Indian Bio-Argo data: processing and usage

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Bio-Argo Floats by India

- Oxygen alone (14 with SBE-IDO and 3 with Aanderra Optode).
- Bio-Argo floats deployment commenced from 2012 and in total deployed 48 floats in Indian Ocean. Of these 19 are NKE-Provors and 29 are APEX.
- 5 Bio-Argo APEX floats are being deployed in collaboration with NIO-Goa.
Yearly distribution of floats

No of floats

Yearly distribution of floats

No of floats
Data usage

• Data is being used for bio-parameter related studies like:

• Insitu analysis
  – Role of MJO on Chla in the EEIO
  – Productivity during cyclones (SPIE conference)
  – Tuna Fish tagging and migratory patterns studies.
  – DCM and MLD relation studies.

• Modelling studies:
  – ROMS models set up
Role of MJO on deepening of chla

- Different MJO phases showed that the increase in the mixed layer chlorophyll concentration occurred mainly during the MJO phases 3—5.

- Approximately 30-50% enhancement of mixed layer chlorophyll during the MJO events can be explained by the vertical transport of chlorophyll rich subsurface waters into the mixed layer.

Under review in Deep Sea Research
Fish tagging experiment and use of DCM from Bio-Argo for diving depths
Fig 2: Tuna vertical movements against along track Temperature profile and Oxycline.

Fig 52: Deep Chlorophyll Maxima (DCM) derived from Bio-Argo floats in the proximity.
Modelling and planned cruises

• ROMS (Fennel) Model is set up for the Northern Indian Ocean and run to match the same time and locations of Bio-Argo floats.
• HABS cruises are executed.
  – Four Bio-Argo floats are deployed along with observations during Mar, 2016.
  – High resolution samples were obtained.
  – Similar cruises were under taken during Feb 2016.
This work is compiled and being submitted as a manuscript:

Title: High-resolution ROMS simulated biogeochemical variability in the Arabian Sea and its validation with *in-situ* observations
Papers published and in pipe line

• Oxycline variability in the central Arabian Sea: An Argo-oxygen study, Prakash et al., JSR
• Can oxycline depth be estimated using sea level anomaly (SLA) in the northern Indian Ocean? Prakash et al., RSL.
• Spatio-temporal evolution of chlorophyll-a in the Bay of Bengal: a remote sensing and bio-argo perspective, Udaya Bhaskar et al., SPIE.
• Observed seasonal and intraseasonal variability of chlorophyll-a in the eastern equatorial Indian Ocean using an Argo profiling float, Girish et al., DSR (under review)
• Observed oceanic biogeochemical response to tropical cyclone Hudhud from a bio-argo float in the central Bay of Bengal, Girish et al., (Manuscript prepeared)
• High-resolution ROMS simulated biogeochemical variability in the Arabian Sea and its validation with in-situ observations, Kunal et al., (Manuscript prepared)
Future

• Ongoing cruise by NIO to deploy 5 floats in the Northern Indian Ocean.

• India is committed to deploy Bio-Argo floats at a ration of 3:2 for CTD: Bio-Argo floats in Indian Ocean.

• Efforts are underway for archiving ship borne bio profiles for inter comparison study.

• Improve the model outputs with the use of Bio-Argo data.