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**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION**

(of UNESCO)

**Twenty-seventh Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XXVII)
UNESCO Headquarters, Paris, 22-24 March 2023**

**JOINT ACTIVITIES WITH IOC OCEAN SCIENCE PROGRAMME**

# Introduction:

The activities described below express the desire to collaborate with IODE and how this is mutually beneficial for several IOC programmes and is a prerequisite for the IOC as an organization to deliver in the value chain from data to data products.

The budget estimates for each of HAIS, Go2DAT, SDG 14.3.1, GOSR, STOR are not requests to IODE but estimates of cost of the activity. The support asked from from IODE is described in the text.

The activities described below are referred to in the Action Paper except GOSR and StOR. However, the identification of the need for interaction and collaboration is described below.

# Harmful Algal Information System (HAIS)

Cooperation of IODE and HAIS goes back to IODE-XIX in 2007 when the IODE Committee adopted Recommendation IODE-XIX.1:

**Recommendation IODE-XIX.1**

**A HARMFUL ALGAL EVENT INFORMATION SYSTEM**

The IOC Committee on International Oceanographic Data and Information Exchange,

**Acknowledging** the data products developed within the IOC Harmful Algal Bloom Programme on harmful algal events, harmful algae monitoring and management systems, current use of taxonomic names of harmful algae, biogeography of harmful algal species, and an expert directory and a bibliography;

**Recognizing** the need for a further development, integration and streamlining of these data products;

**Noting with satisfaction** the invitation by the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB) to develop a Harmful Algal Event Information System as a joint IPHAB-IODE activity;

**Re-emphasizing** the importance of high-quality oceanographic data and information, products and services for scientific, observation and ocean based disaster warning and mitigation programmes of the Commission, for member States, the private sector and other users,

**Endorses** the IOC Harmful Algal Event Information System as a joint IPHAB-IODE activity.

Financial implications:
2007: US$15,000        (extra-budgetary funds, not identified)
2008-2009: US$30.000        (extra-budgetary funds, not identified)

The IOC HAB web site (<https://hab.ioc-unesco.org>) is hosted by the IOC Project Office for IODE, as is the IOC-UNESCIO Harmful Algae Information system data portal (<https://data.hais.ioc-unesco.org>) and Harmful Algae News (<https://prod.hab.ioc-unesco.org/harmful-algae-news/?option=com_oe&task=viewDoclistRecord&doclistID=59>) and Harmful Algae Event Database (<http://haedat.iode.org>).

As part of the Flanders FUST funded DIPS-4-Ocean Assessment project (2014-2021) the IOC published the first ever UN Global HAB Status Report (GHSR), which was released on 8 June 2021 and was an unprecedented analysis of Harmful Algal Bloom (HAB) events worldwide over the past 33 years. The co-authors of the GHSR mined both the global Harmful Algae Event Database (HAEDAT), which at the time consisted of 9,503 events with one or more impacts on human society, and the Ocean Biodiversity Information System (OBIS) database, which contained 7 million microalgal observation records, including 289,668 toxic algal species occurrences. Regional trends of microalgal observations in OBIS were used as a proxy for monitoring effort. Thanks to the financial support from DIPS-4-Ocean Assessments, the IODE/OBIS team also developed a new HAIS data portal (<https://data.hais.ioc-unesco.org>) which visualises the event data from HAEDAT with the HAB species occurrences from OBIS. Currently new funding is sought to support the further development and maintenance of the Harmful Algal Information System (HAIS) data systems including HAEDAT and OBIS HAB, which are both hosted by IODE.

# Global Ocean Oxygen Database and Atlas(GO2DAT)

Global Ocean Oxygen Database and Atlas Steering Committee

**Established**: *The Global Ocean Oxygen Database is an initiative associated to the Global Ocean Oxygen Decade Ocean Decade Programme, and led by the Global Ocean Oxygen Network which was established in 2016 as a IOC working group (*[EC-XLIX/Dec.4.1 (III)](https://oceanexpert.org/document/19158)*). .*

**Partners:/Membership:**

GO2NE members, IOCCP/GOOS/ROOS, IOC, IODE, existing databases (e.g. WOD, EMODnet, CMEMS, GLODAP), GDACs (Argo, gliders, Moorings, AniBOS ,..)

**Activities**:

Terms of Reference for the GO2DAT Steering Committee

* Composition : GO2DAT Steering Committee : Representatives of GO2NE, IOCCP/GOOS/ROOS, IOC, IODE, existing databases (e.g. WOD, EMODnet, CMEMS, GLODAP), GDACs (Argo, gliders, Moorings, AniBOS ,..)
* Define and monitor the functioning of GO2DAT GDAC in compliance with the terms of references of an IODE-approved GDAC (see next slide)
* Work with existing GDACs and the IOC UNESCO International Oceanographic Data and Information Exchange program (IODE) towards the definition of common best practices and an alignment between GDACs of metadata structure, QC and QF procedures with respect to oxygen. These community agreed best practices will be communicated to data providers and repositories via the OceanTeacher network.
* Support increased cooperation between GDACs  and the adoption by NODCs of the GO2DAT standards
* For instance, GO2DAT GDAC will receive and assemble marine O2 data and metadata from the data streams described in section “GO2DAT data flow (Grégoire et al., 2021)” check their consistency, identify duplicates, make sure that the data are quality controlled according to the GO2DAT-GDAC standards and methods, provide feedbacks to the source of data regarding quality issues, make data accessible and metadata available through the GO2DAT data portal and to IODE.

IODE is a key partner in this effort to harness and establish, if required, standard operating mechanisms (OBPS), to build capacities (OTGA) and to connect with NODCs and ADUs, many of which are key stakeholders. Additional financial support will be required to develop GO2DAT, with technical support provided by IODE GO2DAT, as GO2DAT is expected to be a main contribution to OceanInfoHub and at a later stage to ODIS.

**Financial implications:**

2023: US$ 3000 participation in Steering group meeting (extra-budgetary funds)

2024: US$ 10000 participation in Steering group meeting and integration of GO2DAT into the OceanInfoHub (extra-budgetary funds)

# Cooperation with IOC Ocean Science Section in SDG 14.3.1 data portal

IODE support to the SDG 14.3.1 data collection

**Established**: *. In Decision XXIX/9.1, the IOC Assembly at its 29th session in 2017 took note of the assignment of IOC as a custodian agency for specific SDG 14 indicators, particularly under Targets 14.3 and 14.a. This means that the IOC is responsible for the methodological development and measurement of these SDG indicators at the global scale. In alignment with the reports delivered at the IODE XXV, IODE reassured its support to the collection of SDG 14.3.1 data for which IOC is custodian agency. To facilitate data submission, IOC has developed an online portal (https://oa.iode.org/) based on the methodology for SDG Indicator 14.3.1 and the associated data and metadata files, in cooperation with the International Oceanographic Data and Information Exchange (IODE). The online data submission interface allows for the uploading of the completed data and metadata files, with some additional information.*

**Partners:/Membership:**

GOA-ON Executive Council, IOCCP/GOOS/ROOS, IODE, existing databases (e.g. WOD, EMODnet, CMEMS, GLODAP, NCEI, SOCAT).

**Activities**:

In cooperation with IODE the Commission successfully assumed its custodian role in the development of the methodology to support Member States’ implementation of and reporting on the SDG target indicator 14.3.1: Average marine acidity (pH) measured at agreed suite of representative sampling stations. Over the reporting period, IOC continued its support to its MS towards increasing the scientific and data management capacity for Ocean Acidification data and information. This was mainly delivered via two webinars and an OTGA course for the Pacific Islands. This course supported particularly scientists in SIDS.

The SDG 14.3.1 Data Portal (https://oa.iode.org/), hosted and technically maintained at IODE, is a tool for the submission, collection, validation, storage and sharing of ocean acidification data and metadata submitted towards the Sustainable Development Goal 14.3.1 Indicator:. In 2015, the United Nations adopted the 2030 Agenda and a set of Sustainable Development Goals (SDG), including a goal dedicated to the ocean, SDG 14, which calls to "conserve and sustainably use the oceans, seas and marine resources for sustainable development". The IOC of UNESCO was identified as the custodian agency for the SDG Target 14.3: "Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels", and the associated SDG Indicator 14.3.1 ("Average marine acidity (pH) measured at agreed suite of representative sampling stations").

Thanks to the cooperation and support provided by IODE IOC is able to receive SDG 14.3.1 data and metadata. In order to further facilitate the submission, the version control and to lift the burden of scientists, who are asked to provide data to several databases during the year, IOC established two tasks team, which work on the metadata and the vocabulary for ocean acidification data, which the aim to develop a federated system for ocean acidification data. With continuous support by IODE secretariat, the SDG 14.3.1 portal would become one of the platforms to be harvested on a regular basis and could act as a mirror to support visualization/exchange and ensure long term availability of the data.

Additional financial support was obtained to develop some, but not all, additional functionalities in the SDG 14.3.1 portal: (i) allow upload of data sets to the in other formats than excel; (ii) identification of relevant data bases and agree on similar metadata templates; (iii) establishment of a federated system to harvest 14.3.1 relevant data on a regular basis (adoption of ERDDAP technology), (iv) improve the visualization available on the 14.3.1 SDG indicator portal.

It is expected that in 2023 and 2024 IODE support will be required to implement the federated system, to maintain existing functions of the portal and to develop visualization tools for the data user.

**Financial implications:**

2023: US$ 2000 participation in related working group meetings, as well as maintenance and further development of the SDG 14.3.1 data portal (extra-budgetary funds, partly identified)

2024: US$ 30000 participation in related working group meetings, as well as maintenance and further development of the SDG 14.3.1 data portal (extra-budgetary funds, partly identified)

# PROPOSED: Cooperation with THE GLOBAL OCEAN SCIENCE REPORT (GOSR)

IODE support to the Global Ocean Science Report (GOSR)

**Established**: *Through IOC Assembly Decision IOC-XXIX/5.1 (2017), IOC Member States recognized the need for systematic, continuous and long-term data compilation on their ocean science capacity in the editions of the Global Ocean Science Report (GOSR). The first edition of the GOSR was published in June 2017, and it assessed for the first time the status and trends in ocean science capacity around the world. Following its first edition, its second edition was launched in December 2020, which addressed four additional topics: contribution of ocean science to sustainable development; blue patent applications; extended gender analysis; and capacity development in ocean science. IODE recognized the importance of the GOSR and related products and information at its 25th session. Furthermore, the GOSR Tracker and the GOSR data portal are designed as a complementary product to the GOSR, allowing interim monitoring of key parameters on the status of global ocean science. This tracker questionnaire is also expected to be the basis for the SDG 14.a.1 indicator reporting in 2023.*

**Partners:/Membership:**

Contributors to the 2020 edition of the GOSR included: IOC Member States, IOC sections and programmes (GOOS, IODE, MPR, Ocean Decade, Ocean Science Section, Tsunami Unit), All-Russian Research Institute of Hydrometeorological Information, Duke’s Nicholas Institute for Environmental Policy Solutions, Flanders Marine Institute and Ghent University, Food and Agriculture Organization of the United Nations, GEOMAR Helmholtz Centre for Ocean Research Kiel, Japan Agency for Marine-Earth Science and Technology, Kenya Marine and Fisheries Research Institute, Korea Institute of Ocean Science and Technology, Marine and Coastal Research Institute, Mercator Ocean International, Ministry of Science, National Autonomous University of Mexico, OceanOPS, OECD, RELX, Spanish Institute of Oceanography, The Research Council of Norway, U.S. National Academies of Sciences, University of Bergen, University of Dar es Salaam, University of Las Palmas de Gran Canaria, University of Tasmania, University of the West Indies, University of the Western Cape, University of Tokyo

**Activities**:

The GOSR is currently a resource for policymakers, academics and other stakeholders seeking to assess progress towards the sustainable development goals of the UN 2030 Agenda, in particular SDG target 14.a on scientific knowledge, research capacity and transfer of marine technology. The GOSR provides the information for the indicator for target 14.a as the proportion of total research budget allocated to research in the field of ocean science.

The first edition of the GOSR, launched on 8 June 2017, assessed for the first time the status and trends in ocean science capacity around the world. It offered a global record of how, where, and by whom ocean science is conducted, and quantitatively identified the key elements of ocean science at the national, regional and global scales, including workforce, infrastructure and publications. It was the first collective attempt to systematically highlight opportunities as well as capacity gaps to advance international collaboration in ocean science and technology.

The second edition of the GOSR, the ‘GOSR 2020’, presents bibliometrics analysis related to scientific production globally as well as technometrics analysis of patents in ocean science, also at the global level, in addition to primary data from IOC Member States and other governments. Such a comprehensive analysis of patents in ocean science constitutes a precedent in the area of ocean R&D and can be utilized for assessing the contribution of ocean science to sustainable blue economies.

Thanks to the cooperation and contributions provided by IODE and affiliated experts to (i) chapters focusing on ocean data management, (ii) the establishment of the GOSR data portal, (iii) the development of the online GOSR2020 questionnaire, significant progress was made in the collection of new data provided by Member States to IOC towards the SDG Target 14.a.1 and ocean science capacity at large.

With the continuous support by the IODE secretariat it is envisaged that the GOSR data portal will be further expanded, including functions to facilitate the data submission for future GOSR editions. It is expected that the GOSR data portal will provide the function of a data repository, and will allow the submission and retrieval of data and metadata, related literature, feature multiple possibilities of visualization of data to meet the needs of multiple stakeholders. IODE and IOC HQ joined forces in asking for updated information in 2023 (CL-2919), illustrating the complementarity between the regular information required for the GOSR and the IOC Capacity Development Needs Assessment.

Future productions of the GOSR (e.g., GOSR tracker and GOSR 2025) will be only successful if IODE continues maintaining and further developing the GOSR portal, as well as providing and updating the information on ocean data management GOSR.

**Financial implications:**

2023: 5000 USD (in-kind GOSR data portal maintenance)

2024: 20.000 USD (development of GOSR 2025 online questionnaire and updating of GOSR data portal)

# PROPOSED: Cooperation with THE STATE OF THE OCEAN REPORT (Stor)

IODE support to the State of the Ocean Report (StOR)

**Established**: *At its 53rd session in February 2021, the IOC Executive Council (EC) considered the proposal to prepare a periodic ‘IOC State of the Ocean Report (StOR)’ as a response to the increased demand for the key information on the state of the ocean (IOC/INF 1393). Following the 53rd IOC EC, the IOC Secretariat invited Member States to express their views on the spatial and temporal scope of the report, focus areas, and style of presentation (CL-2843). In parallel the IOC Secretariat convened an informal expert consultation on the StOR to further discuss the main features of a possible StOR. At the 31st session of the IOC Assembly in June 2021, Member States endorsed the production of a Pilot StOR. Following this decision, at the 55th session of the IOC EC in June 2022, ‘the pilot edition of the IOC State of the Ocean Report’ was presented, in cooperation with the International Oceanographic Data and Information Exchange (IODE). At this session IOC Member States welcomed the regular publication of the IOC State of the Ocean Report building on the model provided by the pilot edition of the Report and taking into account the comments made during the 55th session of the Executive Council (*[IOC/EC-55/3.3](https://oceanexpert.org/document/30593)*);*

**Partners:/Membership:**

Contributors to the first pilot edition of the StOR include: IOC sections and programmes (Ocean Science Section, Ocean Observation Section, Marine Policy and Regional Coordination Section, IODE, Tsunami Unit, Ocean Decade Coordination Unit), Aarhus University, Alma Mater Studiorum University of Bologna, British Oceanographic Data Centre / National Oceanography Centre, Cardiff University, CSIRO Oceans and Atmosphere, GEOMAR Helmholtz Centre for Ocean Research Kiel, GESAMP Working Group 40, GOA-ON, GO2NE, IEEE, INCOIS, INFOMAR, Institute for Marine and Antarctic Studies, University of Tasmania, Institute of Marine Research, Institute of Marine Science, Federal University of São Paulo (Unifesp), IODE, IPBC, Istituto di Scienze Marine - Consiglio Nazionale delle Ricerche, ITU/WMO/UNESCO-IOC Joint Task Force SMART Subsea Cables, LEGOS-CNES, National Oceanic and Atmospheric Administration (NOAA), Nippon Foundation-GEBCO Seabed 2030 Project, Nord Universitet, Norwegian Mapping Authority, OceanOPS, OECD, Plymouth Marine Laboratory, SOCIB, Stazione Zoologica Anton Dohrn, Stockholm University, Swedish Agency for Marine and Water Management, The Nature Conservancy, University of Gothenburg, University of North Carolina at Chapel Hill, University of Miami, University of Sheffield, University of South Florida, University of Washington, Utrecht University and PBL Netherlands Environmental Assessment Agency, Washington State University Vancouver.

 **Activities**:

The first ‘the pilot edition of the IOC State of the Ocean Report’, which was authored by 65 authors and peer reviewed by 40 experts. It was structured around the initial Challenges of the UN Decade of Ocean Science for Sustainable Development, 2021-2030.

The pilot StOR presents a summary of key changes in the ocean state in terms of its physical, biogeochemical, biological and ecological variables, supplemented by a strategic assessment of developments with regard to integrated ocean management, such as percentage of area covered by observations, area management tools, etc. A fully developed StOR will feature the results of scientific analyses as well as the progress of science-based ocean management provided not only by IOC projects and affiliated programmes, but also by other UN agencies, organizations, and potentially international organizations. The objective is to compile representative parameters assessing the current status of the ocean at the global scale, aiming at providing a concise overview of the current state of the ocean, helping scientists, policymakers and decisionmakers to mobilize global society to act towards ‘the ocean we need for the future we want’ contributing to the 2030 Agenda for sustainable Development and in particular SDG 14, which reads ‘Conserve and sustainably use the oceans, seas and marine resources’.

Thanks to the cooperation and contributions provided by IODE and affiliated experts, the pilot StOR includes storylines addressing marine biodiversity (Challenge 2), data availability and sharing (Challenge 8), as well as capacity development (Challenge 9).

Future productions of the StOR (biannual first one in 2023) will be only successful if IODE continues providing and update the previously mentioned information/storylines, with biodiversity, data management and capacity building being key parameters to assess the state of the ocean.

**Financial implications:**

2023: 5000 USD (in-kind for drafting content for the StOR)

2024: 5000 USD (in-kind for drafting content for the StOR)

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