Marine Environmental Research Infrastructure for Data Integration and Application Network

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Outline

● MERIDIAN - an overview
  ○ Who are we?
  ○ What do we do?
  ○ Funders and partners

● Data management projects
  ○ AIS vessel tracking data
  ○ Metadata profiles
  ○ Data discovery portal

● Modeling, data analysis, and visualization projects
  ○ Directional acoustic data
  ○ Ocean soundscape atlas
    ■ Shipping noise
    ■ Environmental noise
  ○ Acoustic detection and classification with neural networks

● Training initiatives
  ○ PyBaR, educational quiz, workshops
MERIDIAN - an overview
MERIDIAN - who are we?

- Consortium of ocean researchers, computer scientists, and data managers
- 1 PI + 4 team leaders + approx. 13 staff
- 3-year CFI grant (2017-2020)
MERIDIAN - what do we do?

We work hard to ...

● increase the data's value by
  ○ describing it
  ○ making it discoverable
  ○ and reusable

● create open-source software solutions for
  ○ data analysis
  ○ modeling
  ○ visualization

However, we ...

● do not collect data
● are not a data store
Data management projects
1. AIS vessel tracking data

Large portion of the historical exactAIS Archive® data made available by MERIDIAN in partnership with exactEarth Ltd.

- AIS = Automatic Identification System
- Technology developed to communicate vessel information between vessels and from vessels to coastal authorities on a continuous and automatic basis.
- North American region, January 2013 to current (with new data being provided monthly until December 2020)
- 12 licenses for data access are accessible to MERIDIAN collaborators
- Apply at
  https://meridian.cs.dal.ca/services/meridian-s-ais-access/
- We also provide:
  - tools to produce derived products (e.g. GIS layers)
  - general advice on making use of the AIS data
2. Metadata profiles

MERIDIAN is developing metadata profiles for ...

- Underwater acoustic data
  - Based on ISO 19115-2:2009 standard
  - Interoperable with other profiles based on ISO 19115, e.g. US IOOS and CIOOS
  - Incorporates Darwin Core metadata standard for biological information

- Acoustic model outputs (NetCDF files)
  - Incorporates CF1.7 and ACDD1.3 standards
3. Data discovery portal

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Modeling, data analysis, and visualization projects
4. Directional acoustic data

Objective:
Intuitive and interactive 2D/3D visualization tool for directional acoustic data.
5. Ocean Soundscape Atlas

Objective:
Interactive web application for 2D/3D visualization of modeled underwater noise data

Shipping

Environmental
5. Shipping noise

- Initial focus:
  - Estuary and Gulf of St. Lawrence
  - 2013 + 2018

- Use validated shipping noise model:
  
5. Environmental noise

Objectives:

● Model noise due to waves and precipitation
● Develop open-source Python package
5. Environmental noise

Python package capabilities:

- Automatic retrieval of relevant environmental data:
  - Bathymetry
  - Seafloor acoustic properties
  - Water column properties (temperature, salinity, etc)
  - Wave height and precipitation forecasts/hindcasts

- Interpolation of retrieved data

- Transmission loss calculation

- Noise modeling
6. Acoustic detection and classification with neural networks

Fabio's talk!
Training initiatives
Training initiatives

**PyBaR**
- Informal co-working group at Dalhousie University
- A space to discuss data analysis and computational challenges
- Open to students and researchers from all scientific disciplines
- Focuses on Python and R

**Workshops**
- 2-3 workshops currently being planned for fall 2019 and winter 2019/20:
  - Neural-network based sound detectors/classifiers
  - Underwater acoustic data management

**Marine Mammal Sound Quiz**
- Sound clips from Watkins Marine Mammal Sound Database
- Education web-app for school children
- Used in the Big Data Educational Program for Mi’kmaq Children in Nova Scotia

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http://meridian.cs.dal.ca

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