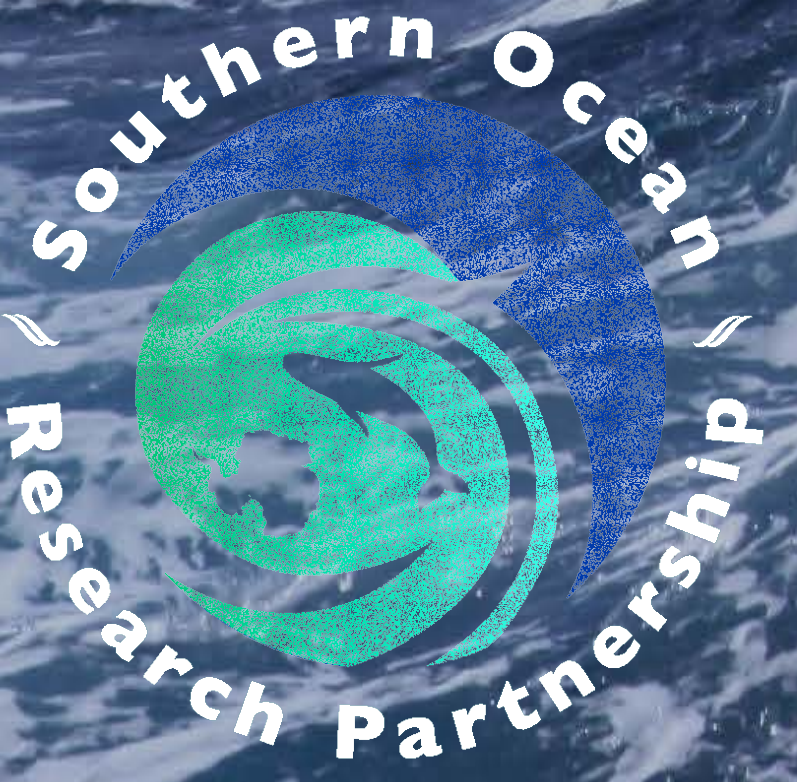


Listen to the BLUE: Towards a pan-Antarctic monitoring system and blueprint of analysis methods to study fin and Antarctic blue whales in the Southern Ocean



THE SORP ACOUSTIC TRENDS STEERING GROUP:

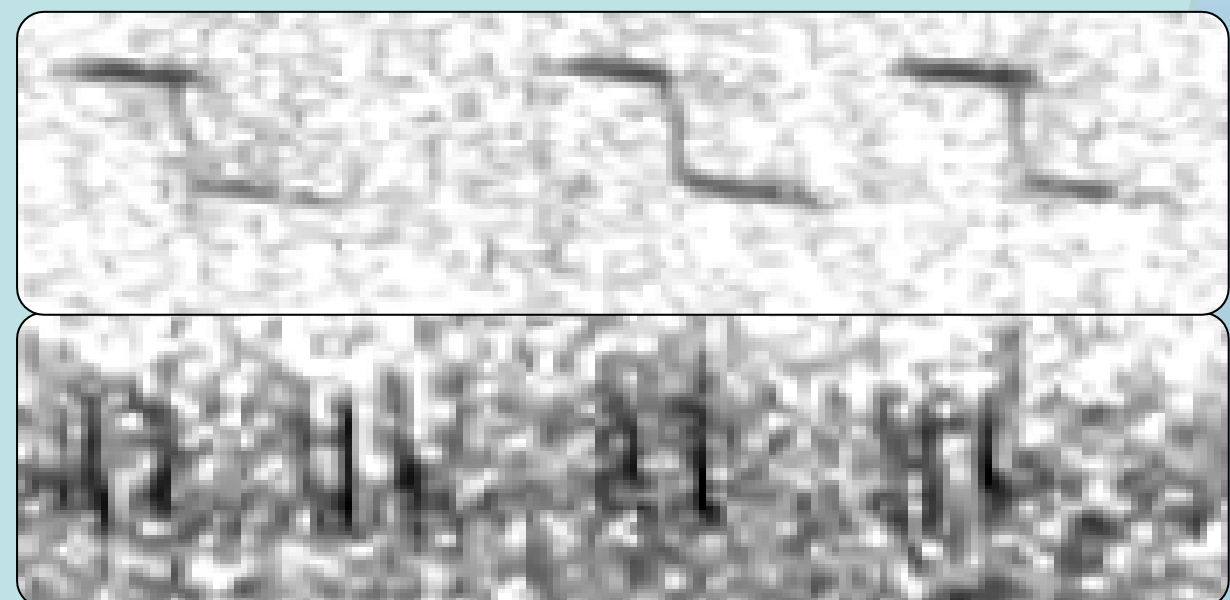
Ilse Van Opzeeland¹, Flore Samaran², Kathleen Stafford³, Ken Findlay⁴, Jason Gedamke⁵, Danielle Harris⁶, Brian Miller⁷

The **SOUTHERN OCEAN RESEARCH PARTNERSHIP** (SORP) is an international consortium of scientists investigating the post-exploitation status, health, dynamics and environmental linkages of Southern Ocean (SO) whale populations using non-lethal techniques.

The SORP **BLUE AND FIN WHALE ACOUSTIC TRENDS PROJECT (ATP)** aims to implement a long term research program examining trends in Southern Ocean Antarctic blue (ABW) and fin whale (FW) population growth, distribution, and seasonal presence using passive acoustic monitoring techniques.

MOTIVATION

In the SO, Antarctic blue whales (ABW) and fin whales (FW) were severely depleted during commercial whaling. From 1978 to 2010 the International Whaling Commission (IWC) supported 3 circumpolar sets of sighting (IDCR/SOWER) to estimate the abundance of ABW. To continue to monitor the post-exploitation status of ABW and to estimate a first abundance of FW in this remote study area, the use of a circum-Antarctic network of long-term passive acoustic recorders has been proposed. This is the aim of the blue and fin whale Acoustic Trends Project (ATP)



ABW and FW calls occur throughout the SO. Acoustic data reveal when a species occurs in a region (distribution and movements), and, ultimately, with additional information such as detection range and call rates, estimates of relative abundance may be possible.

PAST & CURRENT PASSIVE ACOUSTIC MONITORING (PAM) EFFORT

Past and current PAM efforts do not readily allow assessments of ABW and FW trends in abundance because:

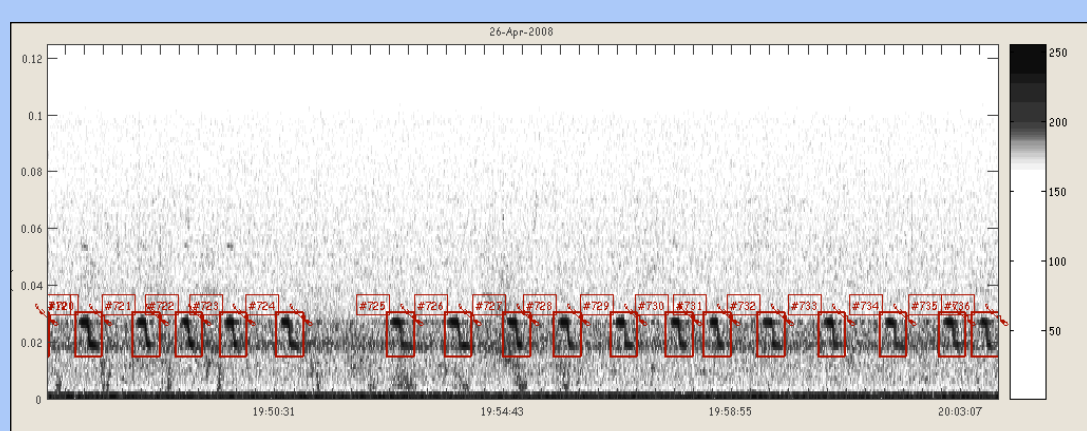
- recordings were made over different time frames between sites
- some areas are data deficient
- different recording instrumentation was used
- passive acoustic data were processed differently

HOW TO COORDINATE PAM DATA PROCESSING AND ARCHIVAL ?

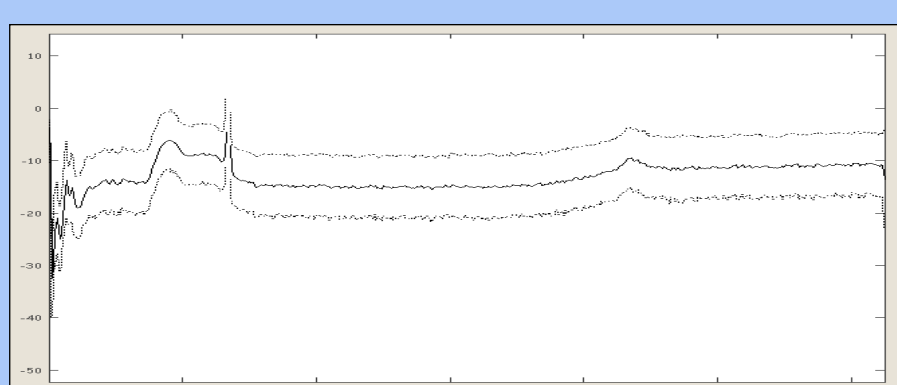
The ATP will provide a blueprint of analysis methods in order to standardize analyses so that data can be merged into a circum-Antarctic data base,

Several analytical tools exist:

- LTSA (Long-term-spectrogram-average): useful for assessing species presence and seasonal occurrence. Also used for assessing the general soundscape (Fig right).
- Automated detectors (event detection) :



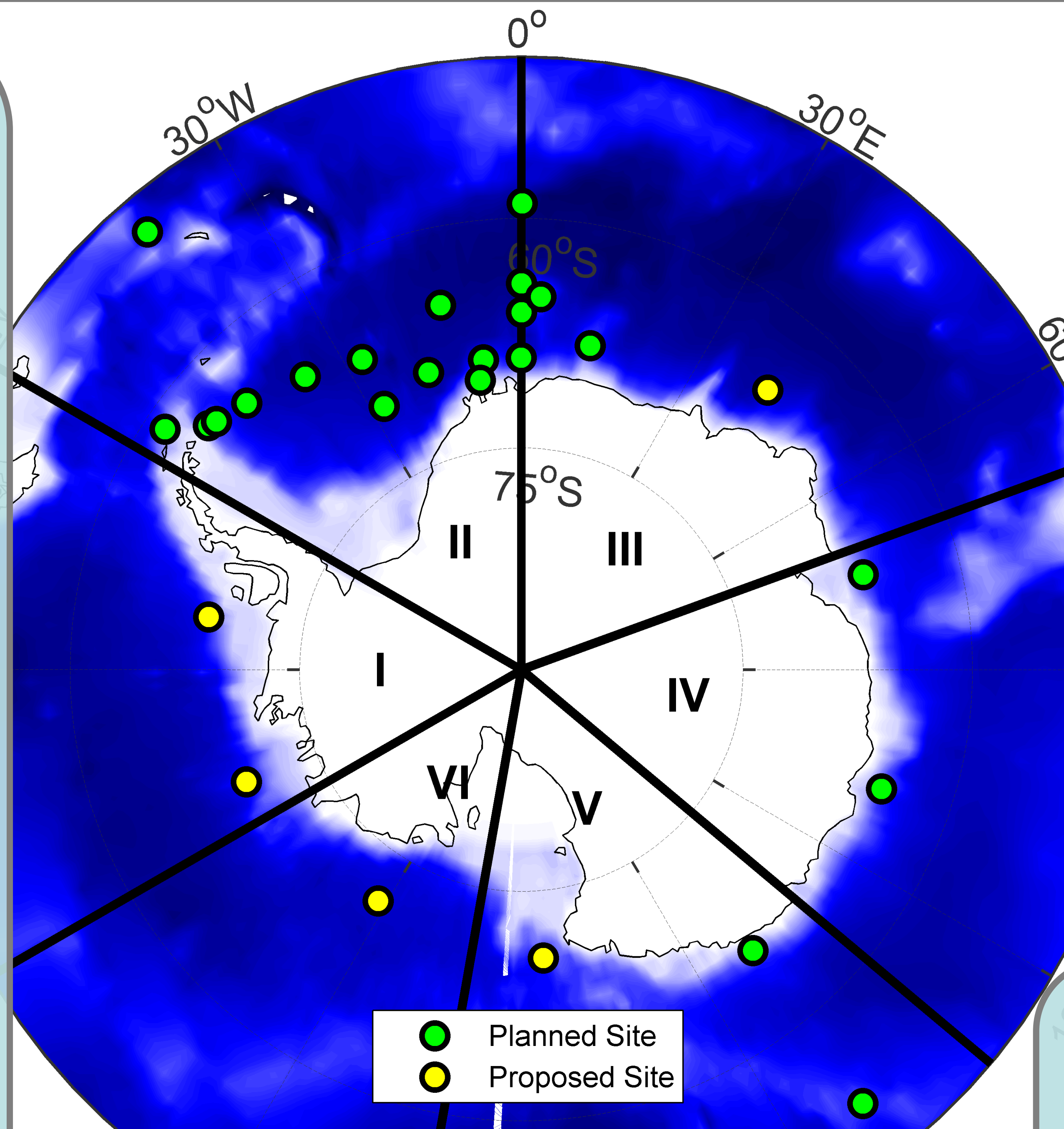
- Energy detection:



Archiving & Managements

All acoustic data collected as part of SOHN will be archived so that partner collaborators will have access to the data.

- checking quality
- provide clear recommendations and framework for data analyses



● Planned Site
● Proposed Site

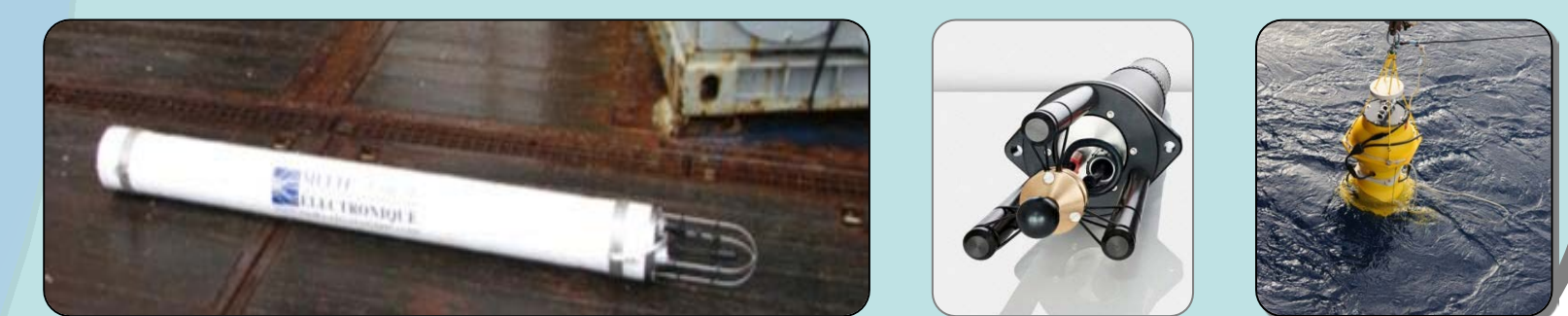
WHAT IS NEEDED TO ASSESS TRENDS IN ABW AND FW ABUNDANCE ?

A PAM data base that has coincident longterm circum-Antarctic coverage (~10 years of monitoring with at least one instrument preferably between 63° and 66° S in each of the six IWC managements areas). Procedures for data collection, processing and analysis would be based on standards and recommendations presented by the ATP. In this way, the distribution, seasonal presence and relative abundance of ABW and FW can be evaluated in a consistent and robust manner

A CIRCUM-ANTARCTIC HYDROPHONE NETWORK

Through international collaboration the ATP proposes to implement a SOUTHERN OCEAN HYDROPHONE NETWORK (SOHN) by:

- allowing for international planning to avoid duplication of research efforts and co-operation in instrument deployments
- providing recommendations on instruments, settings and moorings with further information on logistics (technical report: the White Paper)
- creating a pan-Antarctic database, freely available to participating members
- initiating a library of instruments managed by ATP/SORP from which member nations can obtain calibrated standard instrumentation to ensure future monitoring (funding source not available yet)



ADDITIONAL BENEFITS

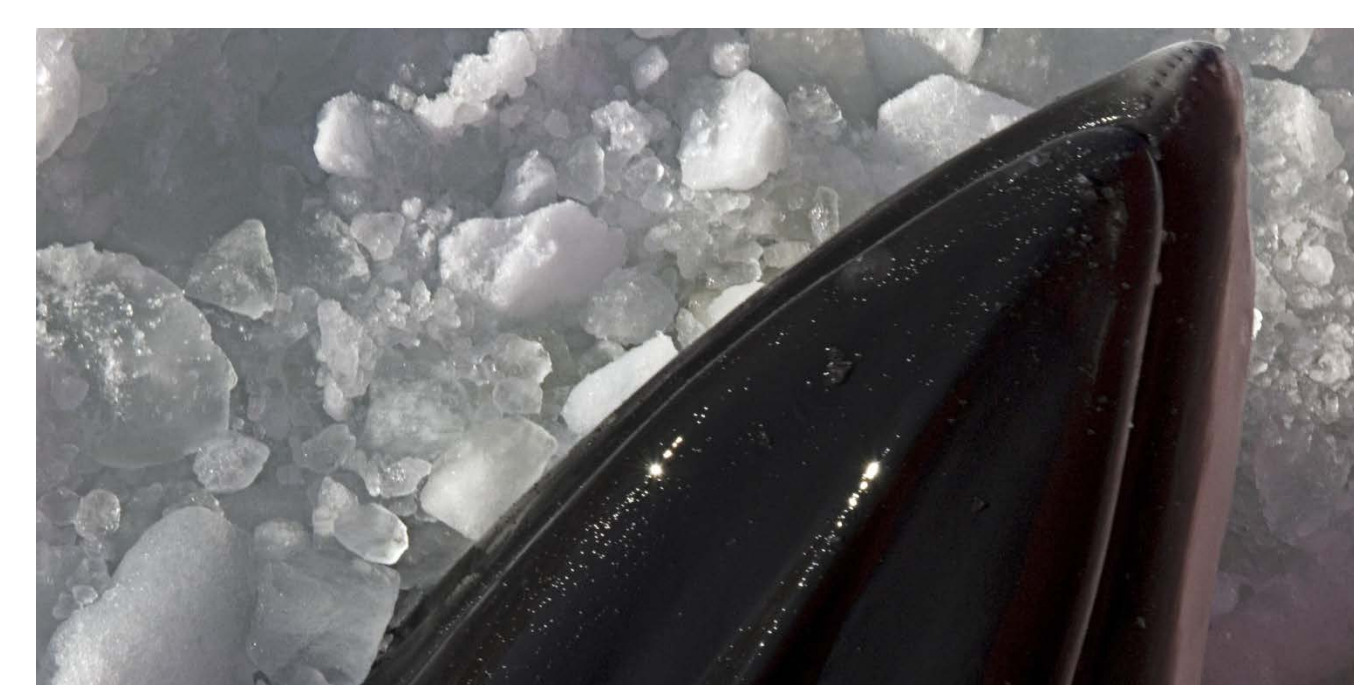
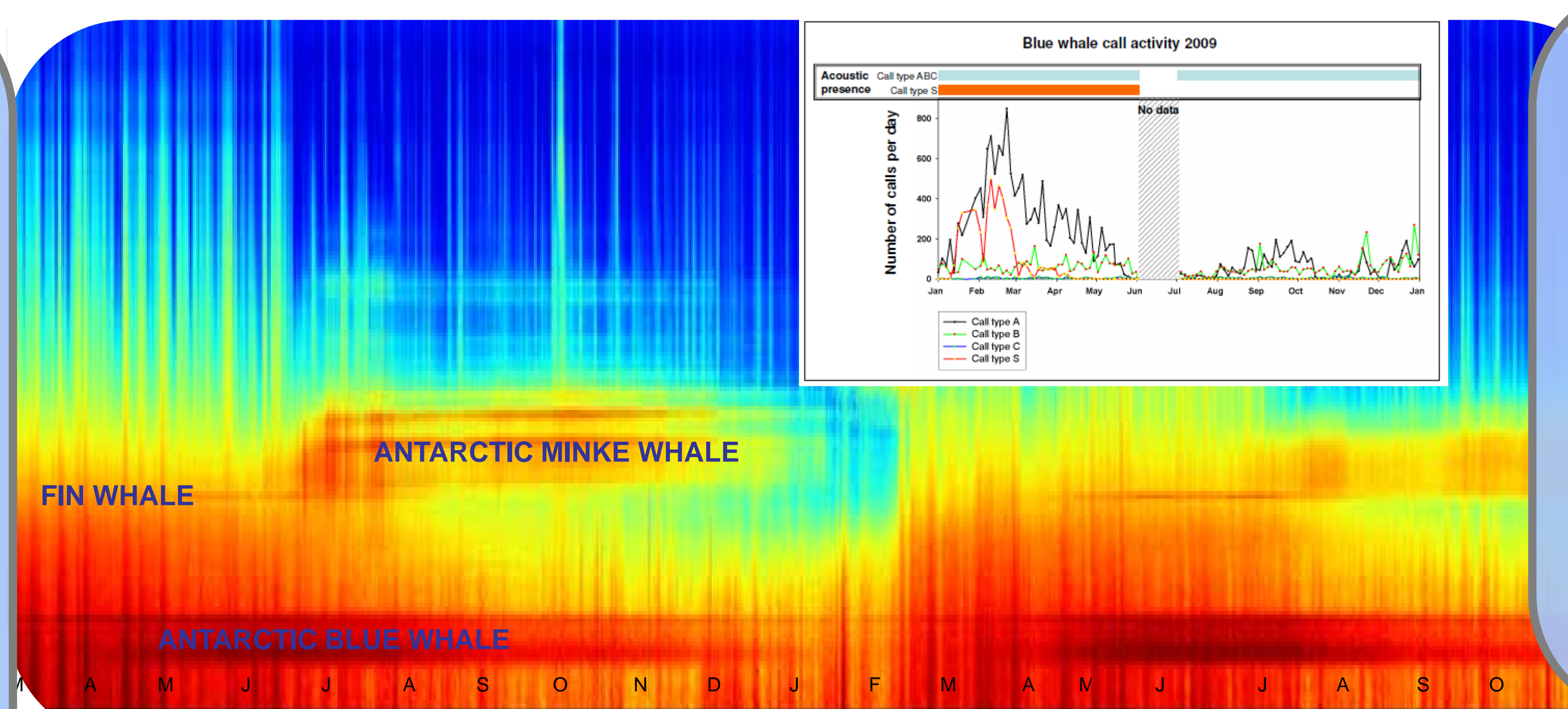
- Recordings will provide information on environmental noise and soundscapes on a decadal scale, which is relevant to other research efforts e.g., the International Quiet Ocean Experiment
- Network provides an opportunity for international student training to deploy and work with PAM
- The coordination and standardization of data collection and analysis required for SOHN may be a useful benchmark for future networks

HOW TO GET FROM PAM DATA TO POPULATION TRENDS ?

To estimate animal abundance from PAM data, (1) the size of the area monitored by the instruments and (2) the probability of detecting animals acoustically within that area must be estimated.

Data about call production are also essential. Often abundance methods rely on call rate estimates, which may come from auxiliary behavioural studies.

To then assess trends in abundance, long term time series are required.



WE NEED YOUR HELP TO LISTEN TO WHALES

To make the SOHN a reality, we are seeking collaboration partners to deploy instruments especially at proposed sites in areas I and IV.

WEBSITE : <http://www.marinemammals.gov.au/sorp/projects/antarctic-blue-whales-and-fin-whales-acoustic-program>
CONTACT : Principle Investigator : fsamaran@univ-lr.fr

WHAT IS THE SOUTHERN OCEAN RESEARCH PARTNERSHIP (SORP)

BACKGROUND:

- proposed to IWC by Australian Government in 2008
- aim: to develop a multi-lateral, non-lethal scientific whale research program that will improve the coordinated and cooperative delivery of science to the IWC, in line with IWC priorities
- 5 research projects
- SORP Partners: Argentina, Australia, Brazil, Chile, France, Germany, New Zealand, Norway, South Africa and USA

WEBSITE : <http://www.marinemammals.gov.au/sorp>

Acknowledgements: SORP and IWC

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⁷ Australian Marine Mammal Centre, Australian Antarctic Division, Hobart, Australia

HYDROPHONE NETWORK

PASSIVE ACOUSTIC DATA ANALYSES