

DEVELOPMENT OF THE ICES CONTINUOUS UNDERWATER NOISE FORMAT AND DATABASE

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Continuous underwater noise, also referred to as ambient underwater noise, has been monitored in the Baltic Sea and in the North Atlantic as part of time limited projects such as BIAS and JOMOPANS. In the Baltic Sea, the BIAS project delivered a Soundscape tool, which has been used by HELCOM in the HOLAS II assessment. Through the Baltic Sea Action Plan, and HELCOM's efforts to support its contracting parties in establishing thresholds for Good Environmental Status (GES) under the EU Marine Strategy Directive (MSFD), as well as the next holistic assessment (HOLAS III), underwater noise is recognized as a pressure on the marine environment. The HELCOM expert network on underwater noise (EN NOISE) proposed to establish a continuous noise database, and transfer the hosting of the Soundscape tool to an international data platform. After a tender specification was published, ICES was selected as the preferred contractor.

Data portal

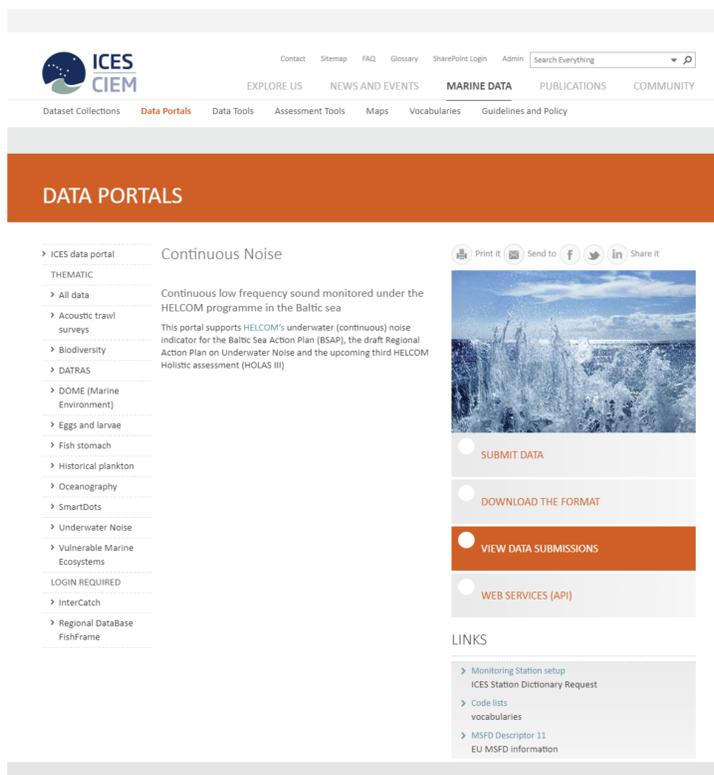
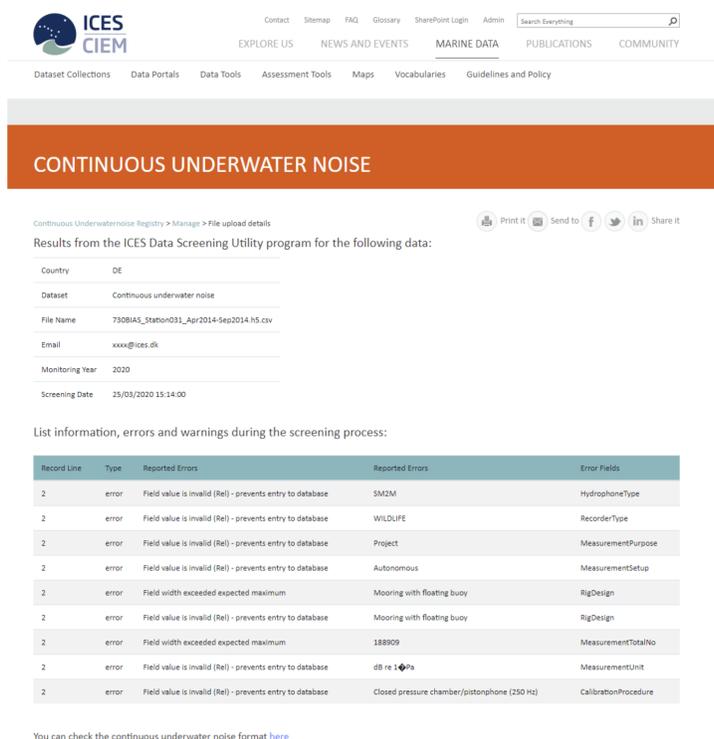


Fig. 1: Continuous Underwater Noise portal landing page

Format and data quality

- The data are organised around deployments and are submitted in HDF5 file format. To guarantee future understanding of the data, information on the reporting institute is to be reported as well. The reporting format structures the data in three groups:
 - the file information group, where information about the institute, the data file, and the period and location of data collection are reported;
 - the metadata group, where information about the deployment is reported
 - the data group, where mean sound pressure levels are reported
- ICES promotes the integrity of the data submitted by
 - limiting the input data in certain fields through the use of controlled vocabularies
 - performing quality checks prior to submission to the database
- Due to the non-flat nature of HDF5 files and the associated challenges, there are two types of quality checks:
 - DATa Screening Utility tool (DATSU) checks that control data against the vocabularies and data type, as well as potential custom made quality checks to be agreed between the ICES data centre and the community
 - quality checks written in C# for multidimensional fields, such as controlling the data collection date range against the dates reported in the file information group, as well as controlling the total number of measurements against the value reported in the metadata group



Technical description

The HELCOM countries collect continuous or duty cycled sound recordings from stationary monitoring stations, which is referred to as raw data. Prior to submission to ICES, data are processed and reported in mean sound pressure levels (dB re. 1 uPa) at regular intervals and in regularly spaced 1/3-octave bands. Further details on mean sound pressure level data can be consulted in the EN-NOISE 2019 document with code 4-1. The continuous noise data are to be submitted to ICES in HDF5 format, as per the agreement between HELCOM and ICES.

Database

The database consists of two components: an SQL server database, and a filesystem database. The SQL server database is used to store the File Information and Metadata groups, as well as a link to the file location. This segregation is in place due to the size and non-flat nature of the HDF5 files, which can be over 5 GB large, with thousands of records.

Data submission

Continuous underwater noise data can be submitted and downloaded through the website. The continuous noise landing page has links to the format download, a list of all data submissions, to the web services, and to the data submission facilities. To submit data, the user is required to login prior to data submission. Upon logging in, the user can choose to upload a file for quality screening, view their data submissions, or view their file uploads.

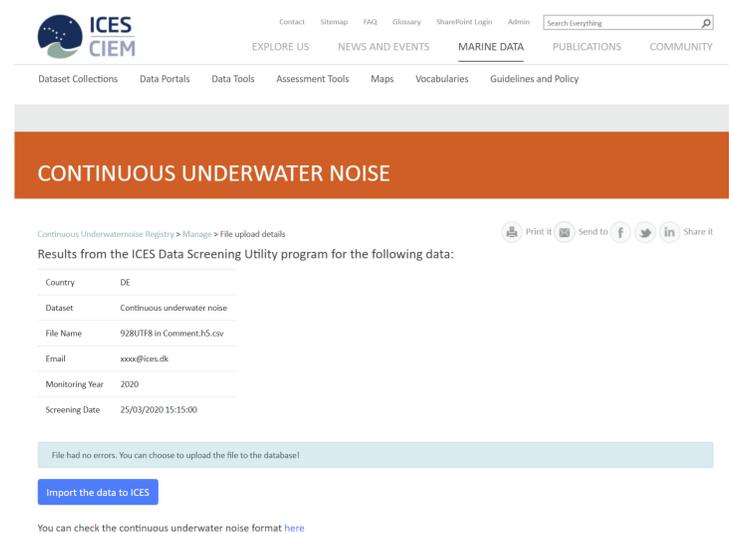


Fig. 3: Screening report of a file that can be submitted to the database

Data extraction and soundscape map

Users are able to download data from the database using the soundscape map. The data is delivered in HDF5 format and the user is able to filter data based on a time period. If the period of time covers more than one deployment, the user receives as many files as deployments. If the period of that covers only part of a deployment, the user receives a file in which the Data group has been trimmed to include only the data corresponding to the requested time period.

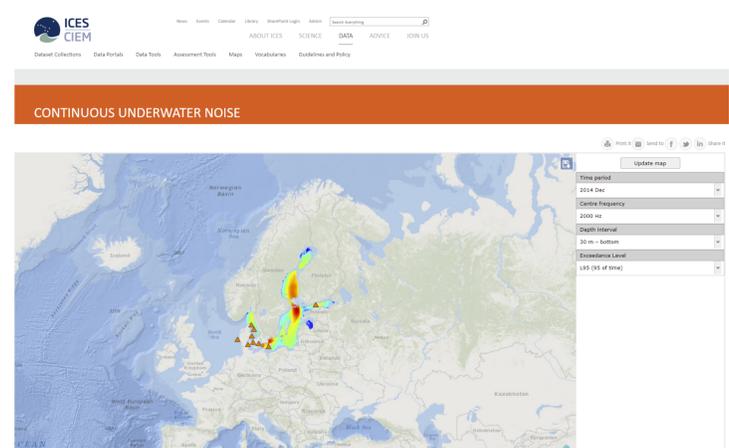


Fig. 4: Soundscape map