Past, present and future: successes and challenges in managing marine data – A celebration of the 50th Anniversary of the British Oceanographic Data Centre (BODC)

IODE International Oceanographic Data and Information Exchange

BODC British Oceanographic Data Centre

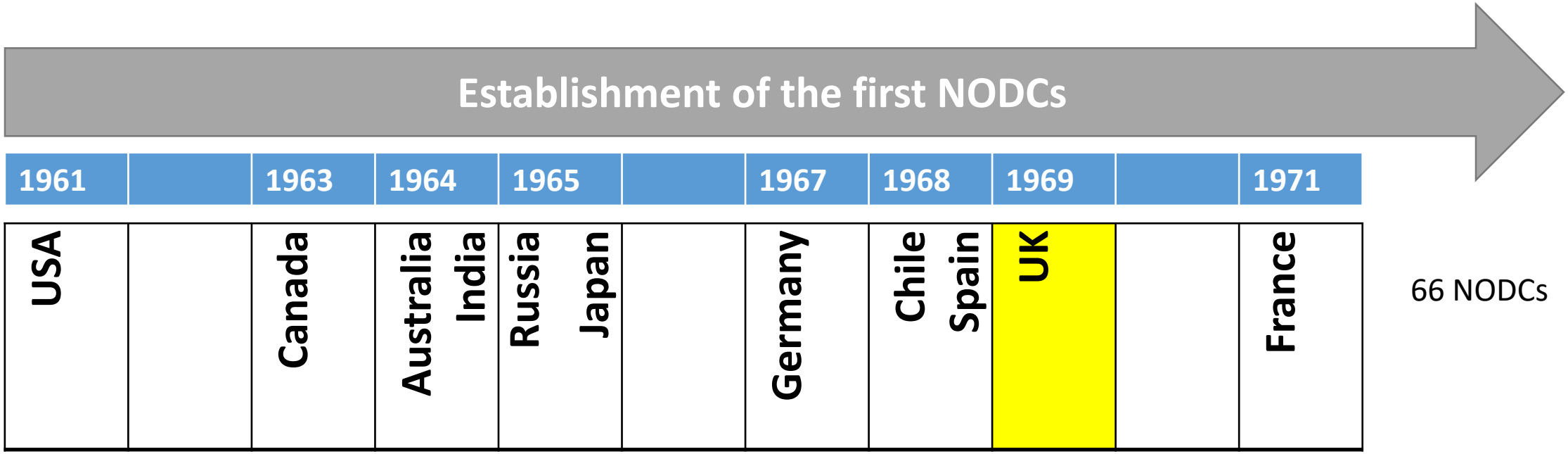
NATURAL ENVIRONMENT RESEARCH COUNCIL

Delivered by Ward Appeltans (IOC/IODE)

8th May 2019, The Bluecoat, Liverpool City Centre

66 NODCs
30 Associate Data Units

(continued renaming of OBIS nodes to ADUs)



! BODC was a Designated National Agency (DNA) before 1969

Between 1980-1996 Iouri Oliounine was the head of the IOC Ocean Services Unit in charge of IGOSS, IODE, and Tsunami programmes

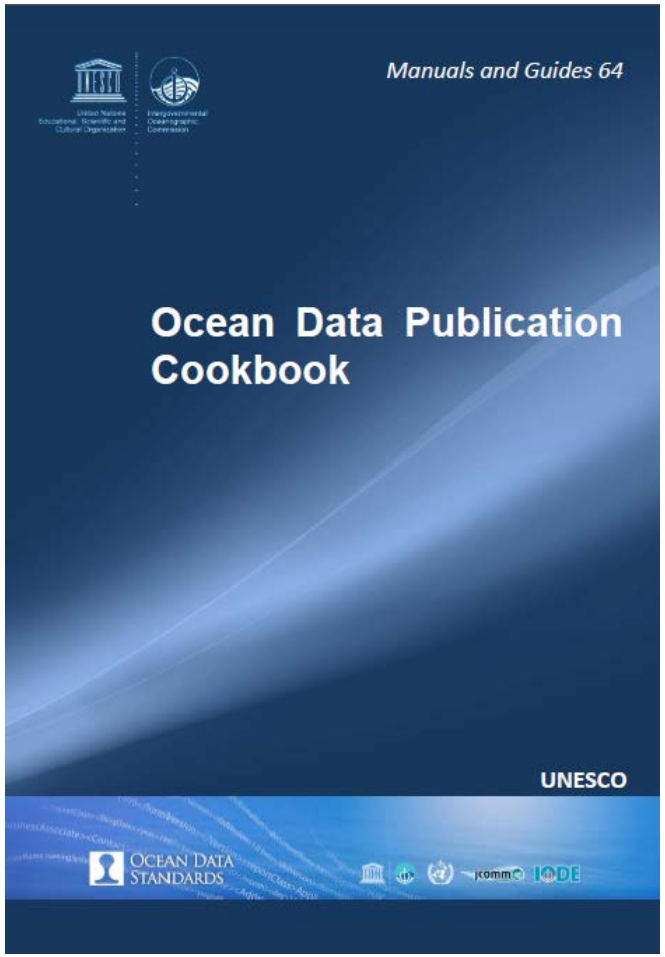
In 1980s and 1990s, BODC was known as the main contributor to the formulation of data policy, data exchange formats, data management tools

BODC in IODE

- Three IODE Chairs:
  - John B. Tait (1964-1968)
  - Nick Flemming (1990-1996)
  - Lesley Rickards (2005-2009)

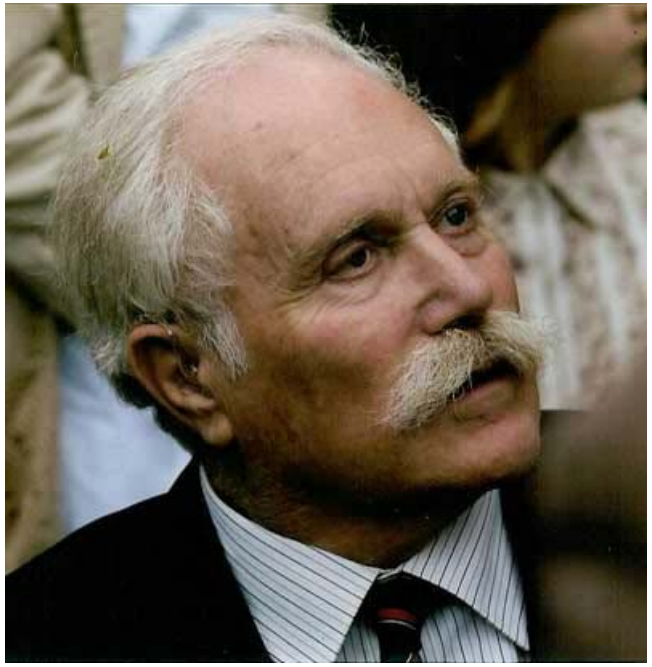
- Several BODC staff actively engaged in IODE Projects:
  - Roy Lowry: Marine Environmental Data and Information Referral System (MEDI), and marine-XML, now under JCOMM/IODE ETDMP
  - Gwen Moncoiffe: OBIS-ENV-DATA, GE-BICH (The Group of Experts on Biological and Chemical Data Management and Exchange Practices)
  - Adam Leadbetter: OTGA-RDM training, ICAN, Data Publication/data citation project (SCOR,MBLWHOI,IODE)

- BODC involved in 52 IODE documents



IOC 50th Anniversary Commemorative Medal

Dr. Meirion Jones from UK is a Founding Director of the British Oceanographic data Centre. From 1979 to 1996 he was actively involved in developing the IODE system including the design of the IOC General Exchange Format. From 1985 to 2003 he was Chairman of the IOC Group of Experts on the Technical Aspects of Data Exchange and of the IOC/IHO GEBCO Sub-committee on Digital Bathymetry from 1983 to 2003. He coordinated the digitization of the GEBCO paper charts and led the publication of the Centenary Edition of the GEBCO Digital Atlas.



Dr. Nicholas Flemming from UK was Director of the British national oceanographic data centre from 1980 till 1987 to take later the position of the chairman of the IODE Committee of the IOC which he occupied till1992. He was Director of EuroGOOS Office and Member of the GOOS Steering Group until 2001. Now he is a research fellow at the national oceanography centre in Southampton.

Dr. Lesley Rickards from UK, Deputy Director of the British Oceanographic Data Centre has over 25 years experience in managing marine data. She was Chair of the IOC International Oceanographic Data and Information exchange Committee from 2003-2007 and represented IODE on the JCOMM Management Committee. She is currently a member of the International Council for Science World Data System Scientific committee and the governing body of the World Data System. In 2007 she was appointed Director of the Permanent Service for Mean sea Level which has close links with the Global Sea Level Observing System – GLOSS. For over 20 years she has been a member of the IOC/JCOMM Group of Experts on GLOSS.

IODE Achievement Awards

2013 Roy Lowry

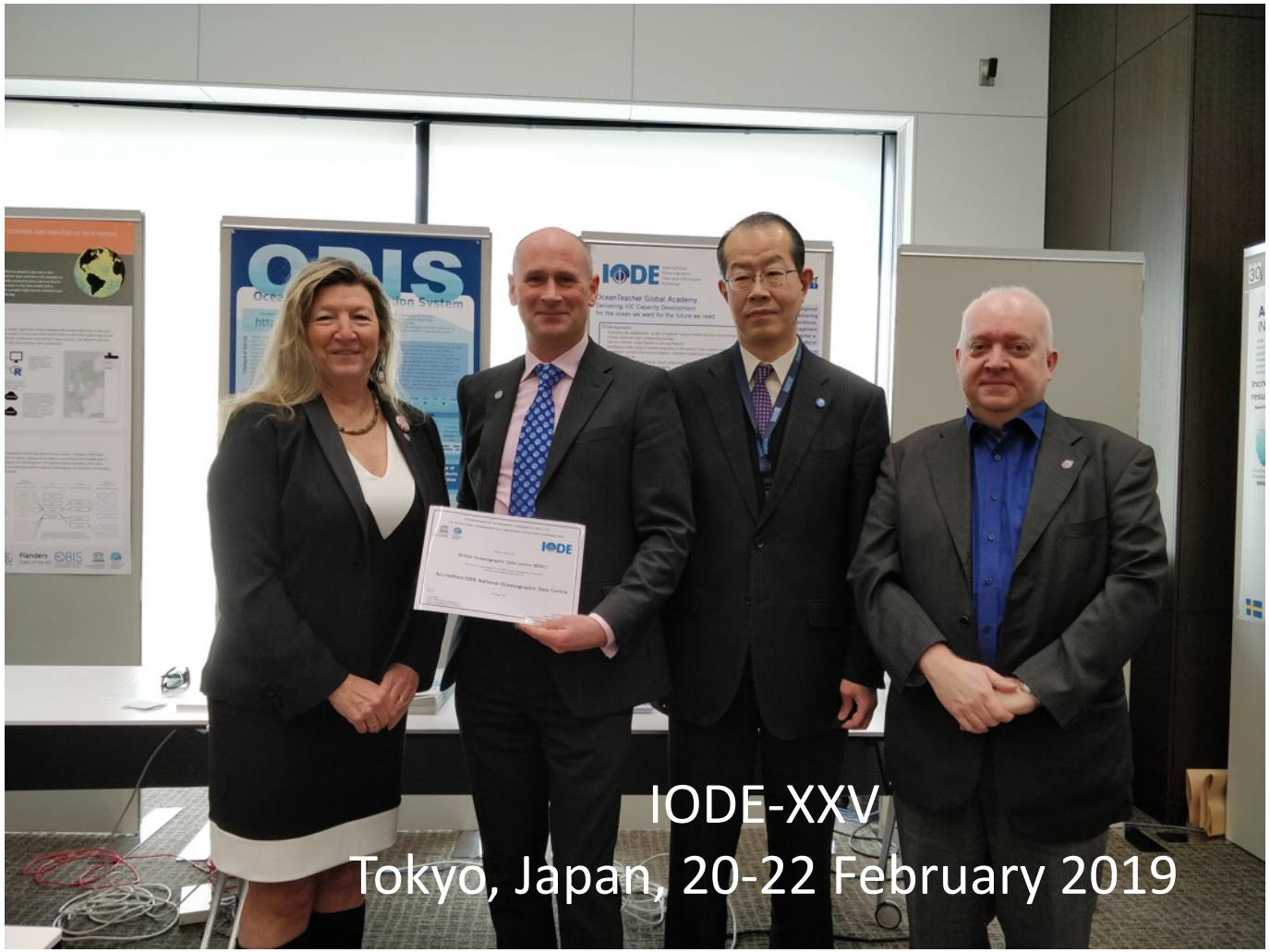
- General Format 3 (GF3)
- Joint Global Ocean Flux Study (JGOFS) Data Management Task Team
- MarineXML, SeaVox
- data publication and citation

2009 Lesley Rickards

- IOC Strategic Plan for Oceanographic Data and Information Management

Quality Management Framework: *ensuring quality data flow in the network*

NODCs to establish organizational quality management systems for the delivery of oceanographic and related data, products and services.



(BODC was accredited by IODE Officers, 23/8/2017)

So far 9 NODCs have been accredited, and 1 ADU

Belgium (x2), China, France, Iran, Ireland, Japan, Korea (Rep. of), United Kingdom and Malaysia (adu)

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

IOC Working Committee on IODE; 11th session; New York; 1984

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

Group photo MDM 1987

United Nations Educational, Scientific and Cultural Organization

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One Planet, One Ocean

IODE-XIV Paris, France, 1-9 December 1992

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MDM 1994

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

MDM Dublin Ireland
1997

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

MDM 1999, Canada

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

MDM 2000

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

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One Planet, One Ocean

MDM 2001

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

First female chair of IODE

IODE-XVIII
2005

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

IODE Group of Experts on the Technical Aspects of Data Exchange (GETADE)
Former JCOMM-ETDMP

Group photo GETADE

United Nations Educational, Scientific and Cultural Organization

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One Planet, One Ocean

IODE-XIX,
Trieste

2007

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

One Planet, One Ocean

IODE-XX; Beijing 2009

UNESCO/IOC/III-11 -27-
Part II Annex V

Exchange of Biological Data

The Working Group considered that a minimum requirement should be to submit along with physical and chemical data, details of what biological sampling was done. This information should include if possible: position, date, time zone, local time of sunrise and sunset, sounding, and the type of sampling (that is phytoplankton, zooplankton or benthos sampling, midwater trawling, long lining or other forms of fishing, underwater photography, acoustic studies, surface collections, etc.) or measurements (priiary production, optical measurements, etc.). Details of the sampling should also be included, incorporating information about the type of gear used, the times of commencement and completion of sampling and the upper and lower depth of sampling, etc. It should also be stated where further information concerning the samples or measurements can be obtained.

Biological results, on the other hand, can be divided into a number of categories which lend themselves in varying degrees to handling by data centres. Many come under the heading of "information retrieval", including systematic or taxonomic information, descriptions of organisms, publications, etc. and these present particularly difficult problems. Other data are insufficiently uniform with regard to method or take the form of continuous records which are difficult to handle. Some biomass statistics are already included in specialized data centres.

The Working Group feel, therefore, that the categories of biological results which can usefully be handled by data centres at the present time are the following:-

1. Primary production measurements
2. Chlorophylls
3. Phytoplankton biomass
4. Zooplankton biomass
5. Benthos biomass

The submission of such data in any form is acceptable providing they are accompanied by precise details of the methods used. It is hoped that after consideration by specialized working groups of SCOR, ACMRR, etc. and as a result of the standardization and intercalibration work being conducted by SCOR and other bodies it may eventually be possible to reach agreement on standardized reporting. As methods improve in the future it will become desirable to include other biological observations, in particular those which may be of importance in fishery oceanography.

R.I. Currie
Rapporteur

In 1964 – under chairmanship of John Tait:

IODE WG Report on the exchange of biological data:

- Eventually standardisation and intercallibration may make standard reporting possible
- Data on PP, Chl a, phytoplankton, zooplankton and benthos biomass are acceptable
- Submit metadata of biological sampling along with physcial and chemical data.
- As methods improve, we may include other biological observations important in fishery oceanography

OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM

OBIS-ENV-DATA

Expanding OBIS beyond species occurrence data, with an extension for environmental data

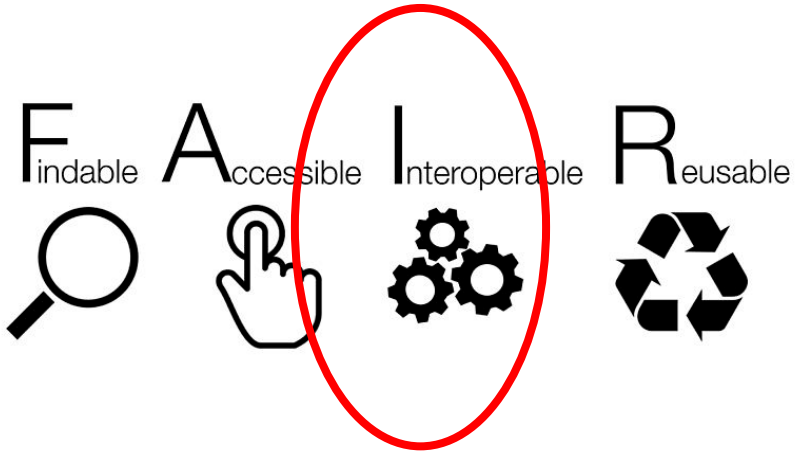
This 2-year pilot project developed procedures and guidelines for managing and sharing mixed datasets, making sure that supporting measurements are curated and distributed alongside the species occurrence data.

OBIS-ENV-DATA involved 11 institutions from 10 countries in North-America, South-America, Europe, Africa and Australia.

In collaboration with EMODnet

OBIS
OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM

Improve interoperability



New terms in the ExtendedMeasurementOrFact extension:

- **occurrenceID**
- measurementType
- **measurementTypeID**
- measurementValue
- **measurementValueID**
- measurementUnit
- **measurementUnitID**

BODC

NERC Vocabulary Server

Past: a dump of measurements and facts

NOW: Structured in MeasurementorFact Extension and standardized

dwc:dynamicProperties

```
SampleSize=Trap deployed for 2 days; Bottom temperature=4.13C; Wind direction=0; Wind speed=1-3 knots

Sample size = 1.81 n.miles * 41.0 ft; Weight(Kg)= .11; Temperature(C)= 6.46

ObservedWeight=0.000153901;

weightInKilograms=0.0404, lengthInMeters=0.163, lengthType=FORK

SampleSize=million cells/m³; ObservedWeight=192.02;

Samplesize=Number per cubic metre; NetMeshSize=236; VerbatimName=Calanus hyperboreus; Sounding=3300

SubSampleWeightInGrams=0.365999997; SubSampleNumbers=2; CalculatedWeightInGrams=0.365999997; CalculatedNumbers=2; SampledAll=Y; AverageWeightInGrams=0.182999998; NonSubSubWeightInGrams=; NonSubSubNumber=

{"sampleSize":"Filtered water volume: 506 m^3"}

{"attributes":"range of standard length: 4.8mm - 21.2mm"}
```

RStudio

events | occurrences | measurements | emeasurements | emeasurements_2

Filter

	eventID	occurrenceID	measurementType	measurementTypeID	measurementVa
1	station_1		bottom water temperature	http://vocab.nerc.ac.uk/collection/P01/current/TEMP...	12
2	core_1		device type	http://vocab.nerc.ac.uk/collection/Q01/current/Q01...	reineck box core
3	core_1		penetration depth	http://vocab.nerc.ac.uk/collection/P01/current/MAX...	34
4	core_1		surface area	http://vocab.nerc.ac.uk/collection/Q01/current/Q01...	0.028
5	core_1		median grain size	http://vocab.nerc.ac.uk/collection/P01/current/MDG...	150
6	core_1		organic carbon content	http://vocab.nerc.ac.uk/collection/P01/current/OCC...	10
7	slice_1		median grain size	http://vocab.nerc.ac.uk/collection/P01/current/MDG...	85
8	slice_1		porewater nitrate concentration	http://vocab.nerc.ac.uk/collection/P01/current/ISMJ...	4.1
9	slice_2		median grain size	http://vocab.nerc.ac.uk/collection/P01/current/ISMJ...	92
10	slice_2		porewater nitrate concentration	http://vocab.nerc.ac.uk/collection/P01/current/ISMJ...	3.2
11	core_1	urn:catalog:EEA:NSBS:85	body size	http://vocab.nerc.ac.uk/collection/P01/current/OBSI...	12
12	core_1	urn:catalog:EEA:NSBS:85	wet weight biomass	http://vocab.nerc.ac.uk/collection/P01/current/OWE...	45
13	core_1	urn:catalog:EEA:NSBS:85	abundance	http://vocab.nerc.ac.uk/collection/P01/current/OCO...	52
14	core_1	urn:catalog:EEA:NSBS:86	body size	http://vocab.nerc.ac.uk/collection/P01/current/OBSI...	28
15	core_1	urn:catalog:EEA:NSBS:86	wet weight biomass	http://vocab.nerc.ac.uk/collection/P01/current/OWE...	17
16	core_1	urn:catalog:EEA:NSBS:86	abundance	http://vocab.nerc.ac.uk/collection/P01/current/OCO...	9

Showing 1 to 16 of 16 entries

Console

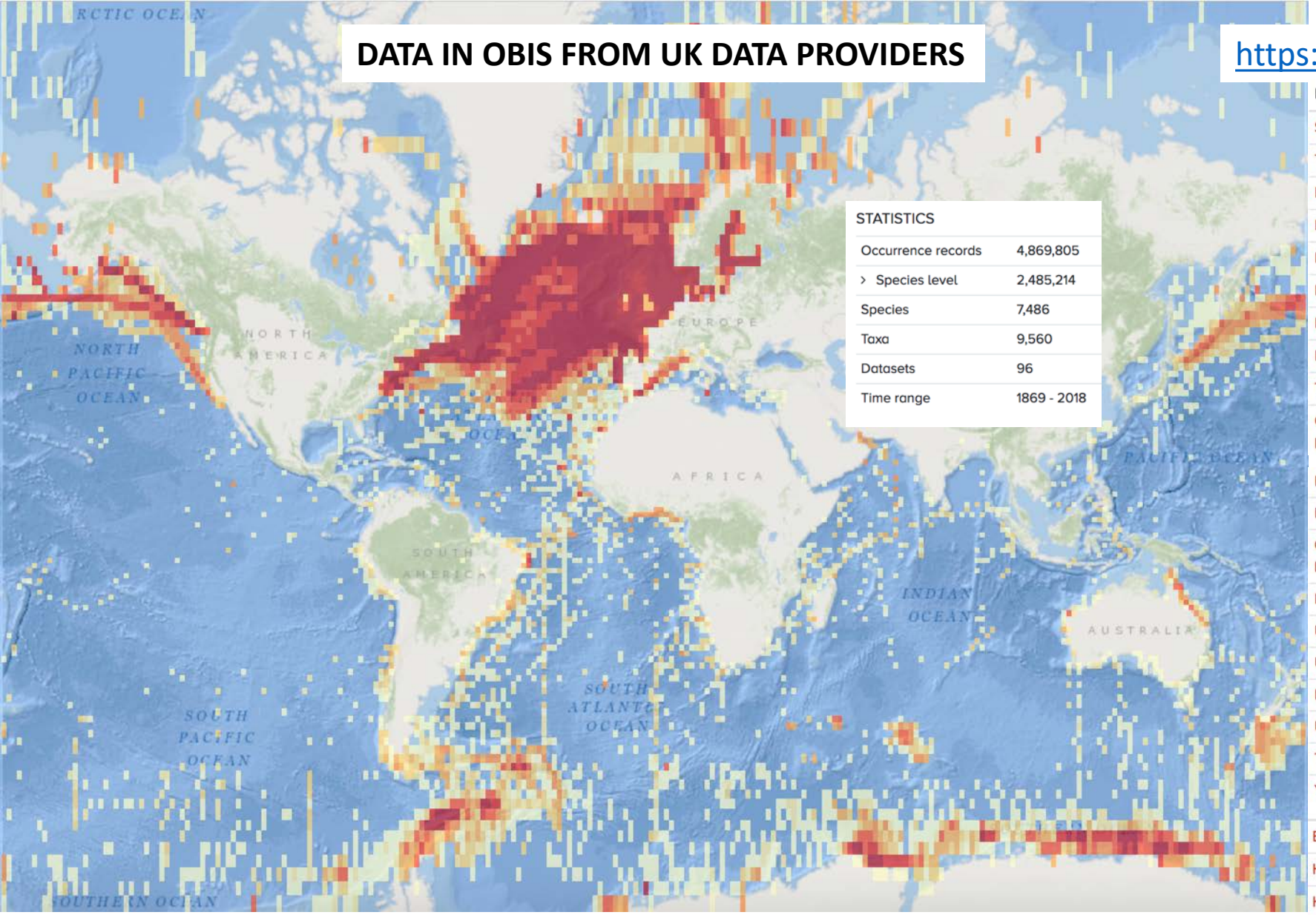
7th Session of the IODE Steering Group for OBIS, Nov 2018

36 participants from 24 countries representing 24 OBIS nodes

SG-OBIS-7 established a Vocabulary Infrastructure project team to establish a basic framework for organizing and curating vocabularies used in OBIS

DATA IN OBIS FROM UK DATA PROVIDERS

https://mapper.obis.org/?countryid=222

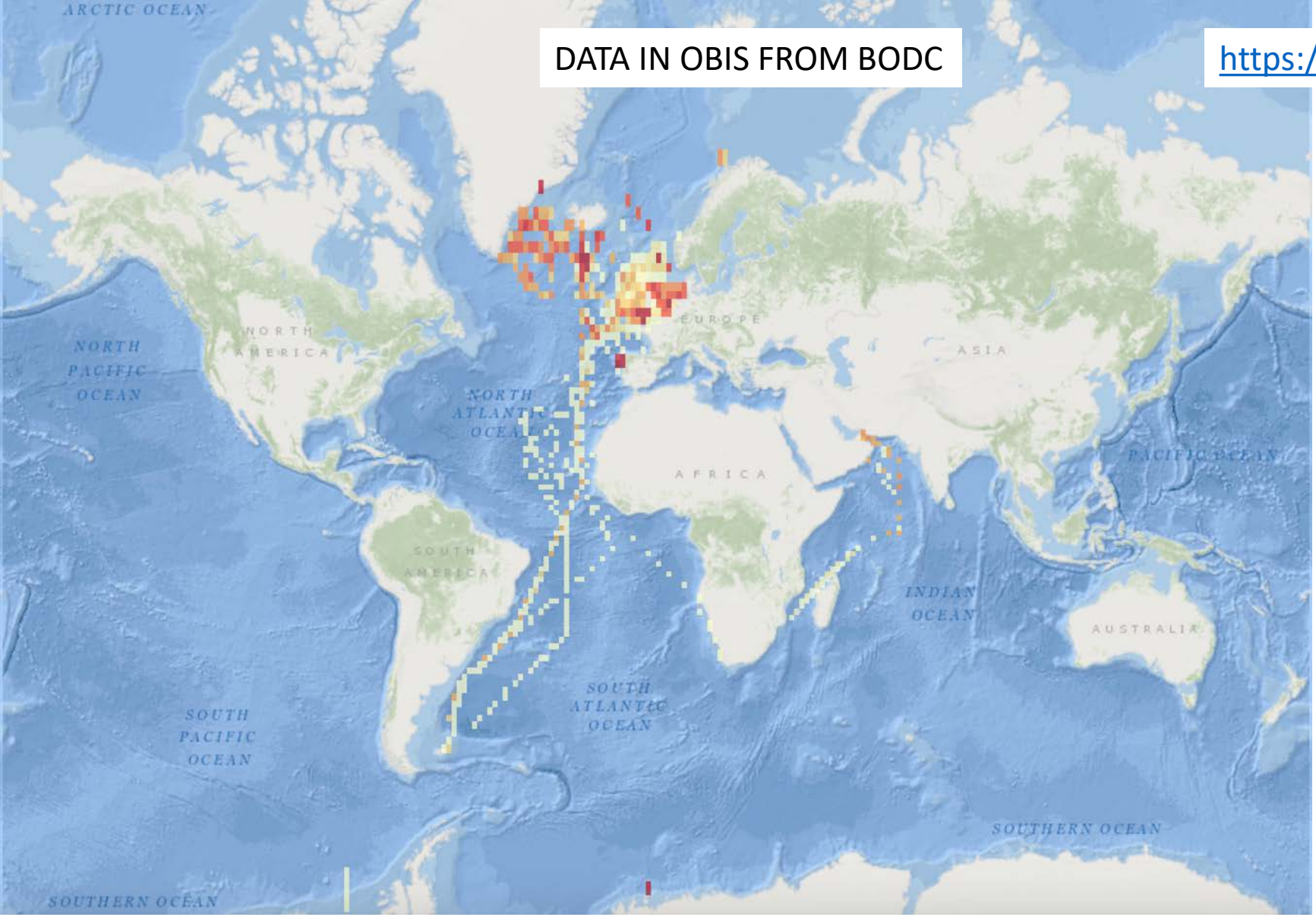


Name	Records
Sir Alister Hardy Foundation for Ocean Science	3,475,349
The Marine Biological Association of the United Kingdom	455,393
National Biodiversity Network Trust	376,196
Natural Resources Wales	254,001
British Antarctic Survey	159,852
British Oceanographic Data Centre	121,517
European Seabirds at Sea	83,224
Plymouth Marine Laboratory	79,905
The Natural History Museum	31,911
Center for Environment, Fisheries and Aquaculture Science, Lowestoft Laboratory	27,664
Marine Ecological Solutions Ltd.	24,238
Institute of Zoology, Zoological Society of London	23,499
Centre for Environement, Fisheries and Aquaculture Sciences, Burnham Laboratory	7,064
Ecological Consultancy Services Ltd.	5,970
University of Plymouth	4,126
University of Glasgow	3,754
Porcupine Marine Natural History Society	3,468
UNEP World Conservation Monitoring Centre	3,149
The Marine Environment Monitoring and Assessment National database	2,494
Yorkshire Naturalists Union - Marine and Coastal Section	2,424
Biosphere Expeditions	1,054
Hartpury College and University Centre	789
Hartpury College — Department of Animal and Land Science	220
ARTOO Marine Biology Consultants	134
Thomson Ecology	53
Seasearch	34
Dorset Environmental Record Centre	32

Approx 10% of all records in OBIS

DATA IN OBIS FROM BODC

https://mapper.obis.org/?instituteid=5168#



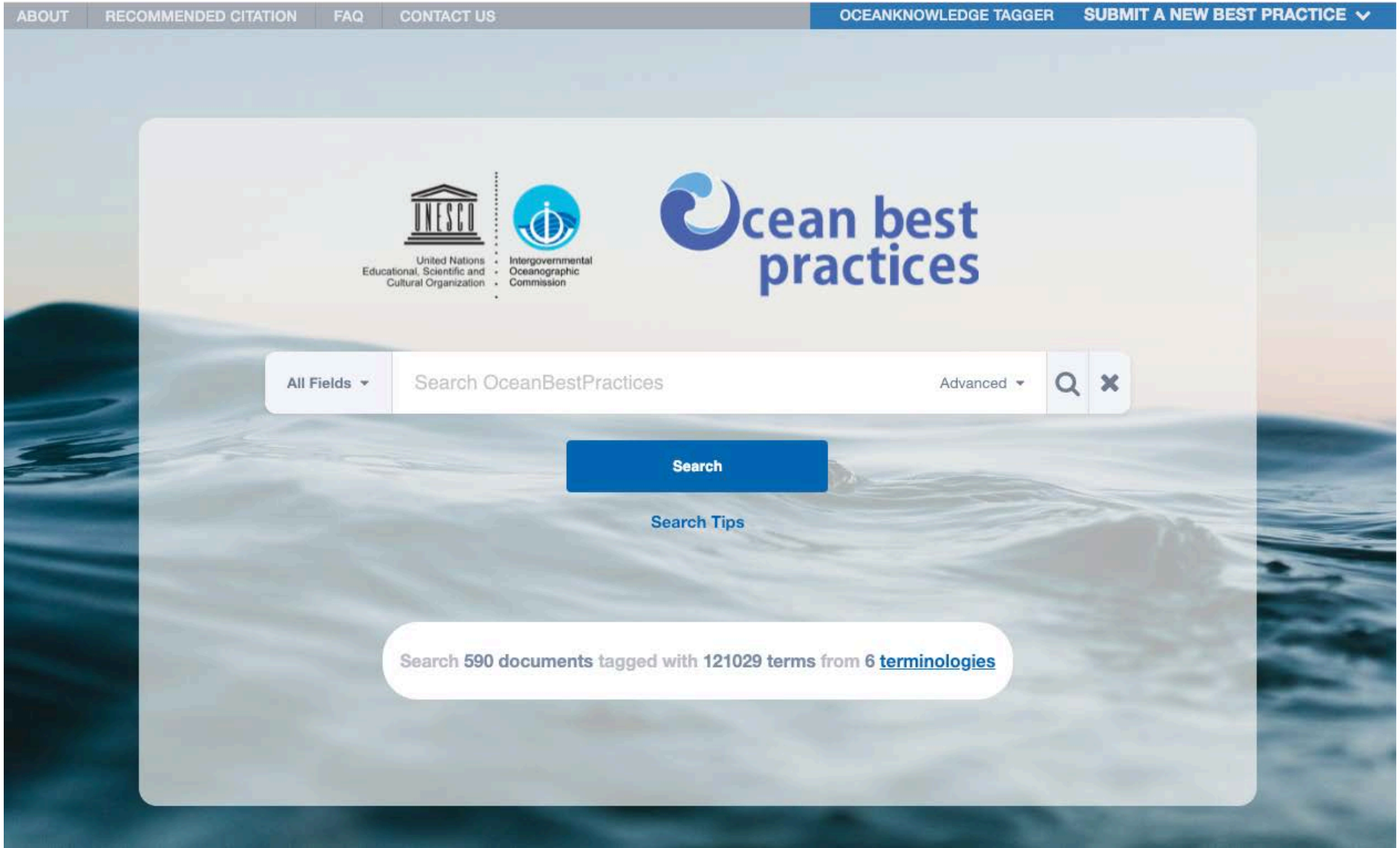
STATISTICS

Occurrence records	124,011
› Species level	68,879
Species	997
Taxa	1,374
Datasets	2
Time range	1908 - 2011

TWO PILOT DATASETS.

FUTURE DATA FLOW VIA UK OBIS (MBA)

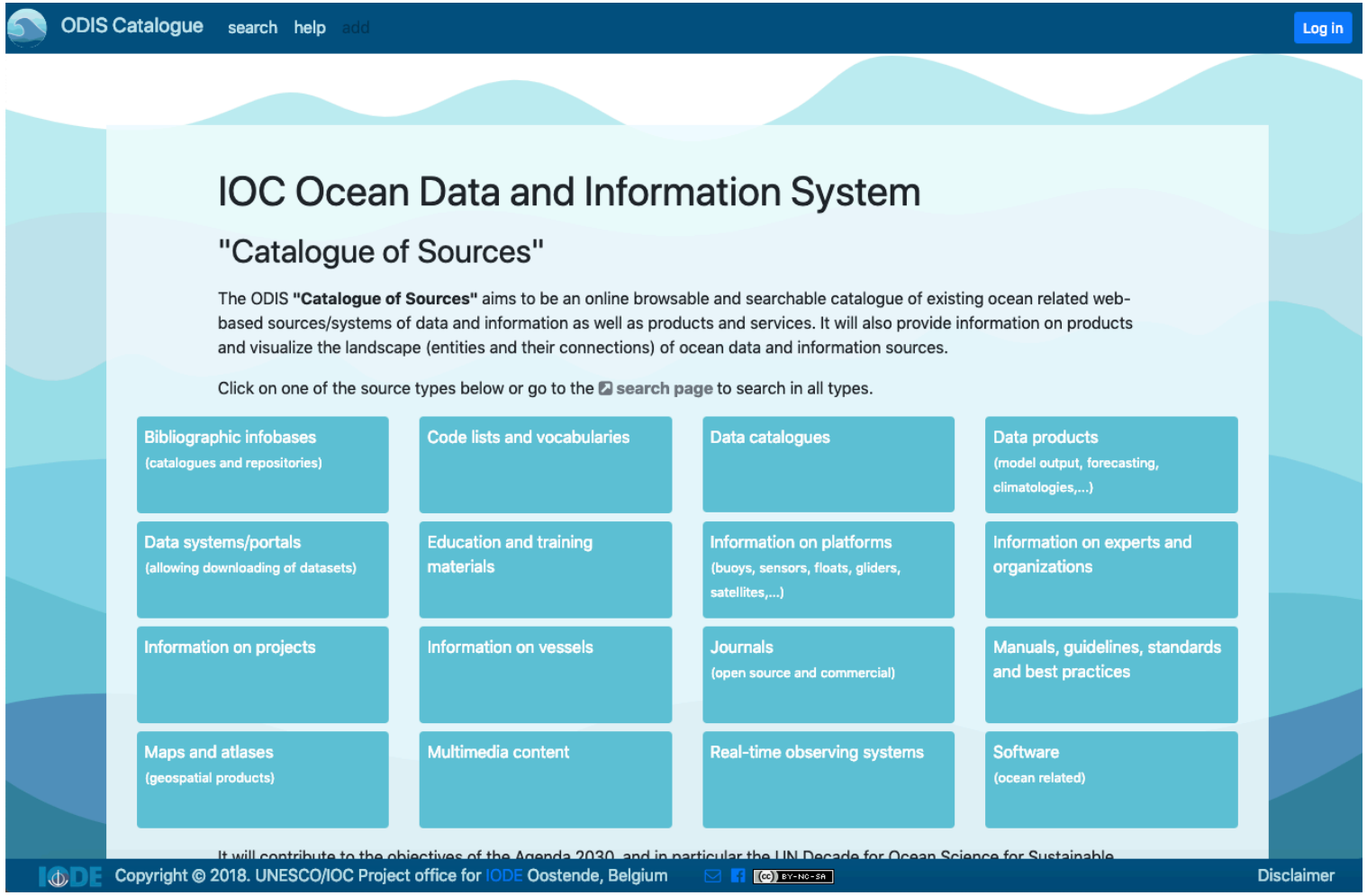
oceanbestpractices.org



IOC Ocean Data and Information System

https://catalogue.odis.org/

The ODIS "Catalogue of Sources" aims to be 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.



IODE's CD tool: OTGA

OceanTeacher GLOBAL ACADEMY

IODE International Oceanographic Data and Information Exchange

Belgium
China
Colombia
India
Iran
Kenya
Malaysia
Mozambique
Senegal

9 Regional Training Centres

www.oceanteacher.org

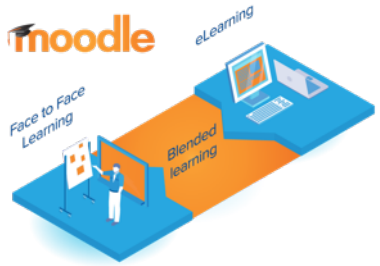
> 2600 people trained in total from 134 Member States

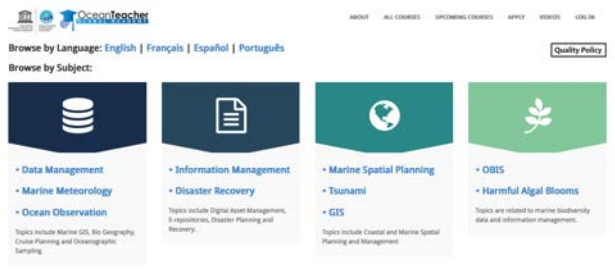
> 4 800 registered users

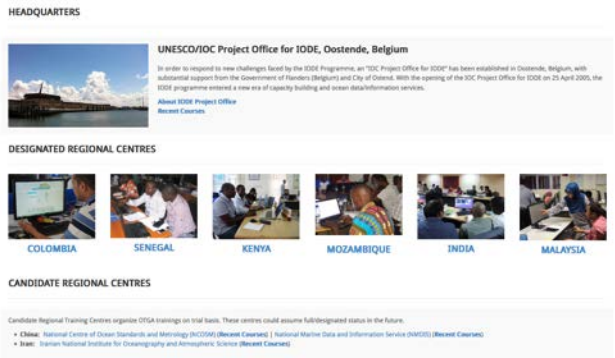
> 200 training courses
(English, Spanish, French, Portuguese)

ISO 29990: 2010

Learning Services Provider







Continue collaboration with BODC

- IODE-OBIS vocab team
- IWG IODE-ODIS to develop the implementation plan and cost-benefit analysis for ODIS
- IODE-GOOS Ocean Best Practices System
- IWG-IODE-SODIS, to propose a strategy on ocean data and information stewardship for the UN Ocean Decade
- Capacity Development via OceanTeacher Global Academy