Deep Argo Implementation Workshop

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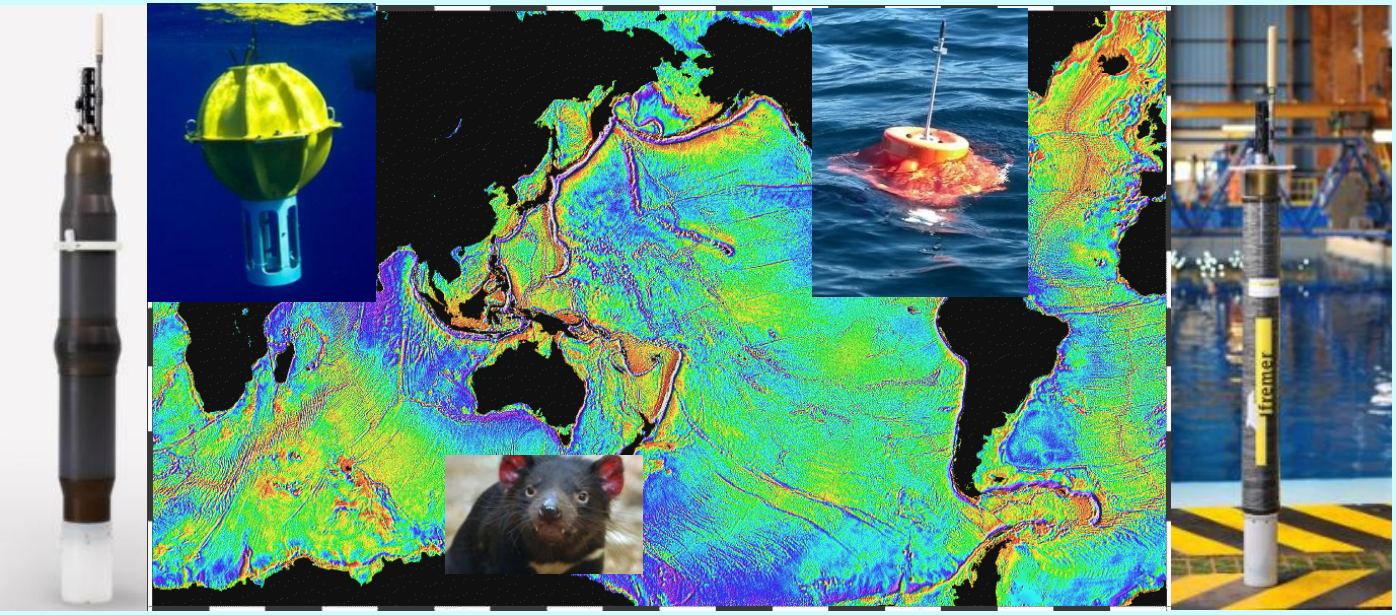


May 5-7 at CSIRO in Hobart, Tasmania (www.argo.ucsd.edu/AcDeep_Argo_Workshop.html)

1. **Objectives**
2. **Agenda**
3. **What can make Deep Argo successful?**

Objectives of the Deep Argo Implementation Workshop

- **Prioritize key scientific issues for Deep Argo**

(i) Closing the heat, freshwater, and sea level budgets,

(ii) Characterizing decadal variability in deep ocean water masses,

(iii) Estimating the mean and decadal variability in deep ocean circulation including meridional overturning circulations.

- **Determine sampling requirements to achieve Deep Argo objectives**

- **Review plans for the deployments of Deep Argo pilot arrays**

- **Promote international collaboration within the Deep Argo community**

Deep Argo workshop – Day 1

Introduction - Guidance for the Workshop from AST-16 (8:30-9:00)

Session 1: Watermass pathways, volume transport and heat budget in the deep ocean: State of knowledge and uncertainties (9:00-12:00)

- Deep ocean heat and freshwater content and steric sea level
- Deep water mass variability
- Circulation pathways, transports, and MOCs

12:00-1:00 Lunch

Session 2: First steps toward the implementation of the Deep Argo program (1:00-3:15)

- Scales and magnitude of variability in the deep ocean
- Practical aspects of sampling strategies using Deep Argo floats (parking depth)
- Deployment opportunities for Deep Argo with and without shipboard CTD
- Status of national planning for Deep float deployment (number of floats to deploy, float depth limitation and CTD, BGC sensors)

3:15-3:30 Afternoon break

Session 3: Deep profiling float prototypes: performances, limitations, and results (3:30- 5:00)

- Deep SOLO
- Deep APEX
- Deep NINJA
- Deep ARVOR

Deep Argo workshop – Day 2

Session 4: Technical aspects of Deep profiling floats for discussion (9:00-12:00)

- CTD calibration and accuracy
- Cycle time
- Profiling depth
- Vertical resolution
- Bottom landing
- Parking depth
- Data collection during ascent or descent
- Use of trajectories
- Quality control
- Data storage

12:00-1:00 Lunch

Session 5: Key relationships between Deep Argo and other programs (1:00-3:15)

- GO-SHIP (CTD reference data, high resolution boundary current transects)
- Boundary current moored arrays (absolute velocity directly measured using current meters, high resolution time series at fixed points)
- Data assimilation modelling of circulation pathways and MOCs (research initiatives and GODAE OceanView)

3:15-3:30 Afternoon break

Session 6: Deployments of Deep Argo pilot arrays (3:30-5:00)

- Atlantic Ocean
- Pacific Ocean
- Indian Ocean
- Southern Ocean

7:00-9:00 Dinner

Deep Argo workshop – Day 3

Session 7: Science motivation and future work (9:00-12:00)

- Value of Deep Argo for estimating sea level and planetary heat balance, and for studying ocean circulation and MOCs
- Research plans for the Deep Argo program in the next 1-3 years
- White paper and future proposals
- Workshop report for the Argo Steering Team

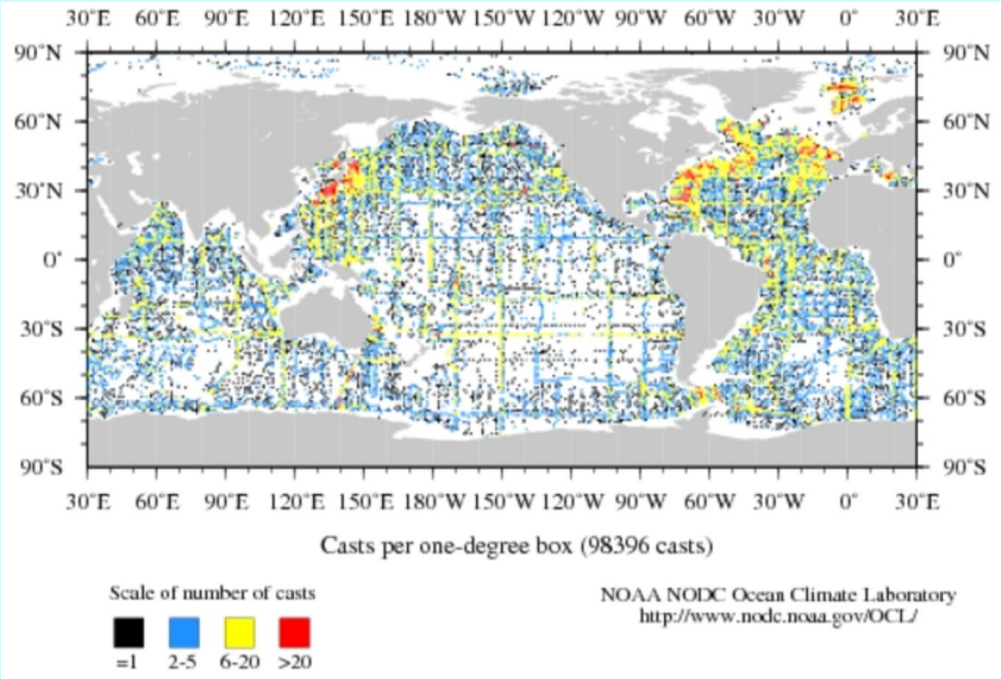
12:00-1:00 Lunch

2:00 Adjourn

What can make Deep Argo successful?

U.S. National Academy of Sciences, 2015-2025 Decadal Survey of Ocean Sciences

- **Narrow, well-defined observational goals aimed at widely appreciated scientific and operational issues**



Systematic observations > 2000 m are made only by the sparse decadal ship survey (GO-SHIP).

The World Ocean Database includes just 98,396 T/S profiles deeper than 3000 m (55,757 deeper than 4000 m), concentrated near Northern Hemisphere continents.

Combination of conventional (0-2000 m TS, 1000 m trajectory ref. vel.) and Deep Argo will provide the data needed to understand top-to-bottom ocean circulation.

- **Broad international and multi-agency support based on meeting societal needs as well as science**

National programs are proposing large increases in the number of Deep Argo floats but the success of these efforts is not yet known. The Deep Argo workshop can help to build national consensus on Deep Argo requirements.

What can make Deep Argo successful?

U.S. National Academy of Sciences, 2015-2025 Decadal Survey of Ocean Sciences

- **Tenacious championship within academia, industry, and government agencies**

Efforts have begun to articulate the high value of Deep Argo but much more is needed.

- **Commitment to publicly available data, which demands careful open data-quality control**

Deep Argo data will be publicly available on the Argo database. It will be crucial to do careful DMQC of the Deep Argo data without weighting the data management system down with complexity.

- **Sensors that are well matched to float capabilities and the demands of low-cost deployment**

The performances and effectiveness of float and CTD for Deep Argo need to be demonstrated.

- **Freedom for methods and technology to evolve, subject to clear performance requirements**

Similarly to the evolution of 2000 m Argo floats and CTDs over the past 15 years, the future improvement of Deep Argo floats and CTDs to meet optimistic performance targets for the abyssal ocean should continue and be encouraged.