Ocean Decade Data Resources Toolkit

Data and Information in the Decade	Data management guidance	Policies and Principles
How (and where) to share my data?	Training & Courses	Case studies / Examples
Where to find the data I need	Contact us / Online Help desk	FAQ (?)

Ocean Data Sharing | Decade Coordination Office

IODE International Oceanographic Data and Information Exchange

unesco Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Box I – Data and information in the Ocean Decade?

Data and Information are key enablers to achieve the Ocean Decade outcomes. The Decade Implementation Plan recognises that "*Digitizing, accessing, managing and, most importantly, using ocean-related data, information and knowledge will be cornerstones of the success of the Ocean Decade*." To facilitate this, a Decade Data and Information Strategy was developed in 2023.

➢ The Ocean Decade's Data and Information Strategy

To deliver on the Decade's ambitions, the Data and Information Strategy was formulated with the vision to build a trusted, inclusive and interconnected ocean data and information ecosystem that is actively used for decision making to support sustainable ocean management. The Strategy aims to catalyse a solution-oriented, global digital transformation for the digital ecosystem we need to overcome the Decade Challenges.

The five strategic objectives are:

i. Develop an ocean digital ecosystem that encourages the sharing and equitable access of multidisciplinary data, information and knowledge by all;
ii. Improve data discovery and usability across the ocean digital ecosystem;
iii. Build trust in data and information shared across the ocean digital ecosystem;
iv. Prioritise digital solutions that support decisions for sustainable ocean management;
v. Expand, empower, and mobilise global communities to advance and maintain the ocean digital ecosystem.

The Decade's Data and Information Strategy starts from the understanding that despite the multiplication of data from diverse sources**, it is still very difficult for users to find, retrieve and use the data and information they need**, and we still have major data gaps to fill. Equally, many Decade actors who are generating data face **challenges in sharing this data in a way that is findable, accessible and interoperable** for the community of users.

There are some key steps that can ensure that data collected by decade actors is made visible and usable, and to help all actors find and use the data they need. These include:

- Having or following a good data policy (see box III)
- Developing a sound data management plan (see box II)
- Creating good and complete metadata associated with all datasets (see box II)
- Using/developing and agreeing on common standards (see box II)
- Reporting data effectively (see Box II)
- Storing data in a suitable repository making the data Findable, Accessible, Interoperable and Reusable (FAIR) (see box IV)

In the following sections you can find some useful resources, tools and templates that will help to guide you in each of these steps.

***Read full report**:*

Ocean Decade data & Information Strategy: The United Nations Decade of Ocean Science for Sustainable Development (2021-2030) https://unesdoc.unesco.org/ark:/48223/pf0000385542

BOX II - Data management guidance

Data Management Plans

Developing a good data management plan is a crucial first step in robust data stewardship. A good data management plan outlines how data will be managed during the life cycle of any project. It will cover everything from data collection processes, quality assurance/ quality control, creation of metadata, data storage and submission to a suitable repository.

The **IODE Guidelines for Data Management Plans** - are an extremely useful resource to check if a data management plan (developed or to be developed) is adequate in relation to sharing "information on the management and sharing of data, information and resulting knowledge" of a project or programme. See below, also, under "tools and templates", some templates for developing DMPs.

- https://unesdoc.unesco.org/ark:/48223/pf0000256544

Guidelines and best practices:

Below are some guidelines and best practices where you can find more information on how to publish your data and or information as well as how to develop relevant plans and adopt FAIR data principles.

- Guidelines for **data publishing** – including *in situ* physical/chemical data, glider data, biological observation data, model/ gridded data, geospatial data—and **Metadata** requirements. https://ioos.noaa.gov/data/data-standards/data-publishing/
- Manuals, guidelines, standards and best practices collected in the IOC Ocean Data and Information System (ODIS) 'Catalogue of Sources'

  https://catalogue.odis.org/search/type=14
- AquaDocs (https://aquadocs.org/pages/About) has recently been proposed/promoted as recommended **repository for storing/sharing publications** coming as outputs from Decade Actions
- **Ocean Best Practices** is a repository of best practices related to ocean science. It contains generic **best practices on data management and data collection**, as well on thematic areas (e.g. sensor types, thematic focus, environment, etc…)

  https://www.oceanbestpractices.org/

Standards

Using, and/or developing and agreeing on common standards is the first step in making data interoperable. Below are some high-level examples,

- Open Geospatial Consortium (OGC) standards to improve access to geospatial, or location information – the glue to geospatial information interoperability - https://www.ogc.org/standards/
- The International Organization for Standardization (ISO) 19115 Geographic Metadata Standard (ISO 19115) www.earthdata.nasa.gov/esdis/esco/standards-and-practices/iso-19115
- The European INSPIRE Directive specifies common data models, code lists, map layers and additional metadata on the interoperability to be used when exchanging spatial datasets. https://inspire.ec.europa.eu/data-specifications/2892

- Citation using Digital Object Identifier (DOI)- A unique and never-changing string assigned to online (journal) articles, books, and other works. www.doi.org [Maybe this should be in the next category]

Depending on the type of data that you are collecting, there may be other community specific or **thematic standards** that you are required or advised to use, or you may need to develop your own. Some examples of the application of standards within different communities are outlined below.

- The Ocean Biodiversity Information System (OBIS) Darwin Core is a body of standards (i.e., identifiers, labels, definitions) that facilitate sharing biodiversity informatics. More information on OBIS' Data Policy and standards is available via the OBIS manual - https://manual.obis.org/
- SeaDataNet provides **user manuals** for updating metadata directories:

  Contribution to **metadata directories** (EDMO, EDMED, EDMERP, CSR and EDIOS): www.seadatanet.org/Metadata/How-to-contribute/Metadata-EDMO-EDMED-EDMERP-CSR-and-EDIOS

  Contribution to **Common Data Index (CDI) directory**: www.seadatanet.org/Metadata/How-to-contribute/Data-CDI
- IOOS guidelines on **data sharing** https://ioos.noaa.gov/data/data-standards/open-data-sharing/
- NCEI provides guidance on **Metadata maintenance and writing quality metadata**

  www.ncei.noaa.gov/resources/metadata
- OSPAR **data reporting guidance** in each of the following work areas: Biological diversity & Ecosystems, hazardous substance & Eutrophication, Human Activities, Offshore Industry, Radioactive Substances

  www.ospar.org/work-areas
- MEDIN Discovery **Metadata Standard** v3.1.2 (marine profile of the UK government Standard GEMINI2) complies with other international conventions such as INSPIRE and ISO19115. (All content within this repository is publicly available and is held under Creative Commons Attribution 4.0 International License)

  https://medin.org.uk/sites/medin/files/documents/MEDIN_Schema_Documentation_3_1_2_full-1.pdf

  https://github.com/medin-marine/Discovery-Standard-public-content

Data reporting

Data reporting is the process of collecting data, storing it in formats and/or visualizing data in a way that makes it meaningful, digestible and usable in context. This is an important aspects for all Decade Actions, to make sure that their data has meaning and can be used to address the Decade challenges.

- IOOS guidelines on **data sharing** https://ioos.noaa.gov/data/data-standards/open-data-sharing/
- National Centers for Environmental Information (NCEI) receives data from many different sources, not only from NOAA or NOAA funded projects, but also from individuals or other research institutions. NCEI provides guidelines **for information submission quality control**. www.ncei.noaa.gov/archive
- OSPAR **data reporting guidance** in each of the following work areas: Biological diversity & Ecosystems, hazardous substance & Eutrophication, Human Activities, Offshore Industry, Radioactive Substances www.ospar.org/work-areas

Tools and templates:

Below are some helpful tools and templates to support good data management, for example to in order to develop a data management plan or write good metadata.

- NOAA template **data management plan**: https://dmptool.org/template_export/756435778.pdf
- The NCEI provides **template to guide the collection of metadata** according to the ISO 19115-2 standard, and provides a minimum information baseline for NCEI metadata records https://www.ncei.noaa.gov/resources/metadata#resources
- Guidance for the **NCEI Collection Level Metadata Template**: https://www.ncei.noaa.gov/sites/default/files/2022-05/AB-GUID-02823_R1_Guidance%20for%20The%20NCEI%20Collection%20Level%20Metadata%20Template%20v1.2.pdf
- **Tools and guidelines** from the **European Marine Observation and Data Network (EMODnet)**: https://emodnet.ec.europa.eu/en/tools-guidelines

BOX III – Policies and Principles

Below are some useful guiding principles and overarching data policies that can be considered when beginning to address, or trying to improve, the data management and sharing practices of your project, programme and/or action.

It may also in some instances for Programmes to consider an adapted overarching Data Policy and Terms of Use.

- IOC Data Policy – In 2023, the IOC adopted its new IOC data policy where reference is made to FAIR and CARE and licensing. https://unesdoc.unesco.org/ark:/48223/pf0000379785
- The FAIR Guiding Principles for Scientific Data Management and stewardship https://www.nature.com/articles/sdata201618. Many resources on how to implement the FAIR data principles are made available by the GO-FAIR initiative: www.go-fair.org/resources/
- The CARE principles for indigenous data governance https://storage.googleapis.com/jnl-up-j-dsj-files/journals/1/articles/1158/submission/proof/1158-1-8528-2-10-20201104.pdf
- Operationalising the CARE and FAIR Principles for Indigenous data futures: www.nature.com/articles/s41597-021-00892-0

- NOAA has implemented the **Data Management Planning Procedural Directive** to ensure that data are properly documented, made accessible, and preserved for future use. All NOAA or NOAA contractors who are generating data have to apply the Directive when managing digitally formatted environmental data and derived data products resulting from observing systems, numerical models, human-collected measurements, research projects, or other acquisition methods.

  Read the Directive: https://nosc.noaa.gov/EDMC/PD.DMP.php
- With the goal of building the social and technical infrastructure to enable open sharing and re-use of data, the Research Data Alliance (RDA) was launched as a community-driven initiative in 2013 by the European Commission, the United States Government's National Science Foundation and National Institute of Standards and Technology, and the Australian Government's Department of Innovation

  Find out more: www.rd-alliance.org/.

BOX IV - How and where to share my data?

There are several **data ingestion support facilities** in place to assist data collectors/owners with making their data FAIR for others to re-use these valuable resources, often provided by national and or regional data centres and/or services. Some examples are:

Global network of oceanographic data centres:

- IODE's list of National Oceanographic Data Centre's www.iode.org/index.php?option=com_content&view=article&id=61&Itemid=100057

Regional

- European Marine Observation and Data Network (EMODnet) www.emodnet-ingestion.eu

National

- National Centers for Environmental Information (NCEI)- provides archive services for much of the data collected by NOAA scientists, observing systems, and research initiatives. www.ncei.noaa.gov/archive
- The Australian Ocean data Network is an interoperable online network of marine and climate data resources. IMOS and the 6 Australian Commonwealth agencies form the core of the AODN. https://imos.org.au/facilities/aodn
- The Marine Environmental Data and Information Network (MEDIN) is an open partnership in the UK and its partners represent government departments, research institutions and private companies. https://medin.org.uk/

BOX V - Training & Courses

There are an increasing number of training courses and workshops in sound data management. Many of these are self-directed and can be followed at your own pace during your own time. Below are some examples:

- A self-directed **course about data and data management within an ocean research** context from Canadian Integrated Ocean Observing System (CIOOS). Viewers can follow along with the modules to understand the best practices. https://cioosatlantic.ca/7-ocean-data-things/
- Ocean Teacher Global Academy (OTGA): https://classroom.oceanteacher.org/ provides **training sessions related to ocean data**. Check out the calendar to find out about upcoming training sessions:

  https://classroom.oceanteacher.org/
- Marine Training- an EMBRC-ERIC service platform dedicated to Marine education and training. http://www.marinetraining.eu/
- ODISCAT education and training materials. https://catalogue.odis.org/search/type=16

BOX VI – Case Studies

Under construction - to be developed starting with DCO-ODS associated programmes Geotraces, Marine Regions, WOD, and other examples - Crown Estate, …

The International GEOTRACES Program

GEOTRACES (www.geotraces.org) is an international program on marine biogeochemistry which mission is to identify processes and quantify fluxes that control the distributions of trace elements and isotopes (TEIs) in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions. While often present at extremely low concentrations in seawater, trace elements and their isotopes act as essential micronutrients for microorganisms (e.g., manganese, iron, cobalt, nickel, copper, zinc, cadmium), or as toxins (e.g., copper, mercury), or as tracers of oceanographic processes (rare earth elements, neodymium isotopes, radium isotopes, uranium/thorium/protactinium isotopes). The GEOTRACES program was envisioned to use state-of-the-art sampling and analytical methods to study the distributions of TEIs over the global ocean from the surface to the seafloor. Thus far, over 35 countries have contributed their data from 148 research cruises, yielding over 2200 scientific publications and three freely-available Intermediate Data Products (IDPs). This successful effort is being followed up by research activities focused on specific processes or regions where TEI behavior suggests the need for more detailed study.

The GEOTRACES Data Products

Compilation of data from scientists from 35 nations into a single database where high quality-controlled data are presented systematically using uniform parameter names.

The GEOTRACES program has produced three Intermediate Data Products (2014, 2017, and 2021) containing hydrographic and biogeochemical (TEI) data from over 3000 stations. The entire GEOTRACES

dataset is freely available. The scientists involved in GEOTRACES are eager to foster collaborations with other ocean scientific communities and professionals.

The most recent GEOTRACES Intermediate Data Product (IDP2021[1]) **represents a compilation of data from scientists from 35 nations into a single database**, where data are presented systematically using uniform parameter names. Data generated by different labs in different nations have all been screened for accuracy and oceanographic consistency. The program practices **active data management in an effort to ensure datasets that are FAIR-compliant**. The program offers tools for data visualization, as well as data selection, extraction and download from the GEOTRACES IDP for all ocean scientists, in a way that is simple and meets FAIR data objectives (Findable, Accessible, Interoperable, Reusable).

International coordination and governance

The GEOTRACES program has fostered **unprecedented international collaboration** and coordination and achieved objectives that were simply not attainable by a single lab or a single nation. This is coordinated by the GEOTRACES International Project Office in Toulouse, France
(Contact: Elena Masferrer, ipo@geotraces.org).

The GEOTRACES program is one of the international programs administered by the Scientific Committee on Oceanic Research (SCOR). The administration is organized to ensure "good governance" and includes several very active subcommittees. Because trace elements and their isotopes (TEIs) are present in seawater at extremely low concentrations (orders of magnitude of 10^{-7} to 10^{-15} mol/kg) **data quality and internal consistency** are controlled by following stringent intercalibration protocols, under the supervision of the Standards and Intercalibration (S&I) committee. Since more than 3000 parameters have been identified, the Parameter Definition Committee developed a consistent parameter naming scheme. Once validated and ready for inclusion in an Intermediate Data Product, the data are compiled and processed by the GEOTRACES Data Assembly Centre (GDAC, British Oceanographic Data Centre, BODC, UK, contact: Donna Cockwell, geotraces.dac@bodc.ac.uk / https://www.bodc.ac.uk/geotraces/) under the supervision of the Data Management Committee (DMC).

Ensure internal consistency of data generated by different labs in different nations

In order to produce a useful global dataset for TEIs it is essential to ensure the accuracy and consistency of data generated by different labs in different nations. A coherent global study with contributions from investigators worldwide requires very high standards of intercalibration. Reference seawater samples are provided to analysts for method development and validation. Recommended sampling and sample handling protocols ("The Cookbook") are online and updated regularly: https://www.geotraces.org/methods-cookbook/. Intercalibration and data reporting procedures were established; to be followed on all GEOTRACES cruises: https://www.geotraces.org/intercalibration-procedures/. The Standards and Intercalibration Committee evaluates all data to ensure reliability and assists investigators with data accuracy and reporting.

Active data management: effort to ensure FAIR-compliant datasets

GEOTRACES uses **very active data management to ensure FAIR-compliant datasets** and to promote data sharing and collaboration. The Data Management Committee provides oversight and interfaces with data generators. They also recommend data policies, standards and formats for data submission.

[1] *GEOTRACES Intermediate Data Product Group (2023). The GEOTRACES Intermediate Data Product 2021v2 (IDP2021v2). NERC EDS British Oceanographic Data Centre NOC.* ***doi:10.5285/ff46f034-f47c-05f9-e053-6c86abc0dc7e*** .

We established a User-friendly Portal for data generators to register their datasets and metadata, as well as submit their data intercalibration reports (GEOTRACES Data for Ocean Research, DOoR Portal).

The Data Assembly Centre (BODC, UK) compiles data in an organized and accessible structure. Easy access and visualization of GEOTRACES data is ensured through free online Intermediate Data Products (IDPs) and development of dedicated web services for data download and visualization (webODV).

All of these tools, the IDPs, webODV and DOoR, are designed to increase GEOTRACES data FAIRness.

GEOTRACES Data for Ocean Research Portal (DOoR)

The GEOTRACES Data for Ocean Research Portal (DOoR) was developed under the leadership of Elena Masferrer (GEOTRACES IPO) and produced by François André (SEDOO-Data Center in Toulouse, France).

The DOoR portal is a dedicated user-friendly on-line portal for:

- registering datasets

- generating data submission and intercalibration report templates

- entering metadata

- completing intercalibration assessment

The DOoR portal includes management tools (6 interfaces) for scientists and technicians working on the data and metadata, as well as for committee members and staff for reviewing, processing and assembling these data.

Each dataset consists of a parameter and a unique machine-generated barcode (Parameter Name::Barcode (e.g., Fe_D_CONC_BOTTLE::khpwfs). This enables reliable dataset tracking.

The DOoR also uses standardized lists to avoid free-text entries (e.g., cruise and parameter selection, PI identification using ORCID, etc.). It is easy for researchers to select cruises and parameter names from dropdown menus. These aspects of GEOTRACES data management have improved the overall efficiency of creating data products.

Ensuring proper acknowledgement of data generators

The GEOTRACES IPO also maintains a database of scientific publications that is also hosted in the DOoR portal, ensuring that the data generators are always linked to their data and publications, and thus are properly acknowledged. As one example, dissolved iron data (Fe_D_CONC_BOTTLE) from the 2014 GP16 cruise in the eastern tropical Pacific, included in the most recent Intermediate Data Product (IDP2021), is associated with 6 published papers.

Enabling visualization and/or partial download of desired data from the GEOTRACES database by all ocean scientists in a way that is simple and meets FAIR data objectives

GEOTRACES has developed methods for visualization and/or partial downloading of desired data from the GEOTRACES database by all ocean scientists, in a way that is simple and meets FAIR data objectives.

There are 4 ways to access GEOTRACES data to accommodate different users:

1. Bulk (full packages) download (BODC site, 3 formats: CSV-ASCII, NetCDF and Ocean Data View (ODV) collections): https://www.bodc.ac.uk/geotraces/data/dp/ or through the DOI: *10.5285/ff46f034-f47c-05f9-e053-6c86abc0dc7e* .

2. Online sub-setting and extraction* (webODV Extractor, easy to select variables, region, cruises, etc.): https://geotraces.webodv.awi.de/

3. Online analysis and visualization* (webODV Explorer, very user friendly, no need to download software or data): https://explore.webodv.awi.de/

4. eGEOTRACES.org Electronic Atlas* (eGEOTRACES allows the user to Select a data group and tracer from any cruise or basin to view the tracer distribution in a section and/or 3-D scenes. Links are provided to the original publications associated with the data): https://egeotraces.org
eGEOTRACES can help in teaching and outreach activities and can also facilitate conveying societally relevant scientific results to interested laymen or decision makers.

*All these tools have been produced by Reiner Schlitzer at the Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany.

Contact GEOTRACES

Finally, GEOTRACES encourages everyone to visit the web site to access the data (https://www.geotraces.org/), and to contact Elena Masferrer at the International Project Office in Toulouse, France (ipo@geotraces.org). You are also invited to visit our Facebook and X pages and to subscribe to our eNewsletter and mailing list.

BOX VII – Where to find the data I need

There is a wealth of open ocean data available via quality and trusted databases, portals and repositories. These range from international to national, and from multidisciplinary to thematic in focus.

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
IOC Ocean Data and Information System (ODIS) Catalogue	Global	The ODIS 'catalogue of sources' is an online browsable and searchable catalogue of existing ocean related web-based sources/systems of data and information as well as products and services. It will also provide information on products and visualize the landscape (entities and their connections) of ocean data and information sources.	https://catalogue.odis.org/
Ocean InfoHub	Global	The Ocean InfoHub aims to build a sustainable, interoperable, and inclusive digital ecosystem for all ocean stakeholders. Existing and emerging data systems are linked, with the ultimate goal of coordinating action and	https://oceaninfohub.org/

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
		capacity to improve access to ocean data and knowledge.	
Ocean Biodiversity Information System (OBIS)	Global	OBIS is a global open-access data and information platform that document the ocean's diversity, distribution and abundance of marine life. The evolving platform allows users to identify biodiversity hotspots and large-scale ecological patterns and plot species distributions in relation to abiotic variables such as temperature, salinity and depth.	https://obis.org/
World Ocean Database (WOD)	Global	The WOD is an NCEI product and an IODE (International Oceanographic Data and Information Exchange) project. WOD is world's largest collection of uniformly formatted, quality controlled, publicly available ocean profile data. It is a powerful tool for oceanographic, climatic, and environmental research, and the end result of coordinated efforts to incorporate data from institutions, agencies, individual researchers, and data recovery initiatives into a single database.	https://www.ncei.noaa.gov/products/world-ocean-database
Pangaea	Global	The information system PANGAEA is operated as an Open Access library aimed at archiving, publishing and distributing georeferenced data from earth system research. PANGAEA focuses on georeferenced observational and experimental data that is open to any project, institution, or individual scientist to use or to archive and publish data.	https://www.pangaea.de/
The Global Biodiversity Information Facility (GBIF)	Global	GBIF is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.	https://www.gbif.org/
GEOTRACES	Global	GEOTRACES is an international program overseen by the Scientific Committee on Oceanic Research (SCOR). It provides open access marine hydrographic and	**4 ways to access GEOTRACES data to accommodate different users:**

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
		biogeochemical data (trace elements and isotopes).	**1. Bulk (full packages) download** (BODC site, 3 formats: CSV-ASCII, NetCDF and Ocean Data View (ODV) collections) **2.Online subsetting and extraction** (webODV Extractor, easy to select variables, region, cruises, etc.) **3.Online analysis and visualization** (webODV Explorer, very user friendly, no need to download software or data) **4. eGEOTRACES.org Atlas (**provides section plots and animated 3D scenes for many of the parameters**)** **(https://egeotraces.org)**
The European Marine Observation and Data Network (EMODnet) service	Europe	EMODnet is a network of organisations, supported by the EU's integrated maritime policy, that work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products.	https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/search
COPERNICUS marine environment and monitoring service (CMEMS)	Europe	CMEMS collects observations from data providers, mainly from EuroGOOS and ROOS members and Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) networks (Observations Programme Area). CMEMS also collaborates with SeaDataNet and EMODnet physics to improve the service for historical/reprocessed data and to involve new partners	https://marine.copernicus.eu/access-data

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
SeaDataNet (2006-2015)	Europe	The SeaDataNet infrastructure links national oceanographic data centres and marine data centres from 35 countries riparian to all European seas. The data centres manage large sets of marine and ocean data, originating from their own institutes and from other parties, in a variety of data management systems and configurations. A major objective and challenge in SeaDataNet is to provide an integrated and harmonised overview and access to these data resources, using a distributed network approach.	https://cdi-bathymetry.seadatanet.org/search
International Council for the Exploration of the Sea (ICES)	Europe	ICES is an intergovernmental body that provides scientific advice for sustainable management of the fisheries and marine resources, mainly in the North Atlantic. ICES publications include advice on fishing opportunities, fisheries and ecosystem overviews. ICES Data Centre manages a number of large dataset collections related to the marine environment.	https://www.ices.dk/data/dataset-collections/Pages/default.aspx
JERICO-RI	Europe	JERICO-RI is an integrated pan-European multidisciplinary and multi-platform research infrastructure dedicated to a holistic appraisal of coastal marine system changes. It enables open-access to state-of-the-art and innovative facilities, resources, FAIR data and fit-for-purpose services, fostering international science collaboration.	https://www.jerico-ri.eu/nl/startpagina/
European Atlas of the Sea	Europe	The European Atlas of the Seas provides information about Europe's marine environment. Users can view predefined and ready to use maps, covering topics such as environment, tourism, security, energy, transport, litter, sea bottom, fishing activity, aquaculture, and much more.	https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/
OSPAR Data and Information System (ODIMS)	Europe	ODIMS is an online tool providing a single point of access to all the data and information gathered through OSPAR's Joint Assessment and Monitoring Programme across the different thematic work areas of the Convention. It will help ensure that data is readily accessible for OSPAR assessments, but also help a broad range	https://odims.ospar.org/en/search/

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
		of users to find data held by OSPAR, to facilitate access to it and make use of it.	
British Oceanographic Data Centre (BODC) database	UK	BODC is the UK national facility for looking after and distributing data concerning the marine environment. It maintains and develops the National Oceanographic Database, manages the data for the UK Tide Gauge Network, manages the Natural Environment Research Council environmental data, and hosts the Marine Environmental Data and Information Network (MEDIN) core team.	www.bodc.ac.uk/data/
The United Kingdom Directory of Marine Observing Systems (UKDMOS)	UK	UKDMOS is a unique internet-based searchable database of marine monitoring conducted by UK organisations. UKDMOS is a tool for searching monitoring programmes and series based on information such as the parameters measured or the frequency of measurements taken.	www.ukdmos.org/
Marine Environmental Data and Information Network (MEDIN)	UK	MEDIN is a UK group working together to improve access and stewardship of marine data. MEDIN is open to all with an interest in marine data and information.	https://portal.medin.org.uk/portal/start.php
National Centers for Environmental Information – National Oceanic and Atmospheric Administration NCEI-NOAA	America	The NCEI Data Access application offers a wide variety of download and subsetting options for a growing collection of environmental data. While current offerings are limited primarily to weather and climate information, the application has a data-agnostic infrastructure designed to accommodate a broad spectrum of observation formats from across science disciplines.	www.ncei.noaa.gov/
AusSeabed Marine Data portal	Australia	The AusSeaBed Portal provides access to publically available acoustic datasets such as bathymetry, backscatter, side scan sonar data and other marine-related products, as well as a suite of analytical assessment tools to maximise the value of the data.	https://portal.ga.gov.au/persona/marine

Catalogue/ Portal/ Information system	Geographical location	Descriptions	Link
Australian Ocean Data Network	Australia	AODN staff provide a framework for data and information management that allows discovery and access of the data by scientists, managers and the public. The Portal incorporates a catalogue of metadata, a search interface driven by facets utilising controlled vocabulary terms, and a map interface that can be used to interact with AODN datasets and offers data download in a number of formats.	https://imos.org.au/facilities/aodn/aodn-data-search-discovery

BOX VIII - Online Help Desk

Under construction

In the meantime, any suggestions, ideas, comments and/or questions can be provided to the Decade Coordination Office for Ocean Data Sharing (DCO-ODS) using - **oceandatasharing@unesco.org.**

BOX IX - FAQ

Under construction

Disclaimer:

This draft Decade Data Resources Toolkit is by no means exhaustive and provide a first set of guidance and reference to more information which may help Decade Actions to include a sound data management approach to their activity. This will be a living toolkit which will be regularly updated, improved, refined and complemented as resources become available to meet the needs of the Decade Actions.

Provide your feedback:

Any suggestions, ideas, comments and/or questions can be provided to the Decade Coordination Office for Ocean Data Sharing (DCO-ODS) using - **oceandatasharing@unesco.org**.

In the future we might consider adding a separate section with guidance for

- *Data sharing by the private sector*
- *Data sharing by citizen science initiatives*

- ...