammals and affects their search for food, calling for action to allow a sustainable management of our seas and oceans to protect marine life.

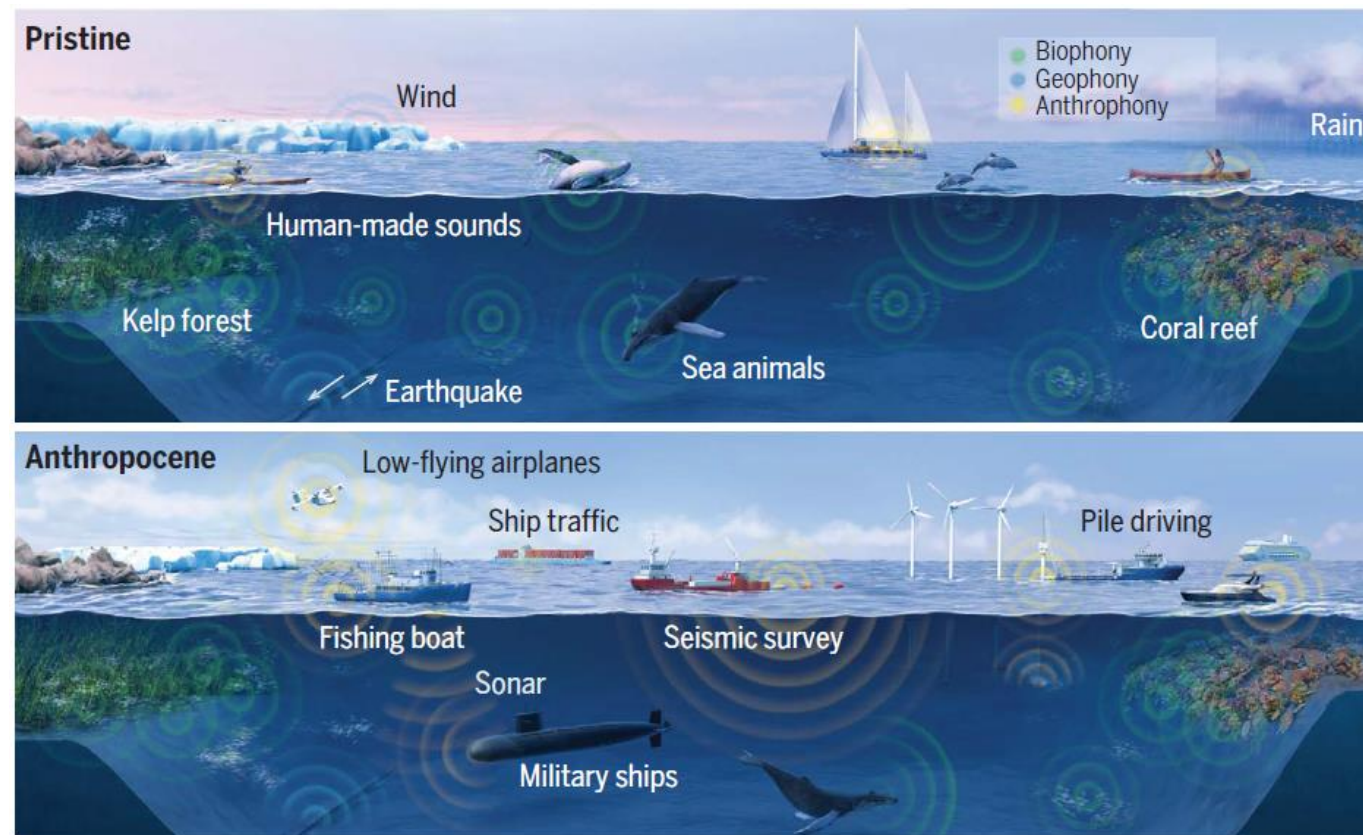
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Anthropogenic noise pollution may mask natural sounds, which are fundamental to survival and reproduction of wildlife, especially for marine cetaceans as they are highly dependent on underwater sounds for basic life functions.

In the 21st century, shipping in the ocean has increased significantly and causes low frequency (10–100 Hz) noise which affects or hinders vital communication of large baleen whales at 15 to 30 Hz. Noise in the ocean has been monitored as a byproduct at IMS monitoring stations of the CTBTO in the Indian, Pacific and Atlantic Ocean. Elsewhere, however, little is known about the soundscape – especially at sites of extreme ship’s traffic as in the vicinity of the Strait of Gibraltar or near major ports in the Mediterranean Sea, like the Italian port of Genova in the Ligurian Sea. Genova is located in a Marine Protected areas know as the Pelagos Sanctuary.



(Duarte et al., Science, 2021)

- INTRODUCTION
- OBJECTIVES
- METHODS/DATA
- RESULTS
- CONCLUSION



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*AIS derived ship's traffic (from MarineTraffic.com)*

Spectral characterizing of ambient ocean noise levels at different marine settings:

- (i) sites in the open ocean away from dense shipping (IMS stations in the open ocean for benchmarking noise levels elsewhere)
- (ii) sites in the vicinity of ports or gateways (temporal data of opportunity)



INTRODUCTION

OBJECTIVES

METHODS/DATA

RESULTS

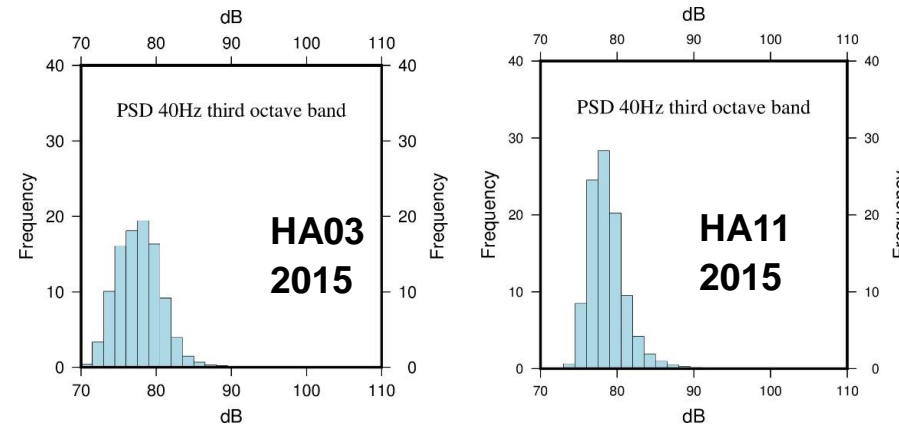
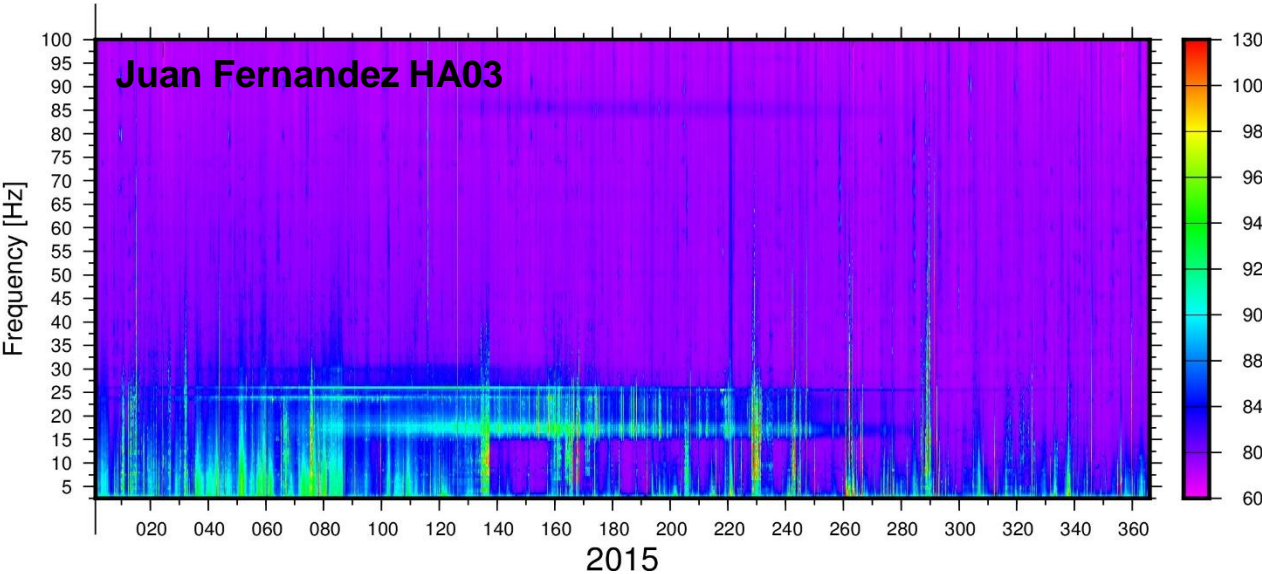
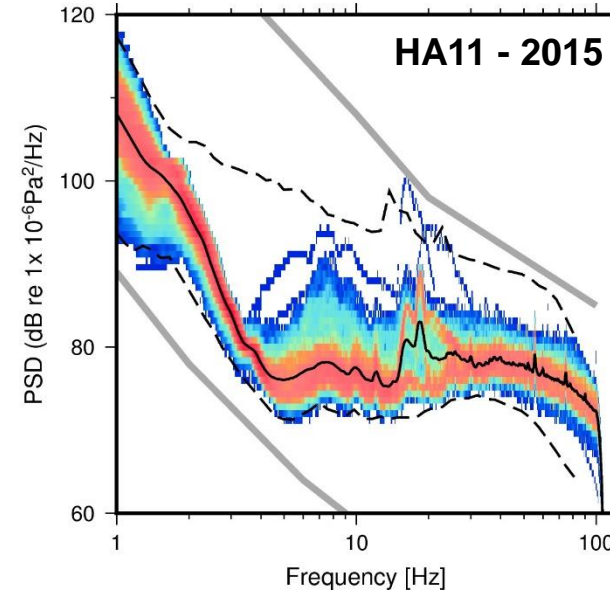
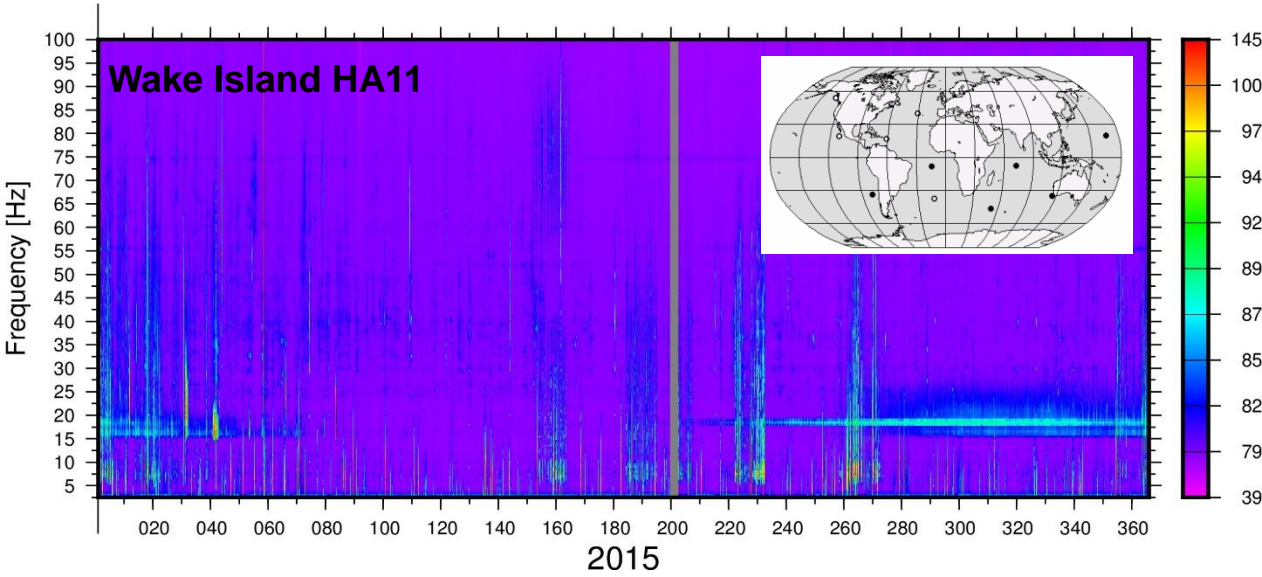
CONCLUSION



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P1.3-435





INTRODUCTION

OBJECTIVES

METHODS/DATA

RESULTS

CONCLUSION



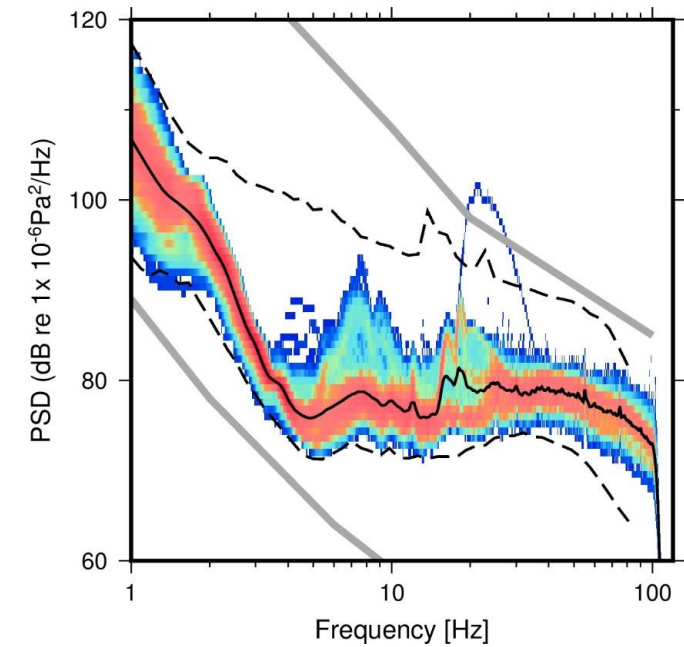
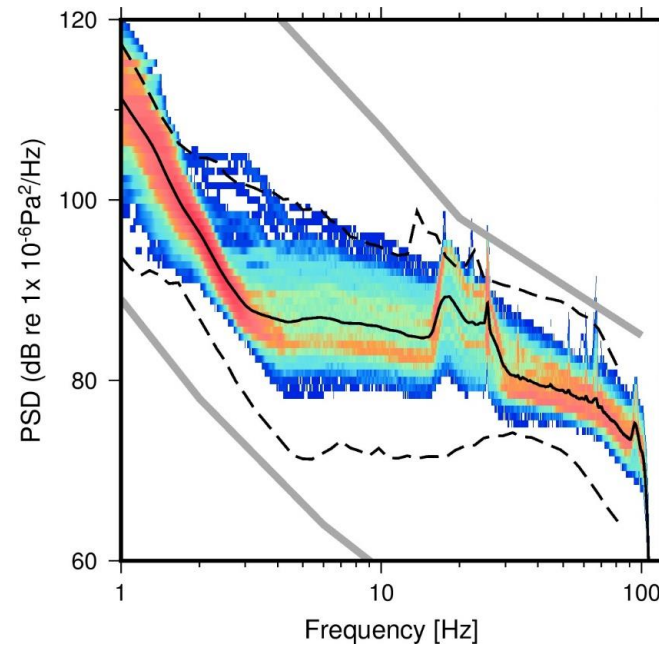
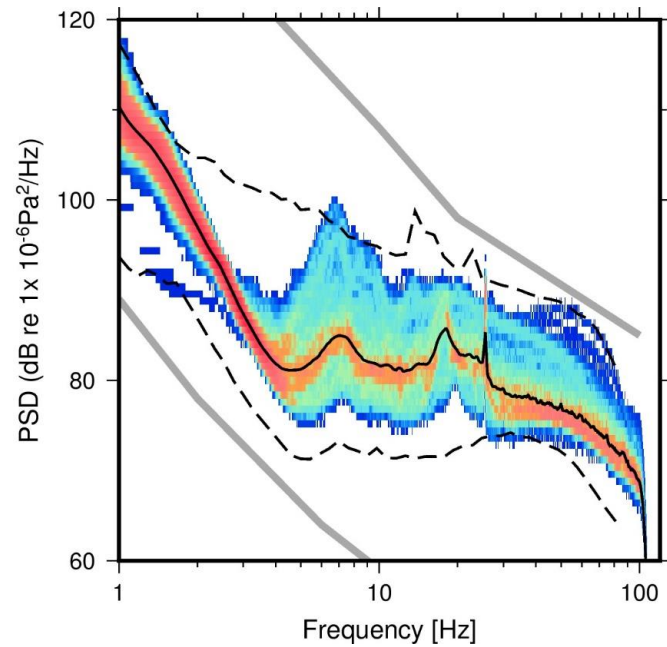
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P1.3-435

**Ascension HA10**

**Cape Leeuwin HA01**

**Wake Island HA11**



Thick grey lines: Wenz limits of prevailing ocean noise

Broken black lines: hydroacoustic global low noise IDC2010\_LH and high noise IDC2010\_HH model (Brown et al., 2014)

**Probability-Density-Function (PDF) derived from 10 min. spectral characterization and resulting daily averages for 2015**



INTRODUCTION

OBJECTIVES

METHODS/DATA

RESULTS

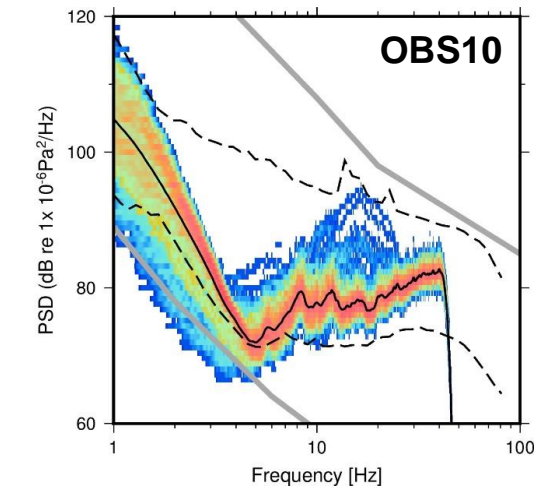
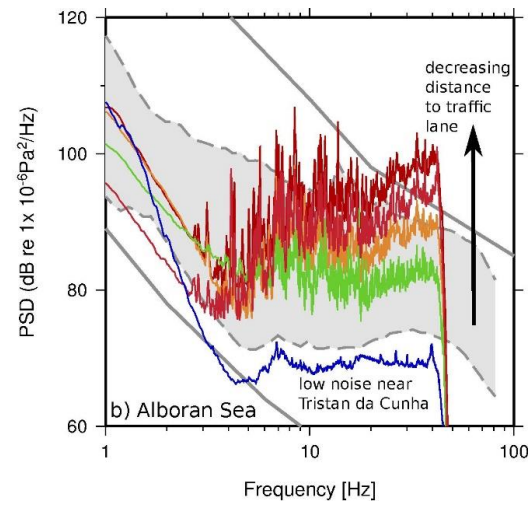
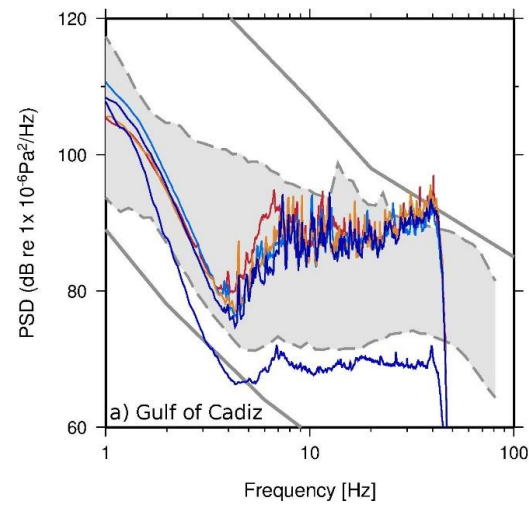
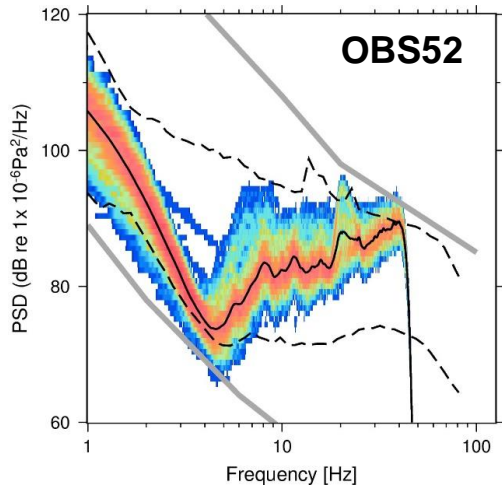
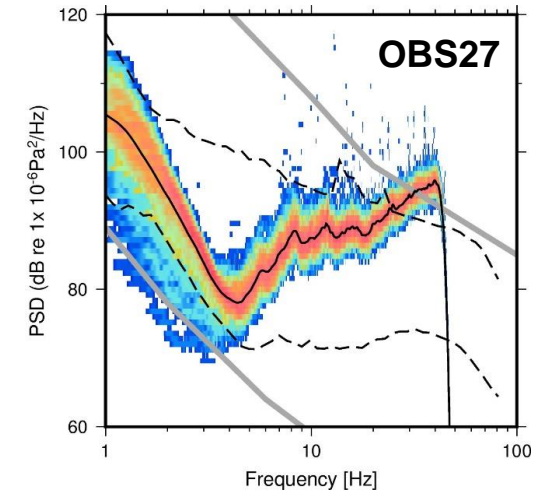
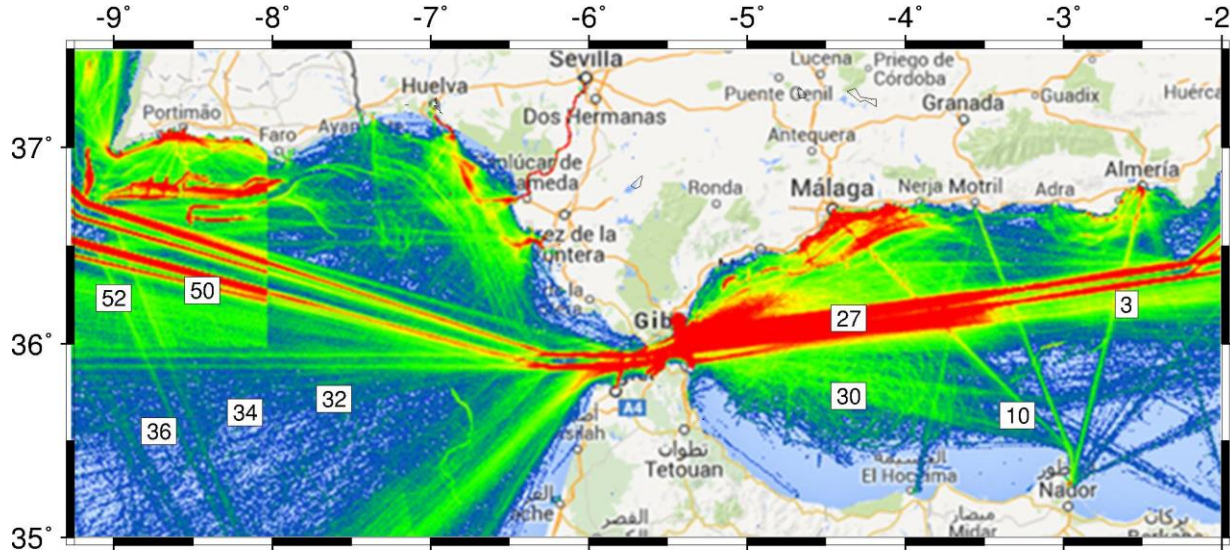
CONCLUSION



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P1.3-435





INTRODUCTION

OBJECTIVES

METHODS/DATA

RESULTS

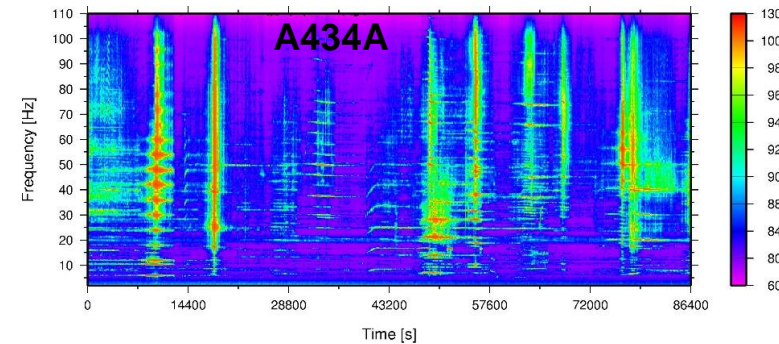
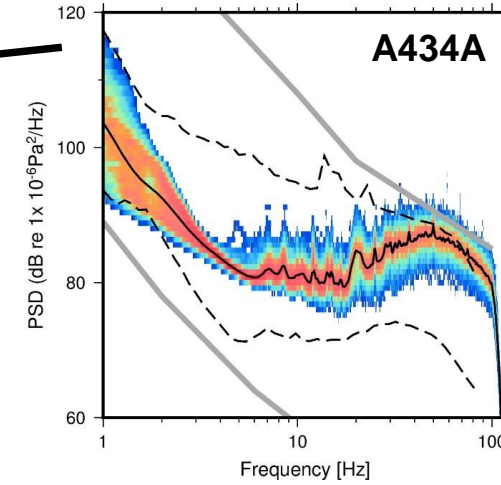
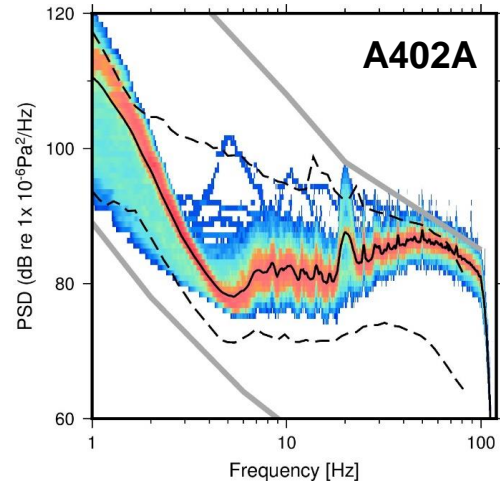
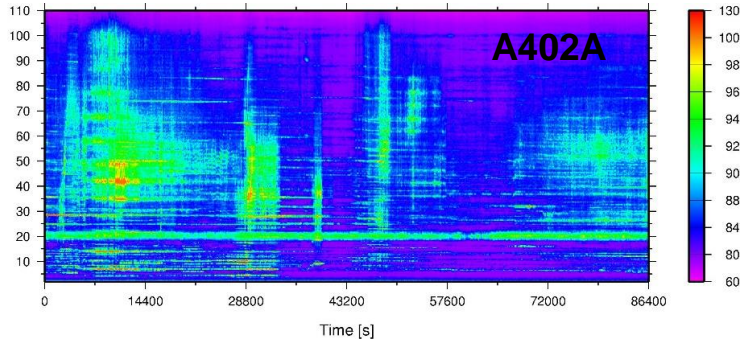
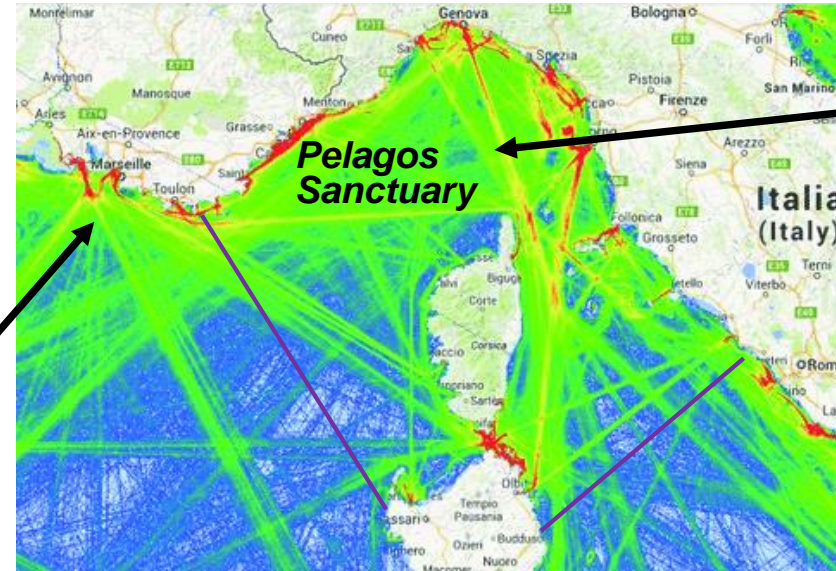
CONCLUSION



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Noise in a Marine Protected Area

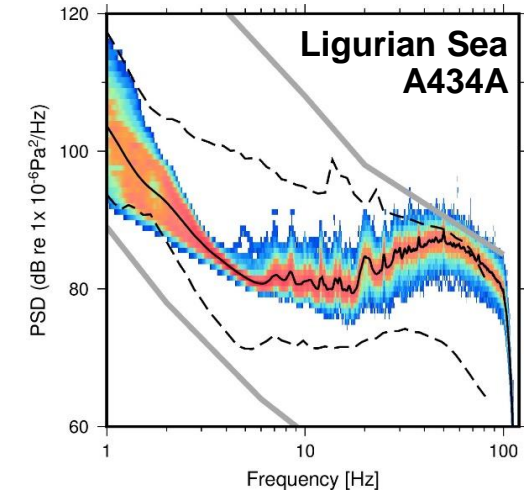
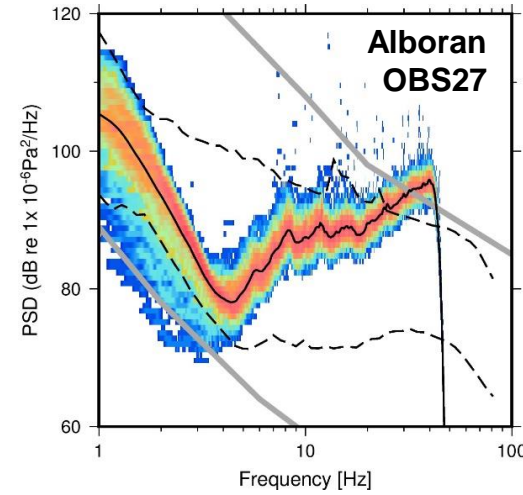
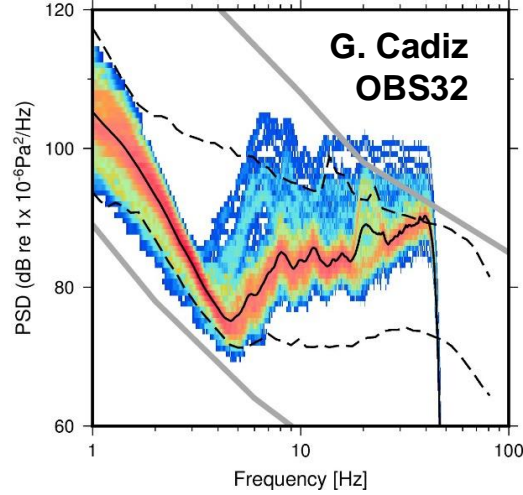
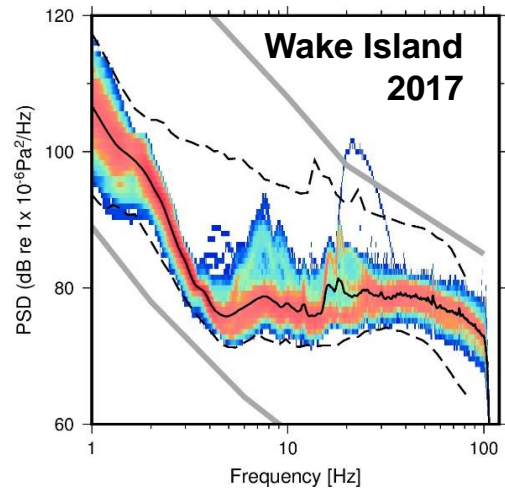


- INTRODUCTION
- OBJECTIVES
- METHODS/DATA
- RESULTS
- CONCLUSION

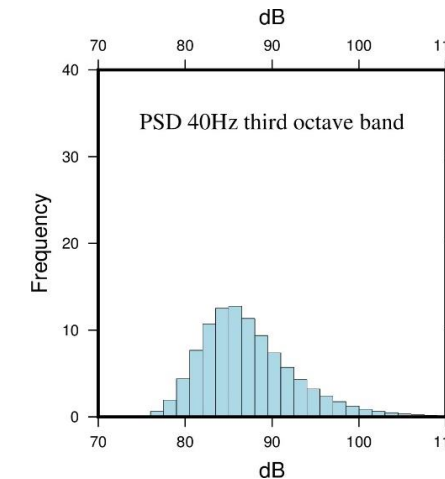
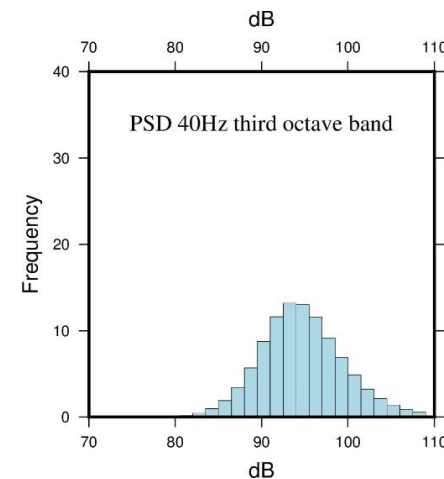
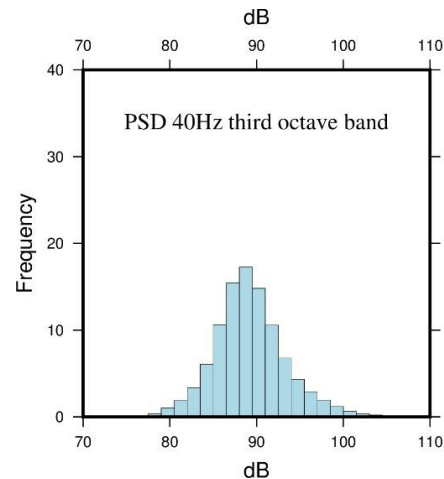
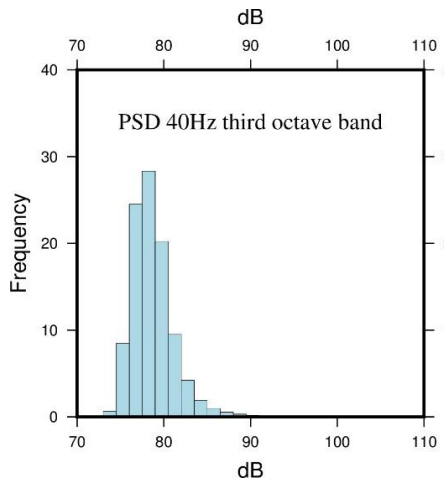


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**CONCLUSION:** Sound-levels in the Mediterranean Sea and its gateways are increased by at least 20 dB with respect to ocean-basin sites and thereby masking communication of marine mammals and hindering hunting for prey and hence anthropogenic noise provides a thread to marine life – even in Marine Protected Areas.



Increasing the sound level by 10 dB result in a 10-fold increase of intensity; an increase by 20 dB causes a 100 times larger intensity; 30 dB indicates a 1000 times larger intensity.

- [INTRODUCTION](#)
- [OBJECTIVES](#)
- [METHODS/DATA](#)
- [RESULTS](#)
- [CONCLUSION](#)

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Duarte, C. M. et al. (2021)

The soundscape of the anthropocene ocean

Science 371, doi:10.1126/science.aba4658

Brown, D., L. Ceranna, M. Prior, P. Mialle, and R.J. Le Bras (2014)

The IDC Seismic, Hydroacoustic and Infrasound Global Low and High Noise Models

Pure Appl. Geophys., 171, 361–375, doi:10.1007/s00024-012-0573-6

Figures on ship's traffic are from or are modified from Marine Traffic.com:

<https://www.marinetraffic.com/blog/how-is-marinetraffic-used-commercially>



INTRODUCTION

OBJECTIVES

METHODS/DATA

RESULTS

CONCLUSION



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P1.3-435