

Australian Bluewater Observing System (IMOS ABOS)

Tom Trull

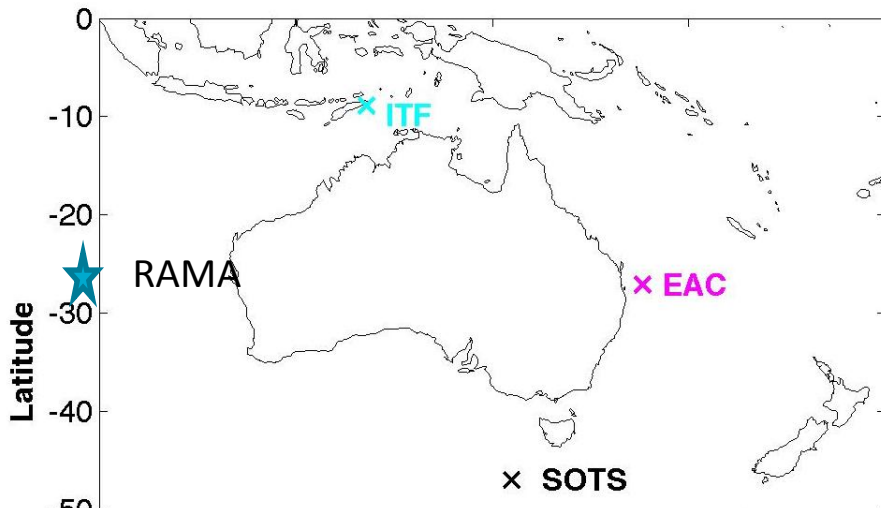
27 May 2013, OceanSITES Steering Committee, Seoul

Wealth from Oceans/CAWCR Ocean Observation, Assessment and Prediction
www.csiro.au


Integrated Marine
Observing System



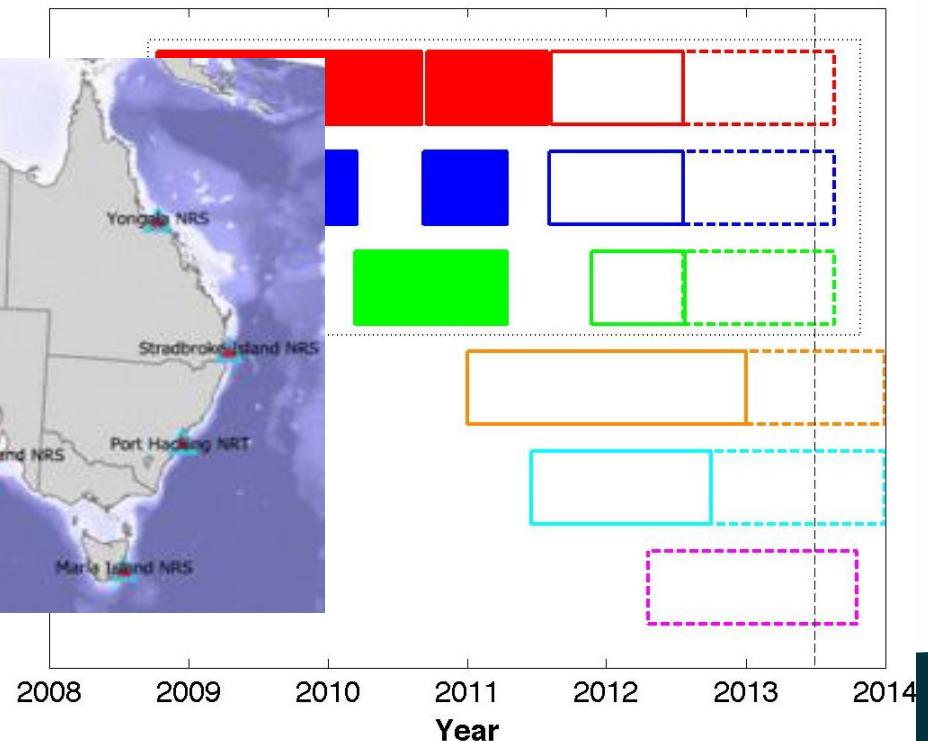
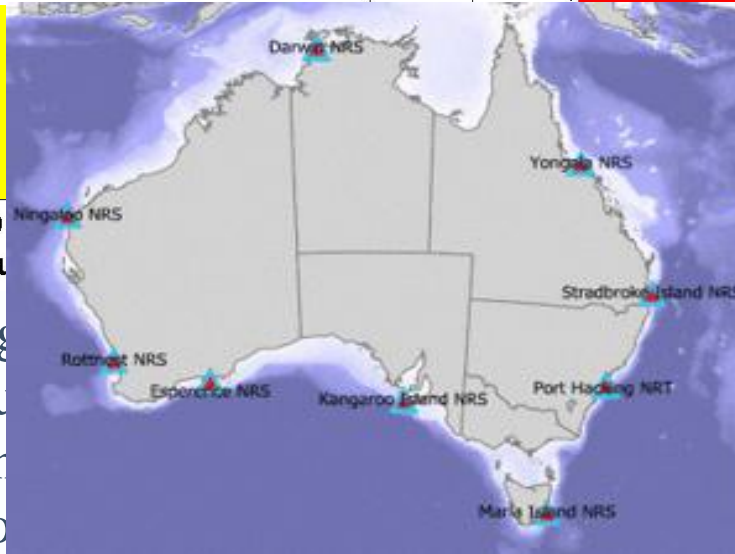
ABOS at a glance



- IMOS funded data from 2008 onwards available via www.imos.org.au
 - ITF and EAC are boundary current arrays
 - Polynya monitors AABW production
 - SOTS is multi-disciplinary
- Histories vary:

Plus 9 coastal sites
www.imos.org.au,
 ANMN facility

- Indonesian Through
- East Australian Cu
- Sub-Antarctic Zon
- Ice-edge Mertz Po



2013 Highlight: ABOS Complete

2013 Lowlights:

IMOS **unfunded** beyond 30 June 2013

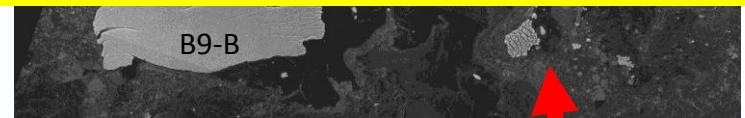
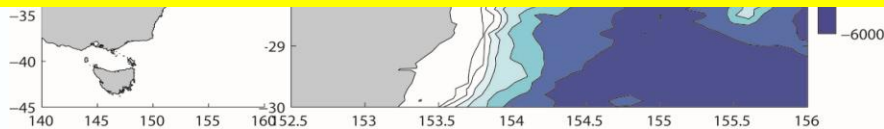
Stopgap 22% budget from universities to Sept 2014.

Staff cuts

Minimalist approach for observing

Data portal and head office maintained

Ongoing funding uncertain - election in September.



IMOS mooring

Polynya moorings (Steve Rintoul): 3 near-bottom CTD-current meter moorings to monitor AABW overflow out of Mertz polynya

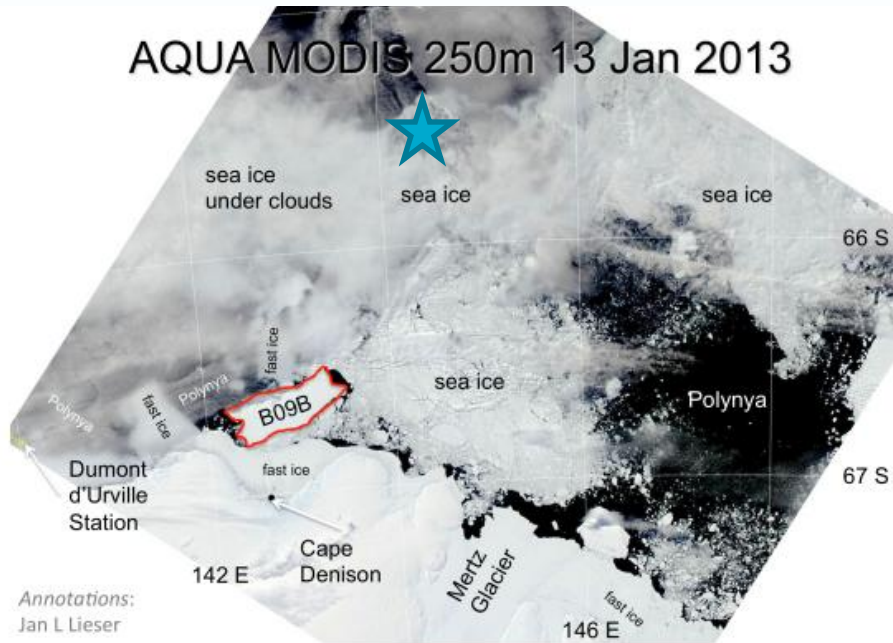
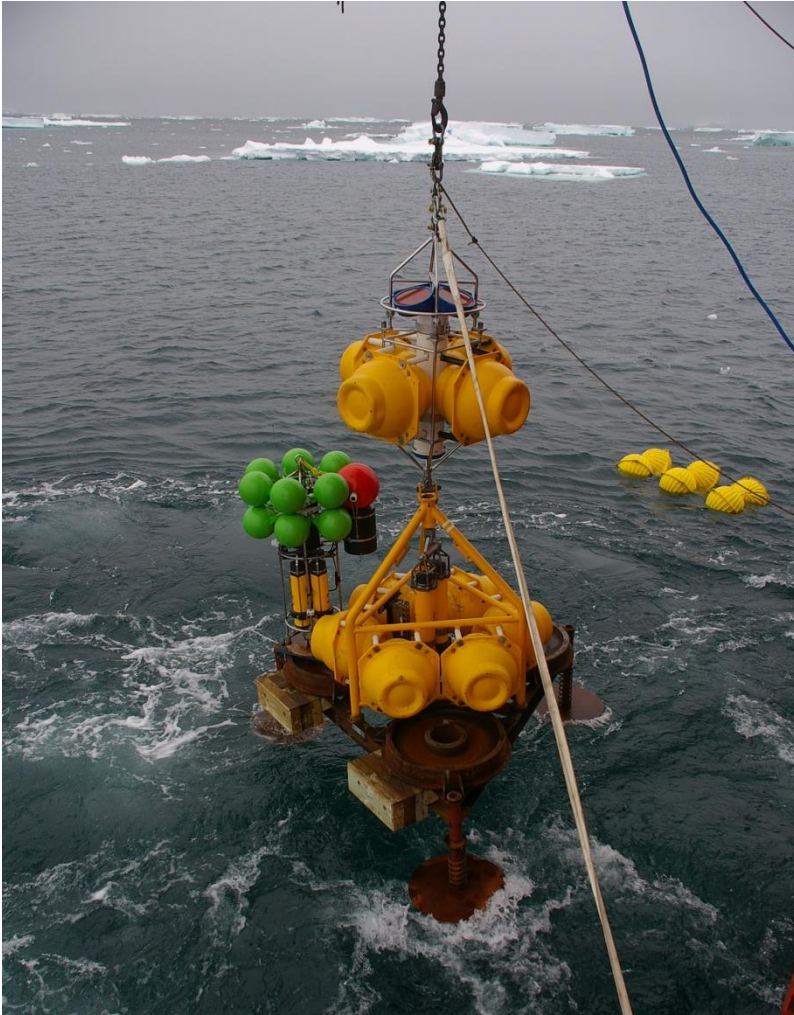


Figure 2: AQUA MODIS image, acquired 13/01/2013 and provided by NASA.

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.”

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

East Australian Current Array (Ken Ridgway)

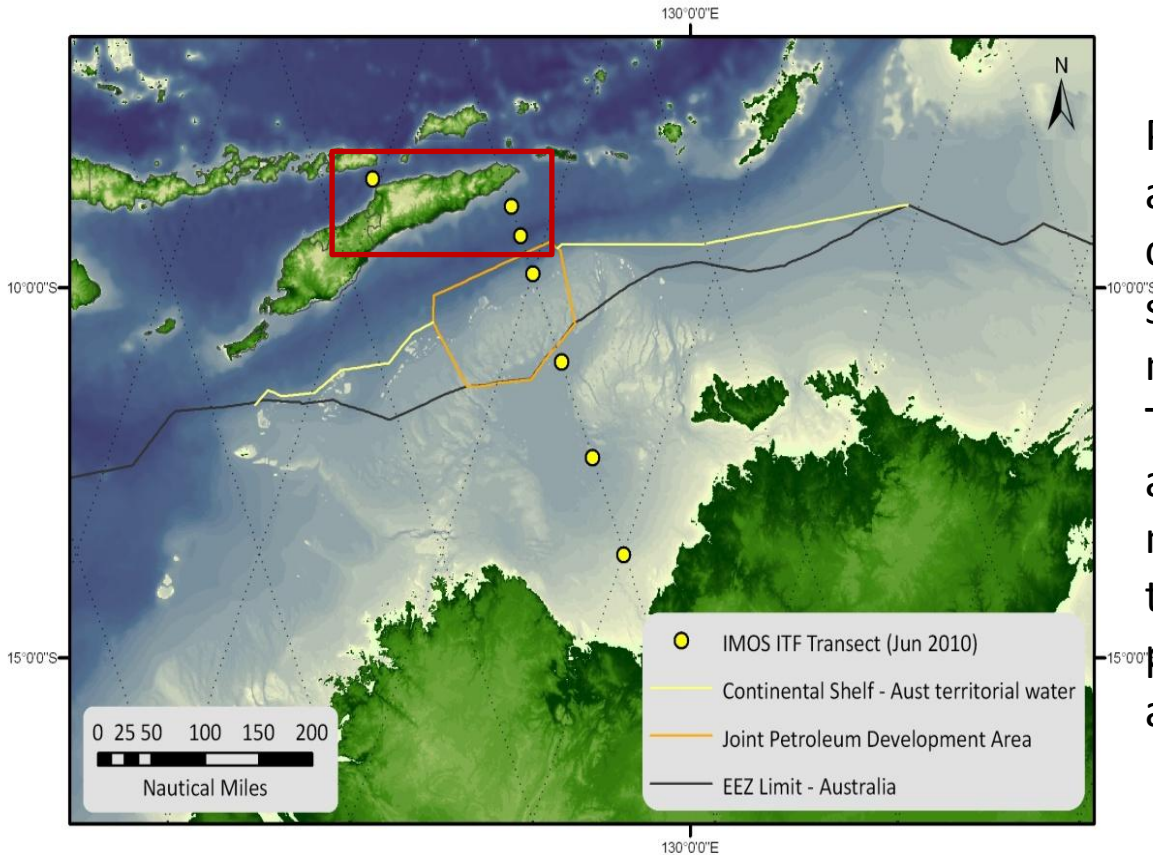
UPDATE:

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

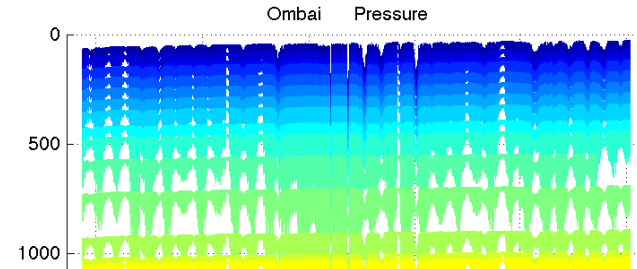
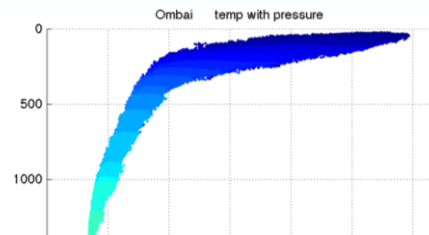


Timor Passage and Ombai Moorings (Bernadette Sloyan): ITF monitoring - CTDs, current meters



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

ITF Mooring Recovery and deployment

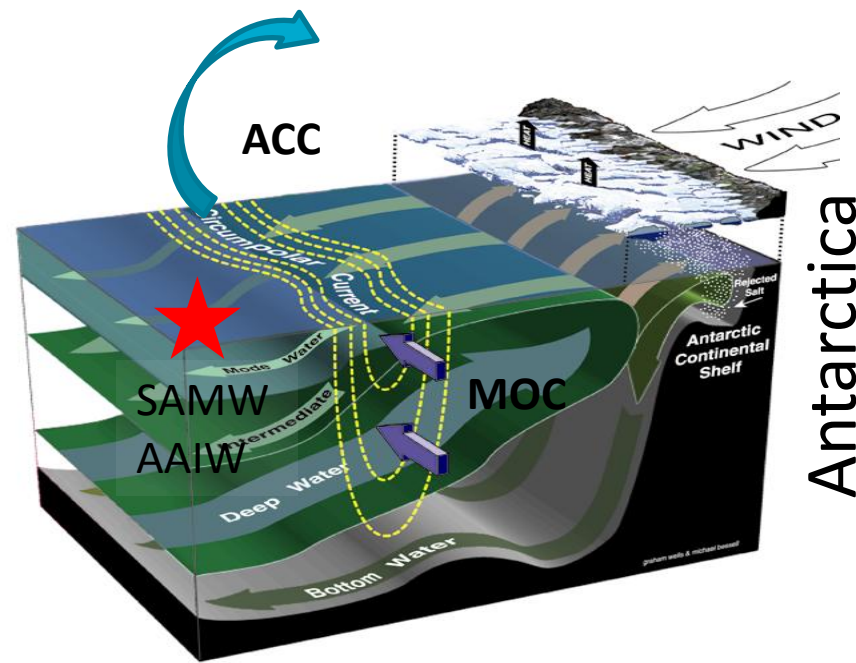
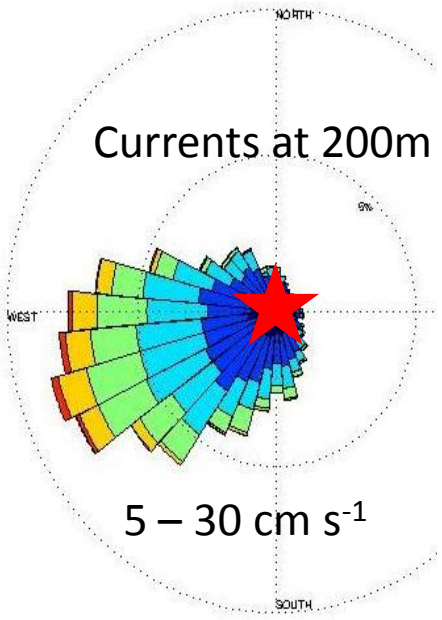
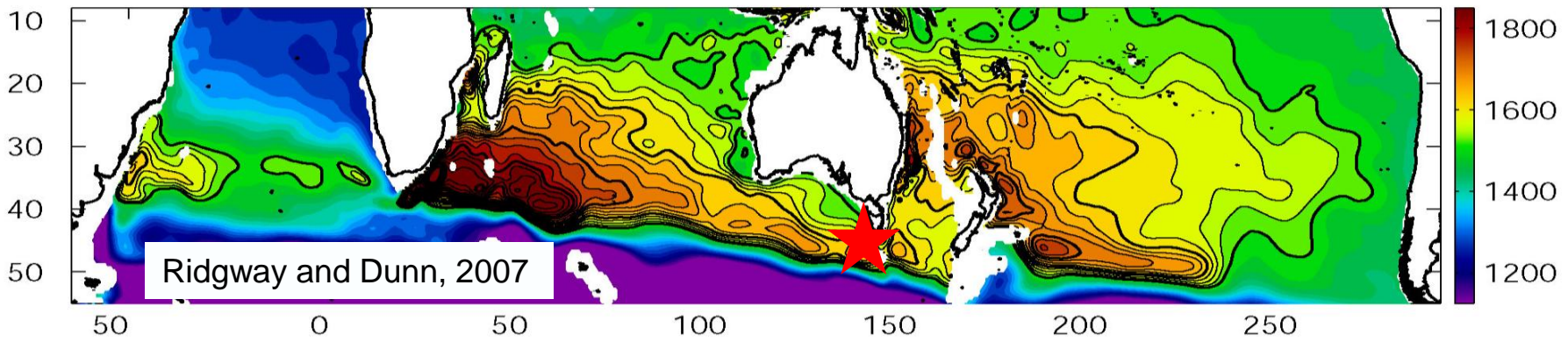


UPDATE:

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

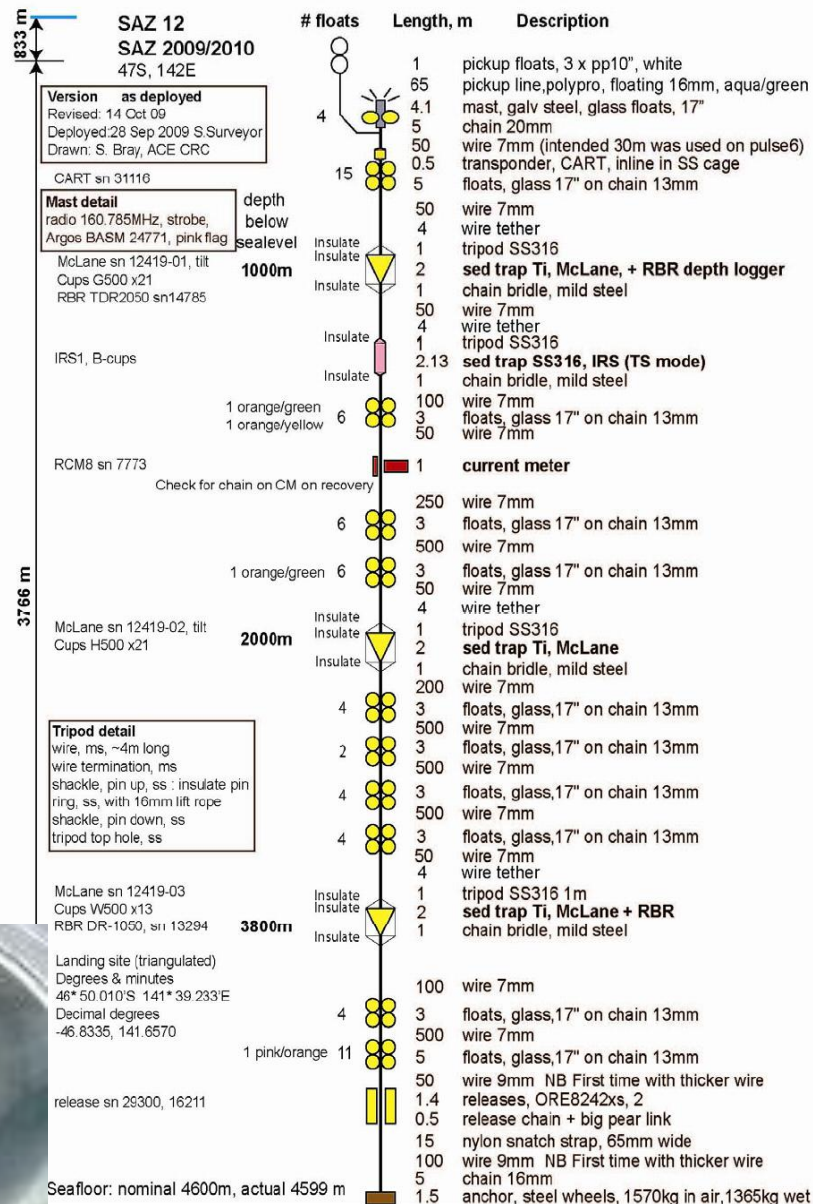
SOTS: west flowing limb of super-gyre, upper limb of overturning



Antarctica

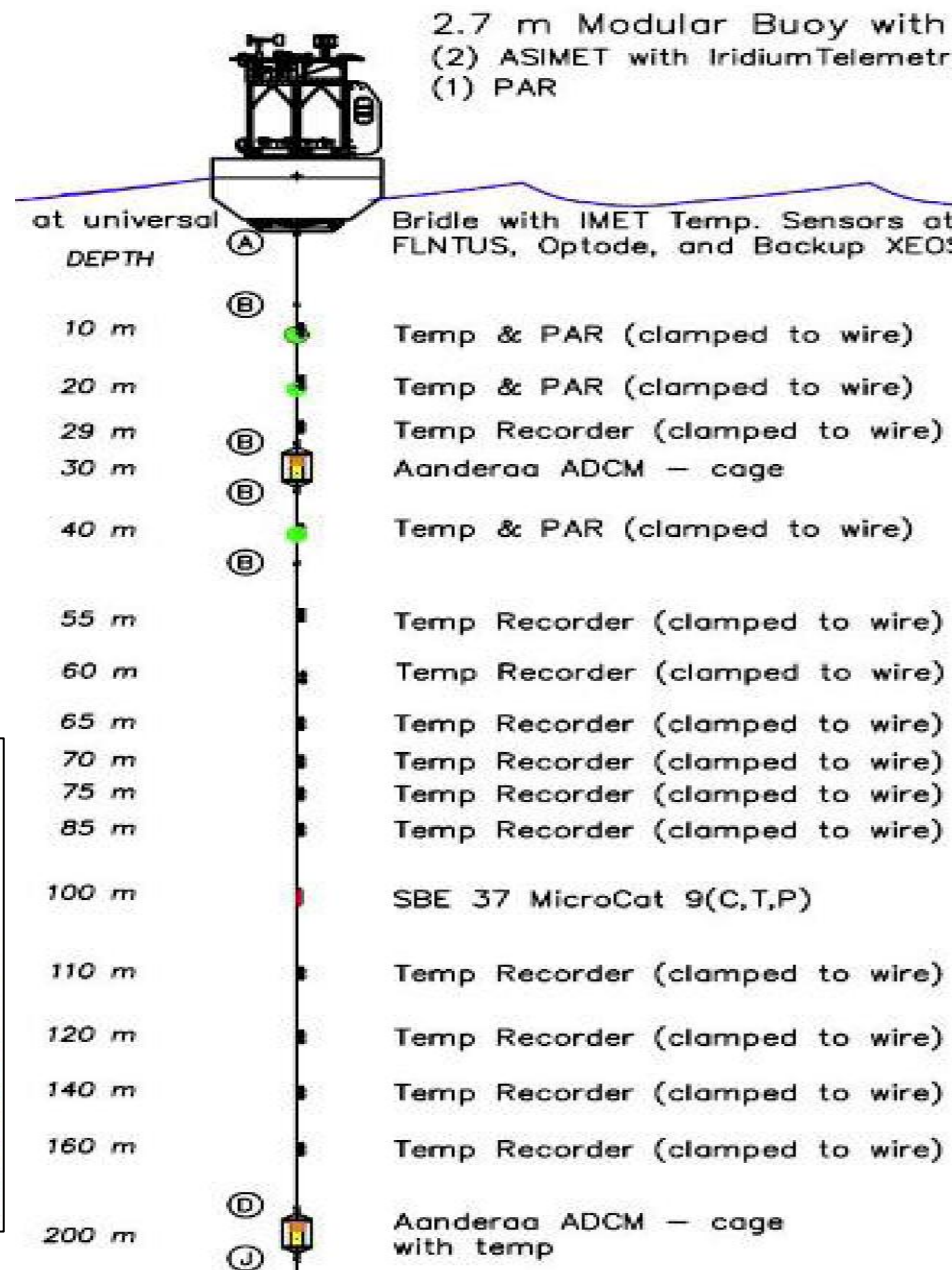
SAZ Sediment Trap Mooring

- 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 pCO₂
- Sea Surface T,S,O₂, 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

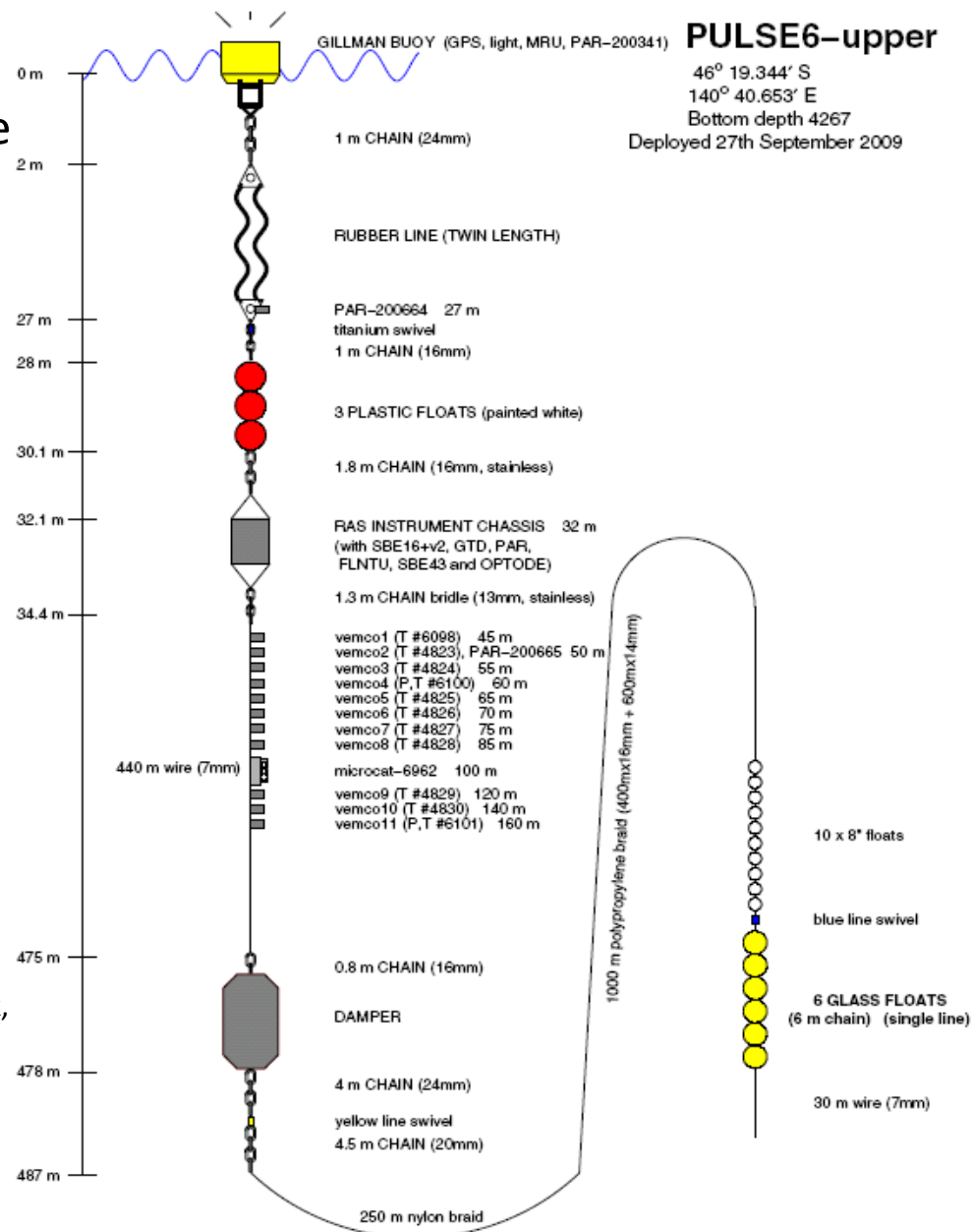


Intake outside shroud through 1mm screen
No filtration
Backflushing with mercuric chloride instead of acid

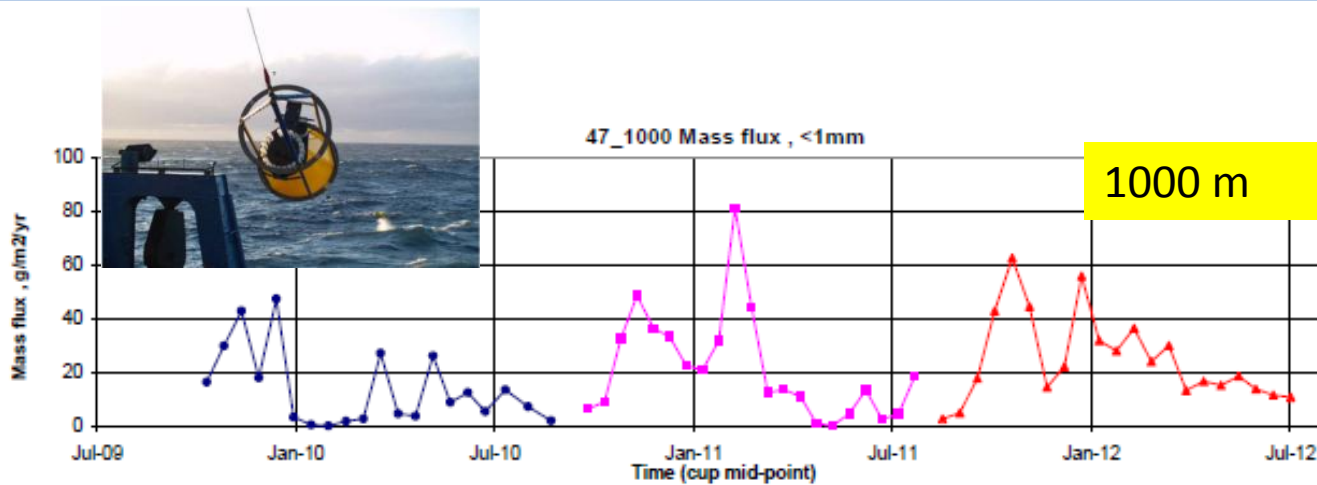
Samples collected in pairs:

HgCl₂ for nutrients, DIC, Alk, 13C-DIC

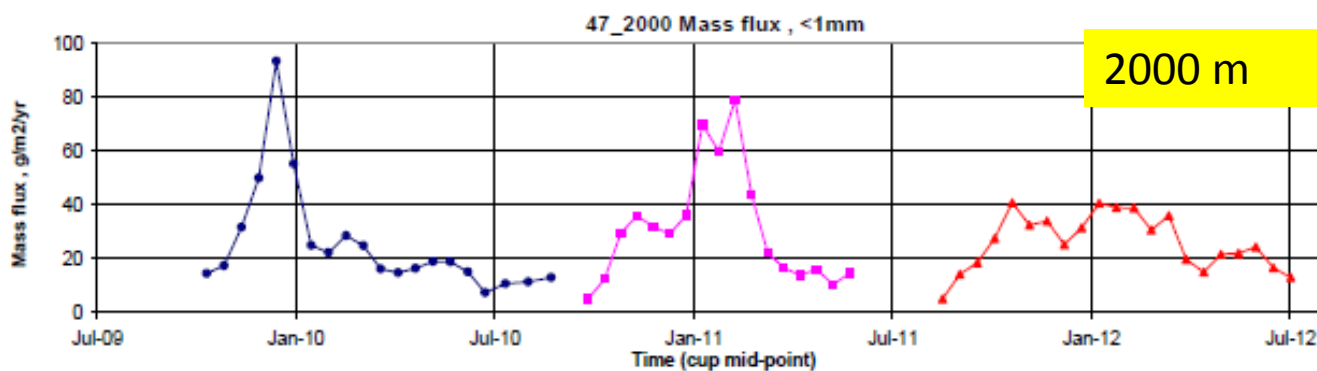
Buffered/Si-enriched glutaraldehyde for microscopy



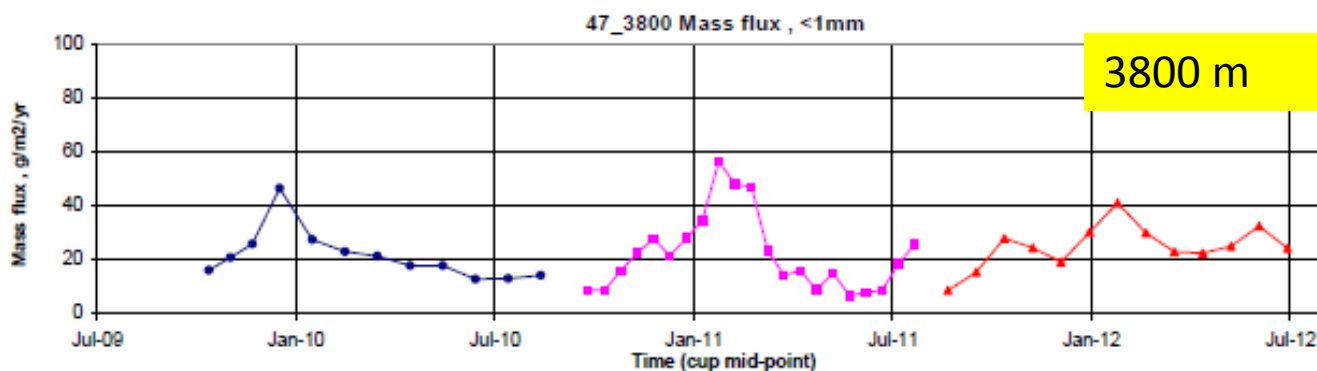
SAZ biological carbon pump – steady success



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



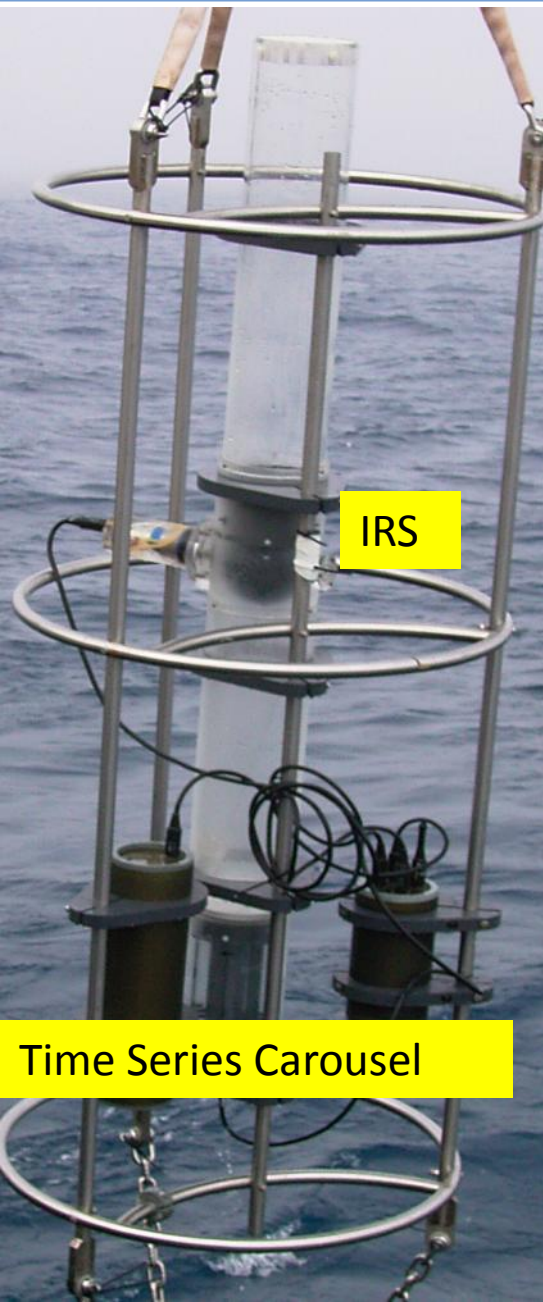
Some seasonal features persist down into the ocean interior.



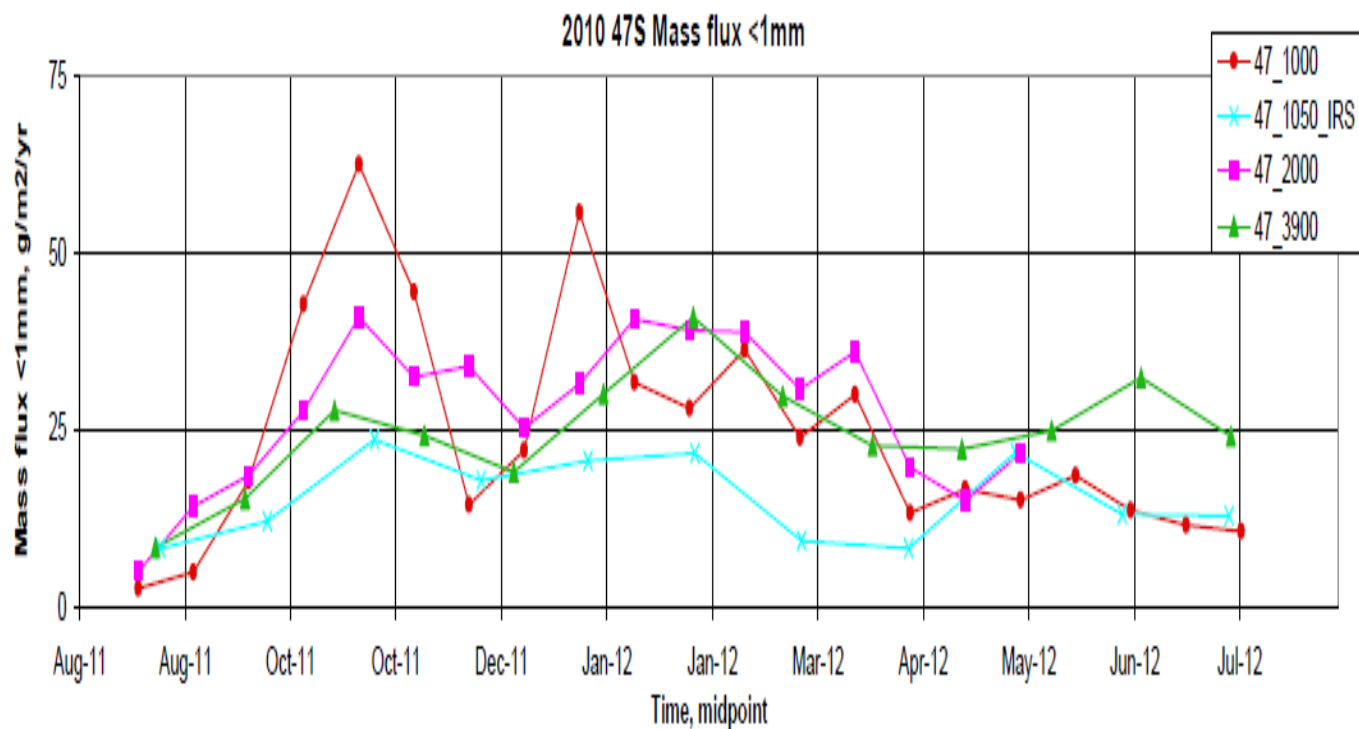
Some years much of the flux occurs before mid-January; other years it occurs later.

Integrated annual flux variability ~2-fold even in the deep ocean.

SAZ: biological carbon pump – recent results

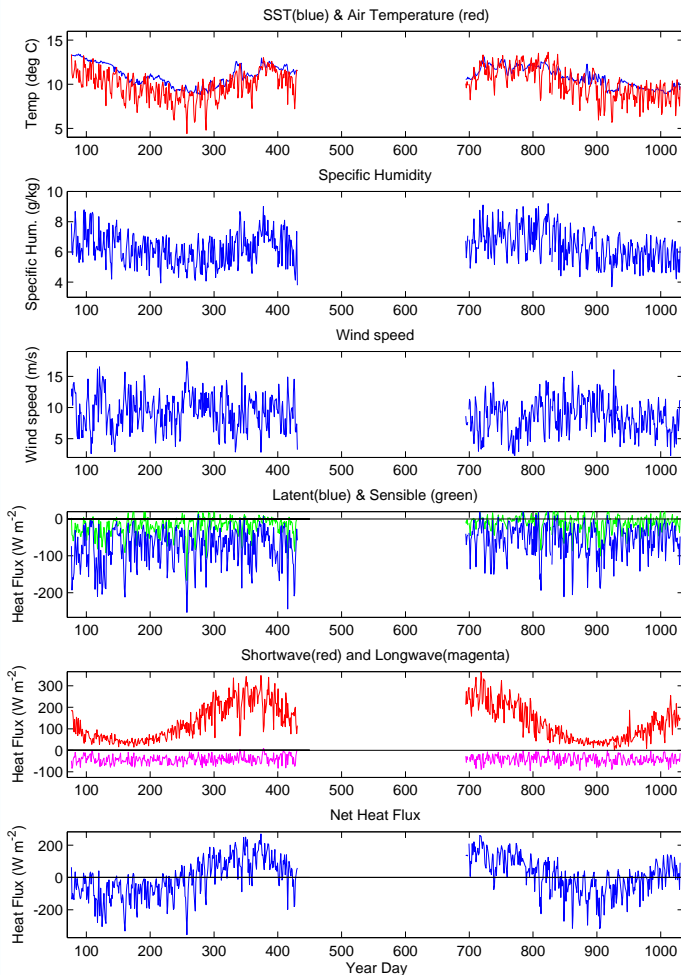


First comparison of Mclane Parflux Funnel traps (the standard deep ocean trap used by SOTS, BATS, HOT, KNOT, and other global time series) , with a cylindrical Indented Rotating Sphere (IRS) trap, designed to exclude zooplankton. IRS fluxes are lower ,with somewhat subdued features. Further tests are 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).



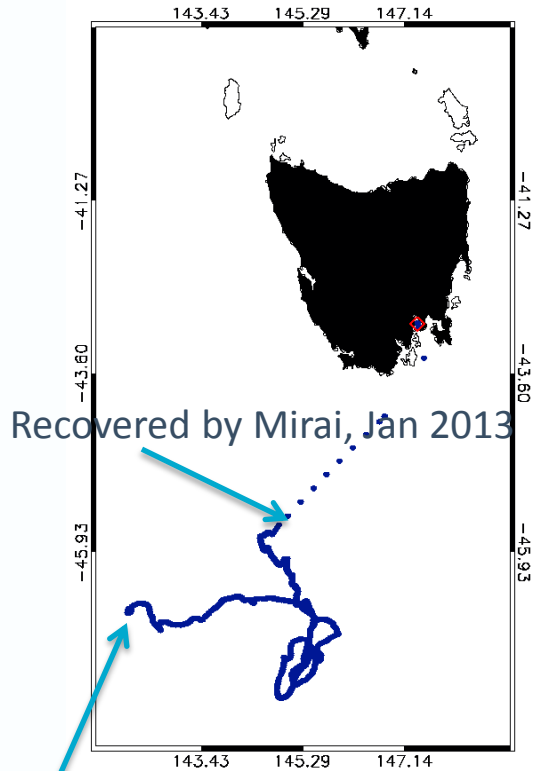
SOFS-1,
2 & 3



2013 – second SOFS break – no data or gear losses

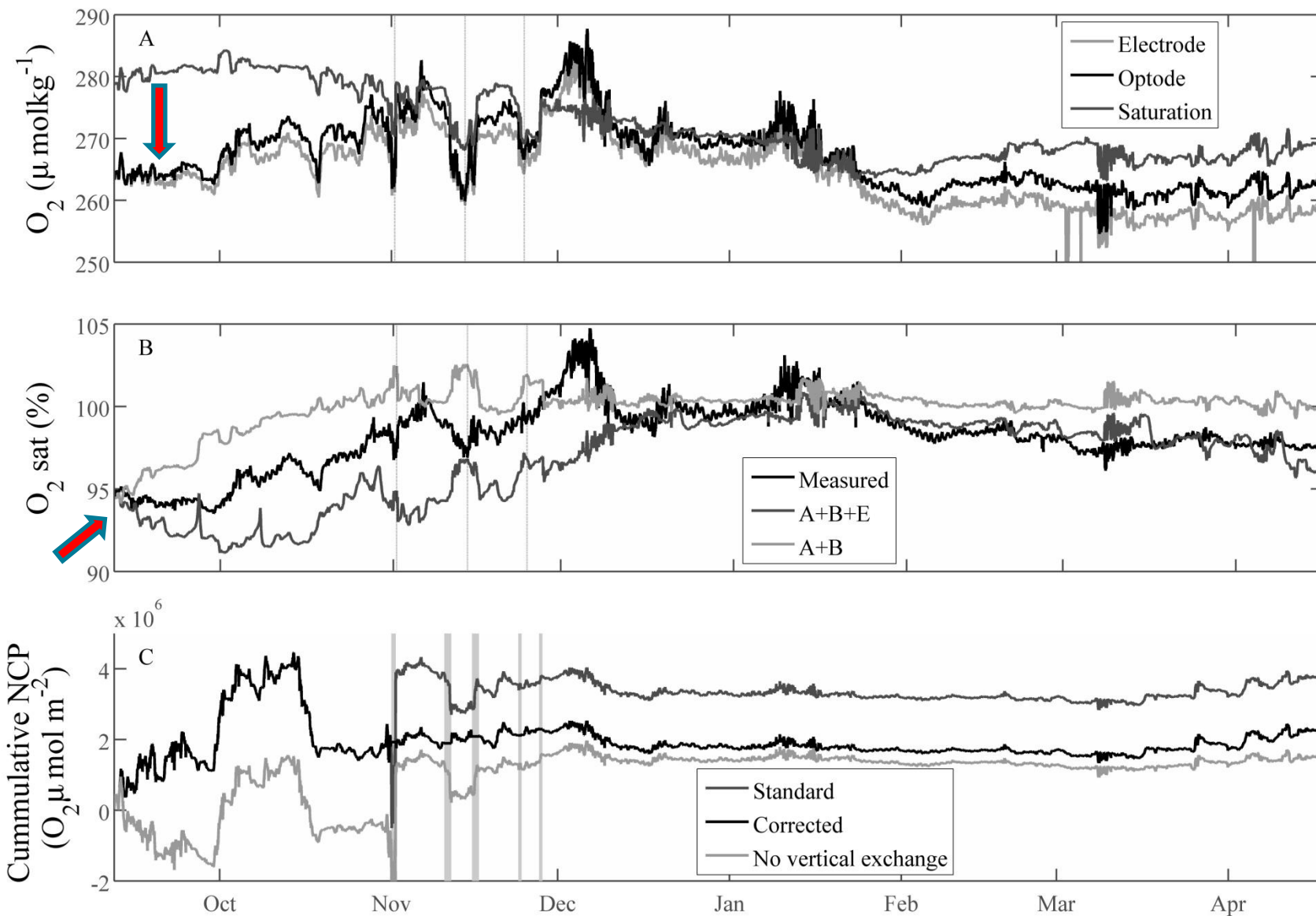
Southern Ocean Flux Station Location

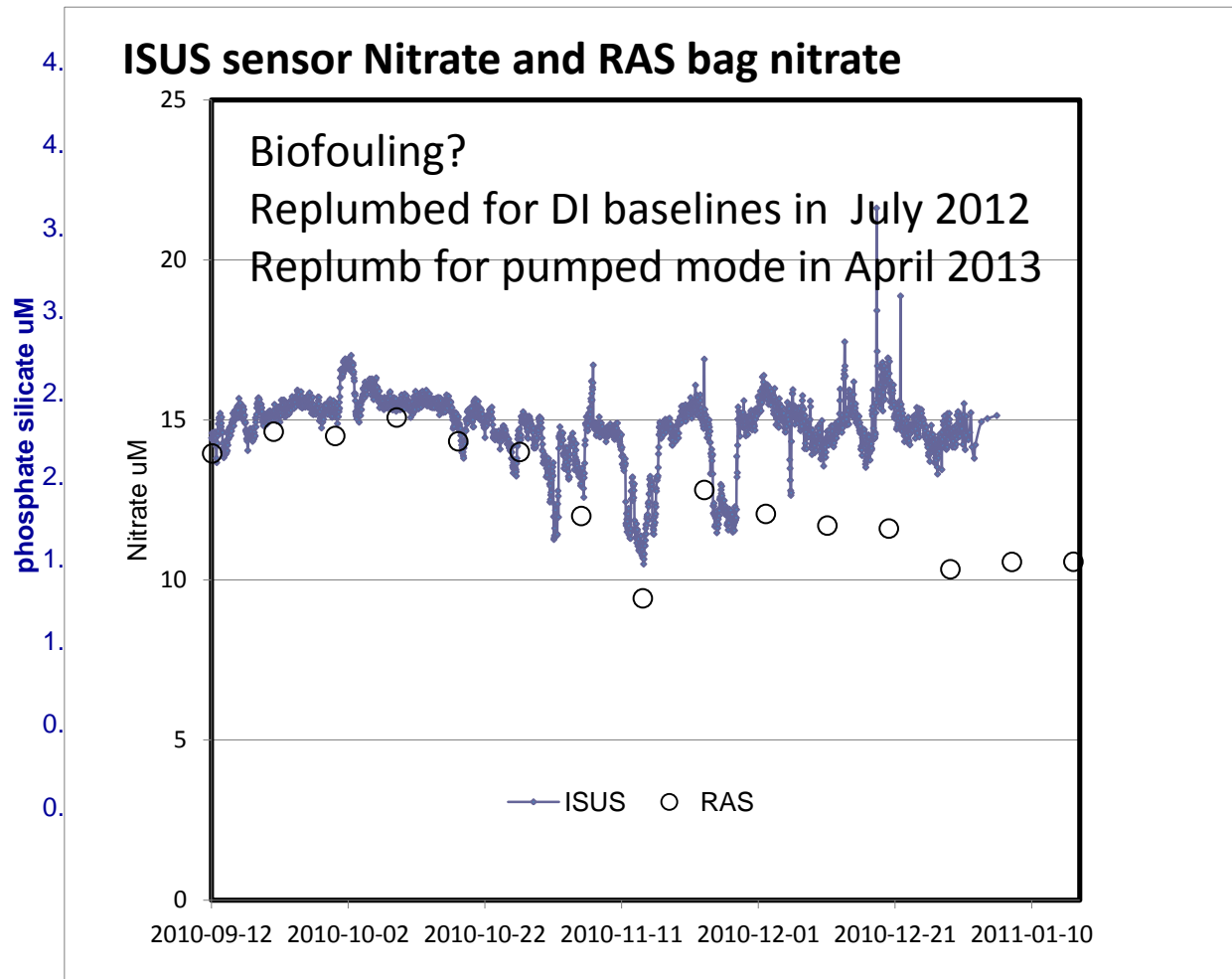
20120714 01 UTC to 20130103 06 UTC



- 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*

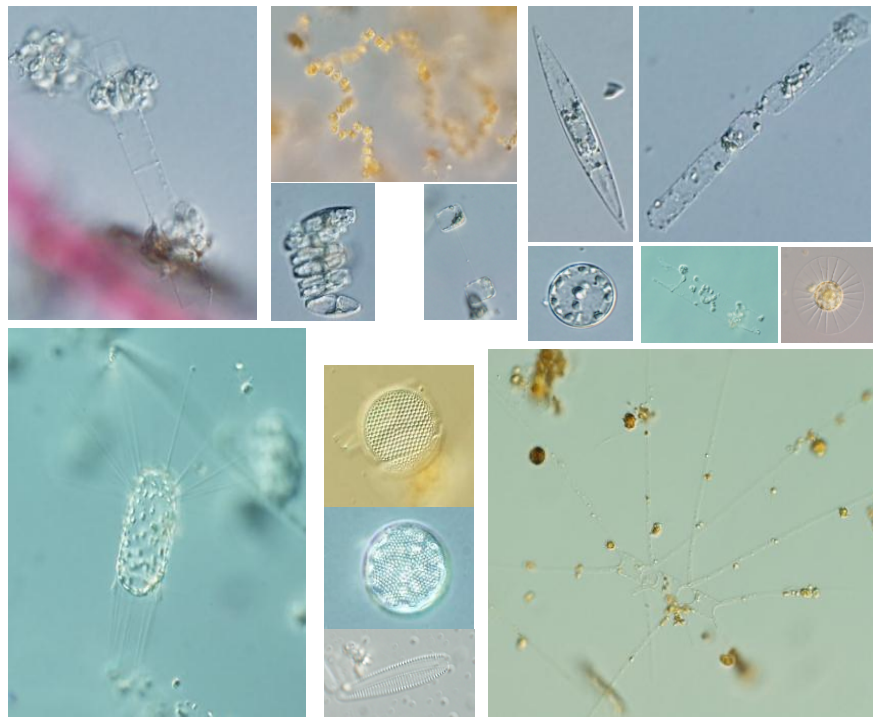
Pulse: Oxygen ventilation, exchange terms, NCP



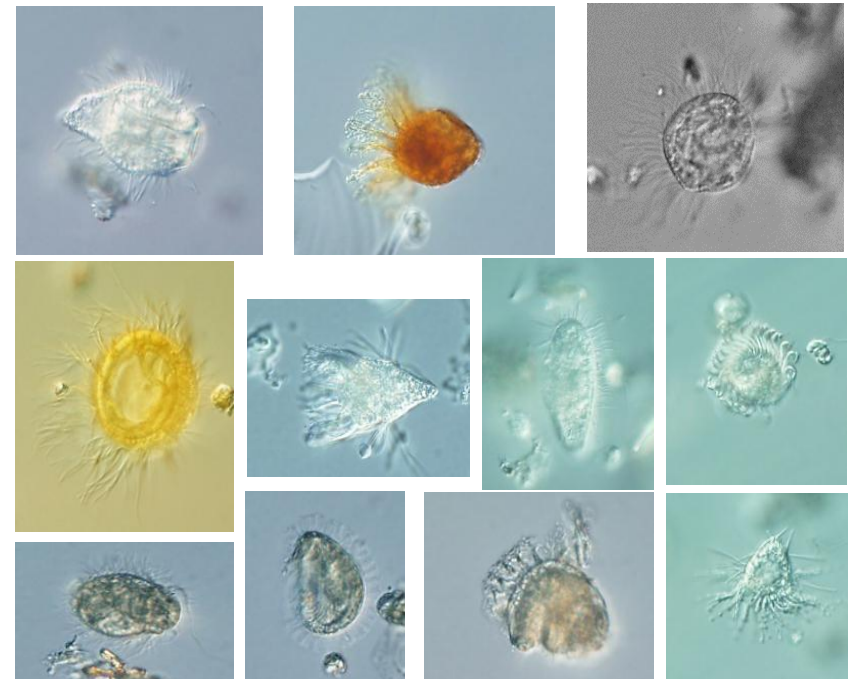


NCP over deployment:
89 mg C m⁻²
Very sensitive to mld

Diatoms

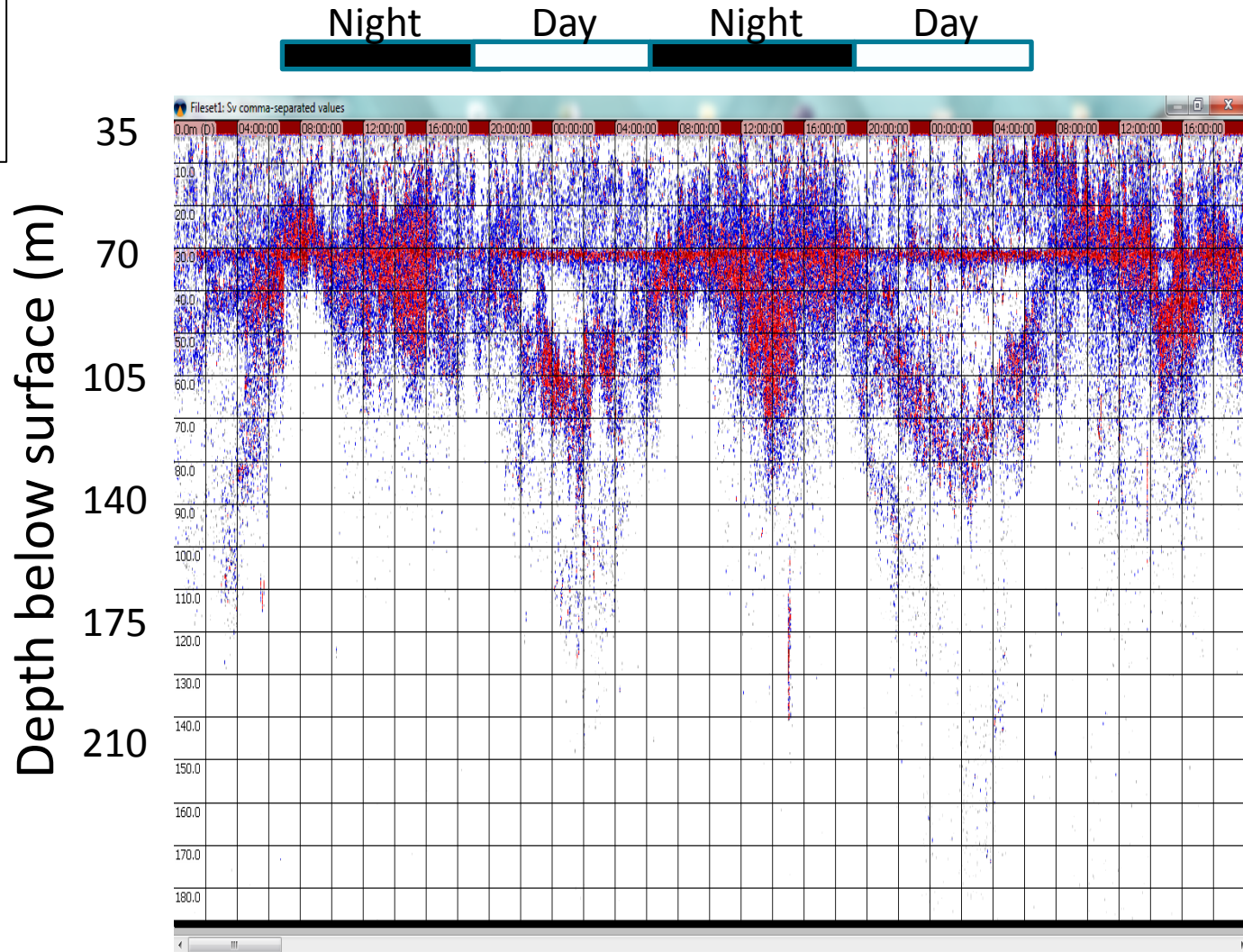


Ciliates

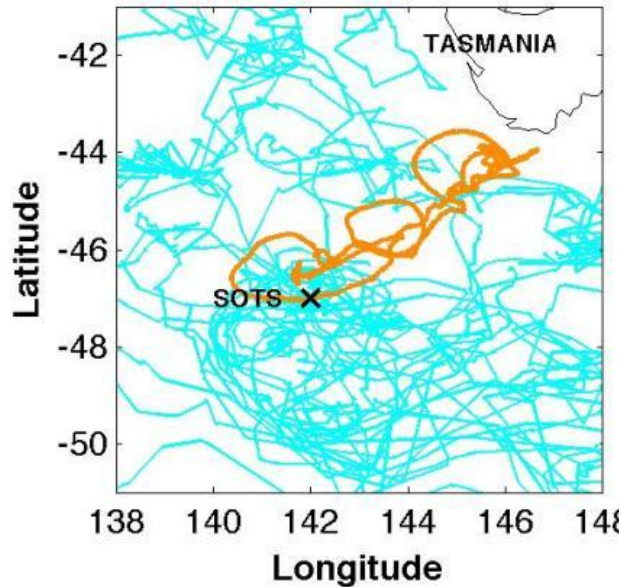


RAS phytoplankton identification, Ruth Eriksen

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



SOTS & SOFS Data Holdings



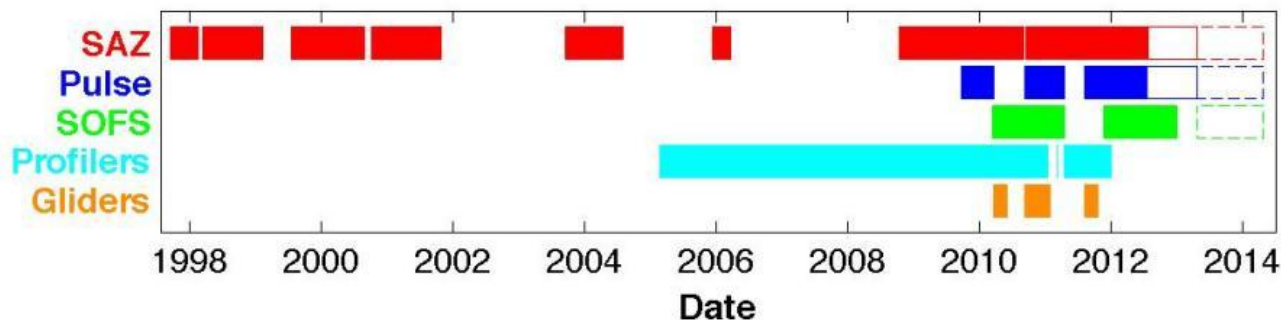
UPDATE:

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

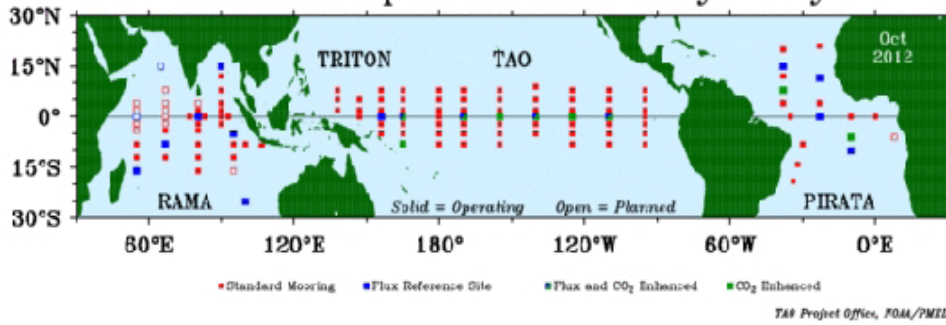


Filled= data in hand, open=collection underway, dashed=planned collection

US/Aus RAMA Mooring – deployed July 2012 for possible turnaround July 2013

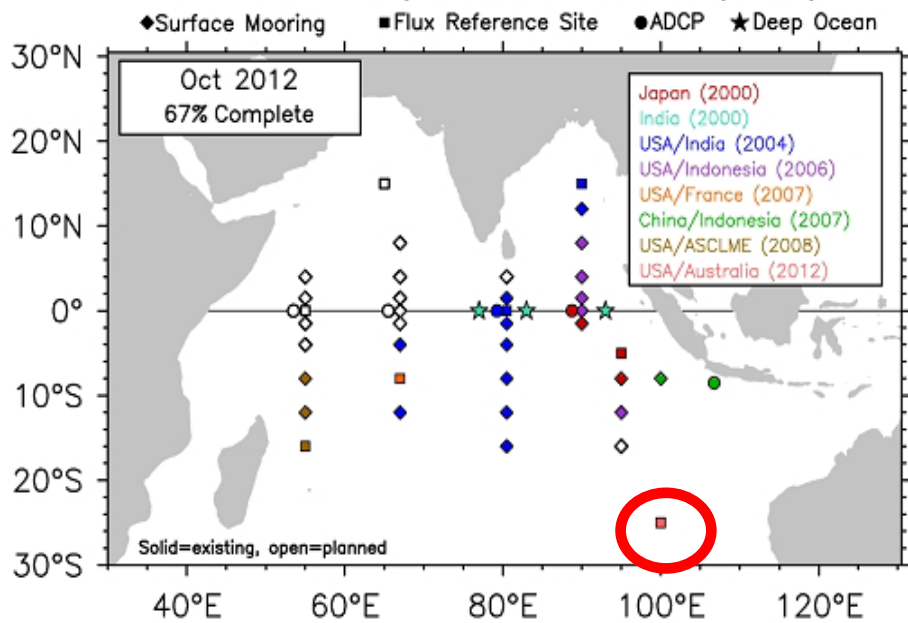
(a)

Global Tropical Moored Buoy Array



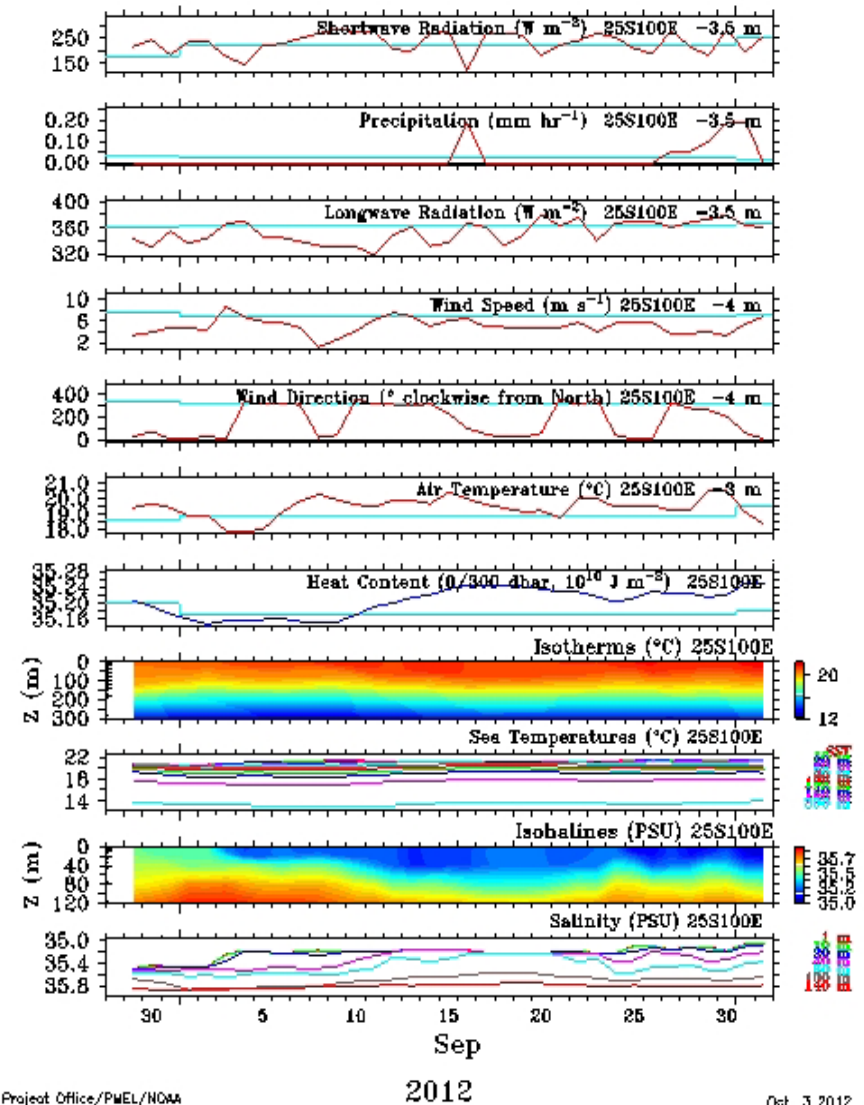
(b)

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



(c)

Daily Data



QUESTIONS?