

Passive Acoustic Open Data Initiative

Description

Passive acoustic monitoring of the ocean sound field is a critical aspect of NOAA's mandate for ocean and coastal data stewardship. Sound can travel vast distances underwater (e.g. across ocean basins) making passive acoustic monitoring a powerful observational tool that is used across NOAA to detect and characterize: (1) sounds produced and used by living marine resources (e.g., endangered marine mammals, commercially important fish species); (2) natural sources of noise from physical oceanographic processes; and (3) anthropogenic noise sources that contribute to the overall ocean noise environment. Passive acoustic data are used broadly across NOAA's NMFS, NOS, and OAR lines offices for a wide range of activities central to NOAA's mission including marine mammal stock assessments, monitoring of earthquake and geological activity, and assessing impacts of anthropogenic noise on marine life.

Passive acoustic monitoring has improved the quality and quantity of information that can be gathered during ocean research projects, but these improvements come with a corresponding increase in data volume. Each NMFS Fisheries Science Center has an extensive data backlog but largely lacks the means to sustainably preserve these data, much less future collections, nor to make them publicly available. Towards that end, NMFS and collaborative partners are proactively seeking mechanisms to efficiently maintain and store passive acoustic data. In 2014, a one year pilot project was established between NMFS and NCEI to develop the framework to receive and archive NMFS existing and future passive acoustic data. Small subsets of raw passive acoustic data collected using stationary recorders by the Northeast Fisheries Science Center were used to develop the pipeline to deliver files and appropriate metadata from data providers to NCEI. These data were also used to create the domain database, and the pathway for data storage. Public dissemination of these valuable data, however, were out of scope during the pilot project efforts. In order for NMFS to meet their PARR requirements, we propose to develop a new web-based map viewer that will allow the public to discover, query and access archived passive acoustic data. Additional datasets collected as part of the Ocean Noise Reference Station Network will be included in the data that are made available to the public. The Ocean Noise Reference Station Network, through a unique collaborative effort across NOAA's OAR, NMFS, and NOS offices, is the first ever acoustic monitoring system deployed broadly throughout the US EEZ, and allows NOAA to collect consistent and comparable multi-year acoustic data sets covering all major regions of the U.S. This dataset improvement proposal will address a deficiency in discoverability, accessibility and usability of passive acoustic data. As additional passive acoustic data are incorporated into the archive in the future, the map viewer to be established here will allow these data to be readily available and thus provide long-term discoverability and accessibility.

Work Breakdown Structure (WBS)

1. Develop database schema to allow for accessibility (Deadline: 1 Oct 2016)
 - a. Use lessons learned from the pilot project to refine the passive acoustic database schema to better match design needs and allow for handling of various data types (i.e. glider, towed array, drifter)
 - b. Develop spatially enabled materialized views that will support map services needed for the web-based map viewer (see WBS.3 below)
2. ISO compliant and harvestable metadata for documentation and discoverability (Deadline: 1 Jan 2017)
 - a. Finalize metadata template to ensure produced records are ISO 19115-2 compliant. This task will help to ensure the archived passive acoustic data, regardless of data provider and collection method, are consistently documented to support discovery, use, and understanding.
 - b. The metadata records will be made available via a web accessible folder, which will be harvested by the NOAA Data Catalog.
3. Develop foundational map services (Deadline: 1 Dec 2016)
 - a. Develop a new map service using the database tables created and populated in WBS.1
 - b. Develop a new web-based map viewer with basic functionality including simple filtering, zoom/pan/identify, background layers, etc.
4. Identify and implement query functions (Deadline: 1 Jan 2017)
 - a. Specific filter functions will be identified to assist users in querying the data on the map viewer. This will allow them to refine their search and improve discoverability. Passive acoustic data are large volume, long-term datasets and any effort to help a user reduce excessive data requested from the archive system will allow for a more efficient user experience and data access service.
5. Delivery of requested data (Deadline: 1 Jan 2017)
 - a. User requests generated by the map viewer will be forwarded by the system to the passive acoustics data manager.
 - b. The data manager will retrieve data orders from tape and stage them for delivery on the NCEI FTP server, or arrange for hard drive delivery if the data volume is too large for FTP.
6. Incorporate Ocean Noise Reference Station Network datasets (Deadline: 30 Jun 2017)

- a. As passive acoustic recorders associated with the Ocean Noise Reference Station Network project are recovered and submitted to NCEI, these data and associated metadata will be incorporated into the existing database and storage structure. These datasets will increase the volume and spatial coverage of data available and will further serve to strengthen archival and access to NOAA's big data.
7. Finalize map services (Deadline: 30 Jun 2017)
- a. Enhancements to the map viewer will allow for increased efficiency as filter functions are tested and the additional datasets are incorporated. This work will produce a robust system that can accommodate an increasing volume of data, display relevant deployment details, successfully query the backend database based on desired filter criteria, and allow for data requests to be filled efficiently.

Budget and Personnel

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\$45,000

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NCEI Org code: 40-14

Financial POC for NOAA Accounting Code

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Grants, Contracts, or Cooperative Agreements that will be used to obligate the funds

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