



# AN OCEAN OF OPPORTUNITY

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80s-90s

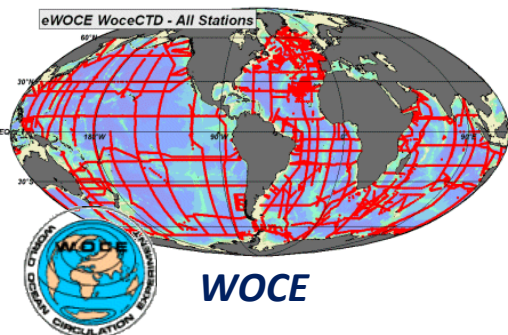
1999

2000s

2009

2010s

2019

**TOGA**TOGA In Situ Ocean Observing System  
Global Tropics**WOCE****OCEANOBS99**

300 attendees

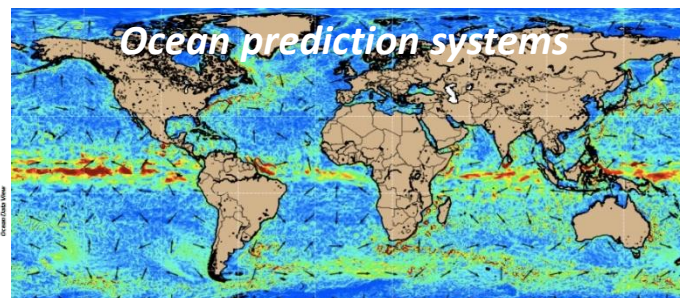
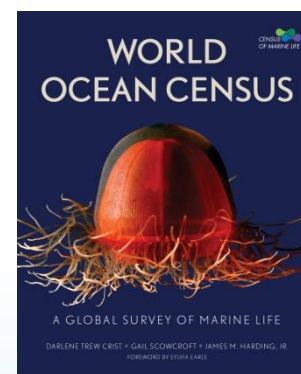
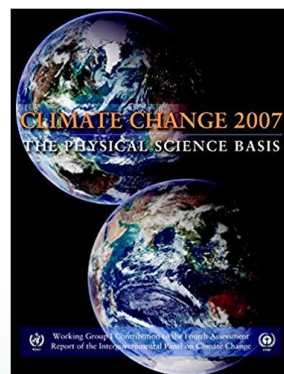
43 White Papers

Climate

“balance of evidence  
suggests human  
influence on climate”

“still many  
uncertainties”

Impacts on the ocean?

**Argo program evolution****Ocean prediction systems****Census of Marine Life**2700 scientists from 80  
countries

“warming is unequivocal”  
“observational evidence  
from most oceans shows  
that many natural  
systems are being  
affected”

Ocean acidification

*We have built up and sustained the  
in situ observing networks envisaged  
20 years ago*

**OceanObs'09**

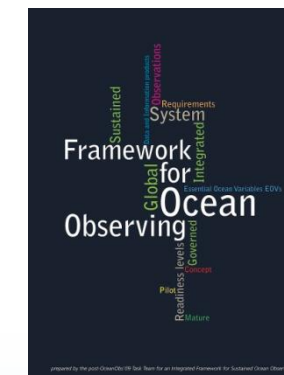
620 attendees

99 Community  
White Papers

Climate

Operational services

Ocean health

**New and emerging networks**





80s-90s

1999

2000s

2009

2010s

2019



# GLOBAL PARTICIPATION AND PERSPECTIVE

September 16-20, 2019  
Hawaii Convention Center

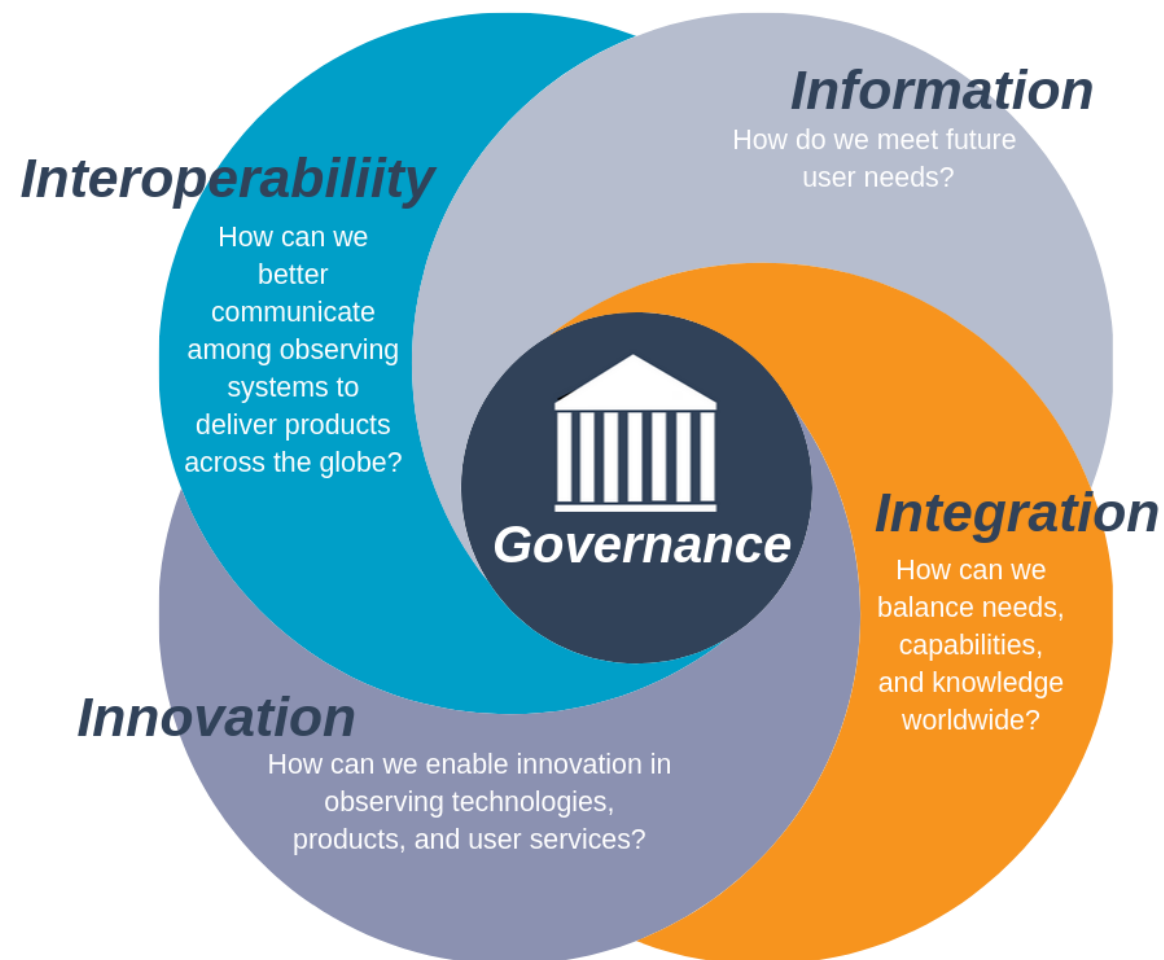
**1566** Attendees

**74** Countries

**140+** Community White Papers

**550+** Posters

**57** Exhibitors



Ocean solutions





# PLANNING AND COMMUNITY INPUT

## *Community White Papers*

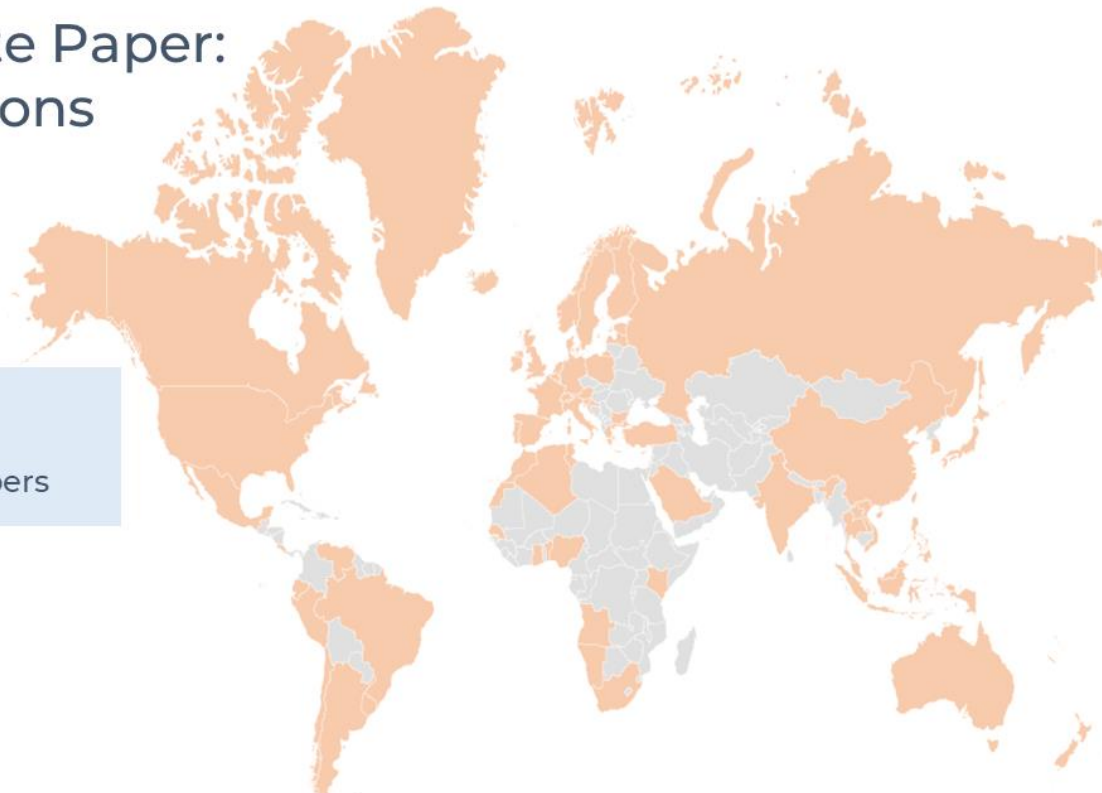
CWPs are the collective perspectives of the ocean observing community and reflect: (1) priorities for the next decade, (2) opportunities for strengthening end-user engagement, (3) concepts for better integration, and (4) prospects for improving societal themes.

**437** Abstracts

**131** Published Articles in  
*Frontiers in Marine Science*

### Community White Paper: Global Contributions

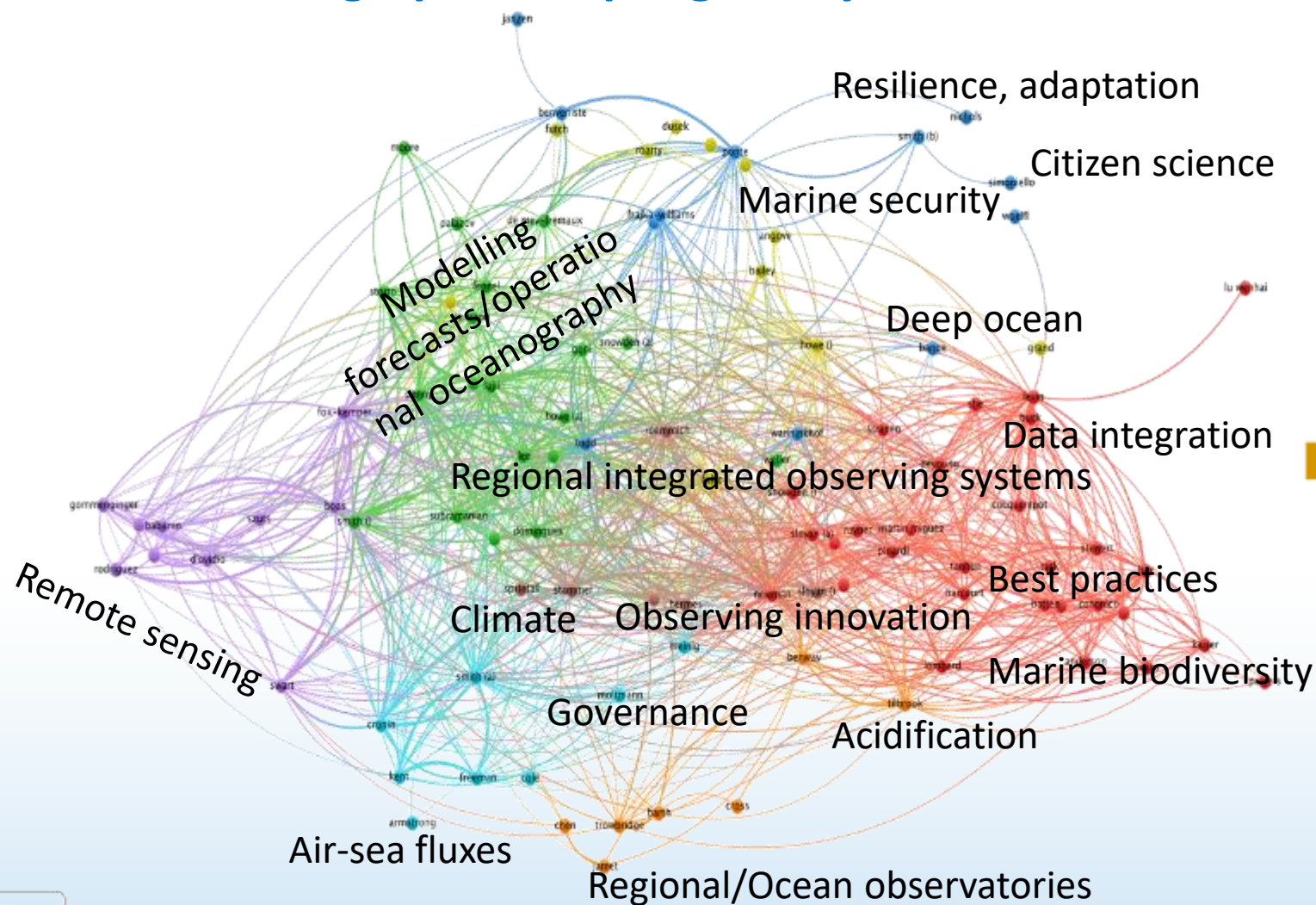
- More than 2500 Authors
- 79 Countries
- 140 Community White Papers



Contributing Country  
Non-Contributing Country

# 142 Community White Papers

## Bibliographic coupling analysis



**Brainstorming/exchanges**

**New initiatives**

**New integration actions**

- Across geographic areas
- Across disciplines and objectives
- Across stakeholders



# PLANNING AND COMMUNITY INPUT

## *Breakout and Special Sessions*

**74** Proposals

**22** Breakout Sessions

**15** Special Sessions

### INFORMATION

#### **BREAKOUT SESSIONS:**

- Blue Economy and Sustainable Development
- Capacity Building
- Climate Change and Variability
- Ecosystem Health and Biodiversity
- Global Observing System for Marine Debris
- Integrated Ocean Observations I
- Ocean, Weather, and Climate Forecasting

#### **SPECIAL SESSIONS:**

- Ocean Observations and the Blue Economy
- A sustainable fit-for-purpose ocean observing system – responding to users needs
- End Users Engagement: A Perspective from China
- Design and Implementation of a Global Harmful Algal Bloom Observing System
- An Ocean of Data: NOAA's Roles in Marine Extreme Events and Hazards

### INNOVATION

#### **BREAKOUT SESSIONS:**

- Community Building and Dialogue
- Integrated Ocean Observations II
- Modeling and Assimilation Innovation
- Observing Technology Innovation-Platforms and Communications
- Observing Technology Innovation-Sensors
- Open Source Software Revolution
- UN Decade of Ocean Science for Sustainable Development

#### **SPECIAL SESSIONS:**

- How Research Institutions Will Enable Innovation for the Global Ocean Observing System (GOOS) Over the Next Decade
- NASA's Oceanography from Space
- Innovation in ocean observing platforms and infrastructure
- Powering the Blue Economy: Energy Innovation for Ocean Observations
- Incorporating environmental DNA into global ocean observing systems

### INTEGRATION

#### **BREAKOUT SESSIONS:**

- Arctic Observing
- Data Integration with User Products
- Governance Needs
- Integrated Ocean Observations III
- Ocean Best Practices
- Traditional Knowledge Building
- Uncertainty Quantification
- UN Sustainable Development

#### **SPECIAL SESSIONS:**

- Building an international Transparent Ocean
- Fostering an Ocean-Literate Generation: an Approach at the Interface of Science Outreach and Communication
- Ocean Partnerships for Sustained Observing
- Observing Needs in the Deep Ocean
- Indigenous Ocean Governance





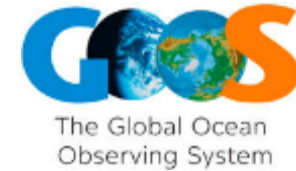
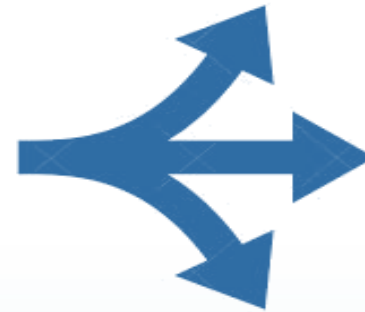
# The way forward

PLANNING AND COMMUNITY INPUT

*Recommendations*



Community driven new  
(more integrated)  
programs



2021-2030 United Nations Decade  
of Ocean Science  
for Sustainable Development

2019

2020 (Coordinating Outcomes)

2021

2030

Leadership (including mentoring, capacity,  
across societies) programs

Collection of recommendations from CWP authors and Breakout/Special Sessions leaders to guide the Living Action Plan (Recommendations will be available online in the coming weeks)





# LIVING ACTION PLAN

A **plan** that incorporates recommendations from Community White Papers, Conference, Sponsors, and Foundational documents (e.g. FOO, GOOS-2030). Much to unpack and organize in coming months!

An **actionable, executable plan** – in post-conference era we must add details to our “what” and “why” statements – who, when, where, and how. Lots of outreach work!!!

A **living plan** will evolve and adapt. We can “baseline” the plan at regular intervals (check in with community), but we must keep evolving and adapting based on new knowledge and externalities.

**HOW?** *“Do it the OceanObs way!”*

- Dedicated staff (globally distributed)
- Joint sponsor AND OceanObs community ownership
- Iterations (check-ins) with stakeholders

*The plan can be used by sponsors/UN Decade/others as a guide or roadmap to community-vetted requirements for sustained ocean observations.*



# COMMUNITY REFLECTIONS:

## *SYSTEM INTEGRATION AND DELIVERY*

### *Connecting with the coast*

- Better integrate coastal observations into the global system
- Increase capacity and support in regions

### *Integrate biological observations*

- Integrate biological EOVs, networks, and technologies to the observing system in the coming decade

### *Data, Data, Data*

- Increase democratization of data, best practices in data management, new technology use in data visualization and access

### *Best Practices*

- Utilize recognized best practices to increase efficiency, data quality, cost reduction, and system robustness.





# COMMUNITY REFLECTIONS:

## *BUILDING FOR THE FUTURE*

### *Embracing innovation*

- Interplay with high-tech innovations in observing sensors, platforms, data managements, and visualization
- Extend observing system to all countries

### *New Social/Human impact EOVs*

- Expand observing capacity to link physics, biogeochemistry, and biological observations to measurement of societal/human impact

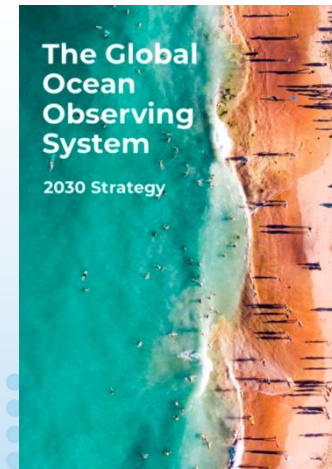
### *UN Decade of Ocean Science for Sustainable Development*

- Utilize initiative for key projects for transformational change



## NEXT STEPS

- Recommendation Synthesis
- Living Action Plan Development
- Community Working Groups
- Follow-on Meetings, Town Halls, and Activities
  - UN Decade of Ocean Science for Sustainable Development
  - Oceans19 Town Hall
  - AGU Fall Meeting
  - OceanSciences Conference
  - ...



**2021  
2030** United Nations Decade  
of Ocean Science  
for Sustainable Development





Everything depends on us



# ADDITIONAL SLIDES





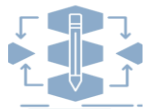
# OceanObs'19 Conference Statement

We, the 1500 participants of the decadal OceanObs'19 Conference, hear the call from maritime stakeholders, operational resource management agencies, and researchers from private and public organizations about the importance of more complete and sustained observations in the ocean globally. Information about the ocean is needed to advance the understanding of the ocean system, design and implement policies that sustain ocean-related human benefits, strengthen security and safety at sea, mitigate the risk of disasters including those related to a changing climate, reduce pollution and harmful debris, and inform efforts to conserve life in the sea for the benefit of future generations. It is required to design and support policy options that sustain ocean-related human benefits.

In solidarity, we, the global ocean observing community and users of this information, invite all governments, international organizations, industries, scientists, engineers, stewards of ocean resources, members of civil society, Indigenous societies, youth and all of us who live, work and rely on the ocean to engage in a collective effort to evolve ocean observing to generate the data and information we need for the ocean we want. And specifically, to:



# OCEANOBS'19 CONFERENCE STATEMENT



Engage observers, data integrators, information providers, and users from the scientific, public, private, and policy sectors in the continuous process of planning, implementation and review of an integrated and effective ocean observing system;



Focus the ocean observing system on addressing critical human needs, scientific understanding of the ocean and the linkages to the climate system, real time ocean information services, and promotion of policies that sustain a healthy, biologically diverse, and resilient ocean ecosystem;



Harness the creativity of the academic research and engineering communities, and work in partnership with the private and public sectors to evolve sensors and platforms, better integrate observations, revolutionize information products about the ocean, and increase efficiency and reduce costs at each step of the ocean observing value chain;



Advance the frontiers of ocean observing capabilities from the coast to the deep ocean, all aspects of the marine biome, disease vectors, pollutants, and exchanges of energy, chemicals and biology at the boundaries between the ocean and air, seafloor, land, ice, freshwater, and human populated areas;



Improve the uptake of ocean data in models for understanding and forecasting of the Earth system;



Ensure that all elements of the observing system are interoperable and that data are managed wisely, guided by open data policies and that data are shared in a timely manner;



Use best practices, standards, formats, vocabularies, and the highest ethics in the collection and use of ocean data;



Involve the public through citizen-engaged observations, information products, outreach, and formal education programs;



Evolve ocean observing governance to learn and share, coordinate, identify priorities, increase diversity, promote partnerships, and resolve conflicts, through a process of continuing assessment to improve observing; and



Promote investments in ocean observing and information delivery and sustain support.





# OCEANOBS'19 CONFERENCE STATEMENT

## *Charting the Path Forward*

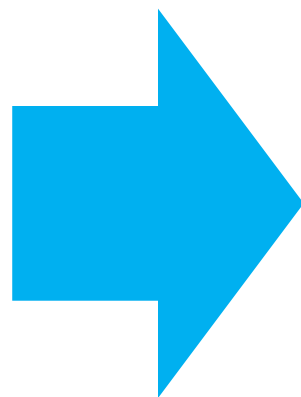
Indicators based on ocean observations help nations **meet national goals and targets** of the United Nations 2030 Agenda on Sustainable Development, the Paris Climate Agreement, the Sendai Framework for Disaster Risk Reduction, the Convention on Biological Diversity, and the Small Island Developing States Accelerated Modalities of Action Pathway.

**Ocean observations are fundamental** to increase the scientific and information content of indicators, contribute to the United Nations Decade of Ocean Science for Sustainable Development (2021-2030) and are coordinated by Global Ocean Observing System (GOOS) and Group on Earth Observations (GEO).

**Realizing all the benefits** of ocean observing requires ongoing science, plans, models and forecasts to generate knowledge for society.

**Partnerships are at the heart** of building and sustaining such an ocean observing system. Partnerships will augment ocean observing capacity, facilitate sharing of infrastructure, promote best practices, build capacity, foster diversity, and develop innovative technologies and approaches. All nations and all stakeholders will benefit by working together on these goals.

**OCEAN  
OBS'19**



**2021  
2030** United Nations Decade  
of Ocean Science  
for Sustainable Development

**OBSERVATIONS – DATA – KNOWLEDGE – ACTION**