BGC-Argo Data Management
INCOIS/India

TVS Udaya Bhaskar
INCOIS, India
04 Dec, 2018
Outline of the talk

• Indian oxygen and Bio-Argo program.
  – Deployment status and processing.

• Data processing and Management Activities
  – QC of data.

• Usage of data from the Bio-Argo floats.
  – Noctilula Bloom.
  – Oxygen ventilation.
  – Subsurface structure during cyclone.

• Future projections.
Indian Biogeochemical Argo Program: Status and Planning

BioArgo Status

BioArgo Deployed

Oxygen Deployed
Validation of BGC-Argo float with in-situ observations
Possible corrections to the data

• In total INCOIS deployed 67 BGC floats. Out of
  – 16 O₂ (14 SBE-DO and 2 Aanderra Opotode 3830)
  – 53 Bio-Argo (Both NKE and Teledyne).

• Based on recommendation of working group:
  – In situ samples are being measured when ever possible.
  – In house calibration is set up.

• Historical profiles are being archived at INCOIS for performing QC of data from BGC floats.
Validation of BGC-Argo float with in-situ observations

SN128

Chlorophyll (mg m\(^{-3}\))

Dissolved Oxygen (\(\mu\) mol)

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Depth (m)
Validation of BGC-Argo float with in-situ observations

Chlorophyll (mg m$^{-3}$)

ROMS (25 km)
ROMS (8 km)
Satellite

BGC Float
--- Corrected
--- Uncorrected

Ship CTD Vs In-situ Chlorophyll

$y = 0.6403x + 0.2573$
$R^2 = 0.1454$
Validation of BGC-Argo float with in-situ observations

BGC Float (Line-uncorrected; dash-corrected)

Ship CTD (Line-uncorrected; dash-corrected)

ROMS (25 km)

ROMS (8 km)
Chla correction using RS data (older floats)

Match points of Bio-Argo and Chla from MODIS are extracted.
Temporally variability of chlorophyll distribution in the Gulf of Mexico: bio-optical data from profiling floats

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New Alpha and Beta values apart from the factory calibration were derived.
Bozena et al (2017) recommended that any values below the chla min followed by DCM can be set to zeros.

A hybrid approach of combining both is being tested.

-ve values between 150 – 250 meters
Application of Data

- Noctiluca blooms in North Eastern Arabian Sea.
- Ventilation of oxygen to OMZ in the Bay of Bengal.
- Sub-surface Chla and other parameters variability during cyclones (JGR 3rd revision)
- Validation of Modelling output.
- Primary Productivity related studies.
Characterization of oceanic *Noctiluca* blooms not associated with hypoxia in the Northeastern Arabian Sea

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Ventilation of Oxygen to Oxygen Minimum Zone Due to Anticyclonic Eddies in the Bay of Bengal

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Abstract Intense oxygen minimum zone (OMZ) occurs in the middepth of the Eastern Tropical Pacific (ETP), Arabian Sea (AS), and Bay of Bengal (BoB). However, the occurrence of anammox/denitrification was reported only in the ETP and AS and its absence in the BoB is attributed to presence of traces of dissolved oxygen (DO). Anticyclonic eddies (ACEs) supply high-nutrient, organic-rich, and oxygen-poor waters from the coastal upwelling regions leading to strengthening of OMZ in the offshore of AS and ETP. In the absence of western boundary upwelling, we hypothesize that the ACEs supply DO-rich water leading to weakening of OMZ in the BoB. Six ACEs were sampled by bio-Argo hydrography and DO. All sampled eddies were formed in the eastern moved toward west. Warm and DO-rich waters were observed in the by ACEs, by 0.5–1.46°C and 3.2–6.5 μM, respectively, than no eddy regions lifetime of ACE: the rate of ventilation in the 100–300 m was est.
Observed oceanic biogeochemical response to tropical cyclone *Hudhud* from a bio-argo float in the central Bay of Bengal
Future

• India is committed to deploy Bio-Argo floats at a ration of 3:2 for CTD: Bio-Argo floats in Indian Ocean during the period 2017 - 2020.
  – Already 10 are deployed in 2018.
  – 17 (18 BGC and 1 with Nitrate being procured)

• Work with correction of BGC data and improve the data quality.