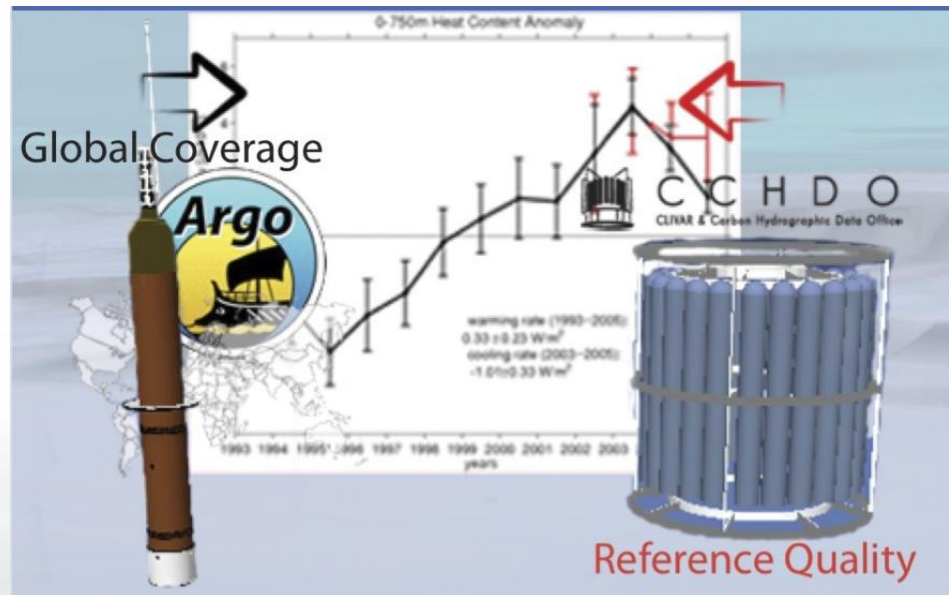


Ship-Based CTD Observations for Argo's Delayed-Mode Quality Control Database Update 6.0



S. DIGGS (SIO) & T. BOYER (US-NODC)

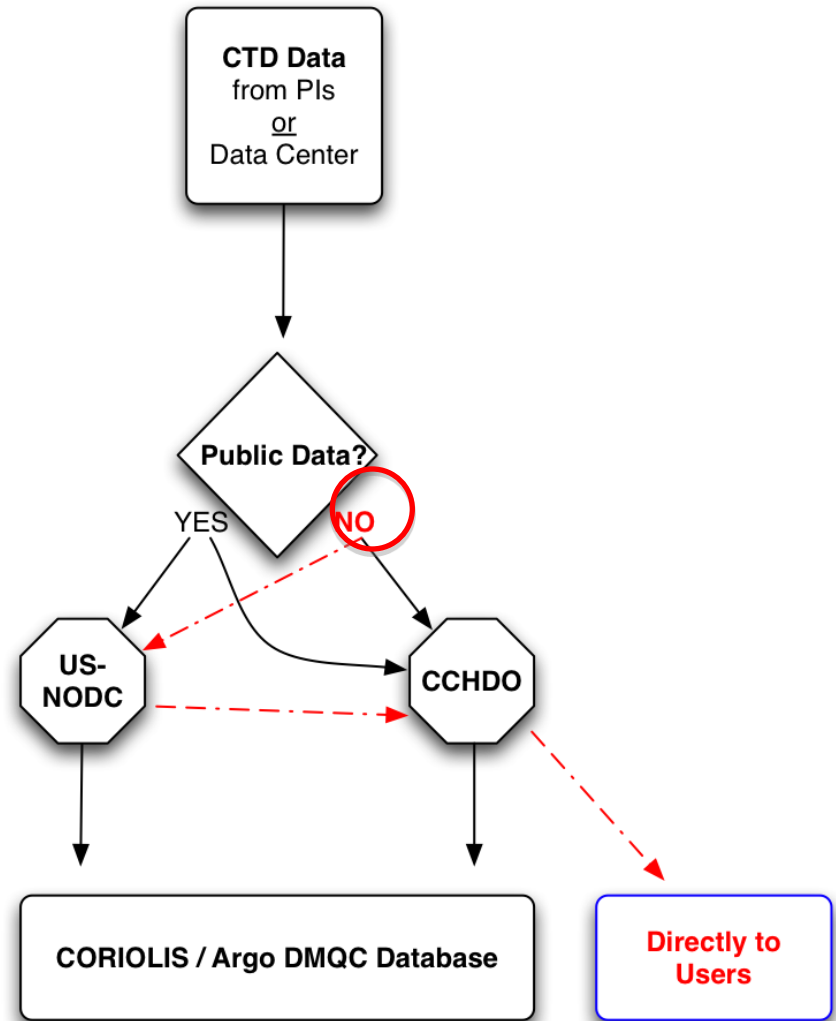
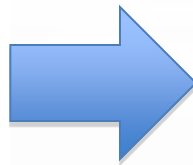
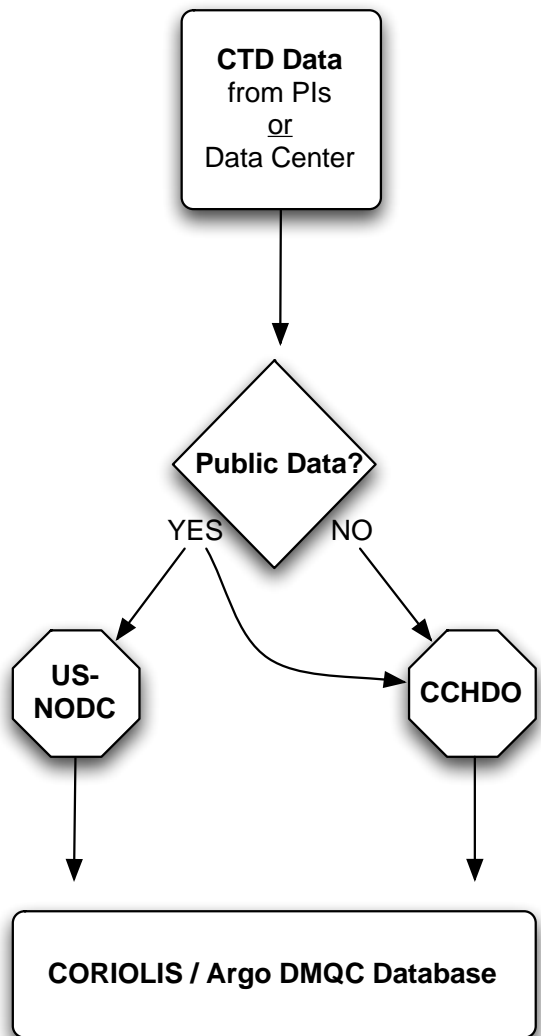
(with able assistance from M. Shen , C. Berys and J. Fields at SIO)

Argo AST-13, Paris FRANCE: 2012.03.21

Introduction and Thanks

- The CCHDO's mission statement doesn't explicitly include programs such as Argo, but we are here to provide infrastructure to support ocean data management.
- While our limited involvement with the Argo program receives no *formal* financial support, we thank Steve Piotrowicz, David Legler and the NOAA Climate Program Office for travel support.
- We are here and involved because we want to help.

Ship-based CTD Data Flow

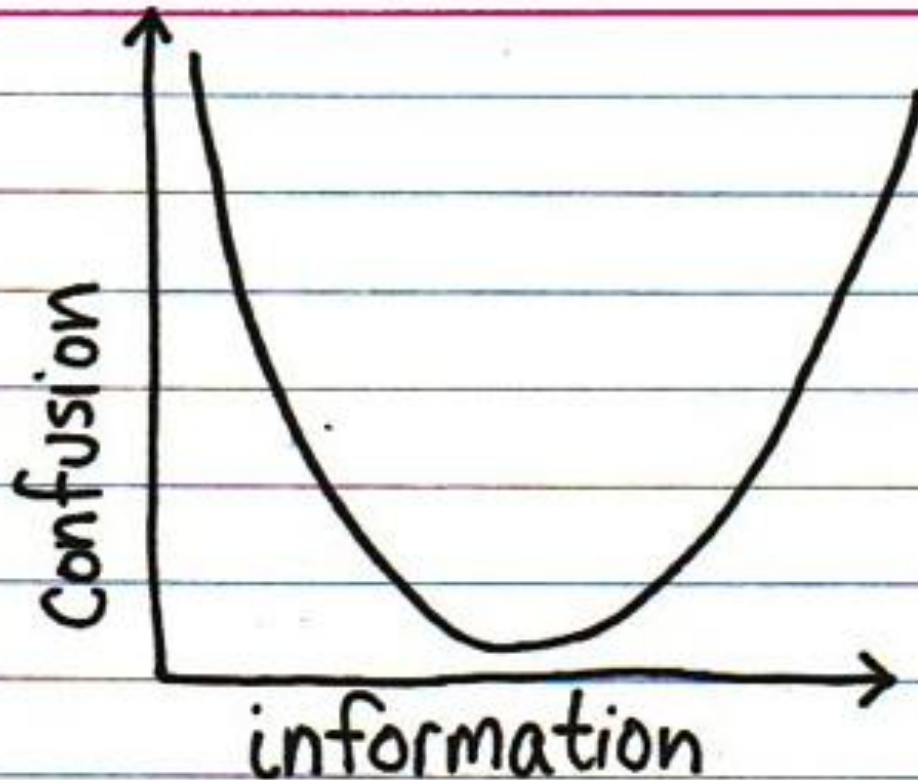


22	Coriolis to make a new historical reference database for DMQC purposes on a twice yearly basis. Explore why this has not occurred in the past.	S. Pouliquen	Better coordination needed between CCHDO and Coriolis. Coriolis made two ref DB in 2011 and new one will be coming out soon.
23	Ask J. Gilson to repeat his comparison of Argo profile reference database to updated historical reference database to see if it is improving in the Southern Ocean	J. Gilson	Will be done by May 2012
24	Provide CCHDO known upcoming CTD cruise track and dates to enter into the CruiseTracker database	PIs, CCHDO	Ongoing
25	AIC to invite float operators to also give information when notifying deployment plans on whether CTD and oxygen will be done on deployment cruises	ATC	Inviting since May 2011. Canada, JMA and Finland have responded so far
32	Finish the Google Earth Argo layer development and approach Google to include it in Earth layers	Diggs, ATC, Japan	

Objective

Review the progress to date and construct a feasible action plan in order to improve the utility of the Argo CTD Reference Data Base

It's not always about more data



Many ways to improve the Argo RefDB

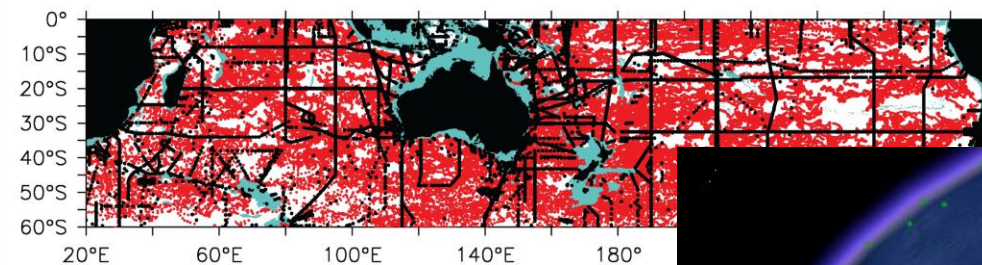
- Increase the number of profiles globally (acquisition)
- Increase the number of profiles in specific regions (acquisition)
 - Southern Ocean
 - Indian Ocean
- Improve the value and accuracy of existing profiles (QC)

Remember: Argo is BECOMING the Reference

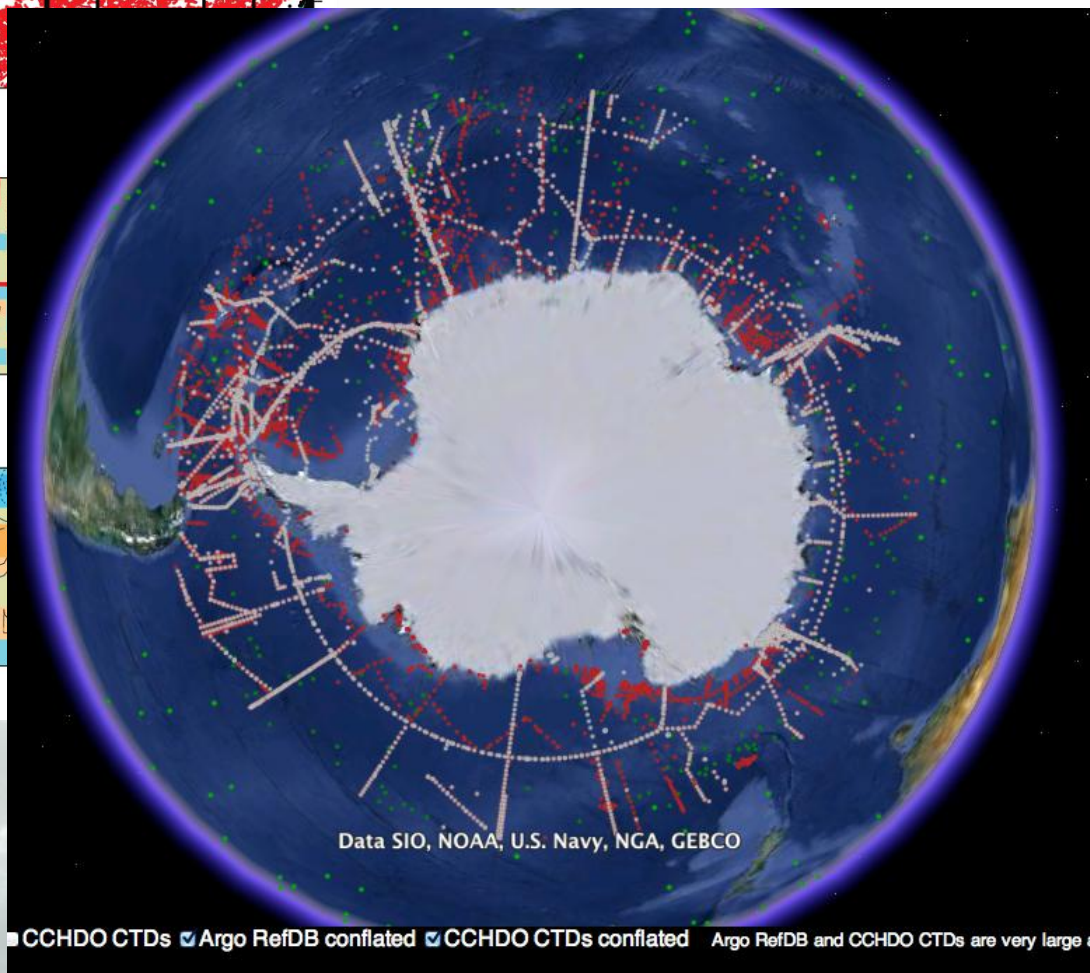
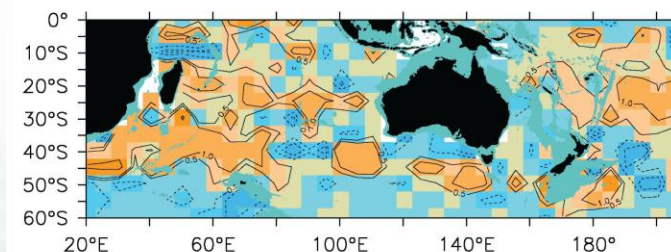
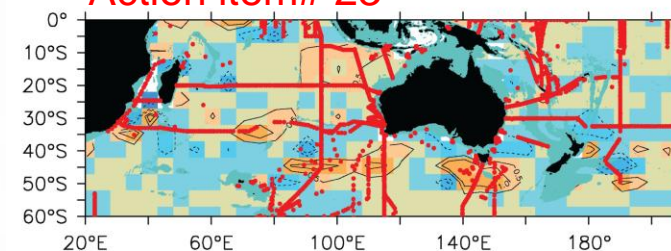
US-NODC support for the Argo CTD Reference Database

- **World Ocean Database updates made available four times/year to Argo CTD reference database**
- **GTSP near-real time and delayed-mode data provide a significant amount of data to each update [Canadian and Japanese CTDs]**
- **Implementing procedures for automatic updates from other data centers, research institutes in the US and worldwide, always with an eye to augmenting Argo CTD reference database.**
- **Where automatic updates are not feasible, individual updates from institutes, scientists are pursued (augmenting efforts by CCHDO)**

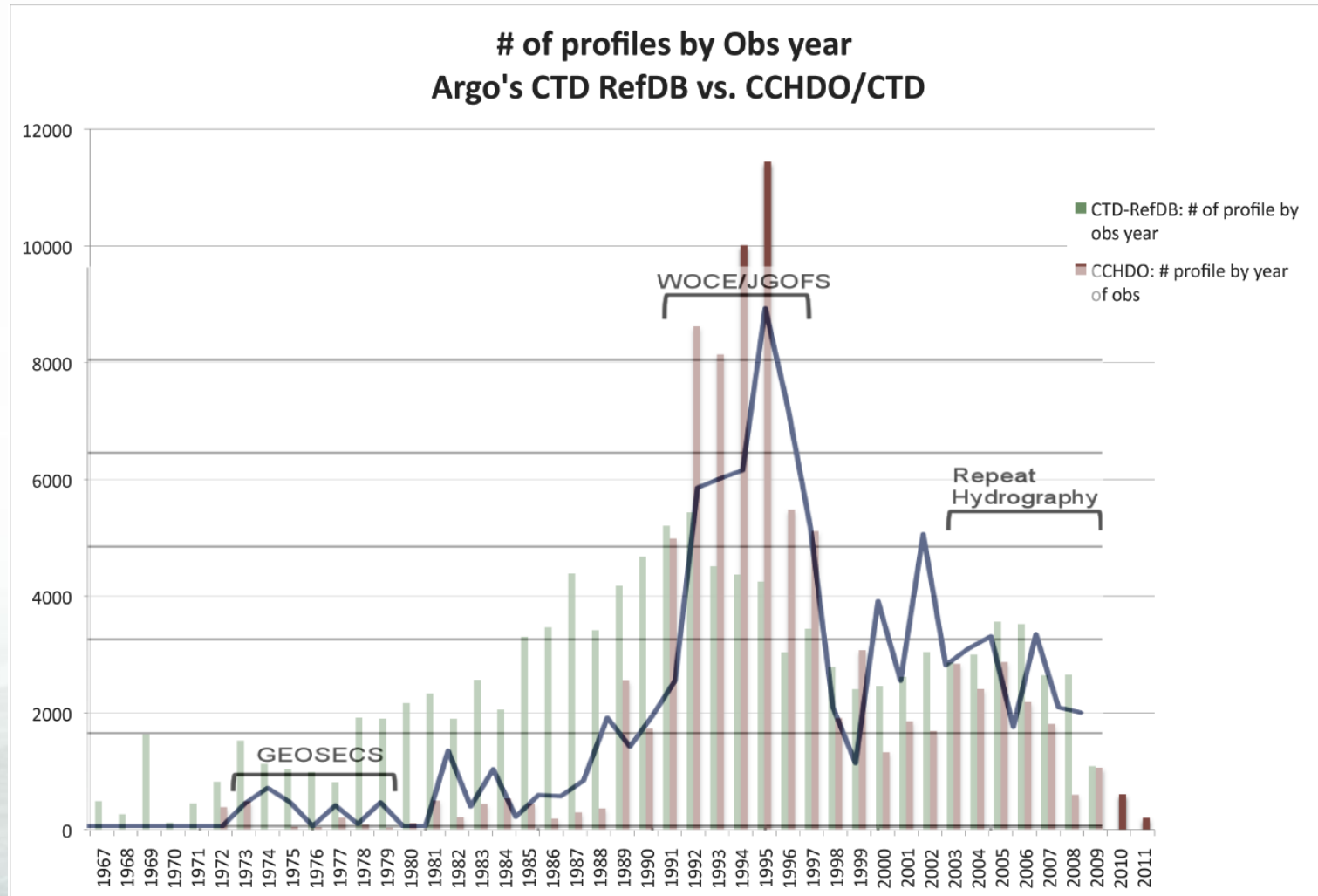
After lots of thought and analysis, we now focus on the Southern Ocean



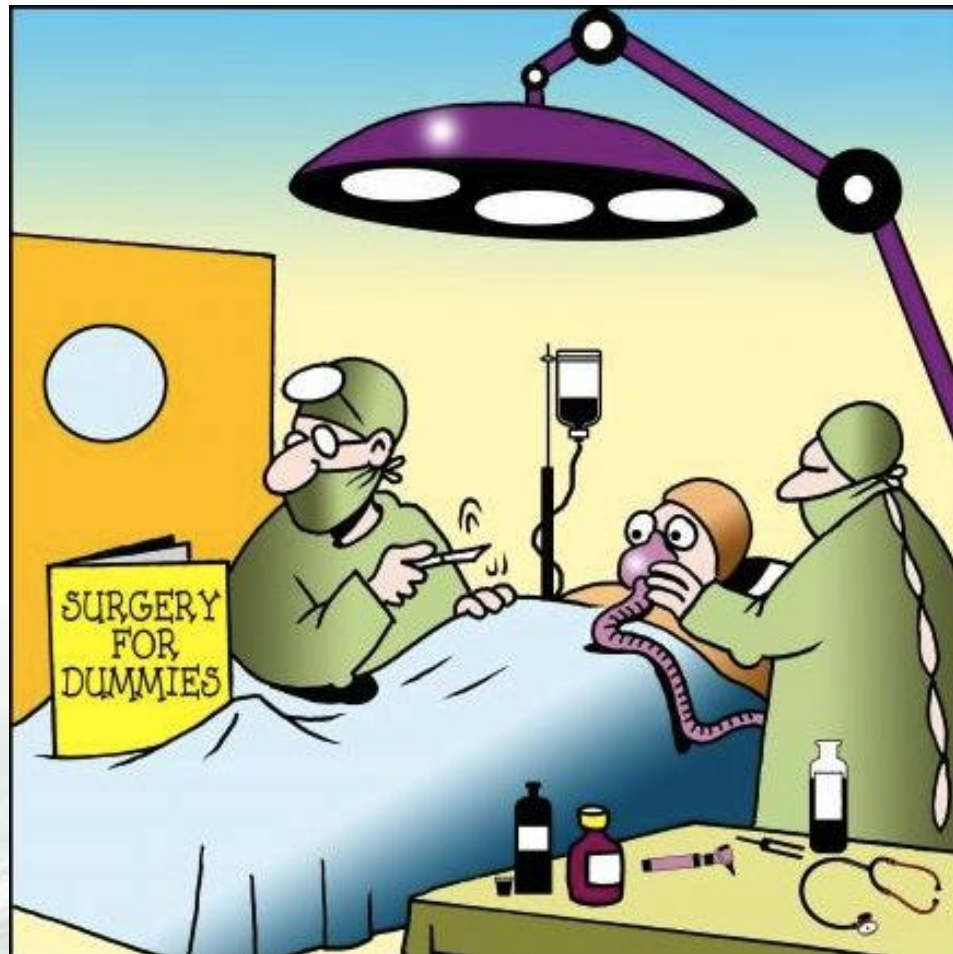
Action item# 23



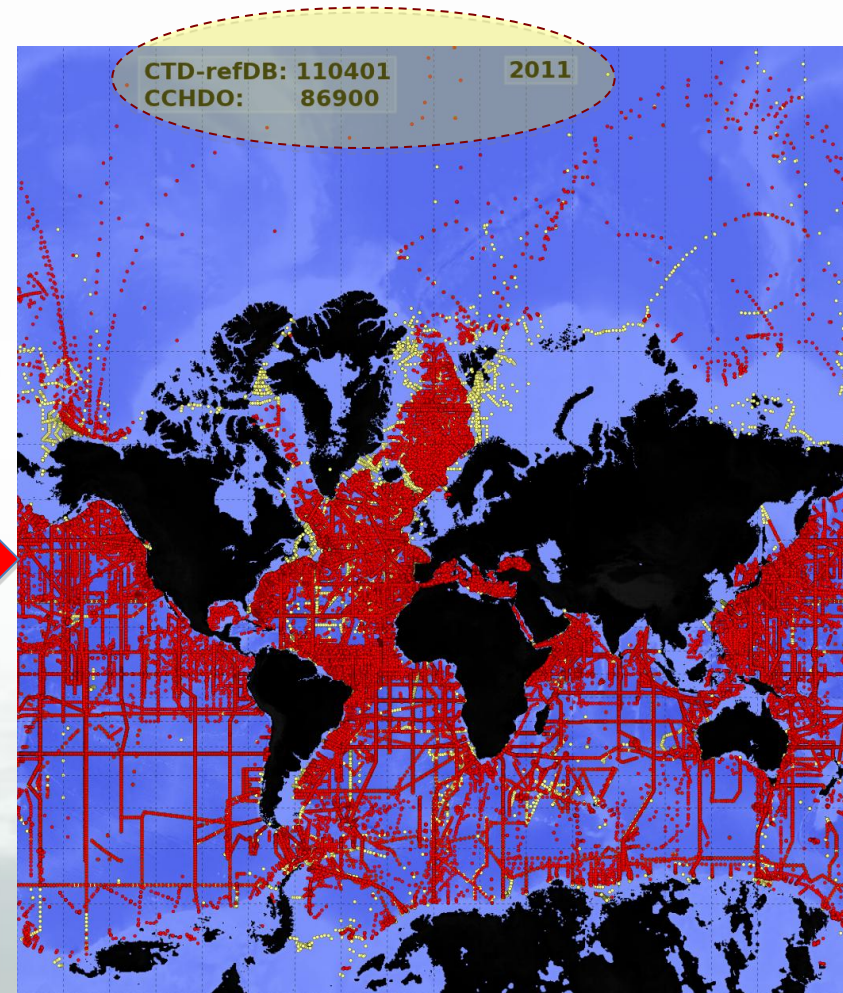
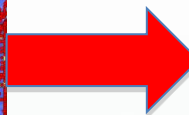
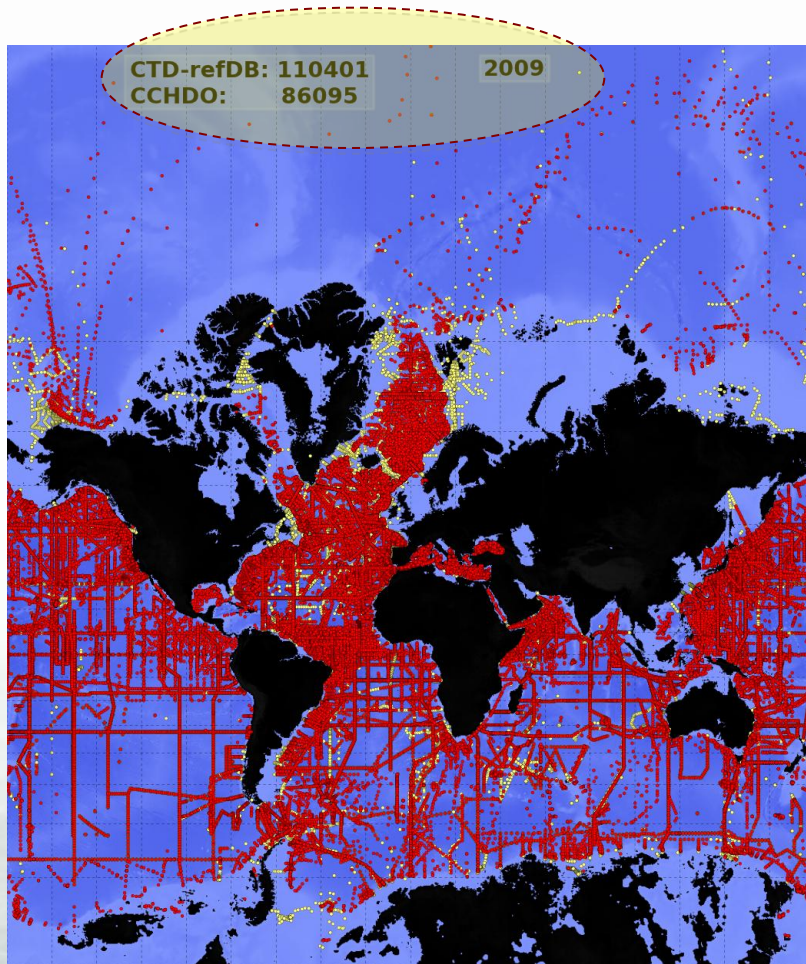
We need to know how much data is out there (inventories)



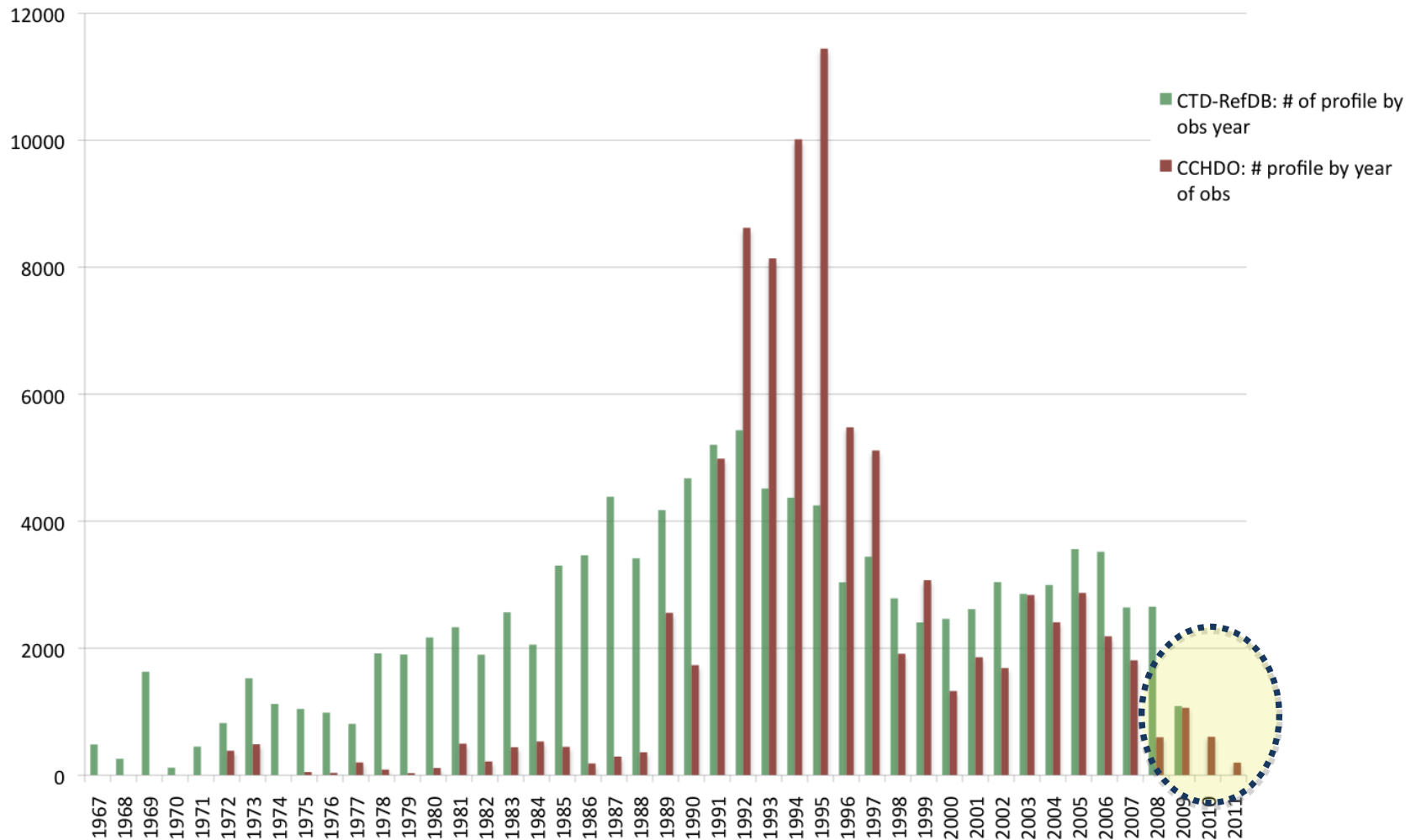
Exploratory Surgery on the RefDB



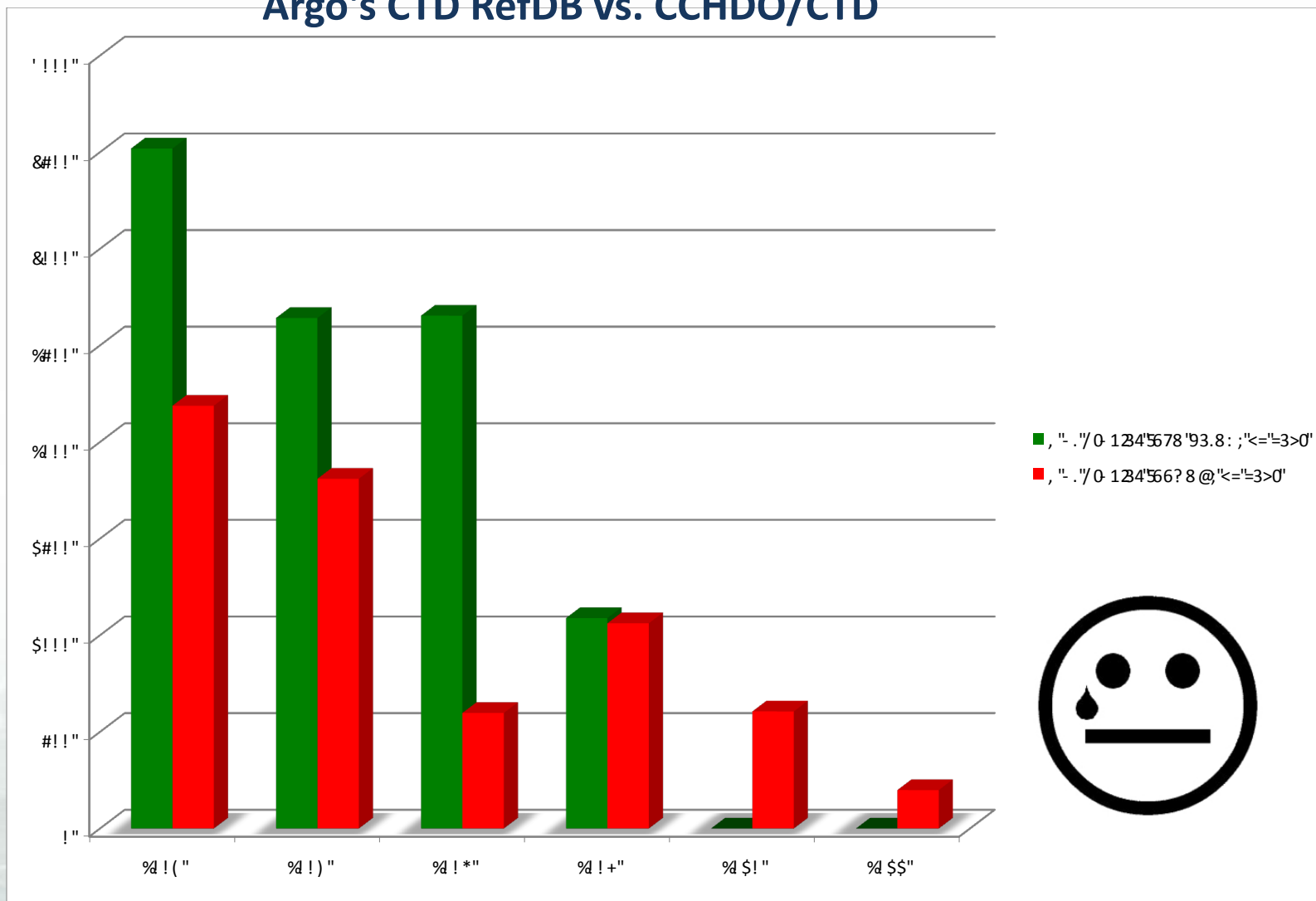
No additional refDB profiles after 2009?



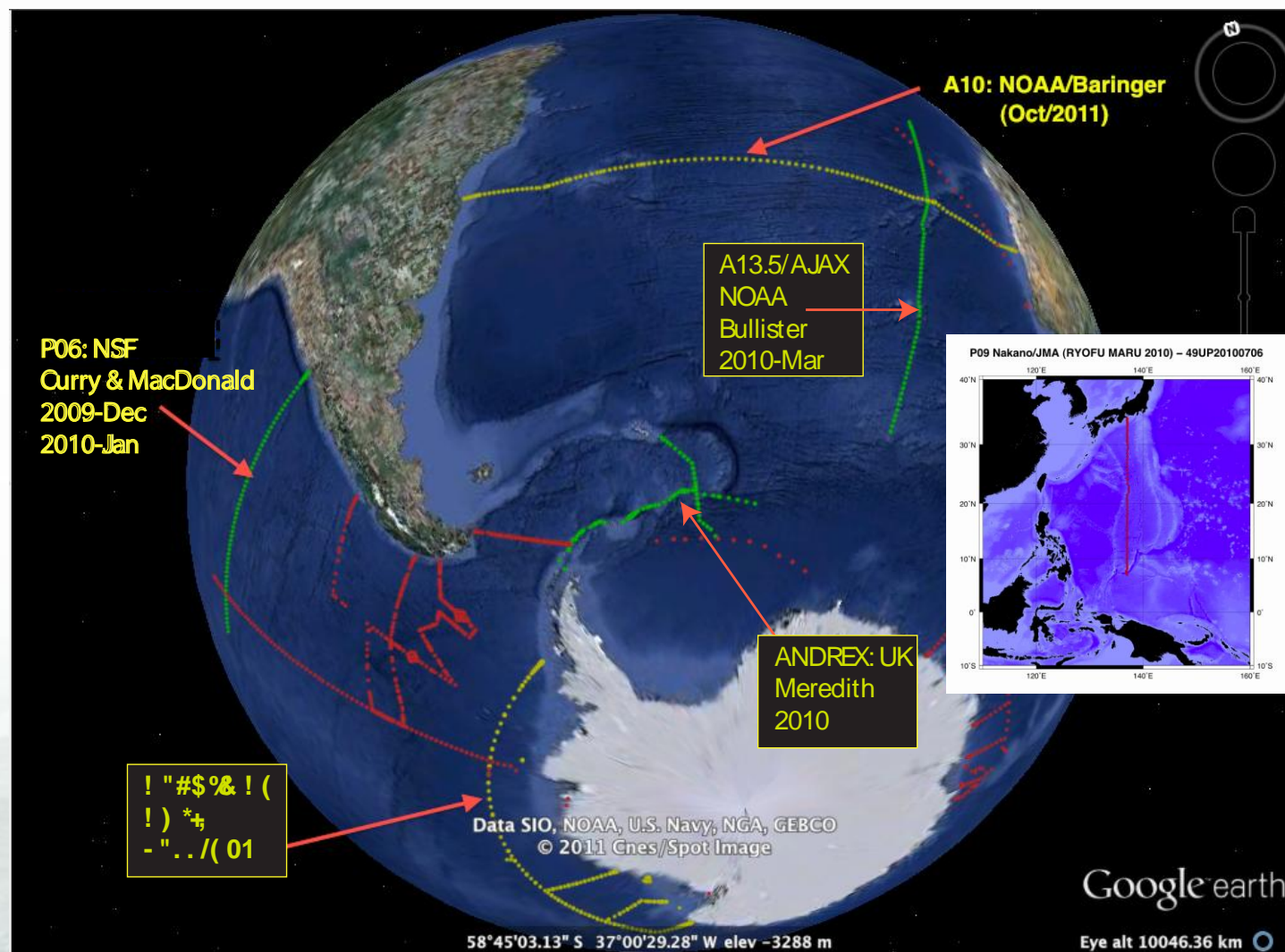
of profiles by Obs year Argo's CTD RefDB vs. CCHDO/CTD



of profiles by Obs year Argo's CTD RefDB vs. CCHDO/CTD



So, what's missing from the Nov-2011 RefDB?



CCHDO Contributions to DMQC-DB: 2010

	Cruise Designation	Geographic Area	# of CTD Profiles	Contact	OK for Argo	Data Rec'd by CCHDO	in DMQC-DB
1	A05	Atlantic / 26N	135	King/UK			
2	A12 E	S. Atlantic / 0E	132	Bullister/USA			
3	ANDREX	S. Atlantic / Weddell	94	Meredith/UK			
4	P06W	S. Pacific / 30S	127	MacDonald/USA			
5	P08E	S. Pacific / 30S	127	Curry/USA			
6	P09	W Pacific	124	Nakano/JPN			

**604
Profiles**

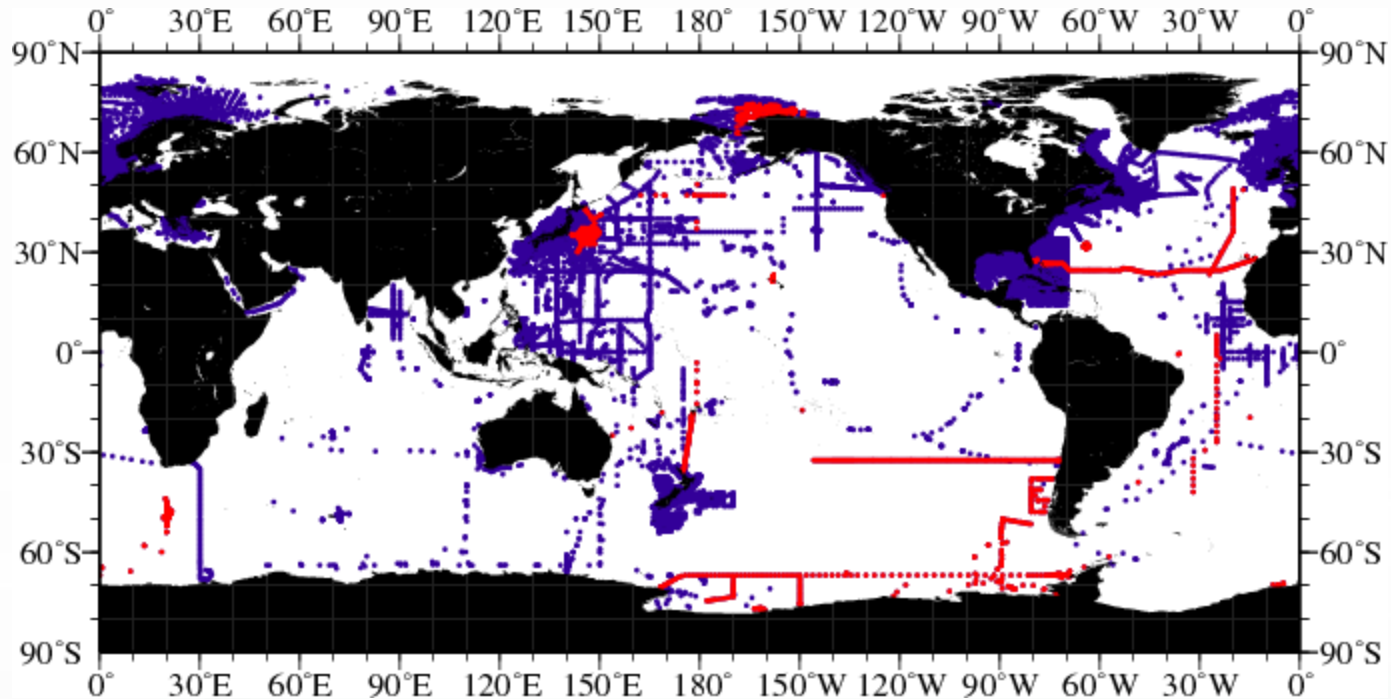
What (if anything) should be done?

- Doing nothing *is* an option (stay the course)
 - RefDB users have not complained about the fact that (as of Nov 2011) **the RefDB did not have CTD profiles from the previous 18-14 months** (what does this mean?)
 - We have started the process of in-depth analysis of the RefDB, but we may need more metadata to identify profiles
- THIS JUST IN: a new version of the Argo CTD RefDB was announced at 09:20 today! *On verra ...***

Moving Forward



- Full CTD inventories are needed from CCHDO, US-NODC (WOD) and IFREMER (refDB only)
- Push vs Pull: who does what in terms of active/passive notifications (all players should be active)
- AST/ADMT should review and comment on Argo CTD-Ref-DB document (2007.11.19/ar-um-04-03)
- Feedback from QC procedures help identify spatial deficiencies in the CTD RefDB
- Guidance from AST is crucial



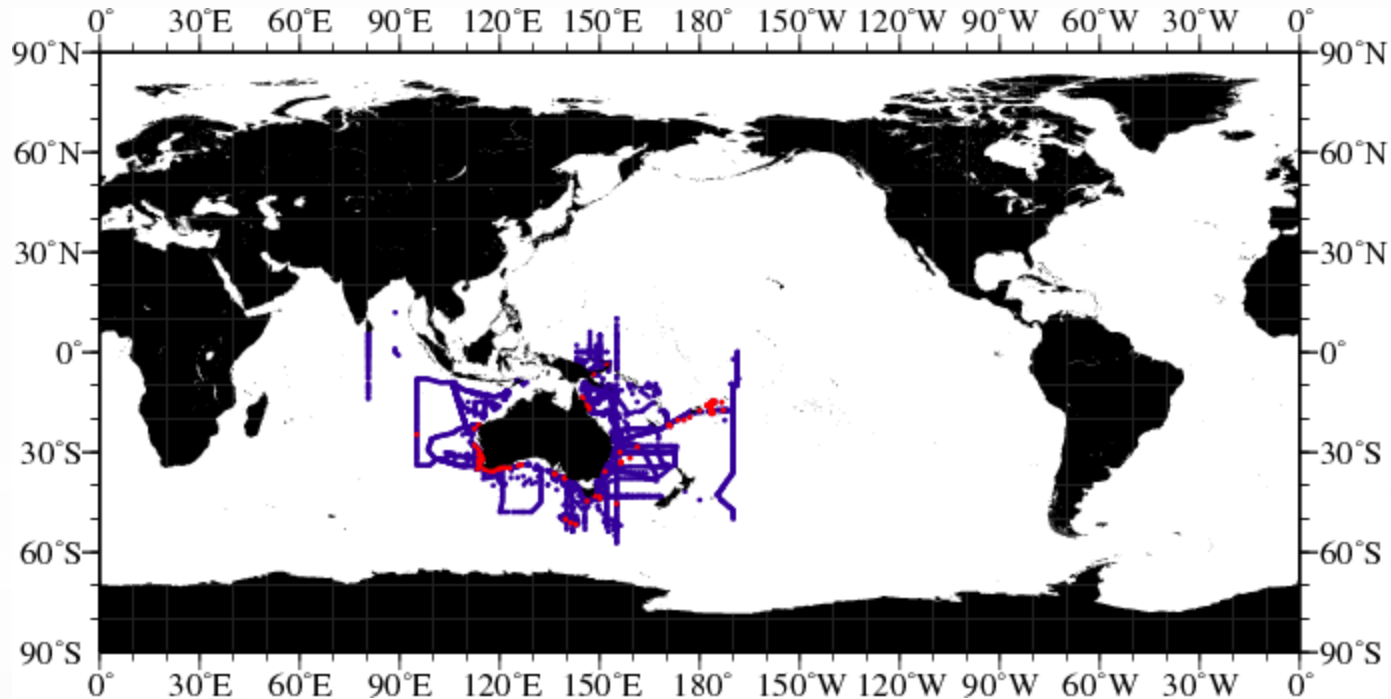
High-resolution CTD data added to WOD since ADMT-11:
96,272 CTDs from sources other than CCHDO (blue)
1,948 CTDs from CCHDO (red) [updated Dec. 2011]

NODC has recently acquired or is working on acquiring data sets relevant to the Argo CTD reference database

- **International Council for the Exploration of the Seas (ICES) – many European countries: working towards automated updates. Last update July, 2011**
- **Chilean Navy (CENDHOC)**
- **Mexican National Oceanographic Data Center**
- **Columbian Hydrographic Office**
- **New Zealand Ministry of Fisheries**
- **PIRATA maintenance cruise CTD data (AOML)**
- **TAO maintenance cruise CTD data (NDBC)**
- **Northeast Fisheries (NOAA-US): twice yearly updates**
- **South African Data Center (+Namibian data)**

Need to Update WOD from Authoritative Sources


- **WOD incorporates new/updated data from CCHDO every 3 months (last update Dec., 2011)**
- **CLIVAR cruise 316N151_3, line A20 first posted in 2004 to CCHDO. WOD received data from different source.**
- **Found in Nov. 2009 that temperature labeled ITS-90, in reality was on IPTS-68 scale. CCHDO updates promptly. WOD does not. Result: WOD carries incorrect data for 2 more years until Ruth Curry brings to our attention.**
- **Lesson: CCHDO should be considered authoritative source for CLIVAR data, regardless of original source in WOD.**
- **Wider problem: keeping abreast of updates from all authoritative sources (and who are those sources?).**



Updated Franklin/Southern Surveyor CTD data from CSIRO
[made available by Esmee Vanwijk and Dave Watts] CSIRO is
the authoritative source for these data (non-CLIVAR portion):
3,724 casts from 153 cruises (blue) to be checked for changes
vs. version in WOD [still to do]


137 casts from 12 cruises new to WOD [passed to Argo CTD
reference database]

Argo Secure File Website


CCHDO
CLIMAR & Carbon Hydrographic Data Office

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Secure File Repository

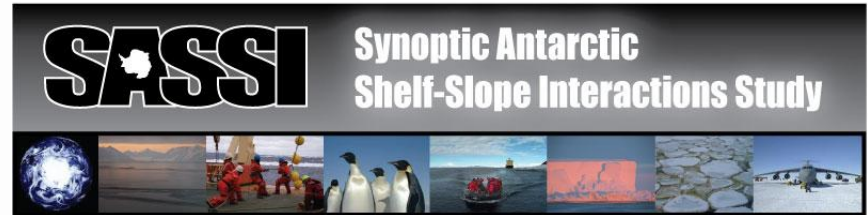
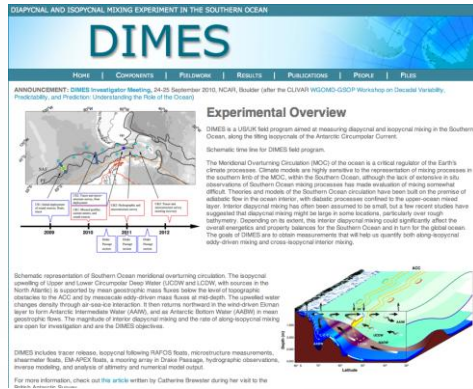
[Repository List](#)
[Add file](#)
[Signout](#)

EXPCODE	FILE	ADDED BY	ADDED AT	DESCRIPTION	
49SH20100120	SM1001_ct1.zip	sdiggs	2010-09-30 15:00 PDT	Mon, Sep 27, 2010 at 08:49 Non-public data for Argo calibration (proprietary, rapid) Submitted by Sato, Kanako (k_sato@jamstec.go.jp)	Edit Delete
49SH20100120	SM1001_nc_ctd.zip	myshen	2010-10-15 15:21 PDT	Non-public data for Argo calibration (proprietary, rapid) Submitted by Sato, Kanako (k_sato@jamstec.go.jp) Converted to netCDF 2010-10-15 M. Shen	Edit Delete
74JC20100319 (ANDREX)	ANDREX_2010_ct1.zip	myshen	2010-10-19 16:50 PDT	Non-public proprietary data. ANDREX CTD data converted from andrex_2010_ctd.tar.gz (N https://www.bodc.ac.uk/data/information_and_inventories/	Edit Delete
09SS20110122	AUSTRALIA-ss2010_v01_CTD_avg_nc.zip	myshen	2011-03-14 21:08 PDT	"PINTS" from the Southern Surveyor from Esmee Van Wijk	Edit Delete
33RO20100308	a13.5_33RO20100308_nc_ctd.zip	myshen	2011-03-15 12:36 PDT	http://cchdo.ucsd.edu/cruise/33RO20100308	Edit Delete
318M20100105	p06_318M20100105_nc_ctd.zip	myshen	2011-03-15 12:39 PDT	http://cchdo.ucsd.edu/cruise/318M20100105	Edit Delete
74DI20100106	a05_74DI20100106_ct1.zip	myshen	2011-03-15 12:40 PDT	http://cchdo.ucsd.edu/cruise/74DI20100106	Edit Delete
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This site is funded by the [National Science Foundation](#).
 This web site and all other CCHDO activities are supported by the National Science Foundation under Grants No. OCE-0327555 and OCE-0824992. Any opinions, findings, and conclusions or recommendations expressed in this web site are those of the PI, James Swift, and the CCHDO and do not necessarily reflect the views of the National Science Foundation.



CCHDO now works directly with projects unifying formats and DM procedures



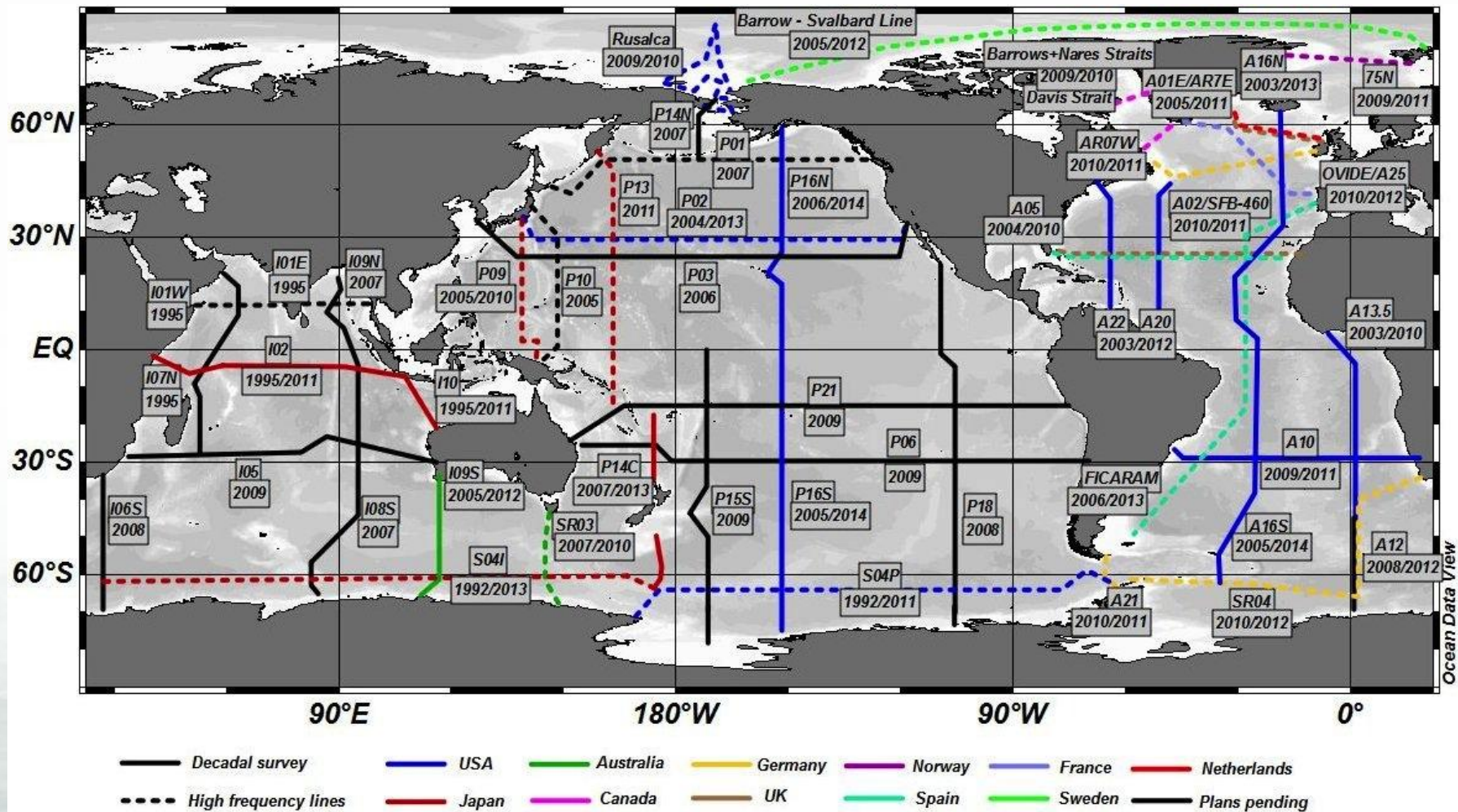
Ocean Data View



<http://odv.awi.de>

© 2011 Reiner Schlitzer

GO-SHIP



GO-SHIP

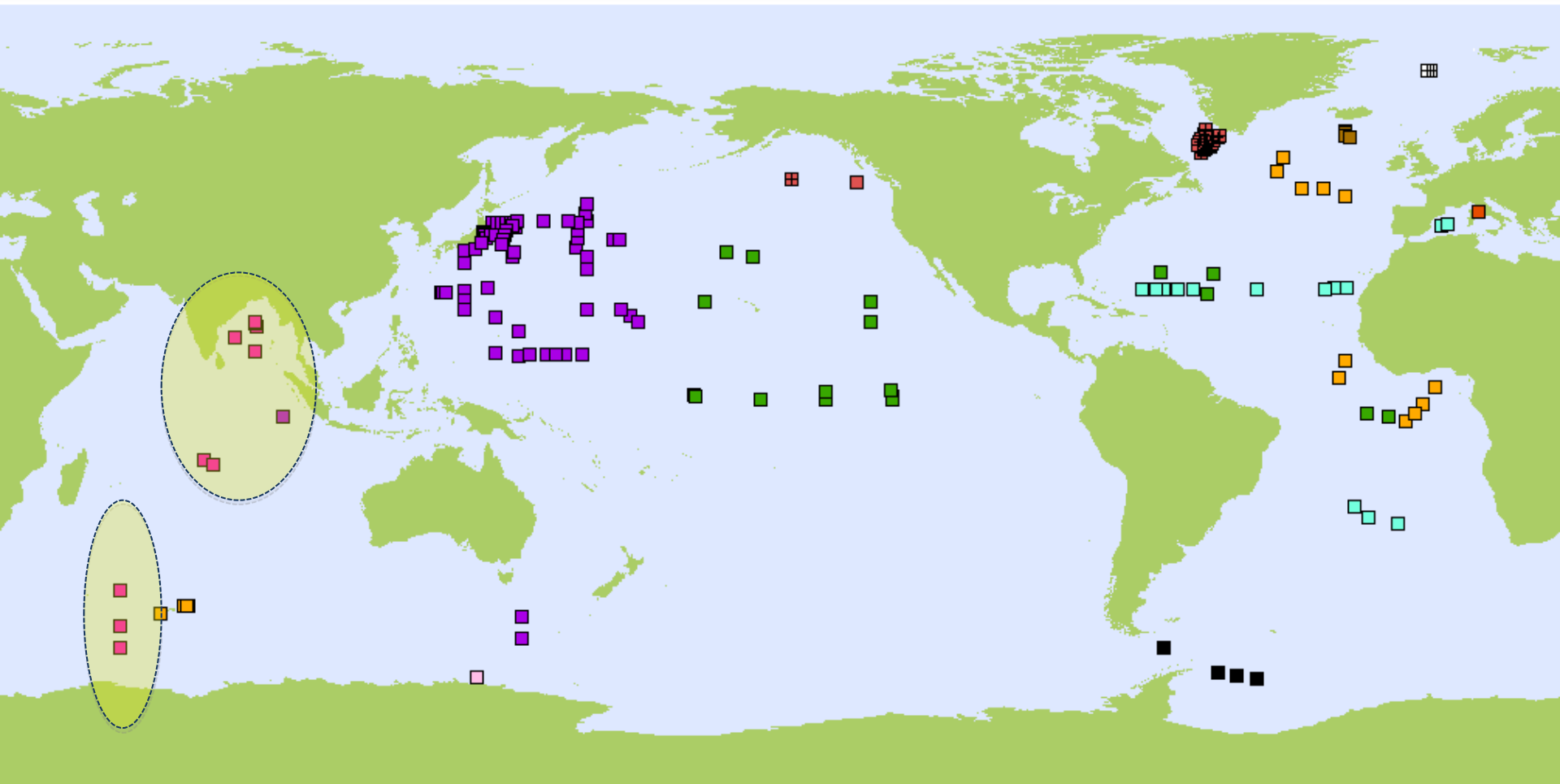
From GO-SHIP Co-Chair, Bernadette Sloyan/CSIRO:

GO-SHIP is continuing to complete the global repeat hydrographic sections, expect for sections in the northeastern Indian Ocean (101W, 107N, I02) due to piracy issues.

The GO-SHIP committee has have held two teleconferences this year; these have updated national plans and addressed issues regarding providing some level of coordination support for GO-SHIP. The issue of coordination support is a high priority of the science committee. We are pursuing the possibility of ½ time support at the IOC, Paris, but this is contingent on securing financial support from participating nations. While we try to find funding, we are monitoring the situation at IOC given the unclear funding position of IOC US financial support.

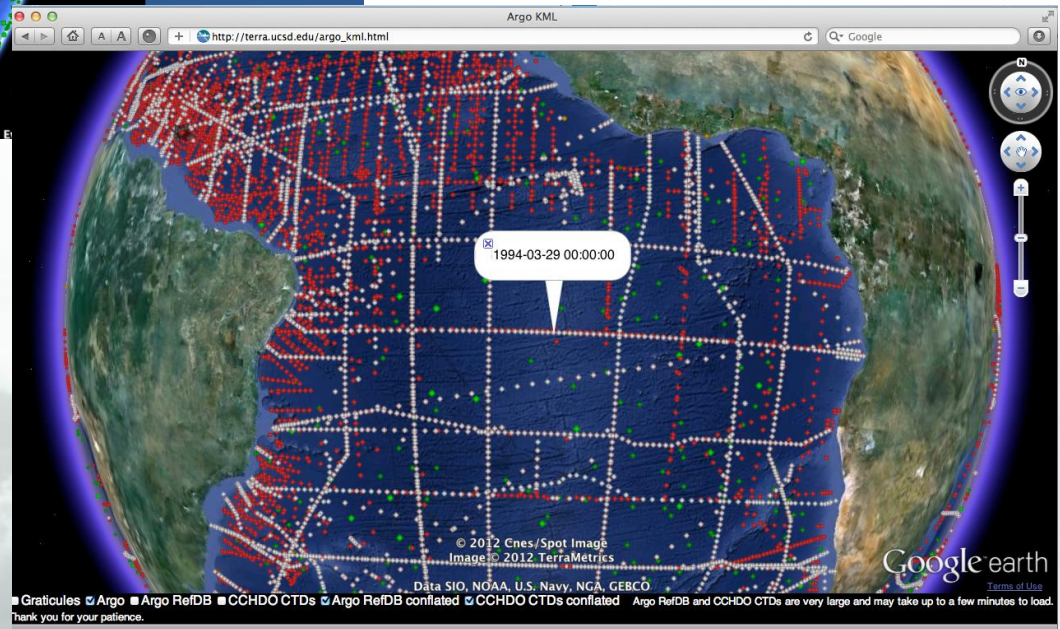
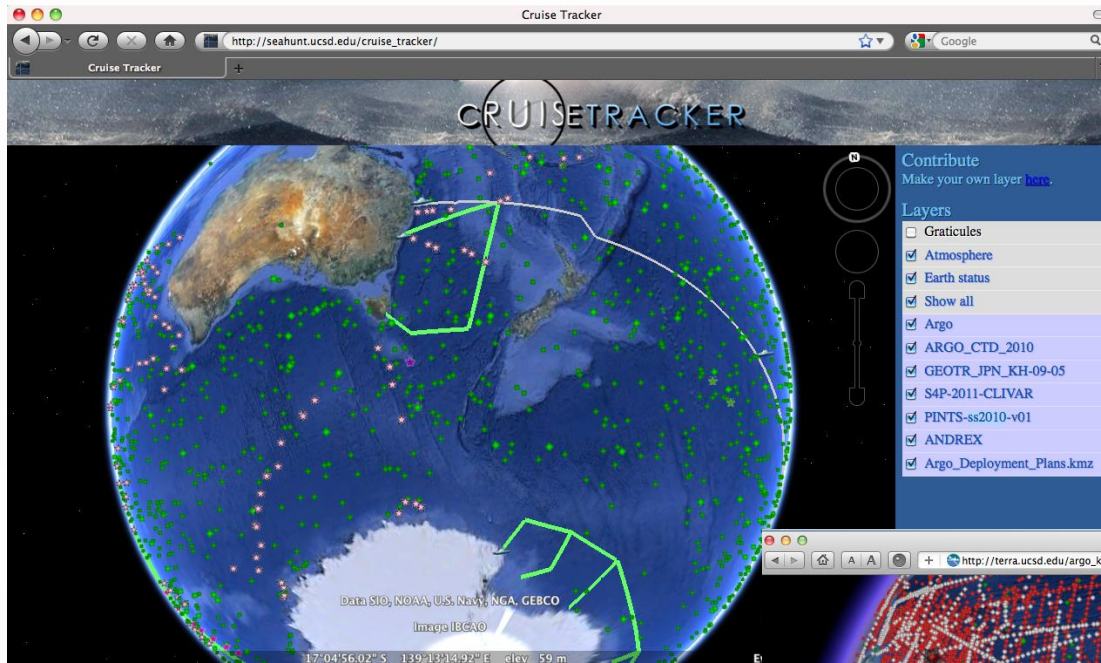
****GO-SHIP with CCHDO have embarked on a census of data availability of recently completed GO-SHIP sections.**

CTD profiles at float deployment locations



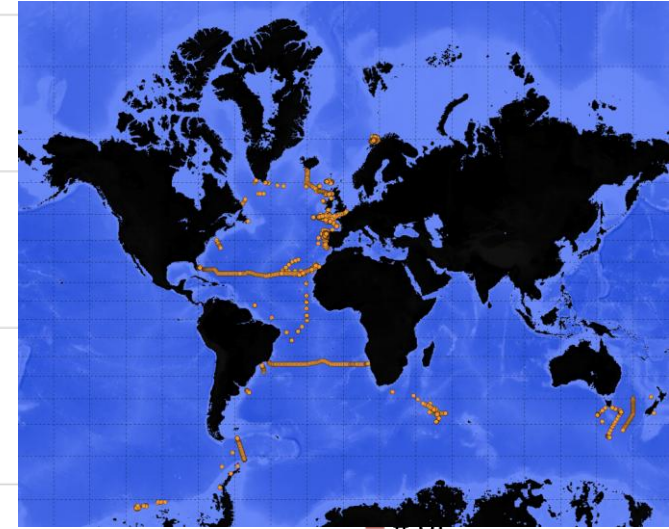
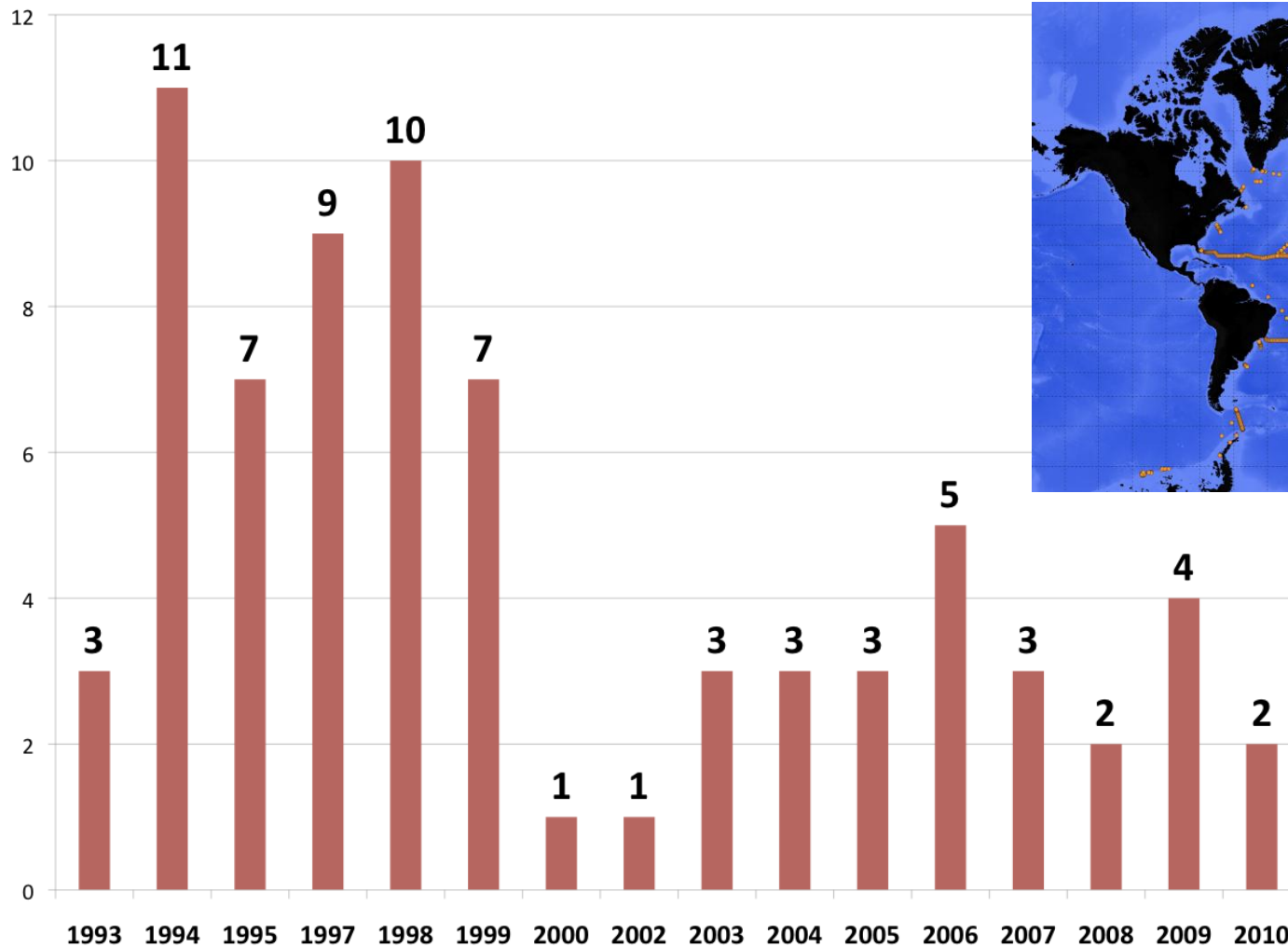
CTDs (166)	AUSTRALIA (1)	FRANCE (17)	ITALY (1)	UNITED KINGDOM (4) + CTD02 (18)	2010
	CANADA (17)	GERMANY (4)	JAPAN (77)	UNITED STATES (18)	
	FINLAND (2)	INDIA (10)	SPAIN (15)		

Web-Based Tools



BODC: 71-74 cruises received by CCHDO Nov 2011

BODC Cruises rec'd by CCHDO 2011.11.15 (J. Buck)

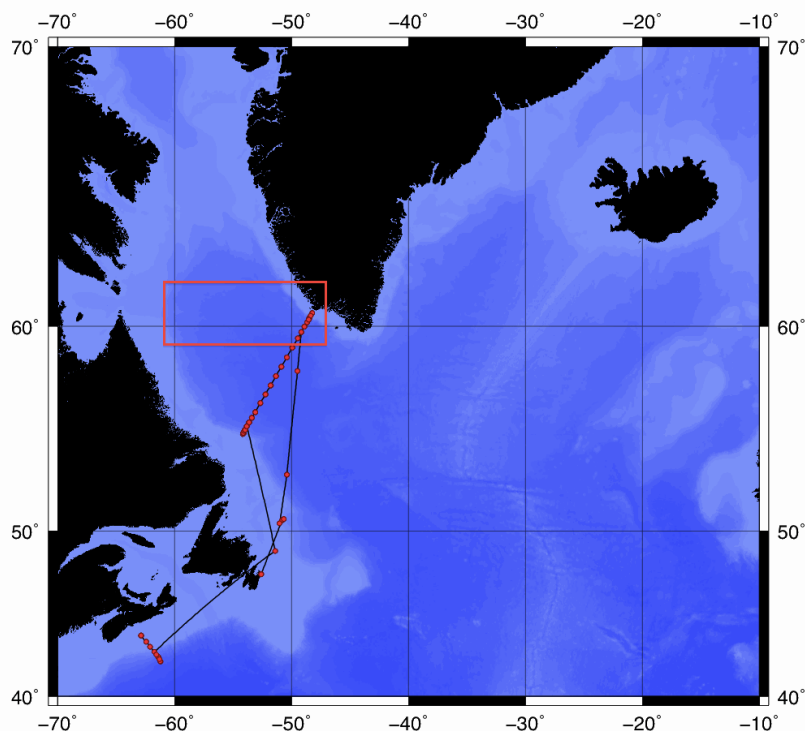


Number of cruises

Useful Feedback from QC Procedures (BODC)

Region	Latitude	Longitude	Software	Mapping Scale - x (deg or km)	Mapping Scale - y (deg or km)	Mapping Scale - t (days or yrs)	PV	Theta range used	Pressure range used	Reference database	Comments	Float examples (wmo id)	Operator's email address
North Atlantic													
North Atlantic - eastern subtropical	25-30N	~340E	OW	8/4 deg	4/2 deg	10 yrs	no	11-14 deg C	300-600 dbar	CTD_for_DMCS_2010V1	Historical data in CTD reference database are out-of-date in this region. Needed to use Argo climatology for salinity evaluation.	6900611	Justin Buck, juck@bodc.ac.uk
North Atlantic - Iceland and Irminger Basins	57N-66N	20W-42W	OW	8/4 deg	4/2 deg	10 yrs	no	start with OW chosen levels then adjust	exclude top 250 dbar	CTD_for_DMQC_2010V1	Observed variability in CTD reference data much less than observed Argo profiles, 0.02 differences in Salinity.	6900388	Justin Buck, juck@bodc.ac.uk
North Atlantic - Labrador Sea	59N-62N	46W-62W	OW								Large upper level surface temperature inversions along greenland coastline, exclude these from mapping. Insufficient reference data for northern Labrador Sea.	6900388	Justin Buck, juck@bodc.ac.uk
North Atlantic - off Northeast Ireland	52N-59N	12W-18W	OW								Most stable levels seem to be 0-6 deg C. For floats that do not sample to 2000m every profile this level needs to be forced.	6900387	Justin Buck, juck@bodc.ac.uk
North Atlantic - Norweigen Sea	62N-69N	6W-3E	OW								Water masses below 1000 m are below seasonal NE Atlantic signals and work well for DMQC.	1900192	Justin Buck, juck@bodc.ac.uk

AR07W Hendry/BIO (HUDSON 2009) – 18HU20090517



SUMMARY

- Progress continues with both the acquisition and delivery of high-quality CTD profiles in spite of numerous challenges (bureaucratic hurdles, government restrictions, version control).
- One particular problem is that the Nov-2011 RefDB does not contain profiles from the last 18-24 months. All three groups (CCHDO, Coriolis(CTD RefDB), US-NODC(WOD)) should **publish full inventories** of the profiles in their relevant data holdings to increase the efficiency of Argo CTD profile acquisition.
- As usual numerous reference CTD quality profiles are expected to be added in the next 12-18months from GO-SHIP, DIMES, US Repeat Hydrography and other programs.
- The CTD profile acquisition team needs to look at additional ways to improve the quality of the RefDB (not just more profiles).
- Although most of the scientific justification has been provided for our current course of action, continual oversight as well as **upcoming cruise information** is needed from both the AST and ADMT members.