Listening to Whales

APPLICATION OF MACHINE LEARNING IN BIOACOUSTIC

Background

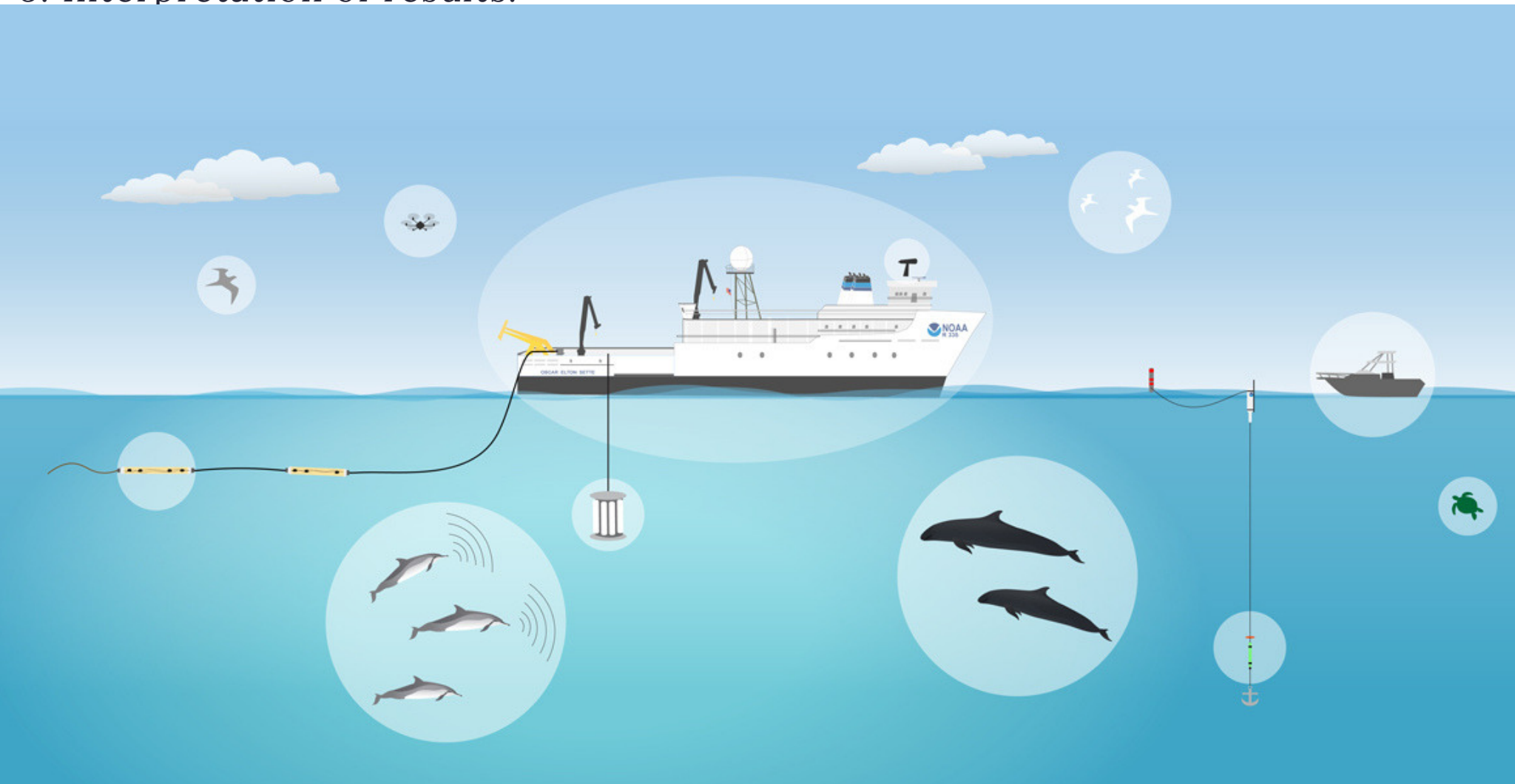
- Low Population of Right Whales.
- Impact of Human activities on whales
- Visual Observation of Whales.

Purpose

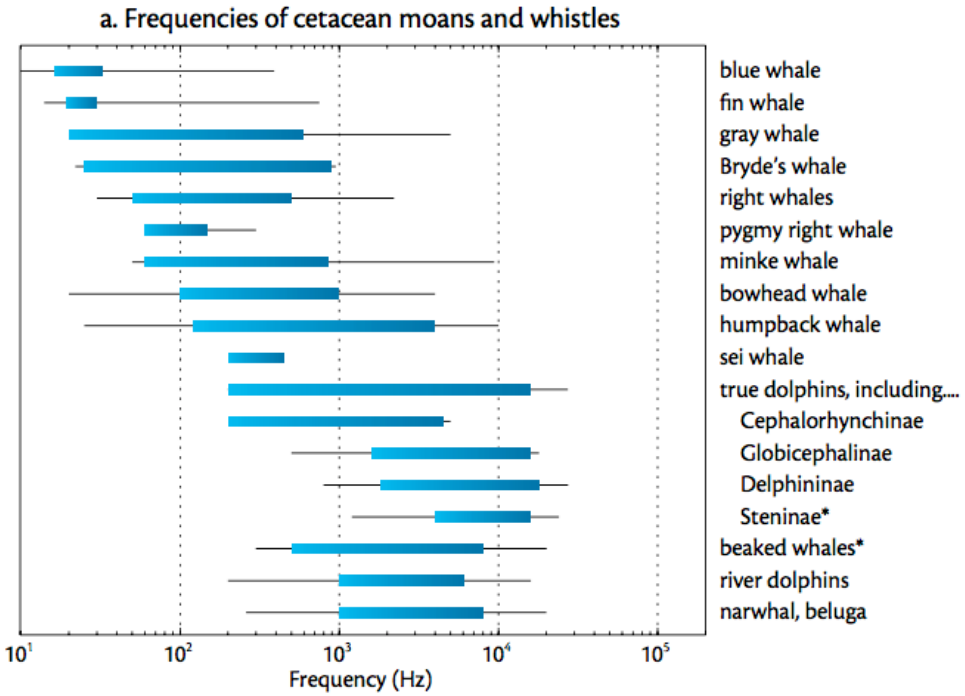
- Passive Acoustic method and Deep learning method
- Identify the species.
- Estimate the group size.
- Study the seasonal occurrences.

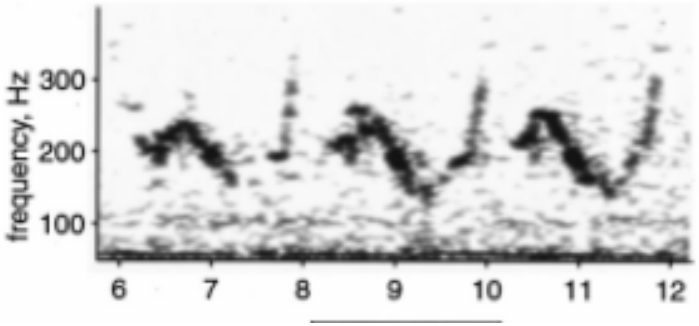
Method

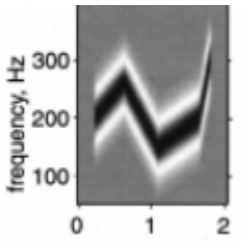
1. Survey Design
2. Placement and recovery of recording instruments
3. *Extraction of vocalization* of interest from recorded data.
4. *Statistical Analysis*.
5. Interpretation of results.



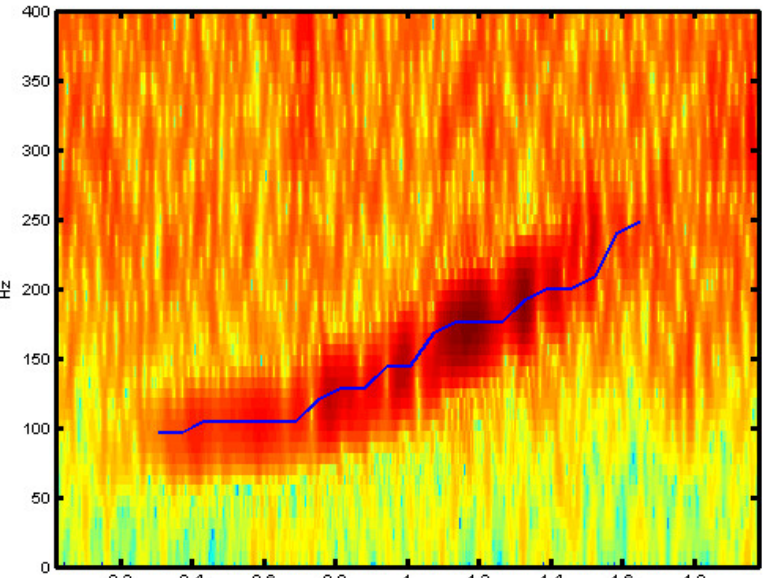
Method







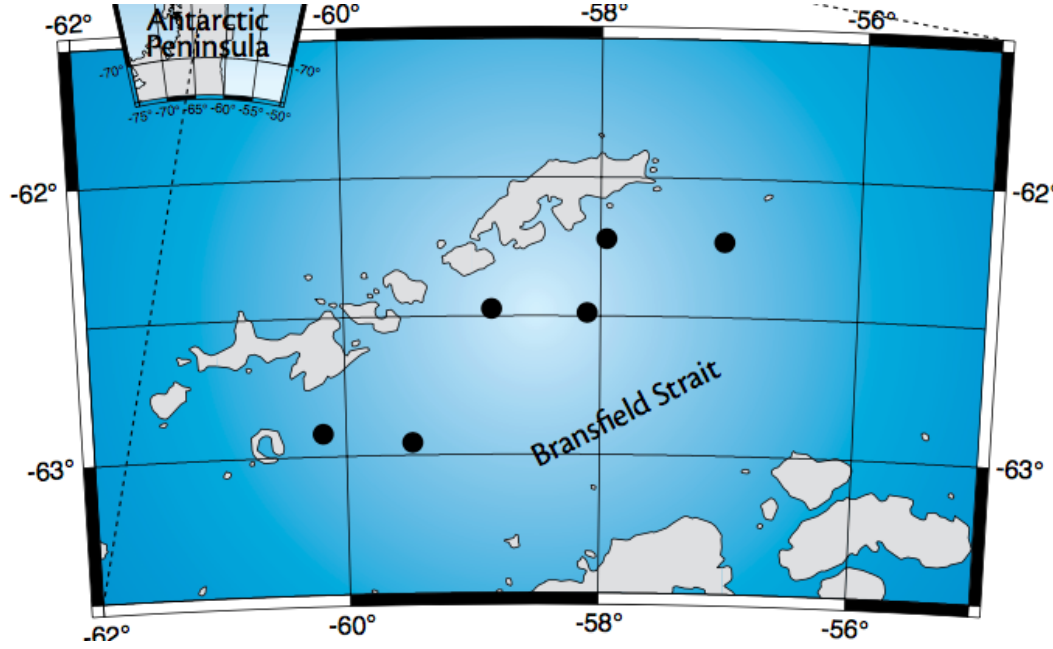
Section no.	Duration, s	Start freq., Hz	End freq., Hz	Bandwidth, Hz
1	0.395±0.079	197.6±9.3	257.2±15.1	50
2	0.458±0.110	257.2±15.1	146.4±12.2	50
3	0.557±0.139	146.4±12.2	196.7±15.5	50
4	0.143±0.105	196.7±15.5	295.7±19.4	50

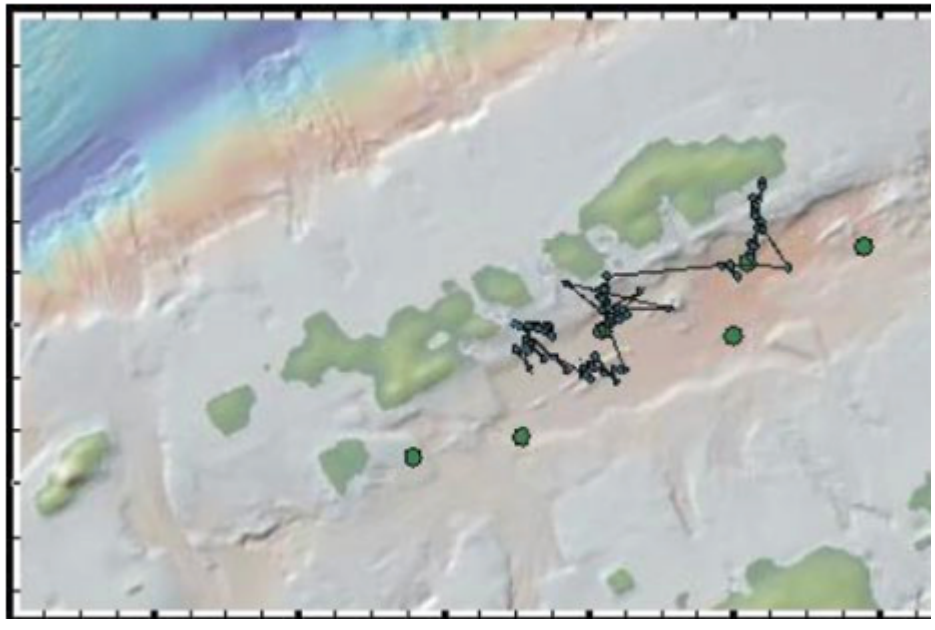


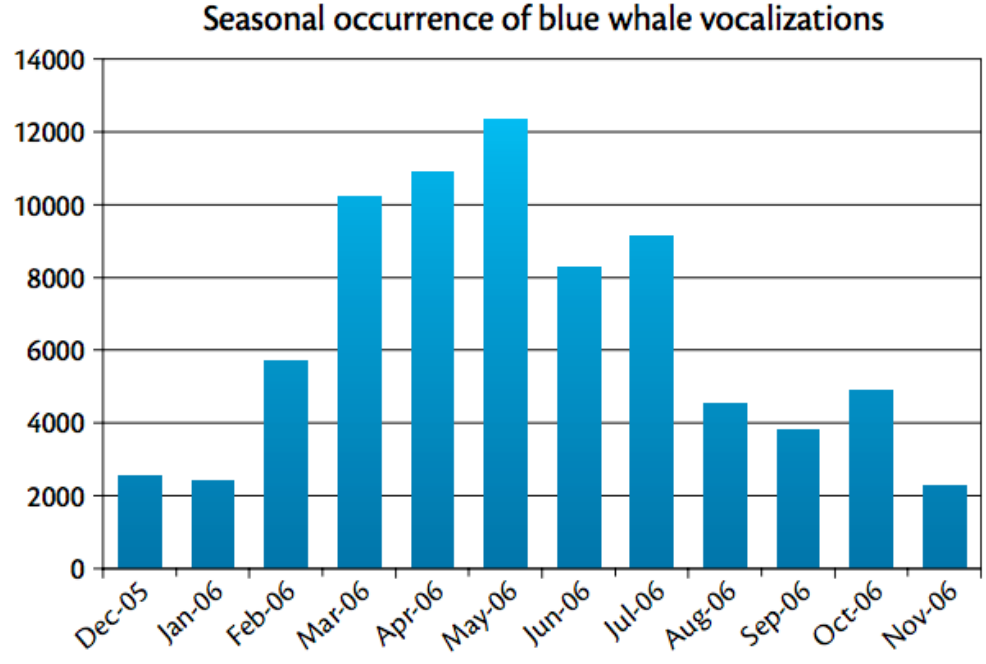
- Spectrogram-based template matching.
- Image-processing and neutral networks.
- Band-limit amplitude in the time series.

An Example Survey

- Six hydrophones were deployed near Antarctic Peninsula.
- Study the occurrences of blue and fin whale.
- Analysis provides seasonal and geographic patterns.







Challenges

- High level of noise.
- Estimate abundance.
- Lack of understanding of behavioral context of sound production for many species.

Thank You!