Introduction to

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PEGO-OBIS node manager

OTGA/INIOAS: Remote Sensing of Coral Reefs
Training Course
20 - 23 October 2019
OTGA/INIOAS - Marine Biogeographic Data processing using OBIS 23 - 26 September 2018, Tehran, Iran (Islamic Republic of)
OBIS builds a global alliance that collaborates with scientific communities to facilitate free and open access to biogeographic data.

Explore OBIS

Taxon search
Enter taxon name

Dataset search
Enter dataset name

Country statistics
Select area

Marine World Heritage Sites
Select area

Common name search
Enter common name

Institute search
Enter institute name

ABNJ statistics
Select area

EBSA statistics
Select area

News

5th OBIS Steering Group report published
The meeting report of the 5th session of the OBIS Steering Group is online. 44 decisions and recommendations were adopted including the election of a new co-chair: Mr Sky Bristol (USGS/OBIS-USA), who will support co-chair Prof Eduardo Klein (USB-Venezuela/Caribbean OBIS).

November 30, 2016 - OBIS steering group community

Extracting and Enriching OBIS Data with R

Programmatic access to biodiversity data is revolutionising large-scale, reproducible biodiversity research. In this series of tutorials we show how OBIS data can be accessed programmatically from within the Open Source statistical computing environment R. This exposes OBIS data to the full range of manipulations, visualisations, and statistical analyses provided by R. It also makes it possible to link and enrich OBIS data, combining it with other environmental, geographic, and biological data sets to better understand the distribution and dynamics of marine biodiversity.

November 22, 2016 - Tom Webb data access data products

Visualisation of biodiversity richness, gaps and completeness

Proposed new OBIS visualisation of marine species richness, gaps and completeness. Using Belgium as a test case.

Tweets by OBIS

https://portal.obis.org/
https://obis.org
OBIS

- is the world’s largest open access, online repository of spatially referenced marine life data
- was established by the **Census of Marine Life program** ([www.coml.org](http://www.coml.org)) since 2000.
- In June 2009, the 25th Session of the IOC Assembly decided through Resolution XXV-4 to adopt OBIS as part of IODE
- OBIS was one of the earliest Associate Members of the Global Biodiversity Information Facility ([www.gbif.org](http://www.gbif.org)) which publishes data on all species.
OBIS international collaboration
OBIS process

- Users
- OBIS
- OBIS nodes
- Data providers

- Data exploration access, visualization and analysis
- Datasets integrated (tax, geo, time, depth, env), QC
- Data sets harmonized, QC and mapped to DarwinCore
- Data files

- Web portal
- R
- API & OGC webservices
>450 data providers in 56 countries

Scientists from 73 countries used OBIS in >1,000 research publications
OBIS at technical level?

- Providing multiple datasets in a standard format for harvesting by iOBIS (*Darwin Core Archive format*)
- Having complete and good quality data and metadata for each dataset
- Regular updates to the datasets where possible
- IPT Server to serve the datasets (or use the IPT server of iOBIS to upload datasets)
OBIS uses the following standards:

- **Darwin Core** (species occurrence data)
- **Ecological Metadata Language** (dataset metadata)
- **Darwin Core Archive including OBIS-ENV-DATA** (sampling events and facts, species occurrences and measurements)
Ecological Metadata Language (EML)
OBIS (and GBIF) uses the Ecological Metadata Language (EML) as its metadata standard, which is specifically developed for the earth, environmental and ecological sciences.
EML is implemented as XML. See more information on [EML].
OBIS uses the [GBIF EML profile (version 1.1)].
in case data providers use ISO19115/ISO19139,
• **Darwin Core** is a body of standards to create a **common language** for documenting and publishing data about **species registers** (field observations or preserved specimens in a collection).

• Started **in 1999 and** ratified as a standard in 2009 by the **Dublin Core Metadata Initiative - DCMI** and nowadays supported by the **TDWG** (Biodiversity Information Standards, formerly Taxonomic Databases Working Group).
• **DwC terms** refer to the column names of your dataset.
• The complete Darwin Core template consists of 73 terms to cover many variables according to the record context. (Full list is here: [http://rs.tdwg.org/dwc/terms/index.htm#Occurrence](http://rs.tdwg.org/dwc/terms/index.htm#Occurrence))
It provides stable **terms** and **vocabularies** for sharing biodiversity data.

https://dwc.tdwg.org/terms/

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**Darwin Core quick reference guide**

This page provides a list of all currently recommended terms of the Darwin Core standard. Categories such as *occurrence* or *event* correspond to Darwin Core classes which group other terms. Convenient files of these terms and their full history can be found in the Darwin Core repository.

**Record-level**

<table>
<thead>
<tr>
<th>type</th>
<th>modified</th>
<th>language</th>
<th>license</th>
<th>rightsHolder</th>
<th>accessRights</th>
<th>bibliographicCitation</th>
<th>references</th>
<th>institutionID</th>
<th>collectionID</th>
<th>datasetID</th>
<th>institutionCode</th>
<th>collectionCode</th>
<th>datasetName</th>
<th>ownerInstitutionCode</th>
<th>basisOfRecord</th>
<th>informationWithheld</th>
<th>dataGeneralizations</th>
<th>dynamicProperties</th>
</tr>
</thead>
</table>

**type**

Identifier: http://purl.org/dc/terms/type

Definition: The nature or genre of the resource.

Comments: Must be populated with a value from the DCMI type vocabulary (http://dublincore.org/documents/2010/10/11/dcmi-type-vocabulary/).

Examples: StillImage, MovingImage, Sound, PhysicalObject, Event, Text
- occurrenceID
- eventDate
- decimalLongitude and decimalLatitude
- scientificName
- scientificNameID
- occurrenceStatus
  - present or absent
- basisOfRecord (DwC-A required term)
  - PreservedSpecimen, FossilSpecimen, LivingSpecimen, HumanObservation, MachineObservation
Darwin Core Archive (DwC-A)

- is a standard for **publishing** biodiversity data using the Darwin Core format.
- It is the preferred format for publishing data in OBIS and GBIF

Darwin Core archives contain text files which are logically arranged in a star schema. This means that there is one **core file** and (optionally) multiple **extensions files**.

For example:

→ The species occurrence recorded in a research field trip = **core file**.
→ Environmental data, sampling methodology, etc. = **extension file**.
In 23 session of the IOC Committee for IODE, March 2015

As part of the IODE pilot project: Expanding OBIS with environmental data OBIS-ENV-DATA, OBIS introduced a customized ExtendedMeasurementOrFact Extension or eMoF, which extends GBIF’s DwC MeasurementOrFact Extension with 4 new terms: occurrenceID, measurementTypeID, measurementValueID and measurementUnitID.
Extended MEASUREMENTS OR FACTS (eMoF)

- **ID**: the identifier used by DwC-A standard to link the eMoF to the Core file.
- **occurrenceID** (new): identifier to link the eMoF with the occurrence extension.
- **measurementType**: The nature of the measurement, fact, characteristic, or assertion.
  - **measurementTypeID** (new): An identifier for the measurementType (global unique identifier, URI)
- **measurementValue**: The value of the measurement, fact, characteristic, or assertion.
  - **measurementValueID** (new): An identifier for facts stored in the column measurementValue (global unique identifier, URI)
- **measurementAccuracy**: The description of the potential error associated with the measurementValue.
- **measurementUnit**: The value of the measurement, fact, characteristic, or assertion.
  - **measurementUnitID** (new): An identifier for the measurementUnit (global unique identifier, URI)
- **measurementDeterminedDate**: The date on which the MeasurementOrFact was made.
- **measurementDeterminedBy**: A list (concatenated and separated) of names of people, groups, or organizations who determined the value of the MeasurementOrFact.
- **measurementMethod**: A description of or reference to (publication, URI) the method or protocol used to determine the measurement, fact, characteristic, or assertion.
- **measurementRemarks**: Comments or notes accompanying the MeasurementOrFact.
Measurements or facts Vocabulary

The MoF terms: measurementType, measurementValue and measurementUnit are completely unconstrained and can be populated with free text annotation. OBIS uses the controlled vocabulary developed and maintained by the British Oceanographic Data Center (BODC), and made available through the NERC Vocabulary server: [https://www.bodc.ac.uk/resources/vocabularies/vocabulary_search/](https://www.bodc.ac.uk/resources/vocabularies/vocabulary_search/).

**measurementTypeID**
- BODC Parameter Usage Vocabulary (P01): [http://vocab.nerc.ac.uk/collection/P01/current](http://vocab.nerc.ac.uk/collection/P01/current)
- OBIS sampling instruments and methods attributes (Q01): [http://vocab.nerc.ac.uk/collection/Q01/current/](http://vocab.nerc.ac.uk/collection/Q01/current/)

**measurementValueID**
- Sampling instruments and sensors (SeaVoX Device Catalogue): [http://vocab.nerc.ac.uk/collection/L22/current](http://vocab.nerc.ac.uk/collection/L22/current)
- Sampling instrument categories (SeaDataNet device categories): [http://vocab.nerc.ac.uk/collection/L05/current](http://vocab.nerc.ac.uk/collection/L05/current)
- Vessels (ICES Platform Codes): [http://vocab.nerc.ac.uk/collection/C17/current](http://vocab.nerc.ac.uk/collection/C17/current)
- DOIs of papers or manuals on the sampling protocol used, published e.g. on IOC’s Ocean Best Practices repository, for example: [http://hdl.handle.net/11329/304](http://hdl.handle.net/11329/304)

**MeasurementUnitID**
- Units: [http://vocab.nerc.ac.uk/collection/P06/current](http://vocab.nerc.ac.uk/collection/P06/current)
https://www.bodc.ac.uk/resources/vocabularies/vocabulary_search/.

Vocabulary search help

<table>
<thead>
<tr>
<th>Rank</th>
<th>Collection</th>
<th>Title</th>
<th>Definition</th>
<th>Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>P01</td>
<td>BODC Parameter Usage Vocabulary</td>
<td>Terms built using the BODC parameter semantic model designed to describe individual measured phenomena. May be used to mark up sets of data such as a NetCDF array or spreadsheet column.</td>
<td>British Oceanographic Data Centre</td>
</tr>
</tbody>
</table>

**Length of biological entity specified elsewhere**

- **URL**: http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX/

- **Definition (en)**: The mean length of specimens of a biological object (identified elsewhere in the data or metadata) in the sample or observation. This may refer to a single individual if the count is one.

- **Version Info**: 2

- **Deprecated**: false

- **Broader**: http://vocab.nerc.ac.uk/collection/P02/current/BPRP/

- **Broader**: http://vocab.nerc.ac.uk/collection/S25/current/BE007117/

- **Related**: http://vocab.nerc.ac.uk/collection/P06/current/UXOM/

- **Related**: http://vocab.nerc.ac.uk/collection/S02/current/S030/

- **Date**: 2016-01-21 13:55:16.0
Data Standardization

↑ -- Length of biological entity specified elsewhere --

<table>
<thead>
<tr>
<th>URI</th>
<th><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX/">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX/</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier ()</td>
<td>SDN:P01::OBSINDLX</td>
</tr>
<tr>
<td>Preferred label (en)</td>
<td>Length of biological entity specified elsewhere</td>
</tr>
<tr>
<td>Alternative label (en)</td>
<td>Len_BED07117</td>
</tr>
<tr>
<td>Definition (en)</td>
<td>The mean length of specimens of a biological object (identified elsewhere in the data or metadata) in the sample or observation. This may refer to a single individual if the count is one</td>
</tr>
<tr>
<td>Version Info ()</td>
<td>2</td>
</tr>
<tr>
<td>Deprecated()</td>
<td>false</td>
</tr>
<tr>
<td>Broader</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P02/current/BPRP/">http://vocab.nerc.ac.uk/collection/P02/current/BPRP/</a></td>
</tr>
<tr>
<td>Broader</td>
<td><a href="http://vocab.nerc.ac.uk/collection/S25/current/BE007117/">http://vocab.nerc.ac.uk/collection/S25/current/BE007117/</a></td>
</tr>
<tr>
<td>Broader</td>
<td><a href="http://vocab.nerc.ac.uk/collection/S26/current/MAT00906/">http://vocab.nerc.ac.uk/collection/S26/current/MAT00906/</a></td>
</tr>
<tr>
<td>Related</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P06/current/UxMM/">http://vocab.nerc.ac.uk/collection/P06/current/UxMM/</a></td>
</tr>
<tr>
<td>Related</td>
<td><a href="http://vocab.nerc.ac.uk/collection/S02/current/S030/">http://vocab.nerc.ac.uk/collection/S02/current/S030/</a></td>
</tr>
<tr>
<td>Date ()</td>
<td>2016-01-21 13:55:16.0</td>
</tr>
</tbody>
</table>

Controlled vocabulary Persistent identifiers (URIs)

<table>
<thead>
<tr>
<th>MeasurementType</th>
<th>MeasurementTypeID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body length</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX</a></td>
</tr>
<tr>
<td>Length</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX</a></td>
</tr>
<tr>
<td>Length (mm)</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX</a></td>
</tr>
<tr>
<td>length_in_m</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX</a></td>
</tr>
<tr>
<td>Length of specimen</td>
<td><a href="http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX">http://vocab.nerc.ac.uk/collection/P01/current/OBSINDLX</a></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
OBIS accepts 2 types of core files: **Occurrence Core** and **Event Core**

Data is structured in 1 to 3 tables related to each other. Number of tables depends on the nature of the data. This structure allows to store not only **occurrences** but also **sampling information** and additional biological and/or abiotic measurements. The general content of each table:

<table>
<thead>
<tr>
<th>Event table</th>
<th>Occurrence table</th>
<th>Measurements or Facts (eMoF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample and/or observation information (time, location, depth, event hierarchy)</td>
<td>Occurrence details (taxonomy, identification, organismID...)</td>
<td>Sampling protocol (equipment, methods) Sampling effort (length, duration, volume...) Environment/habitat variables (physical, chemical, sediment...) Biological variables (Abundance, biomass, lifestage, sex...)</td>
</tr>
</tbody>
</table>
Depending on the types of data you can organize your dataset in three different ways:

- **Case 1:** One OCCURRENCE file (Occurrence Core). Entering only the details of the occurrences.
- **Case 2:** Two sets of files: OCCURRENCE (Occurrence Core) + MEASUREMENTS (Measurement or Fact extension), including the measurements or facts made on each specimen or sample (e.g. size, abundance, wet weight, life stage, etc).
- **Case 3:** Three sets of files: EVENT (Event Core), the sampling event details (position, time, depth of each site, station, sample etc) + OCCURRENCE (Occurrence extension) + MEASUREMENTS (Measurement or Fact extension), including environmental data, the measurements made on each specimen (e.g. size, wet weight), sampling facts.
The three tables are related via the eventID and the occurrenceID.

The eMoF Extension is used in combination with the Event Core and the Occurrence Extension to capture both abiotic measurements and biotic measurements. The occurrenceID is used to link biotic measurements in the eMoF Extension with the the Occurrence Extension and the eventID links the eMoF to the Event Core.
Full lines: eventID links; Dashed lines: occurrenceID links.
When we use Occurrence Core

No information on how the data was sampled or samples were processed.

- No abiotic measurements are taken or provided.
- Biological measurements are made on individual specimens (each specimen is a single occurrence record) This is often the case for museum collections, citations of occurrences from literature, individual sightings.
- Datasets formatted in Occurrence Core can use the eMoF Extension for biotic measurements or facts.

<table>
<thead>
<tr>
<th>scientificName</th>
<th>scientificNameID</th>
<th>occurrenceID</th>
<th>eventDate</th>
<th>decimalLatitude</th>
<th>decimalLongitude</th>
<th>occurrenceStatus</th>
<th>basisOfRecord</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arca zebra</td>
<td>urn:lsid:marinespecies.org:taxname:420713</td>
<td>MCNUSB_001</td>
<td>1999-01-01</td>
<td>10.7413</td>
<td>-63.8791</td>
<td>Present</td>
<td>PreservedSpecimen</td>
</tr>
<tr>
<td>Trachycardium</td>
<td>urn:lsid:marinespecies.org:taxname:203976</td>
<td>MCNUSB_075</td>
<td>1999-01-01</td>
<td>10.8477</td>
<td>-68.2424</td>
<td>Present</td>
<td>PreservedSpecimen</td>
</tr>
<tr>
<td>Atrina seminuda</td>
<td>urn:lsid:marinespecies.org:taxname:420740</td>
<td>MCNUSB_007</td>
<td>1999-01-01</td>
<td>10.6886</td>
<td>-63.8514</td>
<td>Present</td>
<td>PreservedSpecimen</td>
</tr>
</tbody>
</table>
Event Core

When to use Event Core?

• When the dataset contains abiotic measurements, or other biological measurements which are related to an entire sample (not a single specimen)
• When specific details are known about how a biological sample was taken and processed.
• Event Core should be used in combination with the Occurrence Extension and the ExtendedMeasurementOrFact Extension.
## Taxon terms

- **scientificName** (required)
- contain the originally recorded scientific name, even if the name is currently a synonym. This is necessary to be able to track back records to the original dataset.
  - lowest level taxonomic rank that can be determined (but higher ranks, such as genus, family, order, class etc are also acceptable)
  - no identification qualifiers (cf., aff.), see identificationQualifier
- **OBIS recommended practice: no authorship**
- **scientificNameID**
  - [WoRMS](https://www.marinespecies.org) LSID, no matter if the taxonomic status is accepted or not. Double check if authority and kingdom are correct
  - urn:lsid:marinespecies.org:taxname:141433

<table>
<thead>
<tr>
<th>scientificName</th>
<th>scientificNameID</th>
<th>identificationQualifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peltodoris atromaculata</td>
<td>urn:lsid:marinespecies.org:taxname:509315</td>
<td></td>
</tr>
<tr>
<td>Peltodoris</td>
<td>urn:lsid:marinespecies.org:taxname:225423</td>
<td>cf. atromaculata</td>
</tr>
</tbody>
</table>
OCCURRENCE

- Terms
  - basisOfRecord
  - occurrenceStatus
  - occurrenceID

  - globally unique

- urn:catalog:[institutionCode]:[collectionCode]:[catalogNumber] or autonumber in the absence of a catalogNumber]

- occurrenceID is also necessary for datasets in the OBIS-ENV-DATA format.
OCCURRENCE

Terms

basisOfRecord

**PreservedSpecimen**: when specimen is deposited in a collection (please add institutionCode, collectionCode and CatalogNumber)

**FossilSpecimen**: important to distinguish collection date from geological time zone

**LivingSpecimen**: an intentionally kept/cultivated living specimen e.g. in culture collectionan aquarium or

**HumanObservation**: e.g. bird sighting, benthic sample but specimens were discarded after counting

**MachineObservation**: sensors, e.g. DNA sequencers, image recognition

**occurrenceStatus**: Present or Absent (individualCount = 0)

**occurrenceStatus**: a statement about the presence or absence of a Taxon at a Location. Use “Present” or “Absent”.

LOCATION

- Terms
  - `decimalLongitude`, `decimalLatitude`
  - `coordinateUncertaintyInMeters`
  - `geodeticDatum`
    - OBIS recommended practice: **EPSG:4326**

- `locationID`
  - for example MRGID from [http://www.marineregions.org](http://www.marineregions.org)
  - `minimumDepthInMeters`, `maximumDepthInMeters`
<table>
<thead>
<tr>
<th>Before conversion to decimals</th>
<th>In decimal format</th>
</tr>
</thead>
<tbody>
<tr>
<td>18°30’25’’N – 5°15’E</td>
<td>18.51; 5.25</td>
</tr>
<tr>
<td>54,23N – 16,5S</td>
<td>54.23 ; -16.5</td>
</tr>
</tbody>
</table>

**decimalLatitude:** the geographic latitude for the occurrence register. Must be in **decimal degrees**. For example: 12.2354 (for the Northern hemisphere); -12.2354 (for the **Southern** hemisphere).

**decimalLongitude:** the geographic longitude for the occurrence register. Must be in decimal degrees. For example: 68.357 (for the eastern hemisphere); -68.357 (for **Western** hemisphere).

If the locality is known but not the exact coordinates you could search in geocoding services: Marine Regions or Google Maps
- **locationID**: an identifier for the set of location information. You may find this information using the Marine Regions Searching tool: you will find the MRGID. Copy and paste it in your data set excel file.
LOCATION

footprintWKT: transects

LINESTRING (2.80151 51.28597, 2.61749 51.53950)

LINESTRING (2.64496 51.22237, 2.41699 51.26879, 2.50214 51.39749, 2.30988 51.43175)
LOCATION

footprintWKT: polygons

POLYGON ((10.65674 42.77928, 10.50018 42.77121, 10.43152 42.62183, 10.75836 42.38087, 11.05225 42.48628, 10.91492 42.70262, 10.65674 42.77928))
### LOCATION

#### Examples

<table>
<thead>
<tr>
<th>locality</th>
<th>locationID</th>
<th>decimal Longitude</th>
<th>decimal Latitude</th>
<th>coordinate Uncertainty InMeters</th>
<th>minimum Depth InMeters</th>
<th>maximum Depth InMeters</th>
<th>footprint WKT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha Long Bay</td>
<td>MRGID:8897</td>
<td>107.1</td>
<td>20.9</td>
<td>26000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>station_115</td>
<td></td>
<td>2.6999</td>
<td>51.2219</td>
<td>50</td>
<td>30</td>
<td>30</td>
<td>LINESTRING (2.53510 51.21549, 2.66418 51.33748)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5996</td>
<td>51.2765</td>
<td>8134</td>
<td>5</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
TIME

- Terms
  - `eventDate`
  - `verbatimEventDate (not recommended)`
- **ISO 8601**
  - 1973-02-28T15:25:00
  - 1973-02-28 (`yyyy-mm-dd`)
  - 1973-02
  - 1973
  - 1973-02-28T15:25:00Z (UTC)
  - 2015-023
  - 2014-W26
- Not ok:
  - 2015/07/11
  - 1915-6-9 0:00:00
  - 1995-7-0
  - 09-Dec-2009
  - 10-01-2013
  - 1:25
  - 00:18:00+0:00
  - Jan
IDENTIFIERS

Terms

institutionCode
institution who has custody over the collection or dataset

collectionCode
identifier for the collection or dataset (same for all records)

catalogNumber
unique key within the dataset

occurrenceID

organismID

gobally unique

urn:catalog:[institutionCode][collectionCode][catalogNumber]
recordNumber

organismID
### IDENTIFIERS

#### Examples

<table>
<thead>
<tr>
<th>institutionCode</th>
<th>collectionCode</th>
<th>catalogNumber</th>
<th>occurrenceID</th>
</tr>
</thead>
<tbody>
<tr>
<td>UGent</td>
<td>Macrobel</td>
<td>28125</td>
<td>urn:catalog:UGent:Macrobel:28125</td>
</tr>
<tr>
<td>ICES</td>
<td>DATRAS-EVHOE</td>
<td>865761</td>
<td>urn:catalog:ICES:DATRAS-EVHOE:865761</td>
</tr>
</tbody>
</table>
### IDENTIFIERS

#### Example

<table>
<thead>
<tr>
<th>eventID</th>
<th>parentEventID</th>
<th>type</th>
<th>eventDate</th>
<th>decimalLongitude</th>
<th>decimalLatitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>cruise_1</td>
<td></td>
<td>cruise</td>
<td></td>
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<td>subsample_1</td>
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</table>
Data is structured in 3 tables that are related to each other via the eventID and the occurrenceID:
Datasets are published through IPT (the Integrated Publishing Toolkit). This tool allows you to add metadata (description of the dataset) and map the column names of each file with DarwinCore terms (see Module 3). Once published, OBIS can harvest the dataset and integrate it into the OBIS central database.
Hosted resources available through this IPT

<table>
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<td>Observation</td>
<td>555</td>
<td>2018-11-12</td>
<td>2018-11-08</td>
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</table>

Showing 1 to 3 of 3

The most recently updated resources are also available as an [RSS feed](http://217.11.23.22:8080/ipt/).