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# Monitoring of cetacean diversity in the central Mediterranean Sea using a single static acoustic sensor

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## INTRODUCTION

The Mediterranean Sea hosts 8 cetacean species, which have different biology, distribution and ecology, with preferred habitats from coastal areas to pelagic environments. Passive Acoustic Monitoring (PAM) is a non-invasive scientific technique to acquire critical information about cetaceans and effect of human activities (Howe et al., 2019). Here, we investigated their species diversity in a **poorly studied area** of the Sicilian Channel (central Mediterranean Sea), where an offshore wind farm will soon be developed.

## METHODS

A SoundTrap ST600 (Ocean Instruments, NZ) was deployed in the Sicilian Channel (PAM site; Fig. 1) from Feb 18 to Apr 27, 2022. A total of 9,473 acoustic files (69 days, 790 hours, 1 TB) were acquired at 192 kHz sampling rate with 50% duty cycle.

- **Manual Analysis**

A subset of the dataset (1,575 files) was selected to detect cetacean vocalizations. Raven Lite (The Cornell Lab of Ornithology) was used for spectrogram visualization and audio listening at both broadband (fs: 192 kHz) and low frequencies (fs: 1.6 kHz).

- **Automatic Analysis**

A custom algorithm developed in MATLAB (MathWorks, USA) was applied to the entire dataset to identify echolocation signals of dolphins (Caruso et al., 2017; 2020). Additionally, spectrograms were generated to identify “20 Hz calls” of Fin whale.


**Figure 1.** Map with the location of the PAM site (red dot).

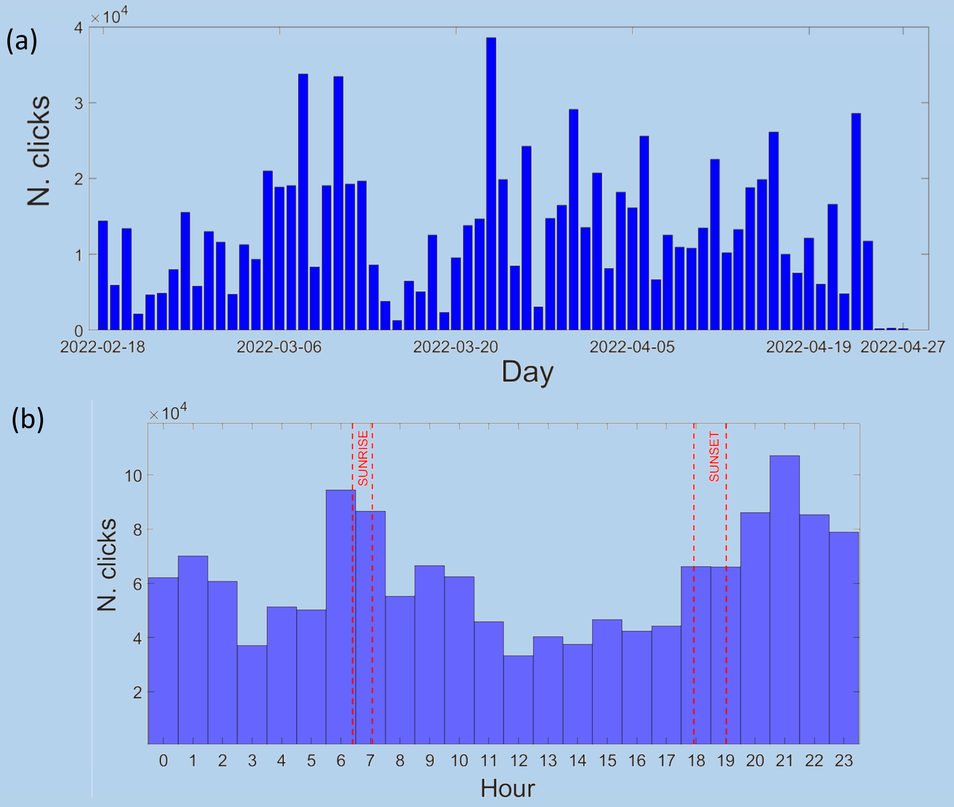


**Figure 3**. (**a**) Number of clicks detected during days for all dataset and (**b**) in relation to hours.

## RESULTS

Results showed high cetacean diversity in the PAM site (Fig. 2). Within delphinids, clicks were the most frequent sound category recorded (56%), followed by whistles (25%) and pulsed sounds (19%).

The automatic analysis identified dolphin clicks every monitoring day (Fig. 3a) and within 3,160 files (about 1.5 million of detected signals). Moreover, the daily pattern of dolphin clicks showed a higher bio-sonar activity during nighttime (Kruskal-Wallis test: $X^2$ = 81.628, p-value < 0.05; Fig. 3b).

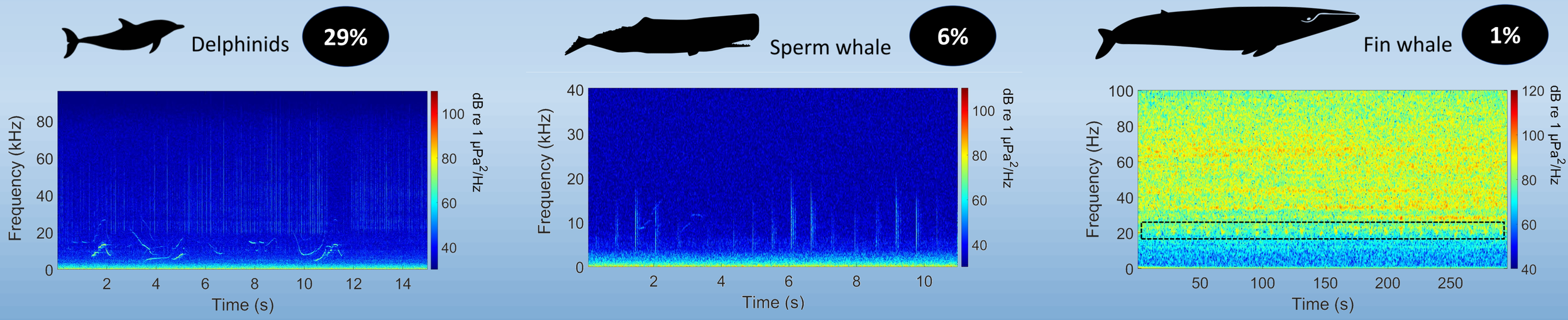


**Figure 2.** **Top**) Percentage of files with cetacean sounds through manual analysis. **Bottom**) Spectrograms: 1 and 2 (nfft=2048, overlap=50, Hann window); 3 (nfft=4096, overlap=50, Hamming window).

## CONCLUSIONS

## THE SICILIAN CHANNEL HOSTS A HIGH DIVERSITY OF CETACEAN SPECIES

**REFERENCES**

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