



Indian Ocean Global Ocean Observing System



# SIBER: Sustained Indian Ocean Biogeochemistry and Ecosystem Research

*IOGOOS Report*

Raleigh R. Hood (Chair)

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*SPONSORS :*



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National Institute of Oceanography  
Goa, India



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INDO-US Science and Technology Forum



Scientific Committee on Oceanic Research



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**IMBER / IGBP**(Integrated Marine Biogeochemistry and Ecosystem Research / International Geosphere-Biosphere Programme);

**WIOMSA** (Western Indian Ocean Marine Science Association);

**CLIVAR / GOOS** (An International Research Programme on Climate Variability and Predictability/The Global Ocean Observing System)

**IOCCP** (International Ocean Carbon Coordination Project)

**CSIR** (India's Council for Scientific and Industrial Research)

**NOAA** (U.S. National Oceanic and Atmospheric Administration)

**NASA** (U.S. National Aeronautics and Space Administration)

**MoES** (India's Ministry of Earth Sciences)

**INCOIS** (Indian National Center for Ocean Information Services)

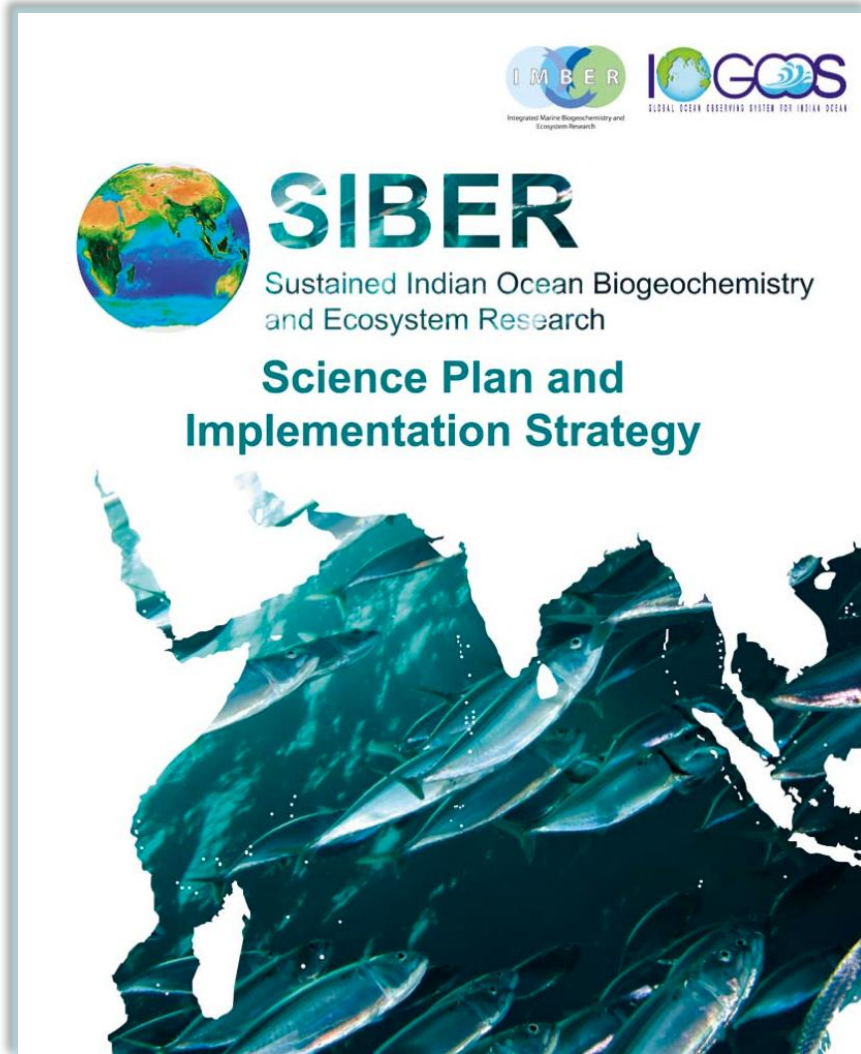




## Outline:

- SIBER Science Plan and Implementation Strategy.
- Update on SIBER India.

# SIBER Science Plan and Implementation Strategy:



**Completed, reviewed, approved and published under IMBER & IOGOOS.**

**PDF version available at:**

<http://www.imber.info/SIBER.html>

<http://www.incois.gov.in/Incois/siber>

## **Science Plan Editors:**

- Raleigh Hood (USA, chair)
- Wajih Naqvi (India, co-chair)
- Jerry Wiggert (USA)
- Michael Landry (USA)
- Timothy Rixen (Germany)
- Lynnath Beckley (Australia)
- Catherine Goyet (France)
- Greg Cowie (UK)
- Lisa Maddison (IMBER IPO)

# What is SIBER all about?

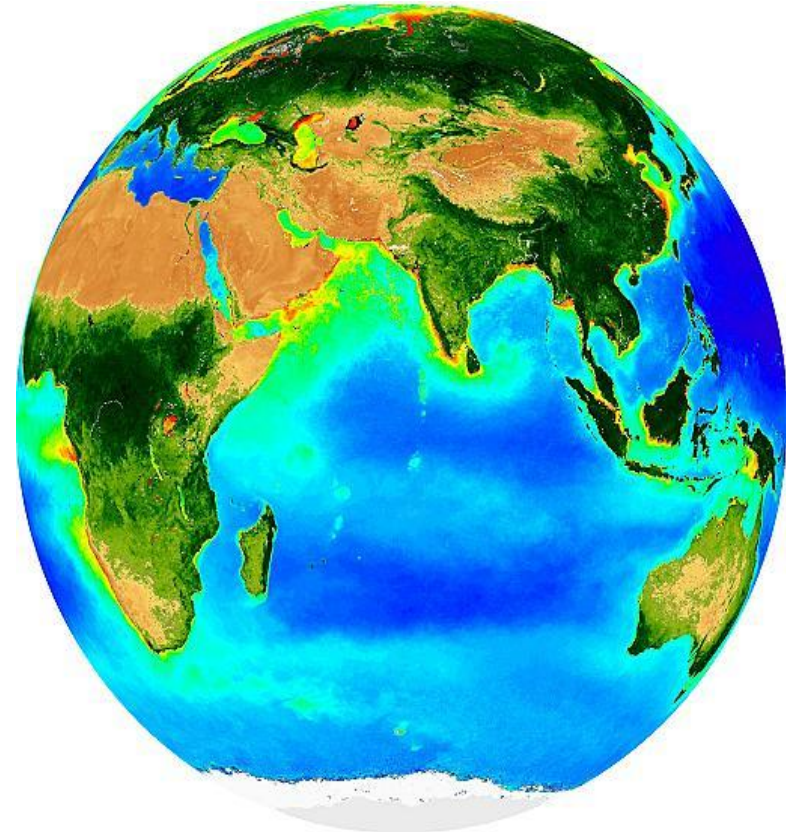
**SIBER: Sustained Indian Ocean Biogeochemistry and Ecosystem Research**



**The long term goal of SIBER is to improve our understanding of the role of the Indian Ocean in global biogeochemical cycles and the interaction between these cycles and marine ecosystem dynamics.**

This understanding will be required in order to:

- Predict the impacts of climate change, eutrophication and harvesting on the global oceans and the Earth System.
- It is fundamental to policy makers in the development of management strategies for the Indian Ocean.



SeaWiFS biosphere image of the Indian Ocean region showing land vegetation and marine surface phytoplankton concentrations for boreal summer/austral winter. From <http://oceancolor.gsfc.nasa.gov/SeaWiFS>.

# What is SIBER all about?

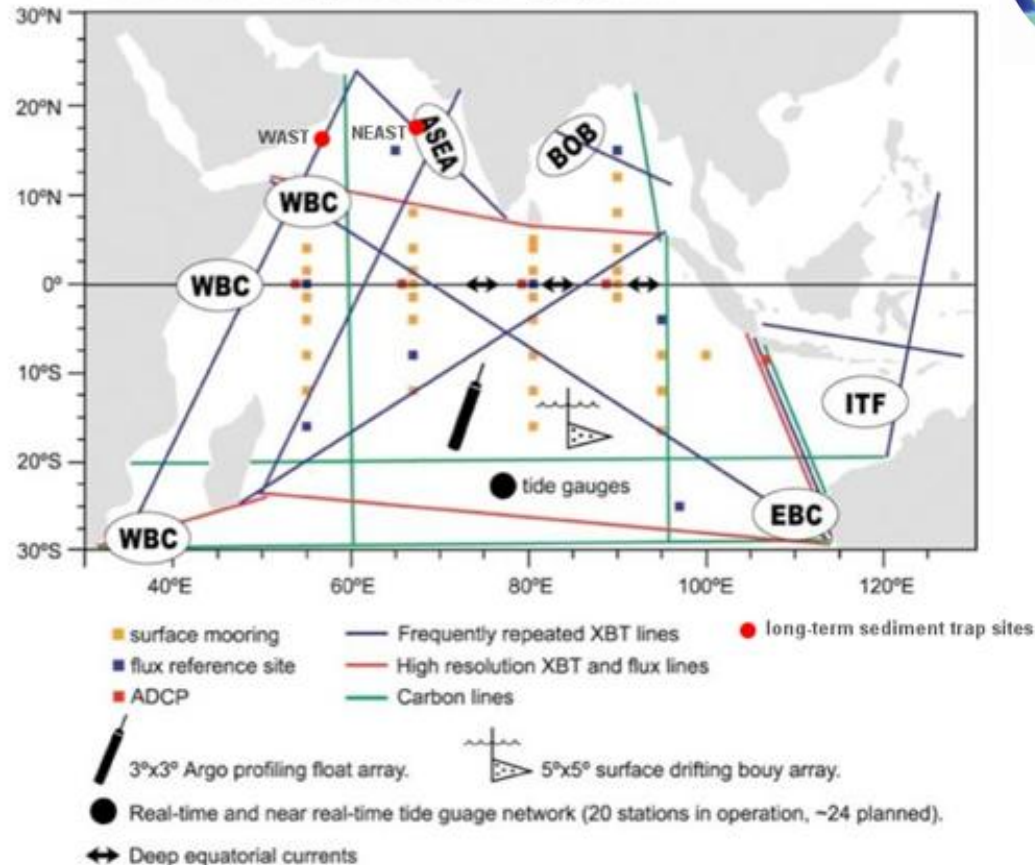
## SIBER: Sustained Indian Ocean Biogeochemistry and Ecosystem Research



➤ SIBER initially emerged as a result of the potential opportunity to leverage the CLIVAR/GOOS Indian Ocean mooring array (RAMA/IndOOS) and associated measurements and cruises.

➤ SIBER has expanded to include the entire basin and all Indian Ocean observing components.

Indian Ocean Integrated Observing System



The IndOOS integrated observing system, with basin-scale observations by moorings, Argo floats, XBT lines, surface-drifters and tide-gauges; as well as boundary arrays to observe boundary currents off Africa (WBC), in the Arabian Sea (ASEA) and Bay of Bengal (BOB), the Indonesian throughflow (ITF), off Australia (EBC) and deep equatorial currents. RAMA: Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction.

# SIBER Science Plan and Implementation Strategy:



To address this long-term goal SIBER has structured its research around six major scientific themes.

**Theme 1:** Boundary current dynamics, interactions and impacts.

**Theme 2:** Dynamic variability of the equatorial zone, southern tropics and Indonesian Throughflow and their impacts on ecological processes and biogeochemical cycling.

**Theme 3:** Physical, biogeochemical and ecological contrasts between the Arabian Sea and the Bay of Bengal.

**Theme 4:** Controls and fates of phytoplankton and benthic production in the Indian Ocean.

**Theme 5:** Climate and anthropogenic impacts on the Indian Ocean, its marginal seas and human populations.

**Theme 6:** The role of higher trophic levels in ecological processes and biogeochemical cycles.

# SIBER Science Plan and Implementation Strategy:

The Implementation Strategy has three major areas of science activity:

**1. Remote sensing Studies:** The obvious starting point for addressing the long-term goal of SIBER is through the use of remote sensing to better characterize the intense variability that is observed in the Indian Ocean.

**2. Modeling Studies:** There are still substantial challenges associated with modeling the highly dynamic regions in the Indian Ocean.

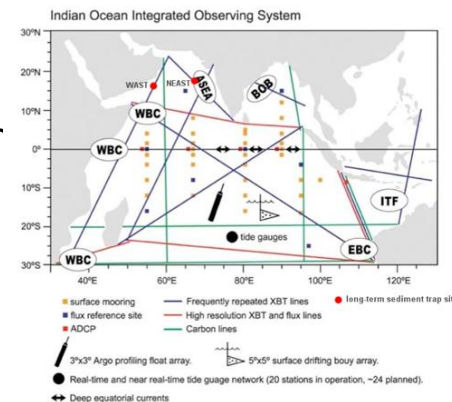
**3. In situ observations and potential for leveraging existing infrastructure:** Studies motivated as a part of SIBER must target and build upon existing monitoring and research infrastructure (e.g., IndOOS/RAMA, IMOS, ASCLME, BOBLME, and other national efforts.).



India's Ocean Color Monitor II



Australia's Bluelink model



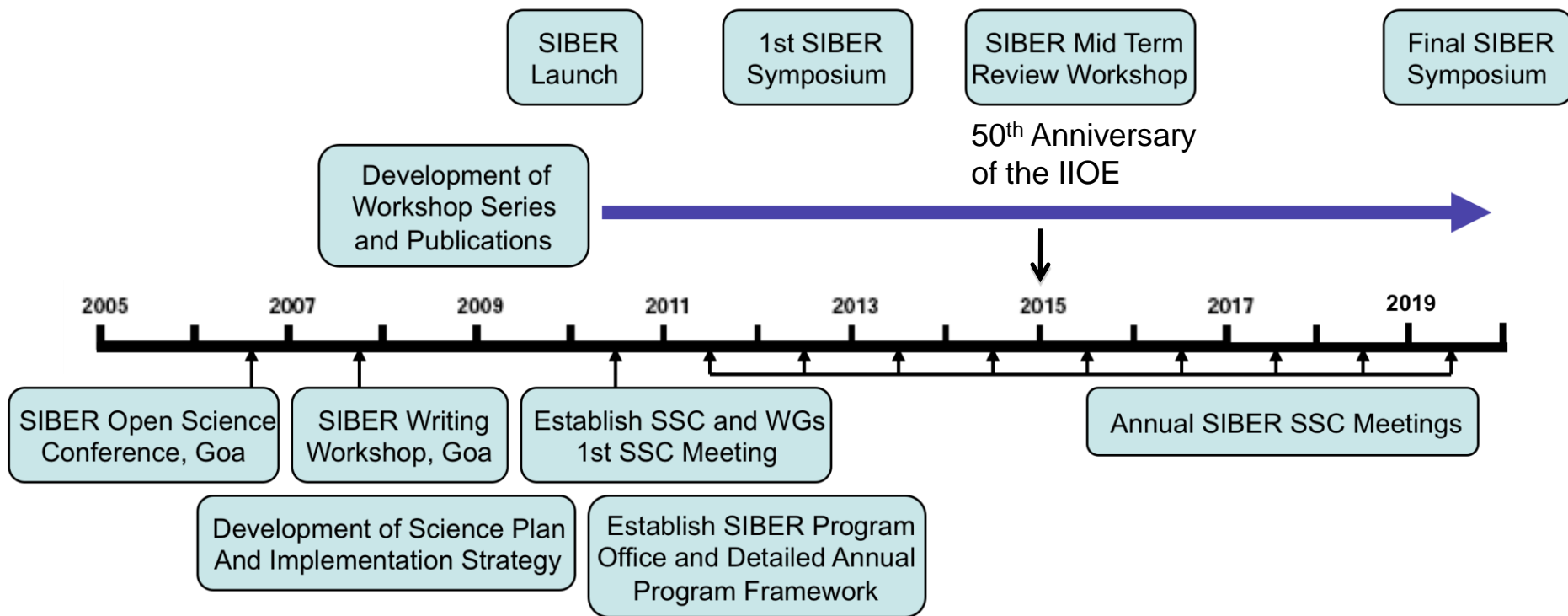
RAMA/IndOOS Observations



# SIBER Program Timeline:

## A 10 year program 2010-2020

Planning → Implementation → Final Synthesis →





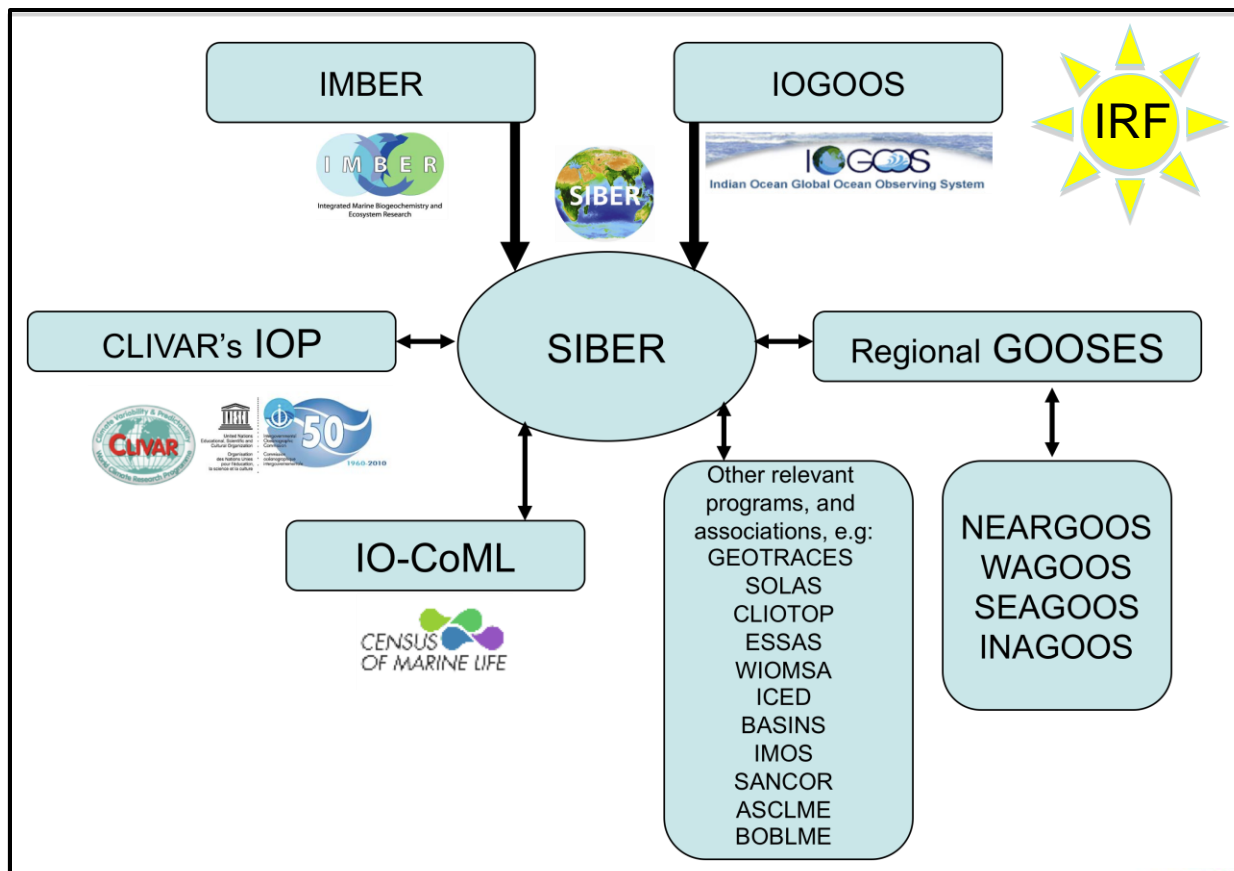
# Programmatic Synergies:



- IMBER and IOGOOS provide logical international programmatic homes for SIBER
- SIBER is now a regional program under IMBER
- SIBER is now the biogeochemical and ecosystem research component of IOGOOS
- SIBER has very close ties to CLIVAR's Indian Ocean Panel (IOP)
- SIBER (and other programs) are supported by the Indian Ocean Resources Forum (IRF)

## SIBER will endeavor to coordinate with and leverage:

- CLIVAR IOP
- Regional GOOSes
  - NEARGOOS
  - WAGOOS
  - SEAGOOS
  - INAGOOS
- IRF
- IO-CoML
- Other relevant programs and associations:
  - GEOTRACES
  - SOLAS
  - CLIOTOP
  - WIOMSA
  - ICED
  - BASINS
  - IMOS
  - SANCOR
  - ASCLME
  - BOBLME





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**Thank You**

