

The Southern Ocean Network of Acoustics (SONA)

Principle Investigator

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Programme Website

www.sona.aq

Project Description

Understanding and predicting how the Southern Ocean responds to change is a globally relevant issue that requires circumpolar scale analyses. Sustained multidisciplinary observations are required to detect, interpret and respond to change. Key is an understanding of baseline levels of ocean circulation and hydrography, and primary and secondary productivity, as it is from these baseline levels that change can be identified. The Southern Ocean Network of Acoustics (SONA) aims to resolve the large scale distribution of mid-trophic level secondary producers, by implementing a self-sustaining long-term acoustic observing strategy within the international observing and modelling communities.

Mid-trophic level organisms range in size from small plankton (<2 cm), which drift with currents, to larger nekton (>10cm), which have the ability to swim freely. They are a taxonomically diverse group that include cephalopods, gelatinous organisms, euphausiids and mesopelagic fish and play a critical role in Southern Ocean ecosystems by transferring biomass and energy through the food web from primary producers to predators.

Acoustic methods offer a means to collect high resolution data over small to large spatial and temporal scales of key mid-trophic level species and/or functional groups from a number of different platforms. However, acoustic measurements cannot be used without standardisation of systems, appropriate validation and quantification of basic relationships between biological variables of interest and acoustic energy. To that end a systematic and long-term strategy to establish an acoustic sampling programme including the implementation of standards and protocols for basin-scale ecosystem comparisons, coordinated through international organisations and programmes is required. The Southern Ocean Network of Acoustics (SONA) aims to address this.

SONA specifically focuses on the sharing and standardisation of methods of collection and processing related to geo-referenced calibrated water column backscatter, Sv [dB re 1m⁻¹] and data sharing. Fundamental to SONA is the collection of bio-acoustic data at single and multiple frequencies (12, 18, 38, 70, 120, 200 and 333 kHz) from existing international vessel infrastructure (scientific research and commercial fishing vessels) on transit over regions of ecological and oceanic importance in the Southern Ocean. Project partners representing international logistic and fisheries resources are signed up through direct data sharing agreements or via parallel data portals such as Integrated Marine Observing System (IMOS). Common standards and protocols for calibration and data processing will be aligned with existing international efforts by the ICES and CCAMLR communities, and IMOS.

Data will be brought together in stages by building the following databases: South Atlantic Scientific database of acoustic backscatter (SAS), South Atlantic Opportunistic database of acoustic backscatter (SAO) and Southern Ocean dataBase of Acoustic backscatter (SOBA). Acoustic data within SONA are managed by the host institutes, but will be exploited through

a fully-searchable web interface, made available on the project website www.sona.aq. Two workshops to analyse the resultant datasets are currently planned.

Project Timeline

August 2013 – August 2016

Key deliverables

- 1) Lead, coordinate and support the Antarctic scientific community in generating an open access database of acoustic observations of the mid-trophic level;
- 2) Implement a self-sustaining long-term acoustic observing strategy framed within the international observing and modelling communities;
- 3) Develop and adopt common standards and methodologies for acoustic data collection and processing, aligned with existing protocols.

Funding

UK NERC IOF. Contributions also from each institutes' national funding (for provision of data), and Mycto-3D-Map (ANR-11-BSV7-0022)

Data Management

Processed acoustic data within the SONA project are managed by the host institutions (SONA partners) and are shared between partners under a data-sharing agreement. These existing datasets will be standardised for onward re-use. Users of the data will be informed of the quality in order to allow storage of data sets with diverse levels of quality.

The data management strategy will be developed as part of SONA, but will piggy back onto existing and developing data management frameworks (e.g. that implemented by IMOS, by the British Antarctic Survey Polar Data Centre and that documented by ICES). SONA metadata will utilise British Oceanographic Data Centre vocabulary and comply with the ICES Acoustic Metadata Standards (ICES, 2013), as well as the NERC Discovery Metadata Standards (NERC, 2014). The latter feeds directly into the Global Change Master Directory (GCMD) as used by SOOS.

Data will be made available through a searchable web-based portal. This portal will be accessible to search metadata records. The final data access strategy needs to be fully described and adopted by the SONA members, but it is envisaged that data access will be a combination of freely-open or log-in restricted depending on licensing requirements of host institutions. It is important that the use of the data, although not (necessarily) limited, can be tracked to use as a metric of success.

References:

- ICES. 2013. A metadata convention for processed acoustic data from active acoustic systems, SISP 3 TG-AcMeta, ICES WGFASSTopic Group, TG-AcMeta. 35pp.
NERC. 2014. Discovery Metadata Standards and Procedures, NERC. Version 1.0. 40pp.