World Meteorological Organization

Intergovernmental Oceanographic Commission of UNESCO

# JOINT WMO-IOC COLLABORATIVE BOARD

**Third Meeting, part 2: Hybrid, 4-6 September 2024, hosted by OECD, Paris, France**

**JCB-3 Part 2**

The September 2024 meeting of the Joint WMO-IOC Collaborative Board (JCB) marked the first-ever in-person gathering of its members since its creation in 2019. The importance of meeting more frequently was emphasized, with the JCB agreeing to hold annual in-person meetings supplemented by virtual sessions in between.

# Opening Remarks

The meeting commenced with welcome addresses from Dr. Vidar Helgesen of the IOC and Ms. Ko Barrett of the WMO. Both leaders encouraged JCB members to embrace new ideas and collaborative approaches.

# Goals and Approaches

The primary aim of this meeting was to identify key priority areas for the JCB's efforts. Given the broad range of interests represented, the process of narrowing down priorities was essential. The JCB co-chairs outlined the JCB Mandate and meeting's structure.

# Presentations from IOC and WMO

Dr. Helgesen and Ms. Barrett provided insightful presentations on the priorities of the IOC and WMO, offering context for the JCB's discussions on aligning its goals with those of the two organizations.

# Identifying Collaborative Work Areas

1. **Mapping Joint Work Areas**

   Prior to the in-person meeting, sections within the JCB were tasked with developing cross-cutting priorities for their respective areas: Observations, data, Prediction, Services, Regional. A comprehensive list of these priorities is provided in Annex 1.

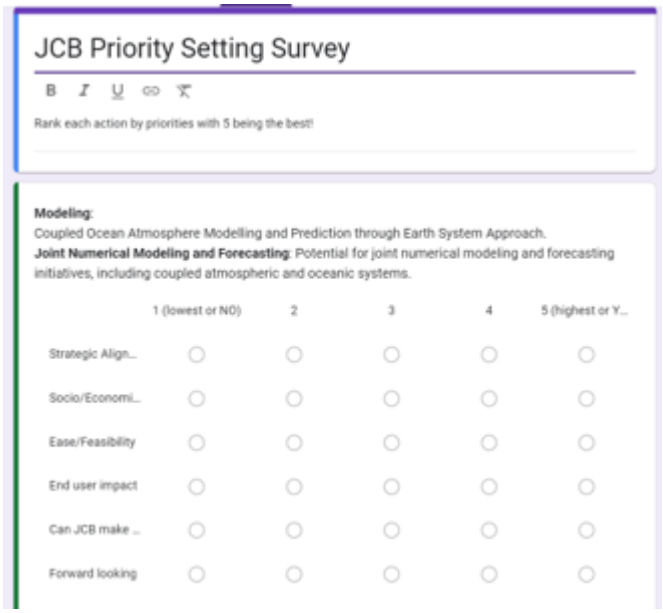
2. **Developing Prioritization Criteria**

   Following the presentations, the JCB agreed  to establish criteria for ranking the identified priorities. The agreed-upon criteria included:

- Strategic Alignment with IOC and WMO
- Socioeconomic Impact
- Feasibility
- User Impact
- Potential for JCB to Make a Difference
- Future Orientation

### 3. **Ranking Priorities**

Members ranked the priorities using a Likert scale from 1 to 5, with 5 indicating the highest importance. Responses were collected, and the highest-ranked priorities were selected for further development.




# Prioritized Work Areas

The resulting priorities were categorized into four main groups:

## 1. Global Basic Observing Network (GBON)

- Co-create a definition of the Ocean GBON, incorporating additional ocean and atmospheric variables, in complement to/as a part of WMO's Global Basic

Observing Network (GBON).

2. Data Management and Interoperability
    - Enhance interoperability for an integrated observing and data system.
    - Improve data sharing between the WMO Information System (WIS) and the IOC Ocean Data and Information System (ODIS).
    - Develop a structured approach to the Marine Climate Data Systems (MCDS) and enhance the integration of observation networks.
    - The meeting also identified the need for IOC-WMO data policy convergence.

3. Coastal and Maritime Resilience
    - Strengthen coastal and maritime community resilience against hazards like tsunamis
    - Supporting the UN's Early Warning for All (EW4All) initiative.

4. Capacity Development
    - Establish a Joint Oceanography and Meteorological Specialized Training Centre.
    - Share data management capabilities with developing countries and provide guidance on ocean observing systems.

# Breakout Sessions

Over the next two days, breakout groups refined strategies for addressing the identified work areas. Each group focused on defining the objectives, timelines, stakeholders, and governance structures necessary for successful implementation.

## Summary from Day 1 break out groups:

### 1. GBON (Global Basic Observing Network - Ocean)

- **Objective**: Assess ocean modeling community requirements to enhance operational forecasting.
- **Action Items**:
    - Include sub-surface physical ocean variables in GBON.
    - Convene experts to discuss improvements and operational mandates.
- **Goals**: Approval of ETOOFS guidelines by WMO.

- **Complexity**: Acknowledge the challenges in expanding GBON for more variables and to the open ocean.

### 2. Data Management/Interoperability

- **Objective**: Establish a WMO/IOC technical working group for data management.
- **Action Items**:
    a. Define Terms of Reference (ToRs).
    b. Suggest members from WMO and IOC.
- **Goals**: Develop an interoperable data system for oceanography and marine meteorology.
- **Governance**: Integrate with existing structures; highlight WIS-ODIS link.
- **Timeline**: Presentation to JCB later in 2024.

### 3. Coastal and Maritime Resilience

- **Objective**: Integrate IOC into Early Warnings for All (EW4All) and expand its scope.
- **Action Items**:
    - Identify topics for integration within EW4All framework.
    - Support community engagement with Secretariat coordination.
- **Goals**: Increase IOC visibility and collaboration with WMO.
- **Importance**: Emphasize the need for observations to improve coastal forecasts.

### 4. Capacity Development

- **Objective**: Enhance joint capacity development in oceanography and meteorology.
- **Action Items**:
    - Utilize existing frameworks; focus on training national agencies.
    - Develop training materials and collaborate with regional training centers.
- **Goals**: Improve national capacity and integrate with current structures.
- **Key Initiatives**: Establish a joint training center and ensure cooperation between WMO and IOC capacity-building groups.

## Overall Thoughts

- **Key Themes**:
    - Build trust and collaboration between ocean and weather communities.

- Engage the private sector and advocate for sustainability in observing systems.
- Promote integration of tsunami, storm surge and other sea-level related hazard services.
- Ensure JCB's advice is considered by relevant entities.
- Align Ocean Decade initiatives with WMO approaches for a comprehensive earth system approach.

## Day 2 break out groups discussion:

### 1. GBON (Global Ocean Observing Network)

**Objective:** Define the minimum basic ocean observations needed globally, using the GBON and/or GOOS mechanisms.

Actions:

1. **Establish a JCB Sub-group**:
   - Coordinate membership with INFCOM/SC-ON and GOOS.
   - Focus on the expansion of GBON related to Essential Ocean Variables, supporting the development of INFCOM's technical regulations for Cg-20 in 2027.

2. **Responsibilities of the Group**:
   - Advise GOOS on basic observing requirements as a foundational component of global ocean observations.
   - Address areas beyond national jurisdiction and variables not central to the WMO and GBON frameworks.
   - Consider UNCLOS provisions and alignment with the GOOS governance reform process ahead of the IOC Assembly in 2025.

3. **Membership Composition**:
   - Core members from SC-ON and GOOS, including additional representatives from INFCOM/SC-WIPPS, SERCOM/SC-MMO, ETOOFS, WWRP, WCRP, OceanPredict Operational Systems WG (OPOS), and aspects related to ocean carbon (G3W, GAW).
   - Engage WMO Regional Associations and GOOS Regional Alliances.

4. **Engagement Strategy**:

- Involve Small Island Developing States (SIDS) and other stakeholders supportive of GBON expansion.

Timeline (approximate):

- **March 2025**: GBON Expansion Roadmap to be finalized, influencing WMO extraordinary Congress in October 2025 (focused on EW4ALL).
- **January 2025**: Completion of the ocean portion of RRR Statement of Guidance.
- **June 2025**: Target decisions at the IOC Assembly to demonstrate the group's effectiveness.

Future Considerations (Post-2025):

- Develop technical regulations via INFCOM-4 in 2026 and Cg-20 in 2027.
- Explore further development of GOOS's GBOON concept.
- Identify strategic advice for WMO/IOC governing bodies.

Immediate Next Steps:

- Seek JCB's adoption of the joint advisory group and request detailed Terms of Reference (ToRs) for correspondence by early October.
- Identify members and appoint a chair.
- Prepare for advice to WMO and IOC by 2025.

## 2. Coastal and Maritime Resilience

**Priorities:**

1. **Engagement in EW4ALL**: Foster collaboration between WMO and IOC in the Early Warning for All initiative.
2. **Tsunami Warnings**: Enhance tsunami warning systems.
3. **Ocean and coastal Predictions**: Improve ocean and costal predictions and forecasts tailored for end users.

Actions:

1. **Mechanism Identification**:

- Identify existing WMO and IOC mechanisms for engagement in Multi-Hazard Early Warning Systems (MHEWS).
- Address gaps and explore collaboration opportunities between WMO and IOC groups.

2. **Joint Modeling Meetings**:
   - Recommend WMO and IOC modeling teams to hold joint meetings.
   - **Champions**: Fraser Davidson and David Richardson.

3. **Outcome Sharing**:
   - Share outcomes from the WMO-IMO symposium on observation, prediction, and services for end users with the JCB.
   - **Champion**: Allison Allen.

4. **Legal Framework Consideration**:
   - Emphasize the importance of observations in Exclusive Economic Zones (EEZ) and the legal framework established by UNCLOS.

5. **Support for Ongoing Work**:
   - Acknowledge and support existing efforts related to marine coastal and marine services under the RRR initiative.

Generic Actions:

- JCB members are encouraged to report on JCB activities to their respective groups.

**Notes**:

- Upcoming OceanPredict meeting scheduled for November 2024 in Paris.

## 3. Capacity Development

**Objective:** Establish joint training centers and resources between WMO and IOC to enhance capacity development (CD) in meteorology and oceanography.

Key Actions:

1. **Cooperation Framework**:
    - Foster collaboration between WMO Regional Training Centers and IOC Training Centers.
    - Encourage cross-pollination of existing CD groups within IOC and WMO, led by David Farrell.

2. **Membership and Coordination**:
    - David Farrell will flag an upcoming WMO CD group meeting for awareness.
    - Request the IOC CD team (through Peter) to identify a member, with Kathy Ann Caesar serving temporarily under David's coordination.

3. **Small Joint Advisory Group**:
    - Form a small advisory group consisting of members from IOC and WMO CD groups under JCB.
    - This group will recommend the development of joint courses and facilitate information sharing among BMKG, India, and the Caribbean.

4. **Global Calendar**:
    - Populate the WMO and IOC Global Calendar with details on CD training programs.

Long-Term Goals:

- Establish Joint Meteorological and Ocean Training Centers leveraging existing frameworks under WMO and IOC
- Encourage volunteers from IOC and WMO CD groups to participate in each other's meetings.

Consultation and Development:

- Seek national and regional experts for consultations on joint course development via WMO regions or IOC Subcommissions.

Timelines and KPIs:

- **October 2023**: Alert the WMO CD group about the joint training initiative from JCB.

- **Today**: Form a small group during the JCB meeting.
- **One Year**: Deliver at least one course proposal for the next in-person JCB meeting.
- **Within 6 Months**: Initiate information exchange meetings between BMKG, India, and the Caribbean.
- **November 2023**: Advertise the joint training effort to IOC partners if approved.
- **Communication**: Engage with the Ocean Decade CD facility regarding platform utilization.

Strategic Advice:

- Recommend that WMO and IOC governing bodies endorse the joint training effort for capacity development.
- Support the establishment of Joint Meteorological and Ocean Training Facilities, leveraging existing centers.

## 4. Data Management/Interoperability

**Priorities:**

1. **Interoperability**: Enhance interoperability between ODIS and WIS2.
2. **Policy Alignment**: Map and align WMO and IOC data policies and terms of use to identify areas of concern, crucial for interoperability.
3. **Joint Governance**: Foster collaboration and joint governance of the Marine Climate Data System (MCDS) by WMO and IOC (IODE).

Actions:

1. **Establishment of a Task Team**:
    - Create a time-limited task team under JCB to develop terms of reference for a joint WMO/IOC working group on data management addressing the priorities above.
    - **Proposed Initial Membership**: Jeremy Tandy, Simon McLellan, Lotta Fyrberg, Paula Sierra, plus Secretariat.
2. **Formation of Joint Working Group**:
    - Following the task team's output, establish a joint working group on data management, with membership determined individually by IOC and WMO.
3. **Expert Participation**:

- Involve relevant experts in a session on WMO-IOC cooperation in data management at the International Ocean Data Conference 3 (March 10-11, 2025, in Santa Martha, Colombia).
- Explore similar WMO events in 2025.

4. **Community Building**:
   - Create a community of oceanography and marine meteorology experts from IODE NODCs/ADUs and WMO NMHSs.
   - Share regular updates on WMO and IOC data management activities with the community.

Technical Bodies Advice:

- Encourage cross-invitations between SG-ODIS and SG-FIT for future data infrastructure technology discussions.
- Extend invitations to IODE Committee sessions and WMO equivalents (e.g., SCIMT).

Timelines and KPIs:

- **Task Team**: Timelines to be decided by JCB.
- **Working Group**:
  - Submit terms of reference (ToRs) to JCB Chairs, then to IODE-28 (January 2025 deadline) and WMO equivalent (deadline TBD).
  - IODE-28 will review and revise the ToRs, with WMO to follow suit.

Questions for Consideration:

- Will the establishment of the working group need agreement from the IOC Assembly and WMO Executive Council?

# Conclusion

The JCB meeting highlighted the necessity for enhanced collaboration and strategic planning to address pressing oceanic and meteorological challenges. The agreed-upon priorities and structured approach will pave the way for significant advancements in the respective fields.

# **Annex 1.** List of priorities from all sections of the JCB.

Some are grouped together as they have a similar theme.

- Coupled Ocean-Atmosphere Modeling and Prediction through Earth System Approach.
- Joint Numerical Modeling and Forecasting: Potential for joint numerical modeling and forecasting initiatives, including coupled atmospheric and oceanic systems.

- Integration of activities up and down the value chain starting from observations to forecasting to services to the end users.
- Enhanced synergy between GBON/RRR (Rolling Requirements Review) process and GOOS (Global Ocean Observing System) Co-Design to promote sustainability for observations.
- The Rolling Review of Requirements (RRR) process: make sure ocean observing is integrated in this process

- Ensure that the marine services provided to users meet their requirements, including in terms of timeliness and quality,
- Advancement of ocean prediction & forecasting to benefit end-users and members.
- Integrated modeling infrastructure for delivering ocean services that meet the requirements of a wide spectrum of users.

- Ocean Carbon Uptake The ocean is the largest consistent sink for atmospheric CO2 in the world. Understanding the past, present, and future ocean carbon sink is essential if we ever want to understand and predict future climate change.
- Potential collaboration on reference materials for standardization and management of ocean carbon data.
- Need for co-located atmospheric CO2 and ocean CO2 measurements Example: atmospheric site at Mauna Loa connects well with the Hawaii Ocean Time Series station, Aloha .This can also be accomplished with buoys that have sensors for ocean T, S, oxygen and chlorophyll; need to ensure such sensors are low-cost and robust.

- Potential ocean observations on tsunami buoys The DART buoys will continue to provide information relevant to tsunamis but are also a perfectly good platform for more ocean observations (particularly need carbon observations).

- Co-creating a definition/expression of what an Ocean Global Basic Observing System (Ocean GBON) should be + add ocean variables
- Strengthening response & resilience of coastal and maritime communities to hazards, including tsunamis, while also supporting the UN EW4All initiative
- Early Warning for All (EW4All): Ensure that discussions on early warning services are integrated with data policy and interface efforts and address the usability of shared data for service provision.

- Collaboration (Nationally, Regionally and Internationally), e.g. the SAWS-NSRI-City of Cape Town, UK Met Office, Coastal Marine Applied Research at the University of Plymouth - collaboration on the development and implementation of the Rip Hazard Model for South Africa.
- Collaboration at regional, national levels: Improve engagement with regional and national stakeholders to enhance the implementation of joint initiatives. Efforts to bring meteorology and oceanography communities together through capacity building, training, and engaging at each other's regional meetings (i.e., WMO Regional associations and IOC regional sub-commissions). Discussed working on specifics in Africa and SIDS could be a focus to support data infrastructure collaboration.
- Increase ability for the marine meteorology and oceanography expert community to come together at regional/local level and ensure involvement of decision makers, e.g. SAWS-SAEON-UCT on development and implementation of a coupled model system to improve the accuracy of weather forecasts and warnings. OCIMS (National Oceans and Coastal Information Management System) Operations Phakisa – Oceans Economy Lab.

- Joint Oceanography and Meteorological Specialized Training Centre
- Share with developing countries the capabilities and experience of existing data management centres, systems and programmes, both within and outside WMO and IOC.
- Provide guidance and training to Member States on technical aspects of marine observing systems.

- Data Policy Convergence: Aligning data policies between WMO and IOC to ensure seamless data integration and usability, including the schedule or points for interaction to have the discussions on this.

- Improving Interoperability: a prerequisite for building a multipurpose, more integrated observing system, and data system
- WIS and ODIS Interface: Emphasis on the need to streamline data sharing and interface between WMO Information System (WIS) and Ocean Data Information System (ODIS) with a focus on federated data systems and seamless data sharing.
- Marine Climate Data System (MCDS): Develop a joint and structured approach to MCDS / climate data centers, converging efforts and review principals and process (i.e. data center identification, certification, evaluation) of climate data collection from both organizations. Reinitiating Marine Climate Data (MARCDAT) and Advances in Marine Climatology (CLIMAR) series, including requests/initiatives from co-sponsored GCOS.
- Interoperability of Data and Integration of Observation Network
- Implement, maintain and make available to users a fully integrated ocean and atmosphere data system.

- Climate Oscillations (e.g. ENSO, PDO, AO, MJO) Understanding coupled ocean-atmosphere oscillations represents a promising opportunity to improve weather

forecasting. These climate oscillations also have a strong impact on ocean properties and circulation.

- Sea Level Rise The UN Secretary General recently warned that the “ocean is overflowing”. Sea level rise is not just an ocean problem. It is very relevant to WMO.
- Sea Ice Changes Understanding sea ice is essential for all of the previous areas of interest plus so much more.
- Possible WMO and IOC collaboration on WMO’s decision to establish an accredited center for providing ENSO warnings, declarations, and predictions.
- Identify and coordinate the provision of resources and logistics for the deployment and servicing of marine observing platforms and instrumentation.

- Seamless prediction and forecasting systems capabilities

- Dissemination and Communication of warnings, e.g. SOLAS forecasts

- Forward look to encourage use of new technology (e.g. AI) - JCB needs to reflect on how to keep up with those when setting priorities
- Encourage involvement of the private sector

- Vector concept (add sensors to platforms already operating; multipurpose)

- Facilitate ocean observations within the EEZ of nations: modern technology and demands of ocean observations are compatible with UNCLOS.

- New technologies, and consider the Digital Twin of the Ocean

- Emerging ocean prediction value chains w.r.t. sustainable management, maritime spatial planning that need forecast products at short, medium and climate time scales.