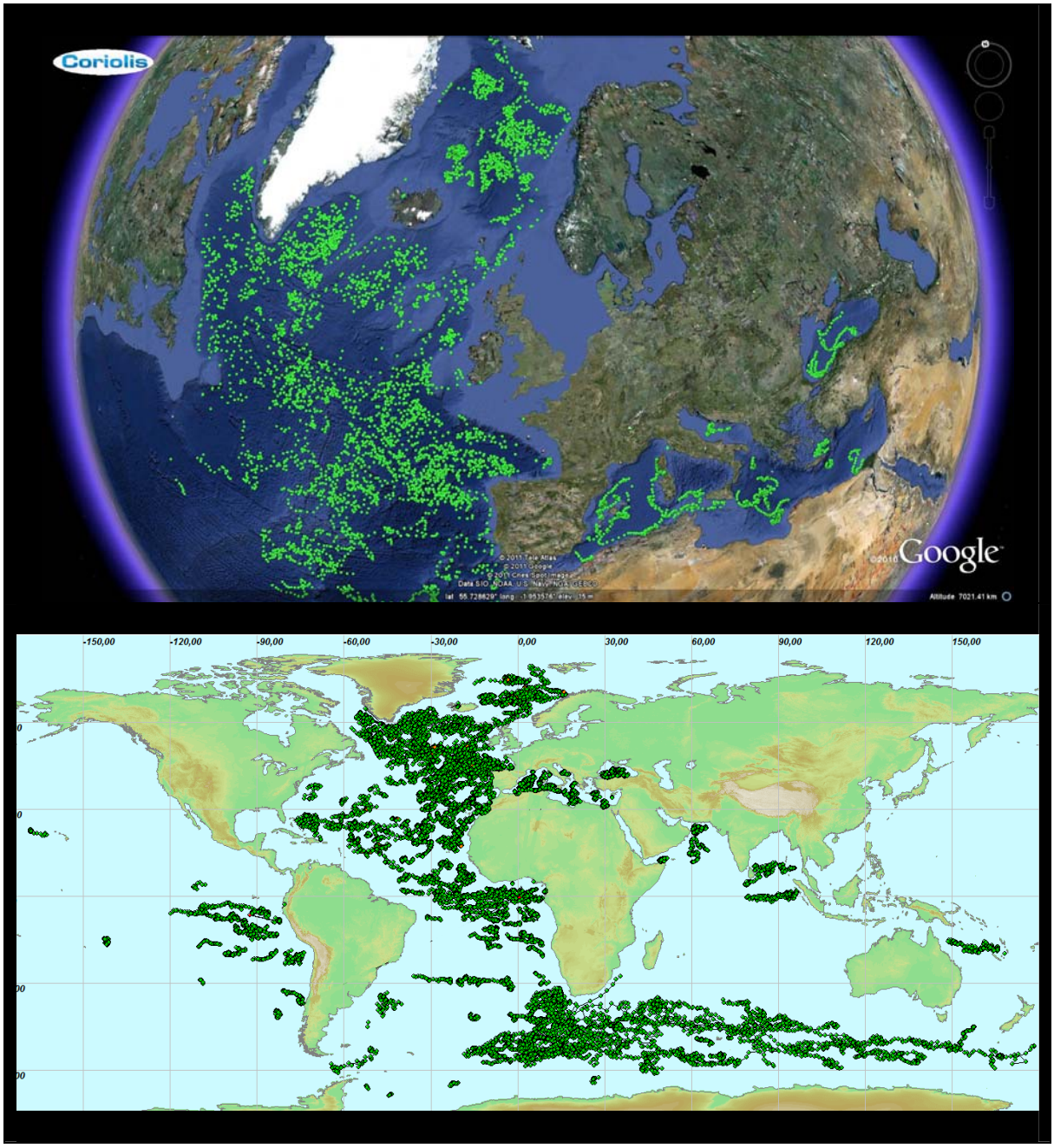
Argo data management report 2011

Coriolis DAC & GDAC

Data Assembly Centre and Global Data Assembly Centre
Annual report September 2010 - October 2011
Version 1.0
November 7th, 2011



Maps of the 15 590 profiles from 502 floats managed by Coriolis DAC this current year.

Status

(Please report the progress made towards completing the following tasks and if not yet complete, estimate when you expect them to be complete)

- Data acquired from floats
- Data issued to GTS
- Data issued to GDACs after real-time QC
- Data issued for delayed QC
- Delayed data sent to GDACs
- Web pages
- Statistics of Argo data usage (operational models, scientific applications, number of National PIs…)
- Products generated from Argo data …

This report covers the activity of Coriolis data centre for a one year period from September 1st 2010 to September 30th 2011.

Data acquired from floats

These last 12 months[1], a total of 15 590 profiles from 502 floats where collected, controlled and distributed.

The 502 floats managed during that period had 36 versions of data format:

- APEX: 22 versions
- NEMO: 2 versions
- PROVOR-Arvor: 12 versions

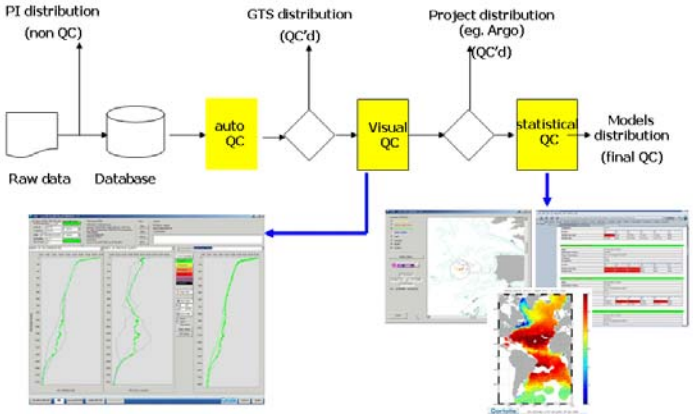
Arvor: a new type of float with Argos 3 telecommunication.
In 2011, among 36 versions of floats, a new type of Arvor float with Argos3 telecommunication was processed. Its high speed data transmission allows short surface times, interesting for deployments in marginal seas such as Adriatic.

This new autonomous oceanographic profiling float has the same main characteristics and metrology than Provor. Lighter, cheaper, it is devoted to temperature and salinity measurements for Argo applications.
Its design has been performed by IFREMER and it is manufactured by NKE.
Arvor float can perform more than 200 cycles from 2000 meters depth to the surface (CTD pump in continuous mode).
It is deployable by only one person, with wireless connectivity using Bluetooth.

[1] From September 2010 to October 2011

Data issued to GTS

All profiles processed by Coriolis are distributed on the GTS by way of Meteo-France. This operation is automatically performed. After applying the automatic Argo QC procedure, the Argo profiles are inserted on the GTS every 2 hours. Argo profiles are inserted on the GTS 365 days per year, 24 hours a day.



CORIOLIS DAC: Argo data flow

Data issued to GDACs after real-time QC

All meta-data, profiles, trajectory and technical data files are sent to Coriolis and US-GODAE GDACs. This distribution is automated.

Data issued for delayed QC

All profile files are sent to PIs for delayed QC. Most of the Atlantic data handled by Coriolis are checked by the European project Euro-Argo.

Delayed mode data sent to GDACs

An Argo delayed mode profile contains a calibrated salinity profile (psal_adjusted parameter).
A total of 18 112 new delayed mode profiles where sent to GDACs this year.
The number of delayed mode profiles increased by 28%.
A total of 82 113 delayed profiles where sent to GDACs since 2005.

Web pages

The web site of the French DAC is available at:

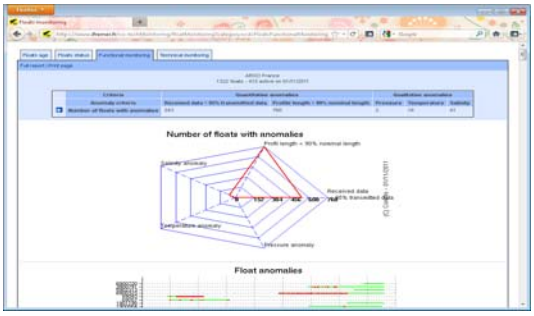
- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo

It provides:

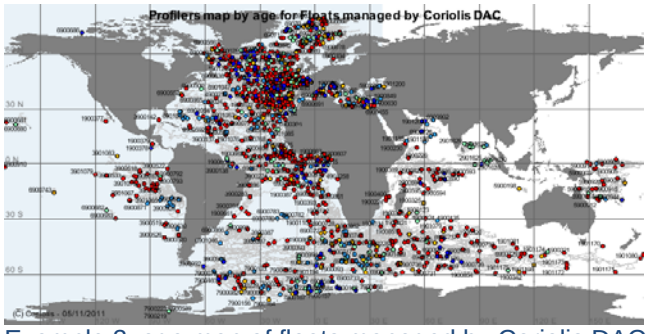
- Individual float description and status (meta-data, geographic map, graphics : section, overlaid, waterfall, t/s charts)
- Individual float data (profiles, trajectories)
- FTP access
- Data selection tool
- Global geographic maps, GoogleEarth maps
- Weekly North Atlantic analyses (combines Argo data and other measurements from xbt, ctd, moorings, buoys)

Some pages of Coriolis web site are dedicated to technical monitoring:

- http://www.coriolis.eu.org/Observing-the-ocean/Observing-system-networks/Argo/Support-to-Data-Mgt/At-sea-monitoring



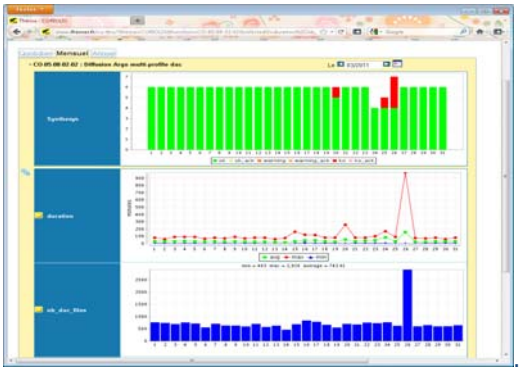
Example 1: technical monitoring of Argo-France floats



Example 2: age map of floats managed by Coriolis DAC.

Data centre activity monitoring: Coriolis operators perform an activity monitoring with an online control board.

Example 1: distribution activity on 03/11/2011. An operator has to perform a diagnostic on anomalies of Argo data distribution (red smileys). A series of small data base incidents explains the unusual situation.



Example 2: data distribution to GDAC activity in March 2011. On 26th, a bigger than usual data distribution delayed the update of DAC files.

Statistics of Argo data usage (operational models, scientific applications, number of National Pis…)

Operational oceanography models; all floats data are distributed to:

- French model Mercator (global operational model)
- French model Previmer (regional operational)
- French model Soap (navy operational model)
- EU MyOcean models (Foam, Topaz, Moon, Noos)
- EuroGoos projects

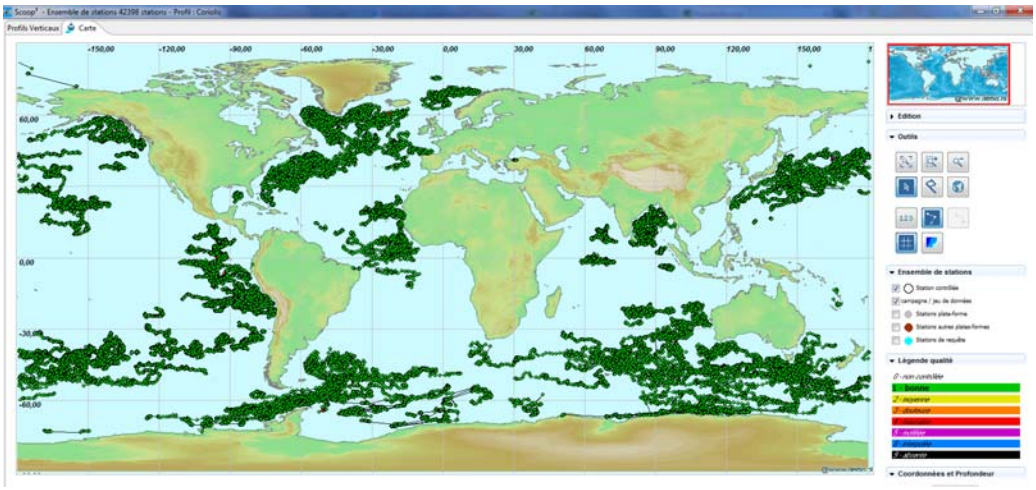
Argo projects: this year, Coriolis data centre performed float data management for 30 Argo scientific projects and 41 PIs (Principal Investigators).

List of Principal Investigators in 2011	
Alain SERPETTE	Jianqing Zhou
Andreas STERL	Jose Luis PELEGRI
Antoine POTEAU	Juergen FISCHER
B. Klein	Juliet HERMES
Bernard BOURLES	K.P. Koltermann
Bert RUDELS	Kjell Arne MORK
Birgit KLEIN	Louis PRIEUR
C. PROVOST et N. BARRE	Olaf KLATT
C.Maes	PASCUAL Ananda
Christine COATANOAN	Pierre Marie POULAIN
Detlef QUADFASEL	Rena CZESCHEL
Osvaldo ULLOA	Sabrina SPEICH et Michel ARHAN
Fabien ROQUET	Serge LE RESTE
Frederic VIVIER	Sunke Schmidtko
Gerard ELDIN	VELEZ BELCHI Pedro Joaquin
Gerasimos KORRES	Violeta SLABAKOVA
Gilles Reverdin	Virginie THIERRY
Gregorio PARRILLA	Xavier ANDRE
Holger GIESE	Xavier CARTON
Isabelle TAUPIER-LEPAGE	Yves GOURIOU
Jens SCHIMANSKI	

List of 2011 scientific projects		
ARGO SPAIN	CONGAS	IFM2
ARGO_AWI	CORIOLIS	MEDARGO
ARGO_BUL	CORIOLIS_OVIDE	MEDARGO_IT
ARGO_CHILE	Coriolis	MFSTEP
ARGO_FIN	DAP	OVIDE
ARGO_NORWA	EGYPT	PROSAT
ARGO_SPAIN	FLOPS	SHOM
ASA	GOODHOPE	TRACK
BIOArgo	IFM	TRACK2010
BSH	IFM-GEOMAR	WEN

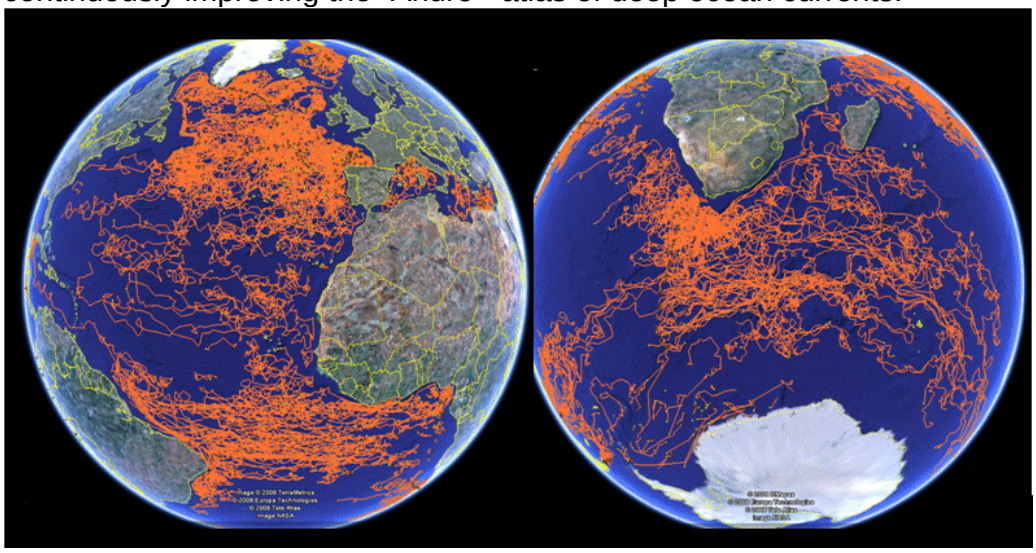
Products generated from Argo data …

Distribution of Argo oxygen observations to EU former CarboOcean project.
Once a week, all Argo floats data with oxygen observations are distributed to the German data centre Pangea using the OAI inter-operability protocol (Open Archive Initiative).
This year, 9 394 new oxygen profiles from 255 floats were distributed.
A total of 44 128 oxygen profiles from 379 floats were distributed since 2004.



Oxygen profiles collected by all Argo partners since 2004.

Sub-surface currents Atlas
Based on Coriolis trajectory data, Michel Ollitrault and the Coriolis team are continuously improving the “Andro” atlas of deep ocean currents.



Argo trajectories from Coriolis DAC are carefully scrutinized to produce the “Andro” atlas of deep ocean currents.

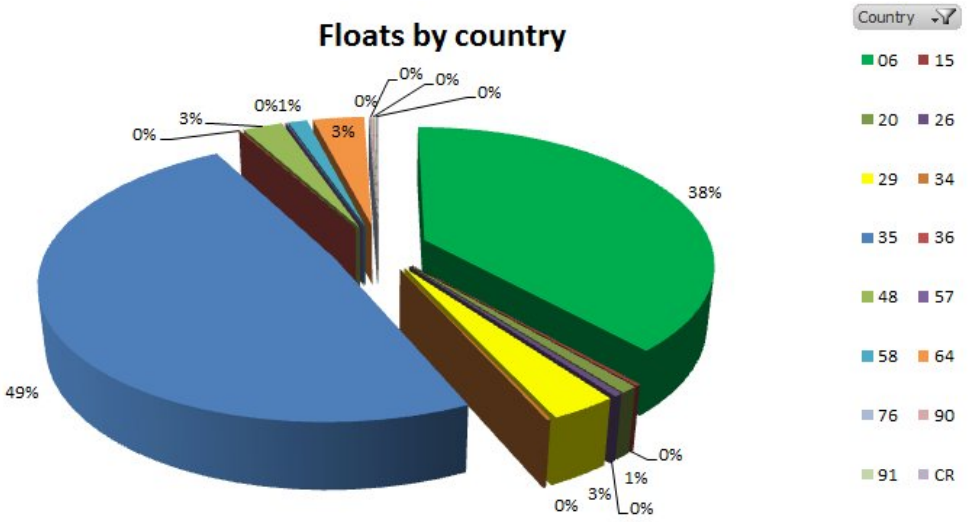
Delayed Mode QC

(Please report on the progress made towards providing delayed mode Argo data, how it's organized and the difficulties encountered and estimate when you expect to be pre-operational).

At the Coriolis data centre, we process the delayed mode quality control following four steps. Before running the OW method, we check carefully the metadata files, the pressure offset, the quality control done in real time and we compare with neighbor profiles to check if a drift or offset could be easily detected. As last year, we have worked on this way with PIs to strengthen the delayed mode quality control.

Some floats have been deployed from some projects, meaning a lot of PIs and a lot of time for explaining the DM procedure to all of them. A few PIs are totally able to work on DMQC following the four steps but this is not the case for most of them. Since the unavailability of the PIs leads to work by intermittence and then extend the period of work on the floats, we did the work with a private organism (Glazeo) to improve the realization of the DMQC, exchanging only with the PIs to validate results and discuss about physical oceanography in studied area. Working in this way, we have largely improved the amount of delayed mode profiles.

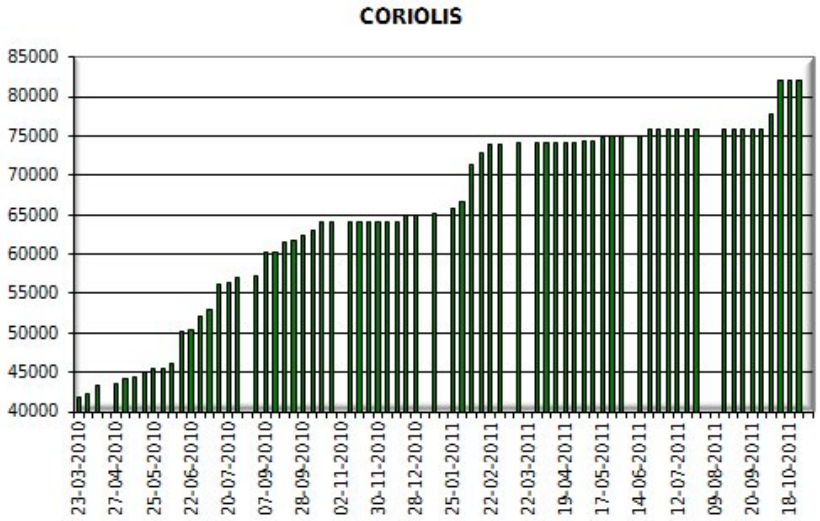
For a few projects, there are still no identified operators to do DMQC, for instance the first run has been done by students which have now left institutes or are not available to carry on with this work. For floats which are German floats (AWI), we found a new operator to run the DMQC. Nevertheless we have made progress with BSH and some floats have been processed in DMQC or are in progress (we are finalizing delayed mode QC for some floats). Only a few projects are still waiting for PI's answers.



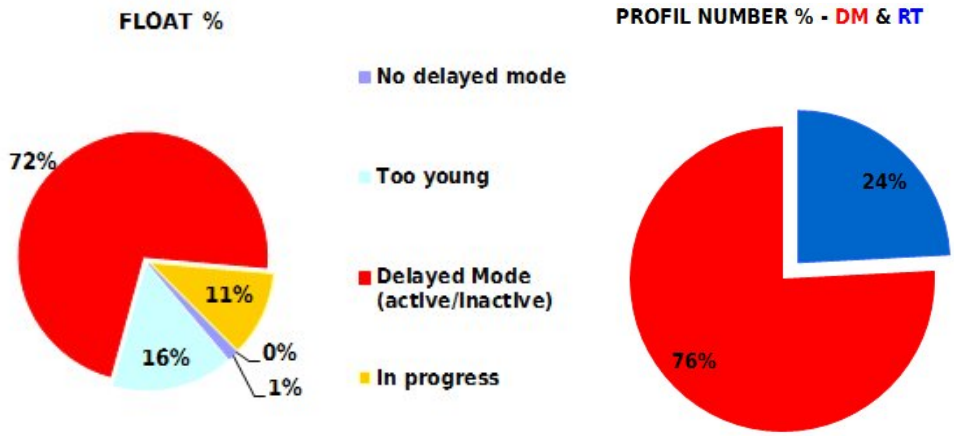
Pourcent of floats by country in the Coriolis DAC.
Codes for the countries: 06 : Germany - 15 : Bulgaria - 20 : Chili – 26 : Denmark – 29 : Spain – 34 : Finland - 35 : France – 36 : Greece - 48 : Italy – 57 : Mexico - 58 : Norway – 64 : Netherlands – 90 : Russia – CR : Costa Rica

Concerning the APEX floats, some progresses have been done to correct the surface pressure. Most of the APEX belong to Germany, a lot of those German floats have been corrected by BSH. Some of the French APEX floats still need to be review in the decoding step and are in the grey list.

During the last year, 18112 new delayed mode profiles where produced and validated by PIs. A total of 82113 delayed mode profiles where produced and validated since 2005.

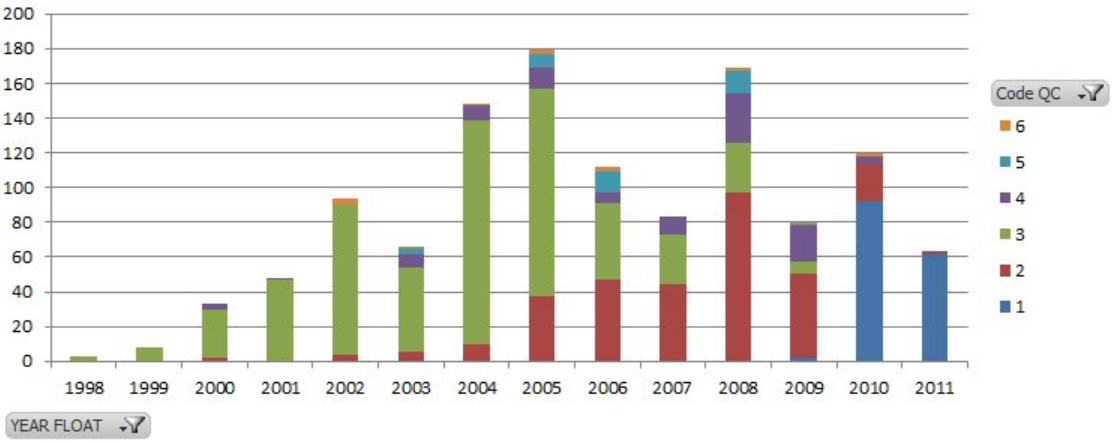


Evolution of the DM profiles' submission versus dates



Status of the floats processed by Coriolis DAC. Left: in terms of float percent and right: in terms of profile percent (DM : delayed mode – RT : real time).

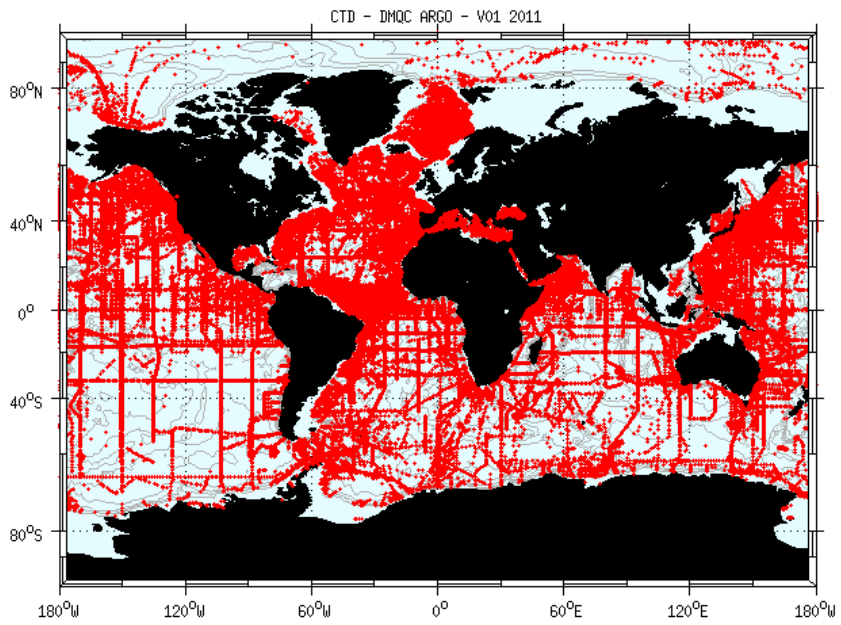
The status of the quality control done on the Coriolis floats is presented in the following plot. For the two last years (2010-2011), most of the floats are still too young (code 1) to be performed in delayed mode. The codes 2 and 3 show the delayed mode profiles for respectively active and dead floats.



Status of the quality control done on profiles sorted by launch's year, code 1: young float, code 2: active float, DM done, code 3 : dead float, DM done; code 4 : DM in progress, code 5 : waiting for DM, code 6 : problems with float.

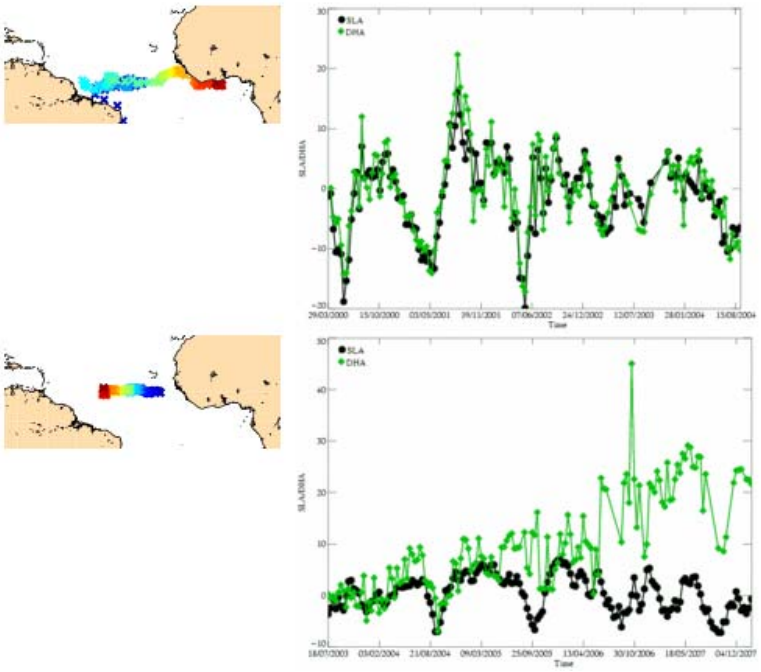
Reference database

The version CTD_for_DMQC_2010V2 is available since April 2011. A new version CTD_for_DMQC_2011V2 is on line since October 2011. This last database takes into account feedbacks from users about duplicate or invalid pair, and bug in position of some stations in not appropriate boxes. A next version will be available for February 2012, some new CTD provided by the updates of WOD2009 will be integrated as well as new CTD provided by PIs (CSIRO, few CTD from CCHDO).



Example of delayed mode activity

A comparison between Argo float observations with SLA and DHA (SLA, Sea Level Anomalies; DHA, Dynamic Height Anomalies) is performed on a routine mode, 4 times a year.



GDAC Functions

(If your centre operates a GDAC, report the progress made on the following tasks and if not yet complete, estimate when you expect them to be complete)

- National centres reporting to you
- Operations of the ftp server
- Operations of the www server
- Data synchronization
- Statistics of Argo data usage : Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …

National centres reporting to you

Currently, 11 national DACs submit regularly data to the French GDAC.
A new Chinese DAC was setup in 2011 : NMDIS : National Marine Data and Information Service, Tianjin.

The additional GTS DAC contains all the vertical profiles from floats that are not managed by a national DAC. These data come from GTS and GTSPP projects. The GTS profiles are quality controlled by the French DAC (Coriolis).

On November 3rd, the following files were available from the GDAC FTP site.

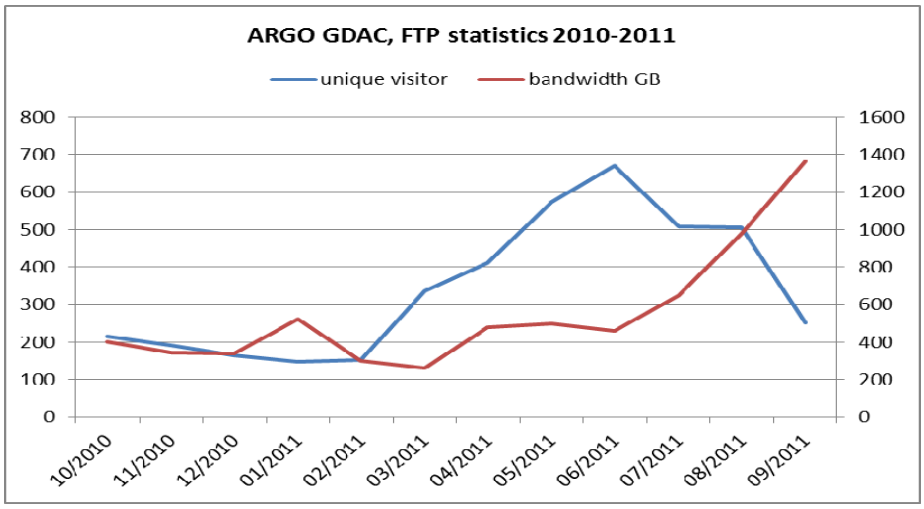
DAC	metadata files	increase from last year	profile files	increase from last year	delayed mode profile files	increase from last year	trajectory files	increase from last year
AOML	3 938	14%	460 192	19%	322 179	18%	3 821	14%
BODC	348	9%	32 216	16%	30 329	14%	329	10%
Coriolis	1 327	15%	110 233	17%	82 487	28%	1 241	14%
CSIO	100	61%	5 631	32%	4 879	48%	99	60%
CSIRO	466	37%	49 248	44%	31 631	19%	460	37%
INCOIS	237	29%	28 374	15%	20 738	2%	237	29%
JMA	1 072	14%	115 274	14%	76 128	13%	1 052	29%
KMA	147	4%	13 473	18%	9 982	19%	131	7%
KORDI	119	3%	11 590	14%	0	-	119	3%
MEDS	317	6%	32 132	16%	22 300	26%	311	6%
NMDIS	15	-	658	-	0	-	15	-
Total	**8 086**	**15%**	**859 021**	**19%**	**600 653**	**19%**	**7 815**	**18%**

Operations of the ftp server

- Meta-data, profile, trajectory and technical data files are automatically collected from the national DACs ;
- Index files of meta-data, profile and trajectory are daily updated ;
- GDAC ftp address: ftp://ftp.ifremer.fr/ifremer/argo

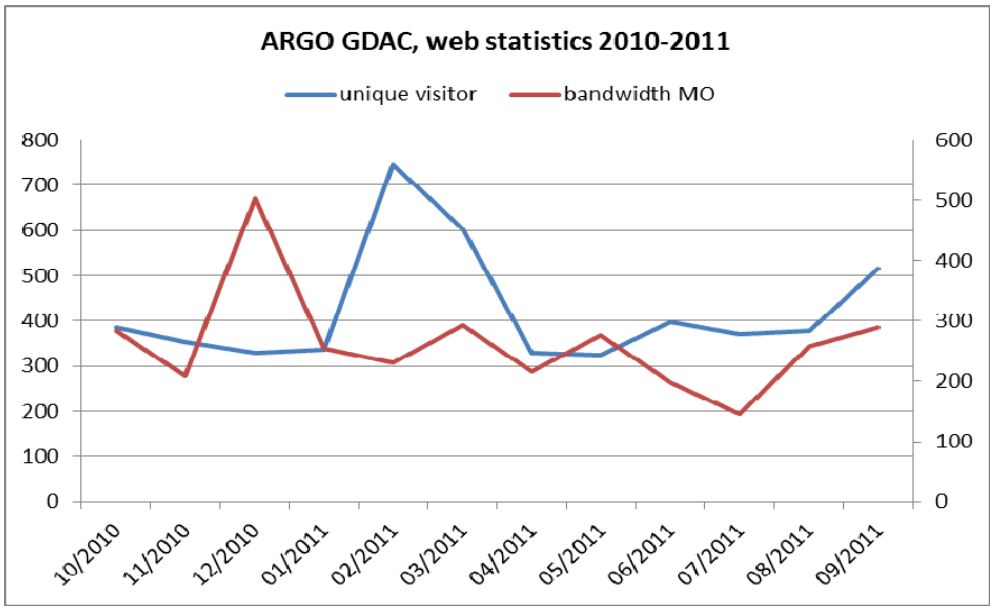
There is a monthly average of 345 unique visitors, performing 3 981 sessions and downloading 550 gigabytes.
There is a strong increase on the ftp server bandwidth during the last 3 months.

ARGO GDAC FTP statistics				
month	unique visitor	number of visits	hits	bandwidth GB
10/2010	215	2 084	1 754 378	402
11/2010	192	1 687	766 873	347
12/2010	166	1 494	902 183	339
01/2011	149	1 318	1 785 207	523
02/2011	153	1 333	2 117 806	299
03/2011	338	3 420	1 439 574	263
04/2011	413	11 882	2 496 235	481
05/2011	574	10 016	2 002 734	498
06/2011	670	4 587	1 689 315	460
07/2011	509	4 247	2 597 451	649
08/2011	506	3 693	3 208 683	978
09/2011	253	2 012	1 781 930	1367
Average	**345**	**3 981**	**1 878 531**	**550**



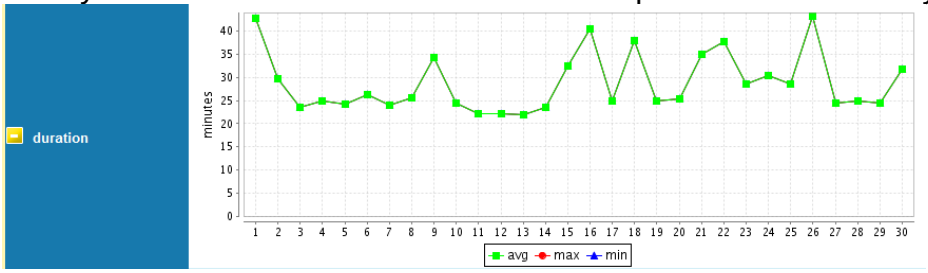
The web site address is : http://www.argodatamgt.org

ARGO GDAC web statistics					
month	unique visitor	visits	pages	hits2	bandwidth MO
10/2010	384	820	2 533	11 069	283
11/2010	354	655	2 483	10 490	209
12/2010	330	652	2 795	10 158	503
01/2011	336	601	2 271	8 938	254
02/2011	745	992	2 273	8 518	231
03/2011	602	866	3 486	12 959	293
04/2011	330	594	5 838	13 047	216
05/2011	325	526	5 844	11 705	276
06/2011	398	627	5 519	10 932	199
07/2011	371	664	5 622	10 711	146
08/2011	379	764	6 348	12 910	258
09/2011	516	939	6 527	15 117	289
Average	**423**	**725**	**4 295**	**11 380**	**263**



Data synchronization

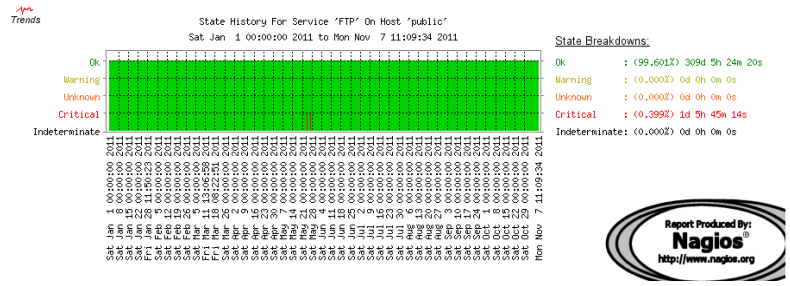
The synchronization with US-Godae server is performed once a day.



Example of synchronization monitoring: duration of the process in June 2010

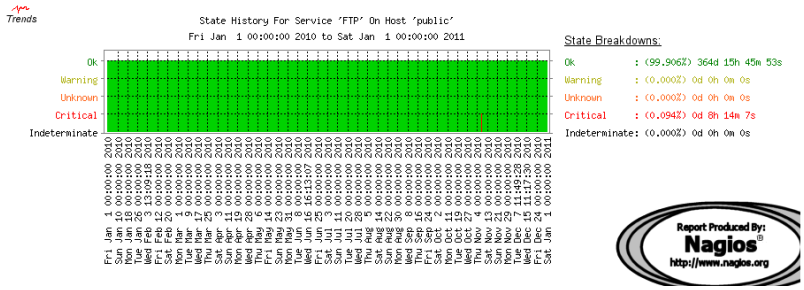
FTP server monitoring

The Argo GDAC ftp server is actively monitored by a Nagios agent (see http://en.wikipedia.org/wiki/Nagios).
Every 5 minutes, a download test is performed. The success/failure of the test and the response time are recorded.



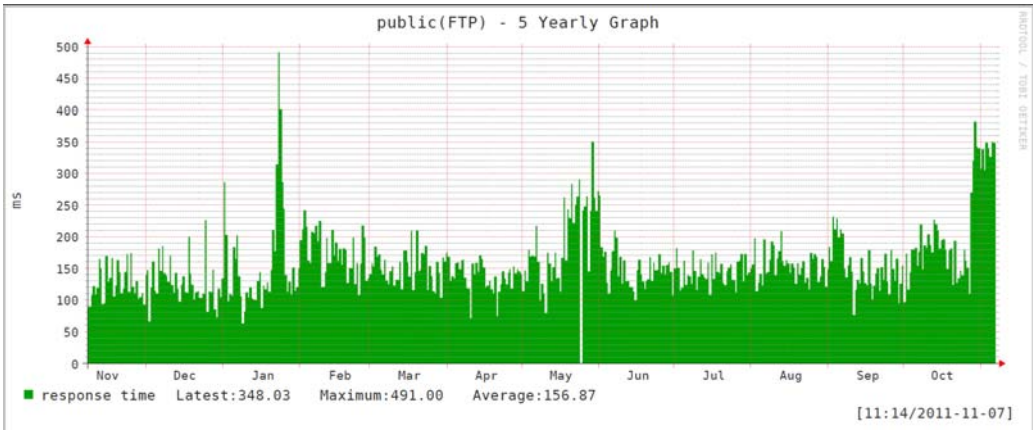
Nagios monitoring: between January and November 2011

The ftp server was **available for 99,6%** of the time.
The 0.4% of failure represents **1 day, 5 hours and 45 minutes**.
Most of the problems occurred between May 21st and May 28th, related to electrical supply problems.



Nagios monitoring: between January and December 2010

The ftp server was **available for 99,9%** of the time.
The 0.4% of failure represents **8 hours and 14 minutes**.
Most of the problems occurred in November 2010, also related to electrical supply problem.



Nagios monitoring: duration of a test file download

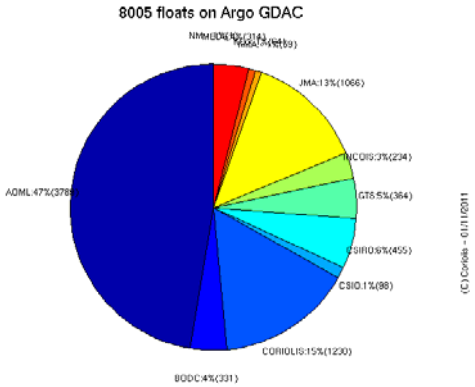
Since October 2011, the ftp server is under pressure, the response time increased twofold. This recent problem should be fixed with a new ftp server.

Grey list

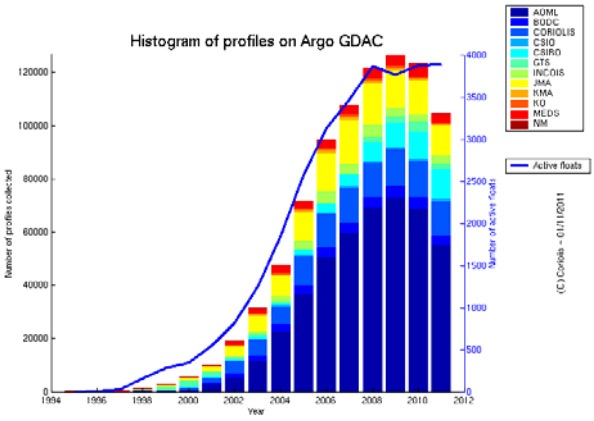
According to the project requirements Coriolis GDAC hosts a grey list of the floats which are automatically flagged before any automatic or visual quality control.

The greylist has 1181 entries (November 3rd 2011), compared to 1229 entries one year ago.

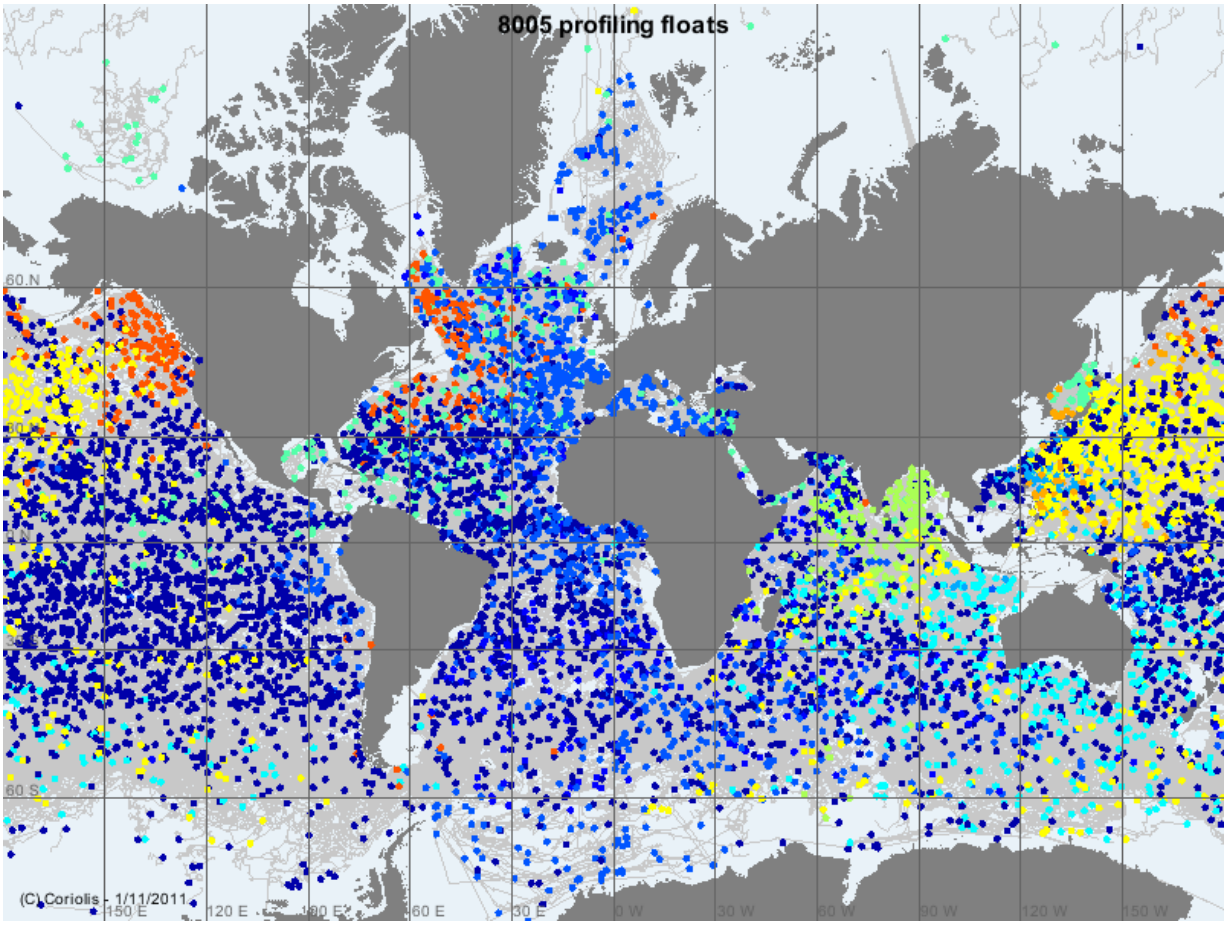
Statistics of Argo data usage: Ftp and WWW access, characterization of users (countries, field of interest : operational models, scientific applications) …



Argo GDAC : floats distribution per DAC in October 2011

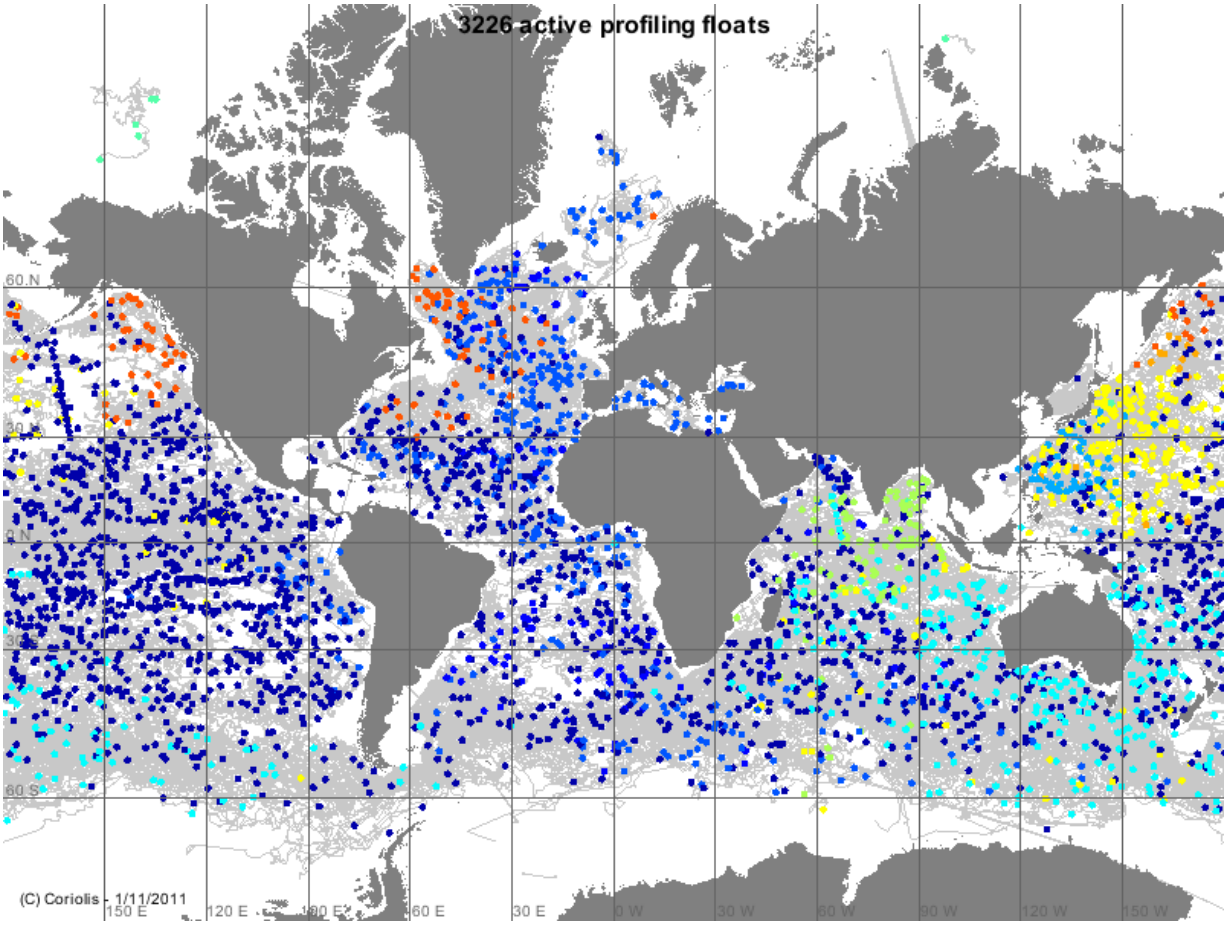


Argo GDAC : profiles distribution per DAC in October 2011[2]

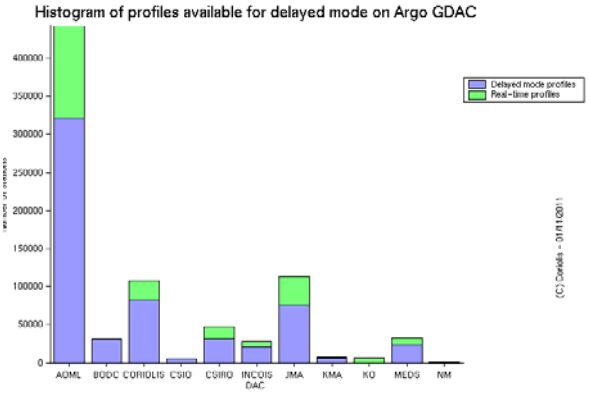


Argo floats available from GDAC in October 2010
(This map includes active and old floats)

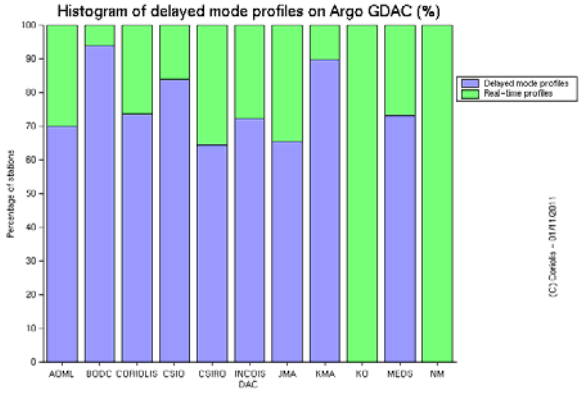
[2] Warning: the blue line displays the total number of active floats during a year. This total is different than the floats active at a particular day.



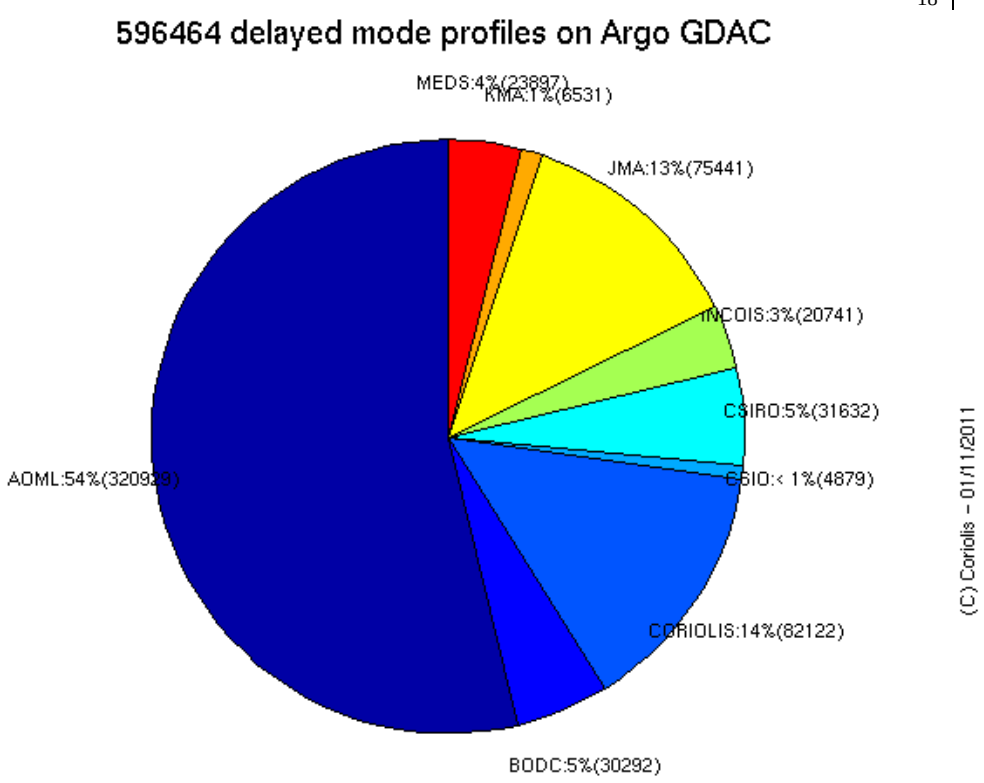
Active Argo profiling floats available from GDAC in October 2011



Argo GDAC : delayed-mode profiles available for delayed-mode in October 2011



Argo GDAC : delayed-mode profiles distribution % per DAC in October 2011



Argo profiling floats with delayed-mode profiles available from GDAC in October 2011

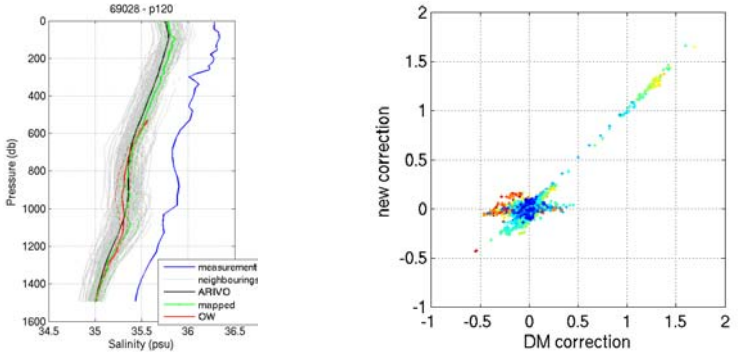
Regional Centre Functions

(If your centre operates a regional centre, report the functions performed, and in planning)
Coriolis is involved in the North Atlantic Argo regional centre. This activity is managed within the European project Euro-Argo.

This activity involves a regular monitoring of the consistency of the quality of data from various types of floats, with techniques such as objective analyses, comparison between floats and altimetry.

Floats salinity intercomparison

A new method is under study for floats salinity inter-comparison. Based on Owen & Wong method, it uses the observations of different floats in an area. This technique may prove useful in area with few CTDs available and to have a delayed mode adjustment with observations more closely related in time.



A comparison between real-time, delayed-mode and "newly" adjusted salinity profiles was performed on 200 north Atlantic floats (17 000 profiles)

Survey on density anomalies

A survey is underway to improve the efficiency of density quality control tests.