Australian Bluewater Observing System (IMOS ABOS)

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ABOS at a glance

- IMOS funded data from 2008 onwards available via [www.imos.org.au](http://www.imos.org.au)
- ITF and EAC are boundary current arrays
- Polynya monitors AABW production
- SOTS is multi-disciplinary

Histories vary:

- Indonesian Throughflow
- East Australian Current
- Sub-Antarctic Zone
- Ice-edge Mertz Polynya

Plus 9 coastal sites
[www.imos.org.au](http://www.imos.org.au), ANMN facility
2013 Highlight: ABOS Complete

2013 Lowlights:
IMOS **unfunded** beyond 30 June 2013

Stopgap 22% budget from universities to Sept 2014.
Staff cuts
Minimalist approach for observing
Data portal and head office maintained

Ongoing funding uncertain - election in September.
Polynya moorings (Steve Rintoul): 3 near-bottom CTD-current meter moorings to monitor AABW overflow out of Mertz polynya

Feb 2013 Steve Rintoul: “The mooring site is still covered by heavy sea ice. If this is the new regime as a result of the collapse of the Mertz Glacier tongue, it may mean the end of the polynya program as presently planned – we can’t work where we planned unless the ice regime changes again.”

Figure 2: AQUA MODIS image, acquired 13/01/2013 and provided by NASA.
Polynya Moorings

UPDATE:
Feb-Mar 2013 6 week voyage on RV Tangaroa (NIWA-ACECRC):
1. Existing moorings could NOT be recovered because of heavy ice.
2. Replacement moorings were returned to Hobart undeployed.
3. Next attempt Feb 2014 using RV Aurora Australis – moorings likely to be moved – collaborations sought.
4. Some forward funding secured via ACE-CRC continuation, future of IMOS funding unknown.

SO NO DATA YET FROM THIS PROJECT
UPDATE:
EAC will be recovered in September 2013 after first 16 month deployment and NOT redeployed. (Funds to re-start are being sought.)

SO NO DATA YET FROM THIS PROJECT
Timor Passage and Ombai Moorings (Bernadette Sloyan): ITF monitoring - CTDs, current meters

Position of the Timor Passage and Ombai moorings (yellow circles within red box). Also shown are four shelf and coastal moorings that complete the Timor Passage array. The shelf and coastal moorings are maintained by AIMS as part of the northern IMOS observation program. The black dotted lines are altimetry ground tracks.
Update: Second ITF deployment will be recovered in June 2014 using new RV Investigator, and hopefully redeployed (funds for subsequent recovery are not yet allocated, but there is agreement that it is high priority.)

so full data available from first 14 months
SOTS: west flowing limb of super-gyre, upper limb of overturning

Ridgway and Dunn, 2007

Currents at 200m

5 – 30 cm s⁻¹

Antarctica
SAZ Sediment Trap Mooring

- Stiff subsurface design
- Paired traps and current meters at 1000, 2000, 3800m
- McLane Parflux funnels
- Indented rotating sphere zooplankton excluding in-situ settling columns
SOFS Air-Sea Flux Mooring

- ASIMET Meteorology
- ADCP currents
- Accelerometer waves
- NOAA pCO$_2$
- Sea Surface T,S,O$_2$, Fl-BB
- AWCP zooplankton
Pulse BGC Mooring

- 1 m diameter, 0.5m freeboard float
- Elastic decoupler, inertial mass, S-tether, integrated instrument package
- Aanderaa Optode O2
- Seabird T, S, Electrode O2
- Pro-Oceanus Gas Tension
- Mclane RAS 24x2x500ml water samples: nutrients, DIC, Alk, Phyto ID
- Wetlabs PAR, Fluo-Backscatter
- ISUS UV nitrate sensor

Intake outside shroud through 1mm screen
No filtration
Backflushing with mercuric chloride instead of acid

Samples collected in pairs:
HgCl2 for nutrients, DIC, Alk, 13C-DIC
Buffered/Si-enriched glutaraldehyde for microscopy
SAZ biological carbon pump – steady success

Three most recent years of SAZ mooring deployments recovered faultless records (Steve Bray, ACE CRC)

Some seasonal features persist down into the ocean interior.

Some years much of the flux occurs before mid-January; other years it occurs later.

Integrated annual flux variability ~2-fold even in the deep ocean.
First comparison of Mclane Parflux Funnel traps (the standard deep ocean trap used by SOTS, BATS, HOT, KNOT, and other global time series), with a cylindrical Indented Rotating Sphere (IRS) trap, designed to exclude zooplankton. IRS fluxes are lower, with somewhat subdued features. Further tests are required to evaluate the implications, including examining zooplankton distributions as estimated from the Acoustic Water Column Profiler deployed on the SOFS mooring.
SOFS (Flux Mooring) – First Publications

• Have 2 years of data spanning Mar 2010 – Jan 2013 from 3 deployments
• Building picture of inter-annual variability (See publication Schulz et al., GRL 2012)
• Adding additional upper ocean observing capability - ADCP, AWCP, ocean turbulence, temperature sensors in mixed layer (0-500m).

SOFS

SOFS-1, 2 & 3
2013 – second SOFS break – no data or gear losses

- **SOFS-3 deployed** July 2012
- **Drifted** off watch circle September 2012
- **Buoy Recovered** RV Mirai January 2013
- **Continued** to collect and transmit data
- Failure most likely due to kink in line forming during deployment
- Heavy wave impacting on buoy tower
- **SOFS-4 built to same specifications**
Pulse: Oxygen ventilation, exchange terms, NCP
Pulse: NCP nitrate sampler & sensor results

NCP over deployment: 89 mg C m\(^{-2}\)
Very sensitive to mld

Biofouling?
Replumbed for DI baselines in July 2012
Replumb for pumped mode in April 2013

ISUS sensor Nitrate and RAS bag nitrate

Nitrate uM

Phosphate silicate uM
Pulse: NCP – Predictive Capacity requires Biology

Diatoms

Ciliates

RAS phytoplankton identification, Ruth Eriksen
Pulse AWCP bio-acoustics - shallower diel cycle in December

38 kHz

$\lambda \sim 4\text{cm}$

Depth below surface (m)

Night | Day | Night | Day

- 35
- 70
- 105
- 140
- 175
- 210

Surface reflection
SOTS & SOFS Data Holdings

UPDATE:
All moorings redeployed in May 2013, for recovery in March 2014.

Currently NO funding to continue Moderate priority if IMOS refunded

Some funding likely to be available for SAZ, possibly Pulse from ACE CRC

Bio-Argo floats likely in September 2013

Filled= data in hand, open=collection underway, dashed=planned collection
US/Aus RAMA Mooring – deployed July 2012 for possible turnaround July 2013

(a) Global Tropical Moored Buoy Array

(b) Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA)

(c) Daily Data

- Shortwave Radiation (W m⁻²) 25S100E -3.5 m
- Precipitation (mm hr⁻¹) 25S100E -3.5 m
- Longwave Radiation (W m⁻²) 25S100E -3.5 m
- Wind Speed (m s⁻¹) 25S100E -4 m
- Wind Direction (° clockwise from north) 25S100E -4 m
- Air Temperature (°C) 25S100E -8 m
- Heat Content (0-300 dbar, 10¹⁰ J m⁻³) 25S100E
- Isotherms (°C) 25S100E
- Sea Temperatures (°C) 25S100E
- Isobalines (PSU) 25S100E
- Salinity (PSU) 25S100E
QUESTIONS?