EMODnet Jamboree
16-18 June 2021

Online event

Ocean Best Practice – Data Sharing.
The perspective from EMODnet Central Portal.

Conor Delaney

EMODnet Secretariat
secretariat@emodnet.eu

What is EMODnet?

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- a **long-term European marine knowledge** initiative funded by the EC (DG MARE);
- **marine knowledge broker**, providing open and free access to marine data, products, services;
- **Large network of >150 organizations, experts & wider community** of data providers and users;
- **Complimentary and in collaboration with other key marine data services** e.g. Copernicus Marine Service
- **marine data & data products from 7 thematics and from the surface to seafloor** (focus on *in situ*);
- **Centralisation (ongoing) of 7 thematics through the EMODnet central portal & data ingestion & Secretariat**

Thematic DATA coverage by the portals

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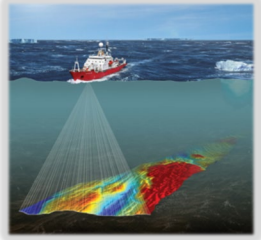
Bathymetry



Survey tracks

Water depth and depth profiles

Undersea features

Wrecks

High resolution bathymetry in coastal areas

Geology

Seabed substrate

Sediment accumulation rates

Seafloor lithology

Seafloor stratigraphy

Coastal behaviour

Geological events and probabilities

Mineral occurences

Seabed habitats

Seabed habitat maps (broad-scale and specific per basin)

Individual seabed habitat maps from surveys

Environmental variables influencing habitat type (depth, salinity, currents, light, ...)

Physics

Wave height and duration

Sea temperature

Wind speed and direction

Salinity

Horizontal speed of the water column

Water clarity

Changes in sea level

Inflow from rivers

Water conductivity / biochemical parameters

Atmospheric parameters

Underwater noise

Chemistry

Acidity

Antifoulants

Chlorophyll

Dissolved gases

Fertilisers

Hydrocarbons

Marine litter (micro, beach, seafloor)

Heavy metals

Organic matter

and biocides

Radionuclides

Silicates

Biology

Occurrences and abundances of species of:

Phytoplankton

Zooplankton

Macro-algae

Angiosperm

Fish

Reptile

Benthos

Bird

Sea mammal

Human activities

Aggregate extraction

Aquaculture

Cultural heritage

Dredging

Fisheries

Hydrocarbon extraction

Traffic in main ports

Ocean energy facilities

Pipelines and cables

Protected areas

Status of bathing sites

Vessel density

Waste disposal (solids)

Wind farms

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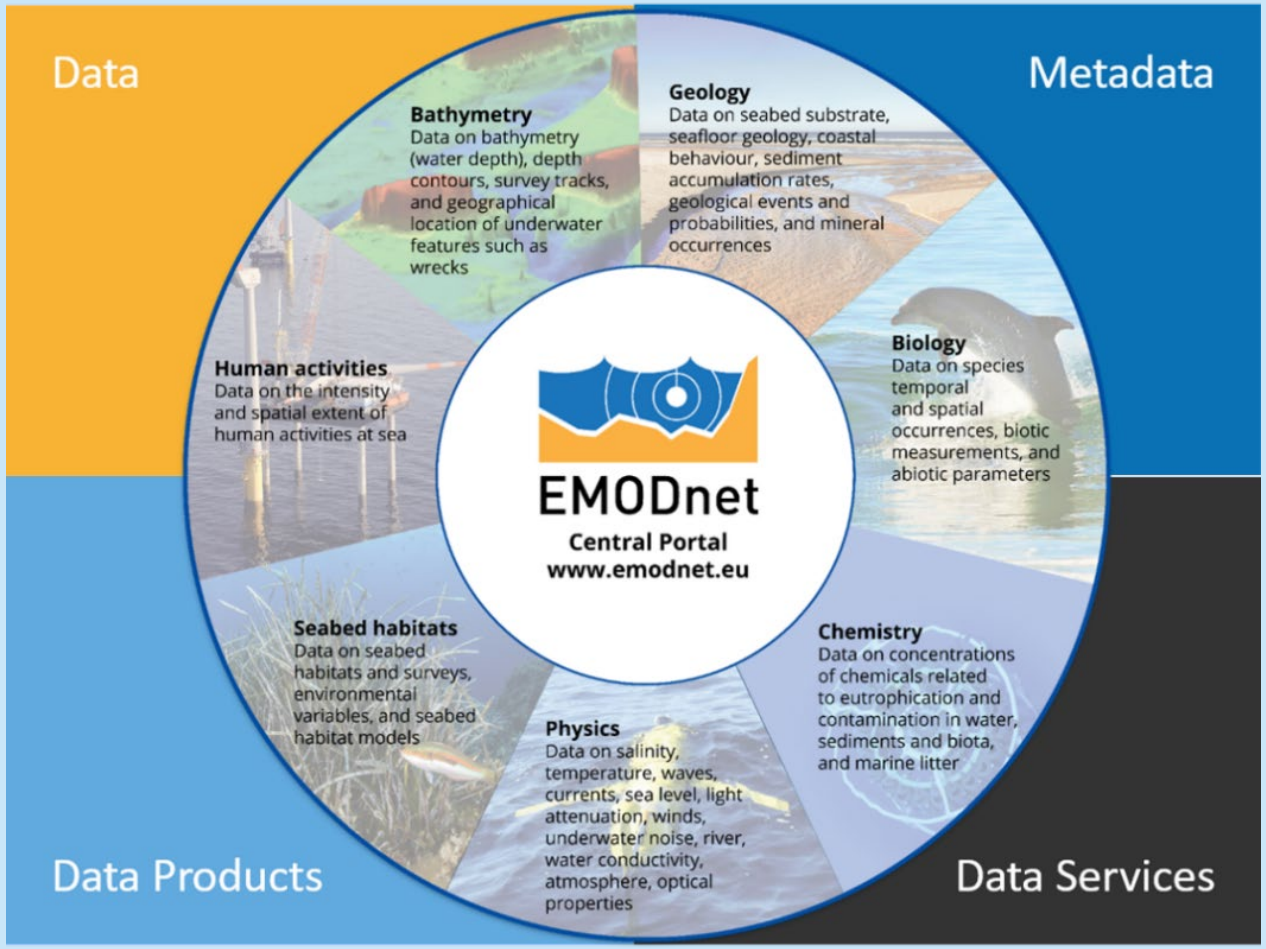
What is EMODnet?

Open and free access to reliable marine data and added value data products, for all



- INSPIRE and FAIR data principles
- Searchable metadata
- Integrated data products
- Web services e.g. OGC, machine-machine readability e.g. WMS, WFS.
- R tutorials on how to use the Web Services
- New: Creative Commons By Licence (Open Data)
- 7 separate web portals …. centralisation to one portal has begun

Thematic DATA PRODUCT coverage by the portals

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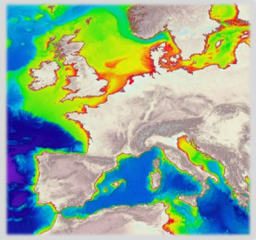
Bathymetry



Digital Terrain Model of:

Survey tracks

Water depth and depth profiles

Undersea features

Wrecks

High resolution bathymetry in coastal areas

Geology

Maps of:

Seabed substrate

Sediment accumulation rates

Seafloor lithology

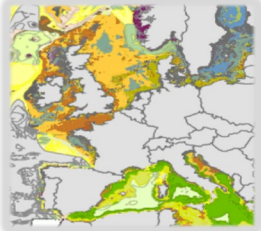
Seafloor stratigraphy

Coastal behaviour

Geological events and probabilities

Mineral occurences

Seabed habitats



EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)

Confidence maps

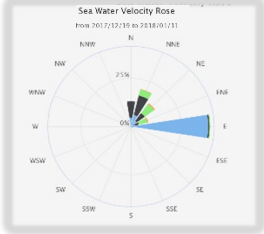
Maps of:

Seabed habitat maps (broad-scale and specific per basin)

Individual seabed habitat maps from surveys

Environmental variables influencing habitat type (depth, salinity, currents, light, ...)

Physics



Time series

Statistics (trends, max, min, average, ...)

Maps of:

Wave height and duration

Sea temperature

Wind speed and direction

Salinity

Horizontal speed of the water column

Water clarity

Changes in sea level

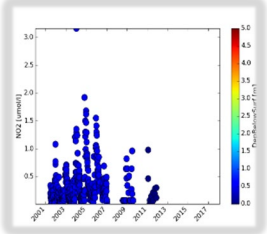
Inflow from rivers

Water conductivity/biogeochemical parameters

Ice cover

Underwater noise

Chemistry



Maps & plots

Profiles of:

Acidity

Antifoulants

Chlorophyll

Dissolved gases

Fertilisers

Hydrocarbons

Heavy metals

Organic matter

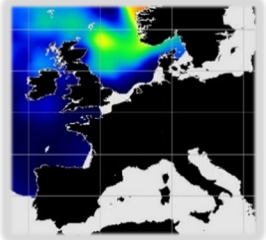
Polychlorinated biphenyls

Radionuclides

Silicates

Marine litter (micro, beach, seafloor)

Biology



Map viewer of:

Phytoplankton

Zooplankton

Macro-algae

Angiosperm

Fish

Reptile

Benthos

Bird

Sea mammal

Gridded abundance plots of:

Benthos

Fish

Sea mammals

Micro-organisms

Physoplankton

Reptiles

Zooplankton

Human activities

Map viewer of:

Aggregate extraction

Aquaculture

Cultural heritage

Dredging

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Traffic in main ports

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Protected areas

Status of bathing sites

Vessel density

Waste disposal (solids)

Wind farms

Central Products Catalogue and Map Viewer

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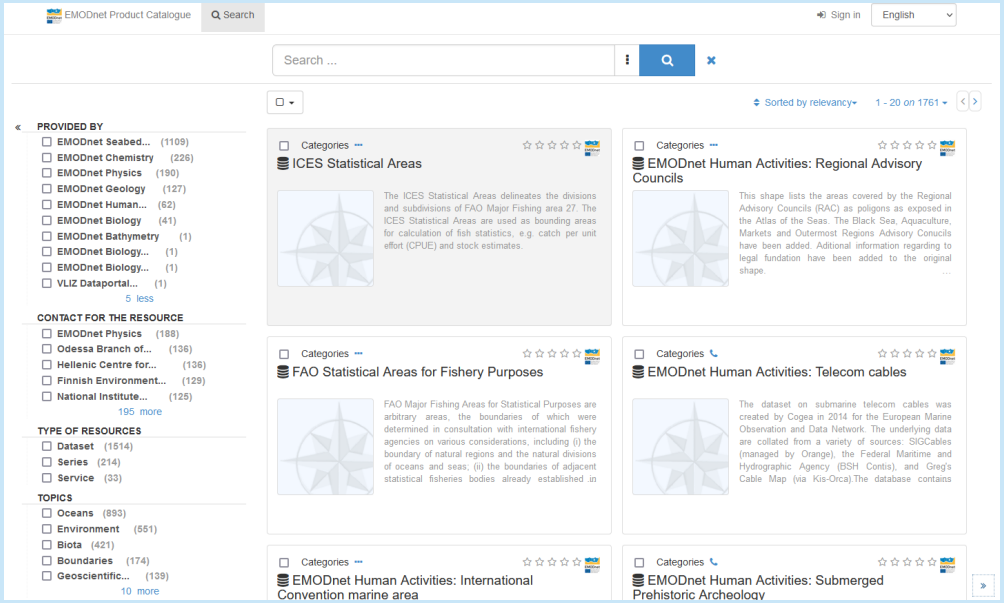
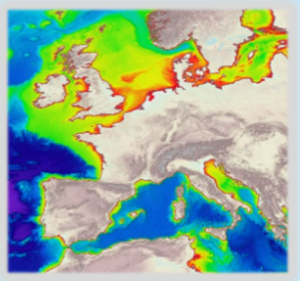
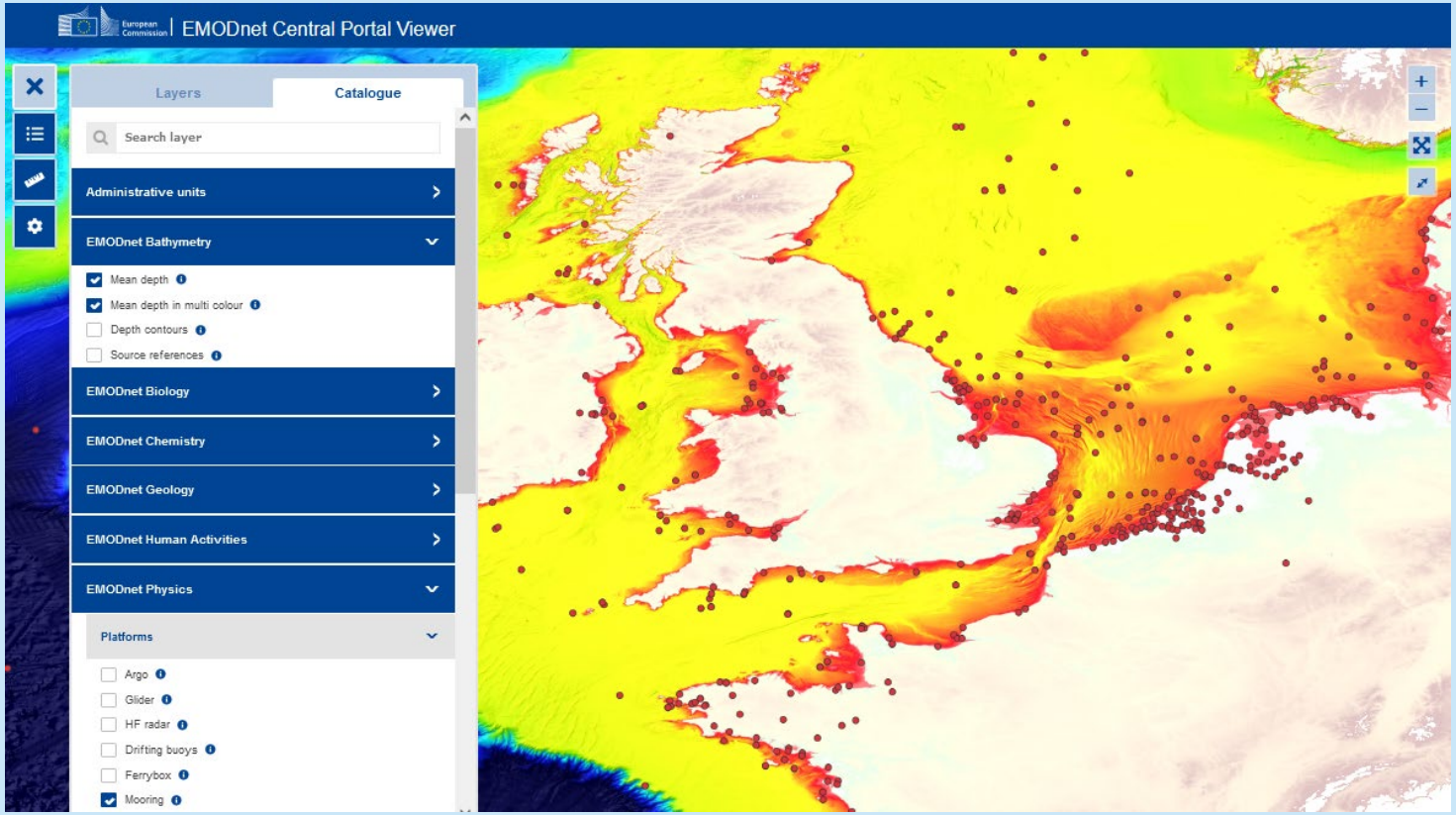




Map Viewer



Web services: **TL;DR**

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Metadata services
The EMODnet catalogues and other partner catalogues (IFREMER, etc.) offer the ability to search collections of metadata for data, services and related information objects related to the EMODnet Marine Data. The data catalogues offer a **CSW** endpoint to other client applications to connect to the service and query the metadata held in the catalogue. CSW Getcapabilites, CSW GetRecords & CSW GetRecordById

Data visualisation services
The Web Map Service standard (**WMS**) provides a simple HTTP interface for requesting geo-registered map images from one or more distributed geospatial databases. The WMS supports the GetCapabilities, GetMap and GetFeatureInfo operations as defined in the Open Geospatial Consortium (OGC) WMS standard. This service is available across all thematic services.

Data download services
The EMODnet data layers are available as a Web Feature Service (**WFS**) or Web Coverage Service (**WCS**) in accordance with the Open Geospatial Consortium (OGC) specifications.

Restful web services (Resource Orientated Architecture)
Representational state transfer API = Get/Post/Put/Delete.
THREDDS, ERDDAP & PyDAP

https://emodnet.eu/en/data
https://github.com/EMODnet/Web-Service-Documentation

Collected once, serve many, the impact of standards to the marine data community – some observations

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- If you adopt file formats and metadata standards of the ‘greater community’ you will benefit from the software tools that the community has created.
- Example: NetCDF (Network Common Data Form) & Climate and Forecast Metadata Conventions (CF)
  - NetCDF is a set of software libraries for creating, accessing and sharing gridded scientific data.
  - CF is a metadata format that when used with NetCDF makes your data useable with many data manipulation, analysis and publishing technologies such as THREDDS,ERDDAP, Python, R, ArcGIS , GDAL etc.
- ERDDAP is one of those tools, it is a data server, data catalogue and data broker (it will pass data requests as messages to other ERDDAP instances and it will reformat/subset data via a web request). It will also allow you to construct a local catalogue out of remote catalogues.
- EMODnet Physics use ERDDAP to host sensor at sea data.
- We are experimenting with using it to host EMODnet Bathymetry DTM products:
  - Belong to the EU they are OpenData covered by *Creative Commons by* license
  - Are in NetCDF with CF format.

ERDDAP Dataset Discovery

Search Datasets

emodnet

Type some words about the dataset you seek, then press the green button

Search Clear

Searched 47 ERDDAP servers; found 415 datasets from 3 servers; total search time 4540ms.

	Title	Institution	Dataset
+	EMODnet - Regional sea level trends are derived from the DUACS delayed-time (DT-2018 version) altimeter gridded maps of sea level anomalies based on a stable number of altimeters (two) in the satellite constellation	CLS, CNES	EMODNET_SEA_LEVEL_199301_201812_T erddap.emodnet-physics.eu
+	EMODnet - Regional sea level trends are derived from the DUACS delayed-time (DT-2018 version) altimeter gridded maps of sea level anomalies based on a stable number of altimeters (two) in the satellite constellation	CLS, CNES	EMODNET_SEA_LEVEL_199301_201812_T erddap.emodnet-physics.eu
+	EMODnet PACE - PSMSL Relative Sea Level Trends	PSMSL	EMODNET_PACE_PSMSL_trends erddap.emodnet-physics.eu
+	EMODnet PACE - PSMSL Revised Local Reference (RLR) annual data	PSMSL	EMODNET_PACE_PSMSL_rlr_annual erddap.emodnet-physics.eu
+	EMODnet PACE - PSMSL Revised Local Reference (RLR) monthly data	PSMSL	EMODNET_PACE_PSMSL_rlr_monthly erddap.emodnet-physics.eu
+	EMODnet PACE - PSMSL Revised Local Reference (RLR) monthly data	PSMSL	EMODPACE_PSMSL_rlr_monthly erddap.emodnet-physics.eu
+	EMODnet PACE - Regional sea level trends are derived from the DUACS delayed-time (DT-2018 version) altimeter gridded maps of sea level anomalies based on a stable number of altimeters (two) in the satellite constellation	CLS, CNES	EMODNET_PACE_SEA_LEVEL_199301_201 erddap.emodnet-physics.eu

http://erddap.com/

EMODnet European Marine Observation and Data Network

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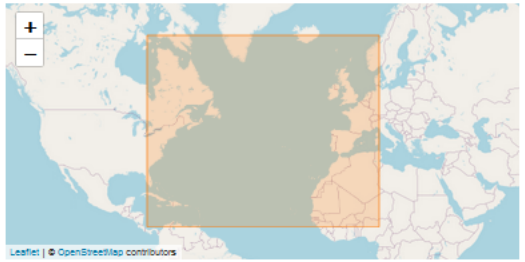
EMODnet Physics - Atlantic Sea Surface Temperature Climatology (1900-2014) - GridSeriesObservation - based on the SeaDataNet aggregated dataset | University of Liege, GeoHydrodynamics and Environment Research | EP_TDS_SDN_TEMP_XX_GR_CLI_ATLANTIC erddap.emodnet-physics.eu

title	EMODnet Physics - Atlantic Sea Surface Temperature Climatology (1900-2014) - GridSeriesObservation - based on the SeaDataNet aggregated dataset
institution	University of Liege, GeoHydrodynamics and Environment Research
cdm_data_type	Grid
summary	No comment. University of Liege, GeoHydrodynamics and Environment Research data from a local source.
license	The data may be used and redistributed for free but is not intended for legal use, since it may contain inaccuracies. Neither the data Contributor, ERD, NOAA, nor the United States Government, nor any of their employees or contractors, makes any warranty, express or implied, including warranties of merchantability and fitness for a particular purpose, or assumes any legal liability for the accuracy, completeness, or usefulness, of this information.
time_coverage_start	1957-01-16T00:00:00Z
time_coverage_end	1957-12-16T00:00:00Z
geospatial_lat_min	10.0
geospatial_lat_max	64.8
geospatial_lat_resolution	0.19999999999999998
geospatial_lat_units	degrees_north
geospatial_lon_min	-82.0
geospatial_lon_max	9.800003
geospatial_lon_resolution	0.2000000065359477
geospatial_lon_units	degrees_east
Northernmost_Northing	64.8
Easternmost_Easting	9.800003
Southernmost_Northing	10.0
Westernmost_Easting	-82.0
Author_e_mail	m.ouberdous@ulg.ac.be
comment	No comment
Conventions	CF-1.6, COARDS, ACDD-1.3
creator_name	University of Liege, GeoHydrodynamics and Environment Research
creator_type	institution



Open Data is driving cloud exploitation. AWS/GOOGLE/Microsoft Azure

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Huge silos of Open Data (AWS/Google)

Registry of Open Data on AWS

NOAA World Ocean Database (WOD)

climate | oceans | sustainability

Description

The World Ocean Database (WOD) is the largest uniformly formatted, quality-controlled, publicly available historical subsurface ocean profile database. From Captain Cook's second voyage in 1772 to today's automated Argo floats, global aggregation of ocean variable information including temperature, salinity, oxygen, nutrients, and others vs. depth allow for study and understanding of the changing physical, chemical, and to some extent biological state of the World's Oceans. Browse the bucket via the AWS S3 explorer: https://noaa-wod-pds.s3.amazonaws.com/index.html

Update Frequency

Data is update on a quarterly basis

License

Open Data. There are no restrictions on the use of this data.

Documentation

https://www.nodc.noaa.gov/OC5/WOD/pr_wod.html

Managed By

See all datasets managed by NOAA.

Contact

For any questions regarding data delivery not associated with this platform or any general questions regarding the NOAA Big Data Program, email noaa.bdp@noaa.gov. We also seek to identify case studies on how NOAA data is being used and will be featuring those stories in joint publications and in upcoming events. If you are interested in seeing your story highlighted, please share it with the NOAA BDP team here: noaa.bdp@noaa.gov

Usage Examples

Publications

- The World Ocean Database Introduction by Tim P. Boyer, Olga K. Baranova, Carla Coleman, Hernan E. Garcia, Alexandra Grodsky, Ricardo A. Locarnini, Alexey V. Mishonov, Christopher R. Paver, James R. Reagan, Dan Seidov, Igor V. Smolyar, Katharine W. Weathers, Melissa M. Zweng
- The World Ocean Database User's Manual by Hernan E. Garcia, Tim P. Boyer, Ricardo A. Locarnini, Olga K. Baranova, Melissa M. Zweng

Resources on AWS

Description
World Ocean Database (WOD) NetCDF Format

Resource type
S3 Bucket

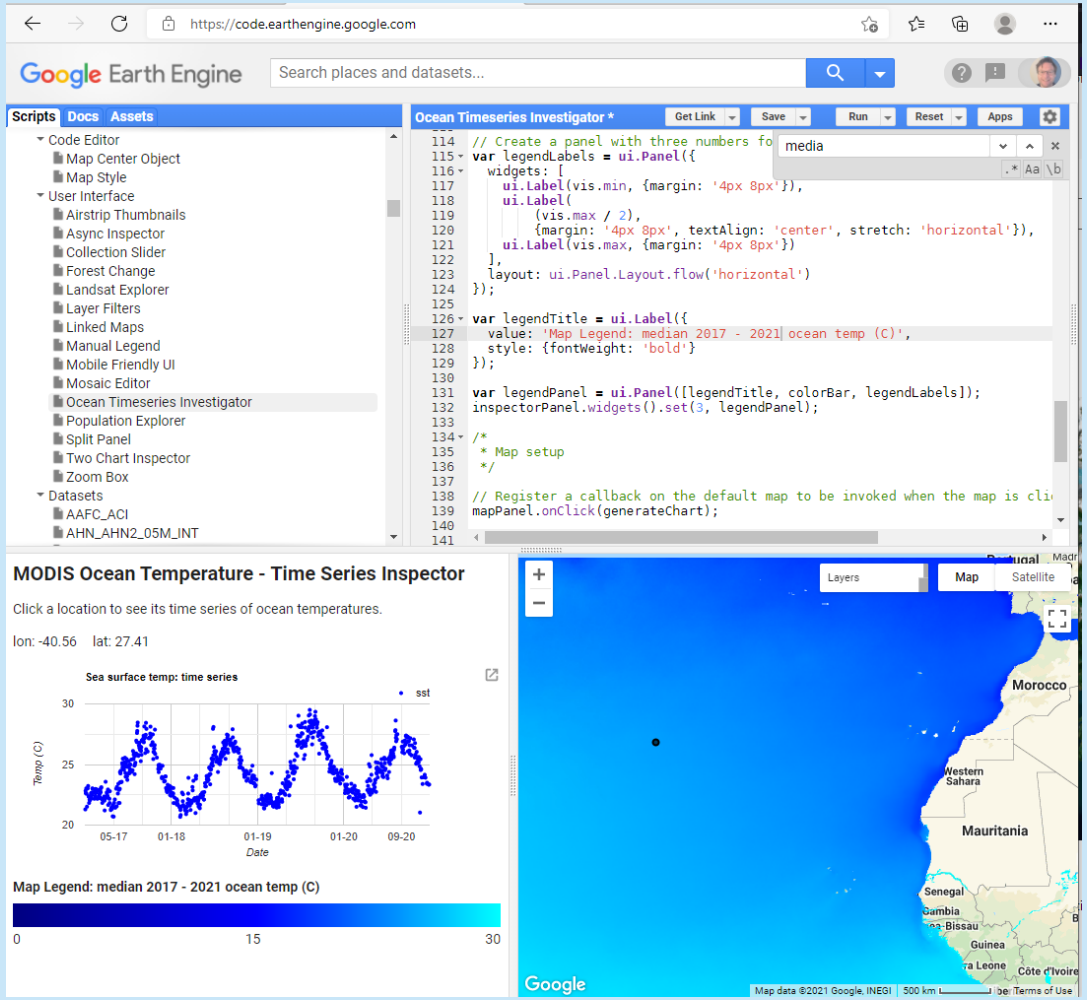
Amazon Resource Name (ARN)
`arn:aws:s3:::noaa-wod-pds`

AWS Region
`us-east-1`

AWS CLI Access (No AWS account required)
`aws s3 ls s3://noaa-wod-pds/ --no-sign-request`

Explore
Browse Bucket

Tools: Google Earth Engine, MS Planetary Computer



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European Marine
Observation and
Data Network