



Global Ocean Observing System



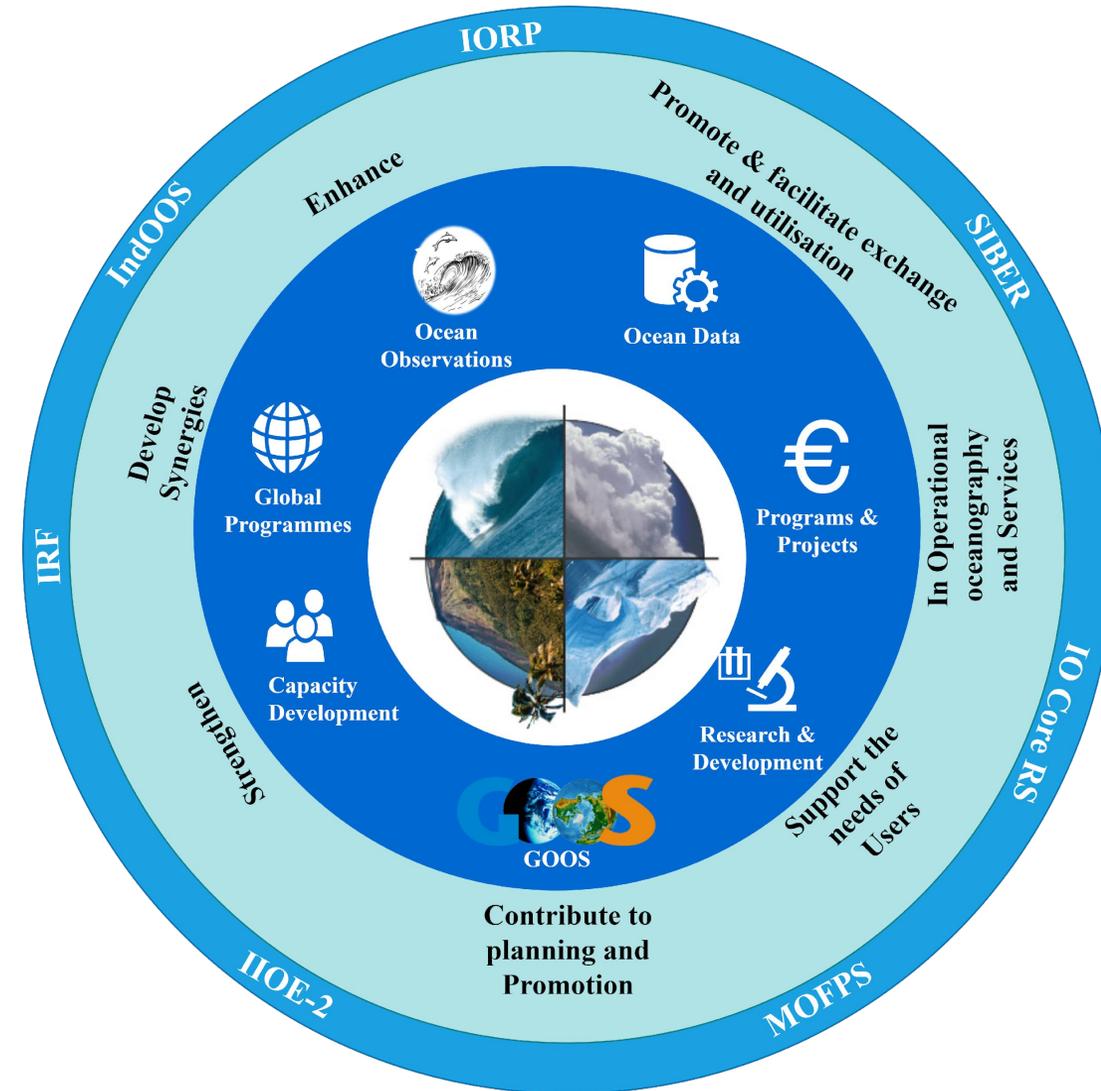
Indian Ocean GOOS Capacity Building

Dr. Brett Molony, CSIRO, Australia
Chair, IOGOOS

GRA Forum at INCOIS, Hyderabad – March 23, 2026

IOGOOS Objectives

- ❖ Enhance the Ocean Observing System in the region
- ❖ Promote and facilitate efficient and effective management, exchange and utilization of oceanographic data
- ❖ Promote programs and projects in operational oceanography and ocean services in the region, meeting the requirements of end-users
- ❖ Encourage research to support the needs of end-Users
- ❖ Develop synergies with other ocean observing programs and regional GOOS bodies
- ❖ **Strengthen capacity building for enhancing the capabilities in the region,**
- ❖ Contribute to international planning and promotion of GOOS



IOGOOS Programs

- ❑ IO is relatively data-poor
- ❑ Co-Designed programs in early 2002. Programs and projects evolved through time
- ❑ IOGOOS focus on observations, Capacity Building and creating applications / services beneficial to the region
- ❑ Programs complement GOOS Strategy, focussing on Operational Services (e.g. tsunami warning)
- ❑ Activities across entire Ocean Data Value Chain: Hardware deployment - Observations – Data management – Operational Services

OFFICIA

Indian Ocean Regional Panel

To develop, coordinate and implement a plan for sustained ocean observations of the Indian Ocean for climate research and ocean state estimation.

IORP

Sustained IO Biogeochemistry and Ecosystem Research

To motivate and coordinate international interest to improve understanding of role of IO in global biogeochemical cycles and marine ecosystem

SIBER

IndOOS Resource Forum

A high-level members forum under IOGOOS to review the progress of the Indian Ocean Observing System and the resources allocation, coordination, etc.

IRF

2nd International Indian Ocean Expedition

To advance our understanding of IO and its role in the Earth System in order to enable informed decisions in support of sustainable development and the well-being of humankind.

IIOE-2

Capability Building Strategy

- ❑ Leverage the position of IOGOOS
- ❑ Collaborate with multiple partners
- ❑ Facilitate participation
- ❑ Utilise online conference facilities

- ❑ Content Focus:
 - ❑ Regional interests
 - ❑ Funding opportunities
 - ❑ Entire Ocean Value Chain



Capacity Building Areas



Ocean Observations

- Practical demonstration of various equipment
- On board demonstration during field work
- Real-time data collection and analysis

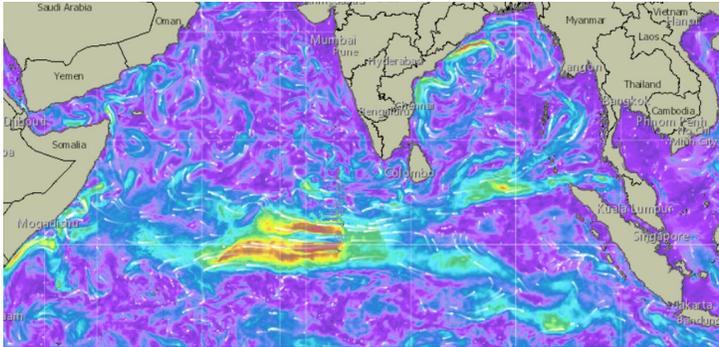


Ocean Literacy

- School / College Students
- General Public Visits
- Targeting Schools / College lectures
- Beach Cleaning Programs

*Photo Source: <https://www.facebook.com/oceanliteracyunescoioc/>

Capacity Building Areas-Operational Oceanography



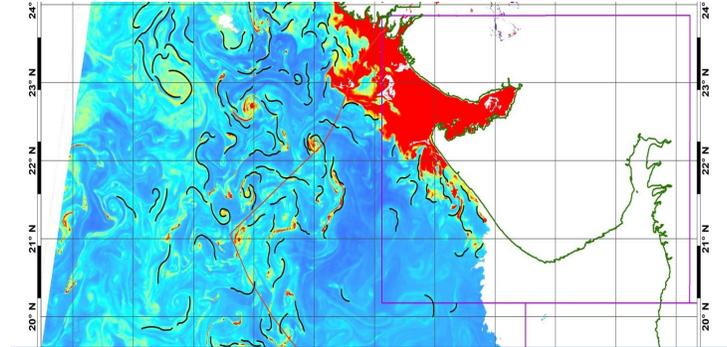
Ocean Forecasting

- Modelling Frameworks
- Model Setup and data feeds
- Data Assimilation Techniques
- Generation of Region-specific products



Multi-Hazard Early Warning

- Coastal Vulnerability Mapping
- Tsunami Modelling & Evacuation Mapping - Tsunami Ready
- Rogue Wave, Swell & Storm Surges



Data Visualization and Analysis

- Marine Spatial Planning
- Working with QGIS
- Ocean Colour Remote Sensing
- Applications to Fisheries
- AI / ML based Tools

List of Training conducted / facilitated

Training Title	Dates	Participants	Sponsored / Organized
Tsunami Inundation Modeling and Mapping (TIMM)	March 16-21, 2026 No: 19	Member countries: India, Madagascar, Maldives, Sri Lanka. Other countries: Seychelles	IOGOOS, ITCOOcean / INCOIS
Training/Workshop on Tsunami Evacuation Maps, Plans, and Procedures; UNESCO-IOC Tsunami Ready Recognition Program (TEMPP)	15 - 23 April 2025 No. 41	Member countries: Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, South Africa, Sri Lanka. Other countries: Comoros, Mozambique, Oman, Seychelles, Timor-Leste, UAE, UK.	UNESCO-IOC, ITCOOcean / INCOIS.
On-the-job training to officials from Mauritius on services	July 29-August 02, 2024 No: 02	Member countries: Mauritius	• ITCOOcean / INCOIS

List of Trainings conducted / facilitated

Training Title	Dates	Participants	Sponsored / Organized
Coastal Vulnerability Mapping and analysis using QGIS	November 25-29, 2024 No: 25	Member countries: Bangladesh, India, Indonesia, Malaysia	• OTGA, ITCOOcean/ INCOIS
"Ocean Color Remote Sensing - Data, Processing and Analysis"	October 21-25, 2024	Member countries: India, Mozambique, Sri Lanka and Tanzania	• OTGA, ITCOOcean / INCOIS
Empowering the Next Wave of Indian Ocean Prediction: IOPredict-2024	December 04-13, 2024 No: 123	Member countries: India, Malaysia, South Africa Other countries: Brazil	• IOGOOS, ITCOOcean / INCOIS
Customization of Ocean State Forecast Products	May 20 - 24, 2024 No: 11	Member countries : Bangladesh, Maldives Myanmar and Sri Lanka. Other Countries : Myanmar	• RIMES, ITCOOcean / INCOIS

Future Capacity Building Opportunities



- ❑ Observing marine ecosystem structure and function: from microbial communities to fisheries and human health (Oct 27-31, 2026)
- ❑ Operational Oceanography for BRICS* Member countries
- ❑ Coastal Vulnerability Mapping and analysis using QGIS
- ❑ Ocean Colour Remote Sensing - Data processing and Analysis

Highlight - COLaB - Coastal Observation Lab in a Box

- ❑ Started out in the Indian Ocean, as a collaboration between the SIBER and IORP
- ❑ *Endorsed by the UN Decade of the Ocean under the CoastPredict programme*
- ❑ *Adds user tailored-observations to address 'gaps' in the IO*

Goal

To equip and train multi-skilled coastal oceanographers in under-resourced countries, who can in turn train others

- ❑ Enables standardised observations data of other COLaB end-users
- ❑ Allow region- or basin-wide comparison and modelling
- ❑ To validate or complement remotely sensed data

Comprehensive solution

- ❑ Uses 'Old-school' technique
- ❑ Highly Portable
- ❑ Deployable from Small Boats (w/o winches)
- ❑ Do not require full fledged lab for chemical analysis
- ❑ User-friendly modelling tools and data management package

Stakeholders

Academic institutions, early career scientists, NGOs, MPA, fisheries managers, port authorities and the mariculture industry (etc).

Training

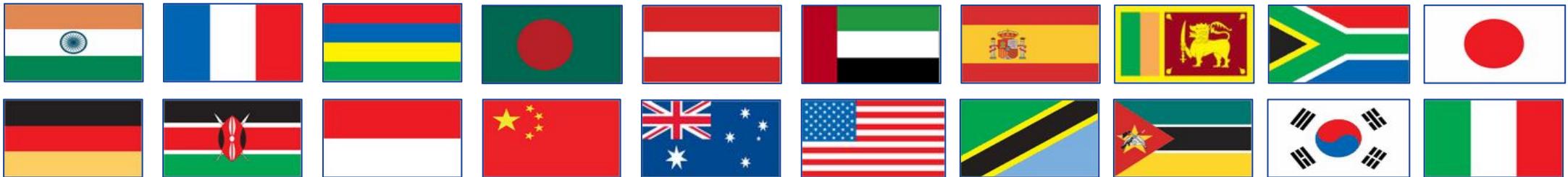
- ❑ A team of staff to create protocols for all techniques
- ❑ In-person training activities at regional training camps



IIOE-2 Early Career Ocean Professionals (ECOP)

Core Committee Members

Members as of March 16 th , 2026	285
Core-Committee Members	12
Advisory Committee	5
Vacant Core Committee Position	4



Each Member has a unique membership ID (IIOE2-ECSN-XXX)

IIOE-2 Early Career Scientists Network (ECSN)

- ❑ Supporting ECSN is an investment in the future leadership of global ocean observing systems
- ❑ Skill development of ECSNs so they can be industry ready
- ❑ Side events at International Conferences for enriching knowledge sessions

Strengthening ECSN Participation – A Key Need

- ❑ Limited financial support remains a major barrier to ECOP participation
- ❑ Earmark funding for at least two ECOP members in all major IIOE-2 meetings
- ❑ Lack of structured pathways for ECR engagement in governance and decision-making

Key Recommendations at IOGOOS

- ❑ Dedicated Funding for ECSN Participation
- ❑ Inclusion of Early Career Researchers in Governance
- ❑ Regional Capacity Building Across Indian Ocean Rim

What's Next?

- ❑ Increase visibility of ECSN network.
- ❑ Engage more effectively with experienced scientists
- ❑ Build on the **DECCAD-IO**, and create more space for capacity building
- ❑ More outreach activities in collaboration with the other ECR Network

Ongoing plan: Celebrating June 2026 as Ocean Awareness Month – Targeted **Minimum 100 ocean awareness lectures** in schools/colleges across the Indian Ocean Rim Countries in collaboration with ECSN / ECOP



IIOE-2 Early Career Scientists Network (ECSN)

Early Career Scientist Network (ECSN) workshop

Organised under the theme “Empowering Early Career Researchers for Collaborative Ocean Science and Leadership”



150 participants

Dr. Haimanti Biswas and Dr. Nimit Kumar delivered inspiring reflections on the importance of collaboration, capacity development and networking in scientific careers.

Leadership transition and announcement of the new ECSN Core Committee

Highlights

- Ocean Insights – Indian Ocean Seminar Series feat. ECRs (monthly seminar during 2023-24)
- Contribution to the Second International Indian Ocean Expedition (IIOE-2) Science Plan Addendum: A Basin-Wide Research Program
- Participation in several IO cruises (example: EKAMSAT Cruise in Bay of Bengal in 2025)



Highlights

- Ocean Insights – Indian Ocean Seminar Series feat. ECRs (monthly seminar during 2023-24)
- Contribution to the Second International Indian Ocean Expedition (IIOE-2) Science Plan Addendum: A Basin-Wide Research Program
- Participation in several IO cruises (example: EKAMSAT Cruise in the Bay of Bengal in 2025)
- Monthly contribution to IIOE-2 Newsletters in a dedicated early career section
- Regular contributions to IIOE-2 Bubble



December 2015
IIOSC, NIO, Goa



December 2025
IIOSC, INCOIS, India



IIOE-2 Early Career Scientists Network (ECSN)

Capacity Building

Rising Tides, Rising Voices: ECSN on Climate Challenges in the Indian Ocean Mauritius, May 2025

Integrated Meetings of IOGOOS, IIOE-2, JORP, SIBER, IRF, ECSN, and KUDOS.

Participants highlighted the importance of partnerships with local NGOs, schools, and community leaders, which enable two-way learning: scientists gain insights from local knowledge, while communities receive scientific support for adaptation planning.



47 Participation, Workshop Highlights Published in IIOE-2 Newsletter

Capacity Building



DEVising EARLY-CAREER CAPACITY DEVELOPMENT-INDOCN (DECCAD-10)



1. Fish habitat Modeling
September 2023
2. ITEC/POGO F.O.O.D
February 2024
3. IOCCG Summer lecture series
November 2024
4. PORSEC2025 – pre conference tutorial
April 2025
5. COES-WIO 2025
September 2025



Photo: Glimpses of the ITCOcean training, Jan-Feb 2024

Capacity Building

DEVising EARLY-CAREER CAPACITY DEVELOPMENT-INDOCN (DECCAD-10)



Partners



Lead Institution:
Early Career Scientists' Network at IIOE-2 JPO, INCOIS – India

Action Items:
> Organize 2 major capacity building per year, during 2023-2027

Progress so far:
> 5 workshops completed since the launch

Metamorphosis of ECs from a learner to a mentor

IIOE-2 ECSN at AGU Ocean Science Meeting 2026

Early Career Scientists Network at the OSM26

24 February CC21A-07 @ Hall 3, Tidal Pool
Against the Trend: Stable OMZ in the Eastern Arabian Sea Despite Warming and Stratification by Sudheesh V

27 February HC52A-01 @ Forth
Challenges in Cryosphere Governance: Interlink between the Arctic and the Hindu Kush Himalayas by Padmashree Anandhan

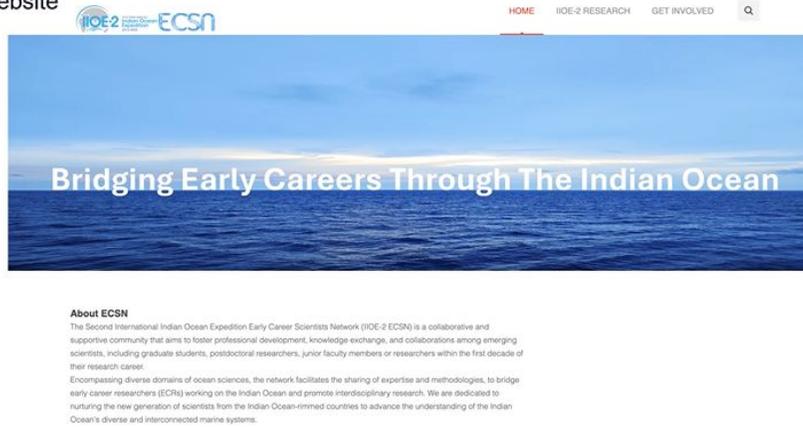
27 February OB53C-10 @ Hall 4, eLightening Theater 1
Spatio-temporal variation in Particulate and dissolved Organic Matter Dynamics in the Southern North Sea by Saumya Silori



IIOE-2 Early Career Scientists Network (ECSN)

Outreach

- Website



Upcoming events

IIOE-2 ECSN Workshop (Hybrid)

Beyond the Bench: Leveraging Fellowships for Global Research Impact - *Dr. Ngozi Margaret Ogiuiah, Chief Research Officer, Nigerian Institute for Oceanography and Marine Research, Lagos, Nigeria*

From Field Measurements to Satellites: My Journey Through the IOCCG Fellowship in Advancing Ocean Colour Remote Sensing - *Mr. R. Chandra Sekhar Naik, Project Scientist, ESSO-INCOIS, India*

Total Number of Registration as of 18.03.2026 = 196

Upcoming events

Geodesy for a Resilient Africa Summer School 2026

An intensive, hands-on training turning satellite data into action for Africa's most pressing climate challenges.

Where: AIMS-Cameroon, Limbé, Cameroon

When: 29 June – 3 July 2026

How: In-person (limited virtual attendance available)

Who: Applicable to Master's & PhD students, early- & mid-career researchers, postdocs, NGO leaders, climate practitioners & decision-makers (Africa-based only).

What: Gain practical training in

- ✓ Satellite data processing,
- ✓ Geodetic reference frames & vertical datums,
- ✓ Sea-level monitoring & coastal dynamics
- ✓ Climate risk assessment
- ✓ Translating science into policy action

What's next?

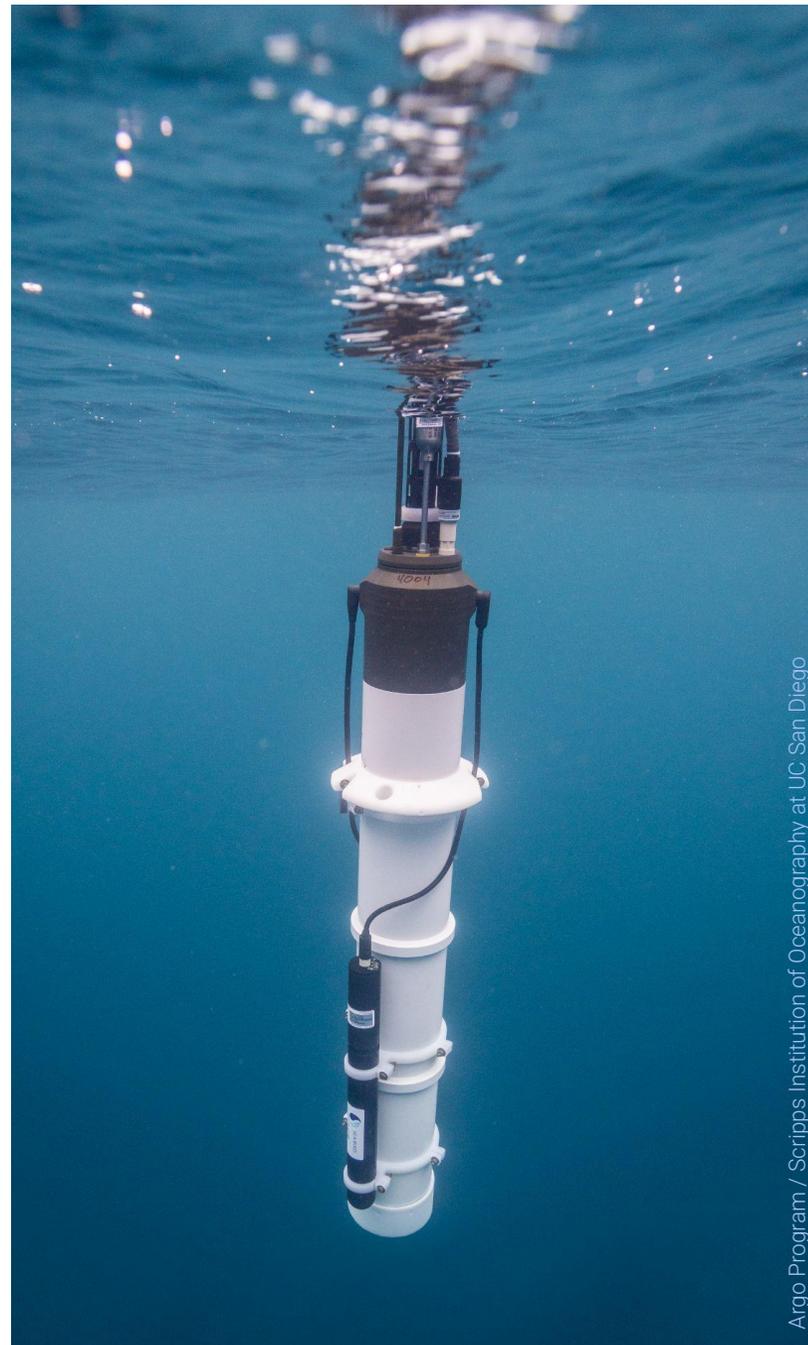
- Increased visibility of the ECSN network.
- Restarting webinar series.
- Engage more effectively with experienced scientists on the higher-level aspects of ongoing and upcoming projects.
- Inclusion of ECSN members in IIOE-2 Working groups
- Build on the DECCAD-IO, and create more space for capacity building
- More outreach activities in collaboration with the other ECR Network
 - An ongoing plan is celebrating June 2026 as Ocean Awareness Month – Minimum 100 ocean awareness lectures will be conducted in schools/colleges across the Indian Ocean Rim Countries in collaboration with ECOP.
- Writing review/perspective papers





Thank you

goosocean.org



Argo Program / Scripps Institution of Oceanography at UC San Diego

