

# French National report on Argo – 2009

## 11<sup>th</sup> Argo Steering Team meeting

### March 2010

#### 1. The status of implementation (major achievements and problems in 2009)

##### - floats deployed and their performance

27 floats and 8 additional floats co-funded by the MFSTEP project have been deployed in 2009. The current position of the French active floats and the French float survival rate are displayed Figure 1 and Figure 2.

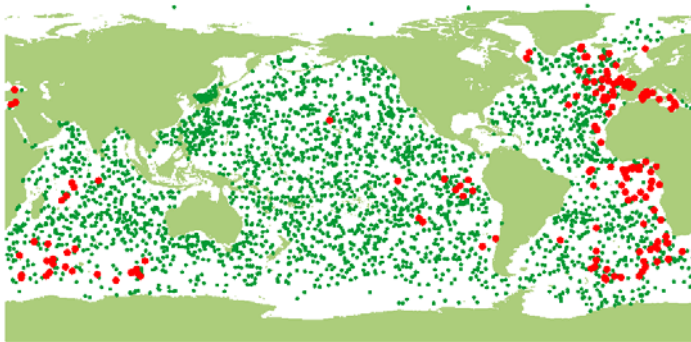


Figure 1: The large red dots represent the French active floats.

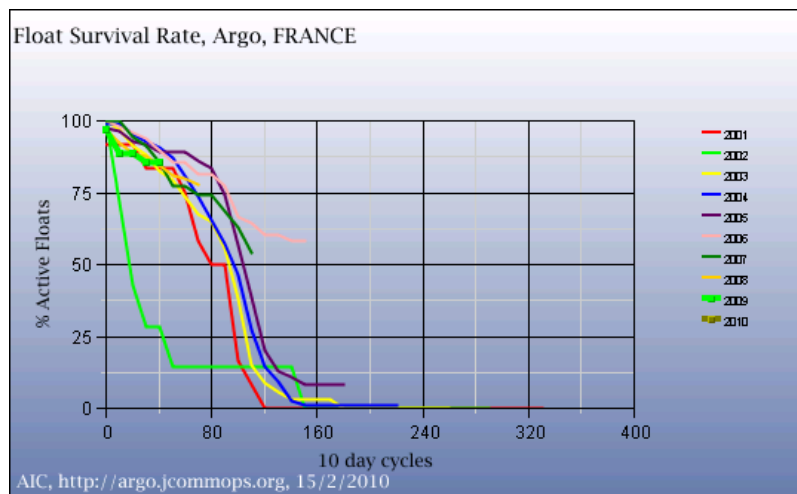


Figure 2: Float survival rate of the French floats

- technical problems encountered and solved
- status of contributions to Argo data management

Within Argo-France, Coriolis plays three roles in the Argo data management organization: Argo Data Assembly Centre, Global Data Centre, and leader of the North Atlantic Argo Regional Centre.

As Argo Data Assembly Center, Coriolis processes in Real Time and Delayed Mode float data deployed by France, by 5 European countries (Germany, Spain, Netherlands, Norway, Italy) and by 4

non European countries (Chili, Costa Rica, Mexico, Russia). Coriolis data center processes data coming from 1066 floats (506 Provor, 479 Apex, 80 Nemo and 1 Metocean floats) including 340 active floats in February 2010 (135 Provor, 184 Apex and 21 Nemo floats). Data are processed and distributed according to Argo recommendations. Some floats are deployed as part of scientific projects. The detail can be found on the Coriolis web site:

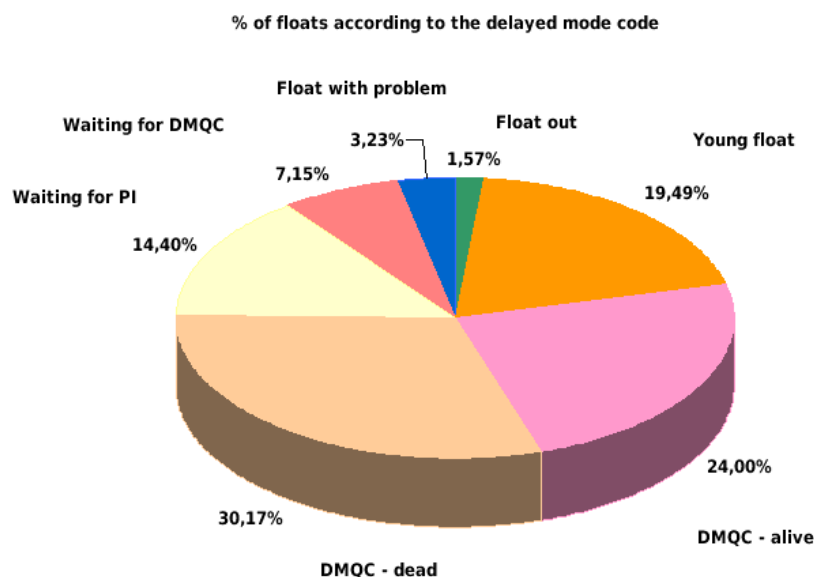
[http://www.coriolis.eu.org/cdc/scientific\\_projects.htm](http://www.coriolis.eu.org/cdc/scientific_projects.htm)

Coriolis operates one of the GDAC in close collaboration of FNMOC/USA. Coriolis also coordinates the North-Atlantic ARC activities and in particular the float deployment in Atlantic.

**- status of delayed mode quality control process**

As of today, about 50% of the French floats have been controlled in delayed mode and about 22% of the floats are waiting for DMQC.

Last year, a second delayed mode control has been done to the old GYROSCOPE floats to take into account recent knowledge of the DMQC process (pressure correction, OW method). The delayed mode data of those floats are better but this led to a delay in the DMQC of more recent floats.



**2. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo**

Since 2000, France has provided a significant contribution to the growing Argo array. 455 French floats and 68 floats co-funded by European Union have been deployed in different geographic areas. The deployments meet specific French requirements but they also contribute to the global array.

Year	Man/Year	French floats	Co-funded EU floats	Total
2000		11		11
2001	3	12		12
2002	6	7	4	11
2003	9	34	20	54
2004	15	85	18	103
2005	15	89	11	100
2006	12	51	14	65
2007	12	36		36
2008	12	90		90
2009	12,6	35		35
<b>Total(2000-2009)</b>		<b>450</b>	<b>63</b>	<b>517</b>
<b>2010</b>	<b>12,6</b>	<b>95</b>		

**Tableau 1: (Man/year column) Man power dedicated to Argo for coordination activities, float preparation, deployment and data management activities (GDAC,DAC, NAARC, DMQC) within Argo-France. (French floats column) French floats contributing to Argo deployed by year. (Co-funded EU floats column) EU floats are the additional floats co-funded by European Union within the Gyroscope, Mersea and MFSTEP projects. Estimated value is given for 2010.**

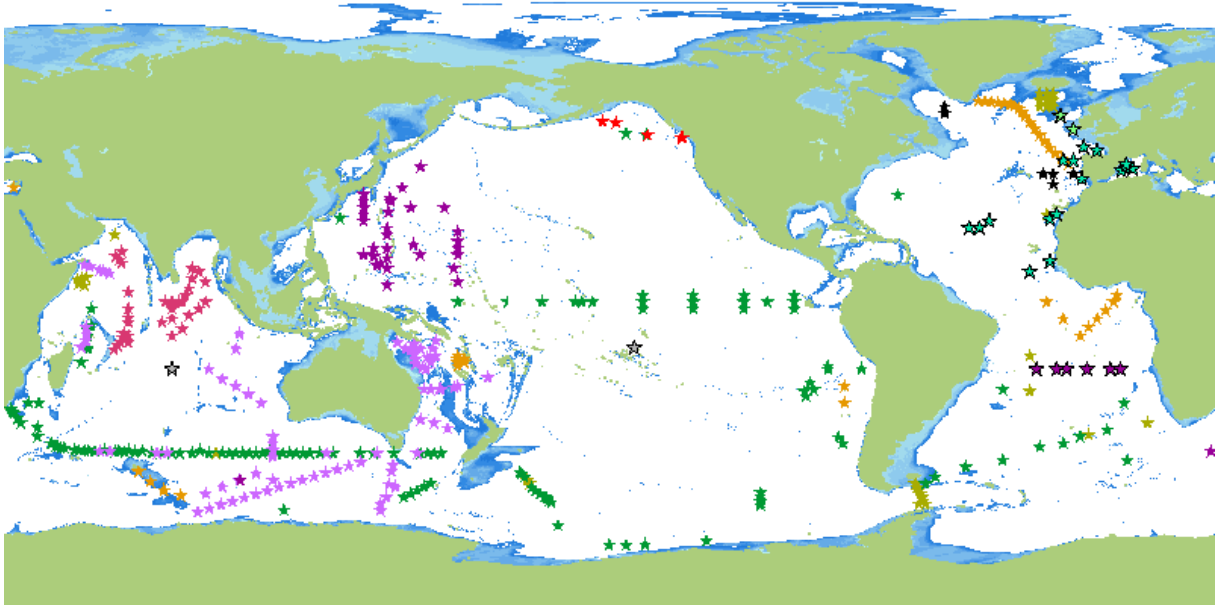
The French Argo Project is funded by the ministry of Research and by local administrations (Britanny region, Finistère department, city of Brest) mostly through Ifremer but also through other french institutes involved in oceanography (CNES, IRD, INSU, Météo-France) and in a lesser proportion by the ministry of Defense through SHOM. Ifremer and SHOM plan to buy between about 50 and 15 floats respectively in 2009 and beyond. As part of the Euro-Argo preparatory phase, Ifremer (for the Argo-France project) works with its funding ministry (mainly research ministry) to agree on a long-term funding level and commitment. Together with its European partners, Ifremer also works with the European commission to set up a long term EC funding to Argo.

In parallel to the Euro-Argo initiatives and to sustain the commitments of France in Argo, a proposal has been submitted to the French agencies to identify Argo-France project as a research observatory. When obtained, the agreement is valid for 10 years.

Overall the level of support, additional to float purchase, is as indicated in Tableau 1 (man power for coordination activities, float preparation, deployment and data management activities).

### **3. Summary of deployment plans (level of commitment, areas of float deployment) and other commitments to Argo (data management) for the upcoming year and beyond where possible.**

According to the current deployment plan, 95 floats will be deployed in 2010. Deployments plans of 35 floats are already known and shown Figure 3.



**Figure 3: Deployment plan. The orange stars represent the French deployment plan for 2010.**

Coriolis will continue to run the Coriolis Dac and the European GDAC as well as coordinating the North Atlantic Arc activities. Within the Euro-Argo project development will be carried out to improve anomalies detection at GDAC both in RT and DM, to monitor in real time the behaviour of the European fleet and to improve data consistency check within NA-ARC.

France also contributes to the funding of the AIC.

#### **4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers**

A key aspect of the French Argo program is to develop the capabilities to fully exploit Argo data for operational forecasting as well as research applications. Therefore Coriolis has developed together with MERCATOR (The French operational oceanography forecast centre) a strong connection with the French research community via the Mercator-Coriolis Mission Group (GMMC). It consists of about one hundred researchers (with some turnover each year) following a scientific announcement of opportunities and call for tender. Its task is to support the Mercator and Coriolis scientific activities and to participate in product validation. As part of the scientific announcement of opportunities mentioned previously (GMMC), PIs can be selected to deploy floats within their scientific experiments. The list of experiments during which floats were deployed are available through the Coriolis web site ([http://www.coriolis.eu.org/cdc/scientific\\_projects.htm](http://www.coriolis.eu.org/cdc/scientific_projects.htm)). Additional projects including Argo data in their analysis are also funded by other institutes (CNES, IFREMER, INSU, SHOM, Météo-France).

Operational ocean forecasting. All Argo data (alongside with other in-situ and remotely sensed ocean data) are routinely assimilated into the MERCATOR operational ocean forecasting system run by the MERCATOR-Ocean structure. Assessments have clearly demonstrated the positive impact of Argo data on ocean analyses and predictions.

Ocean science. Argo data are being used by many researchers in France to improve the understanding of ocean properties (e.g. circulation, heat storage and budget, and mixing), climate monitoring and on how they are applied in ocean models (e.g. improved salinity assimilation, ...). List of scientific

publications is available through the Argo web site (<http://www-argo.ucsd.edu/FrBibliography.html>) The French Argo Users' Group provides a forum for engagement between these scientists and the French Argo program.

Argo France coordinates the North-Atlantic Argo Regional Center. Besides coordinating deployment in the North-Atlantic, Argo France is working on method to improve data consistency check in the North-Atlantic and to detect TNPD Apex floats with large negative pressure sensor drift.

**5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by the AIC, the coordination of activities at an international level and the performance of the Argo data system. If you have specific comments, please include them in your national report**

Ten years after the beginning of the Argo program, information concerning the functioning of some floats is already lost. The value of the Argo data is increasing with years and in 20 years from now, Argo data will be even more valuable than today. We have to ensure that our current knowledge is saved to avoid problems such as those concerning XBT and their fall rate for instance.

Argo data are supposed to be used for the monitoring of climate change signal. Climate change is a very sensible topic. Can we guarantee that the current DM Argo data can be used for climate change studies? Do we provide enough information relative to those data? Can a user outside the Argo community find all necessary information to use the data as he should do?

The Argo format has been designed according to the nominal float cycle. New capabilities are now available and the range of possibility is growing very fast:

- New sensors
- Measurements on different vertical axis for a given platform
- Near surface data
- Iridium transmission
- Two way communications that allow changes in the float mission
- Etc...

The Argo format has not been designed to manage all those configurations. In addition, one might expect that in the future even new data or configurations will show up. Can we keep adding new data or keep fitting new configuration in the existing Argo format? I have no clear answer to this question.

**6. To continue improving the number of CTD cruise data being added to the reference database by Argo PIs, it is requested that you include the number and location of CTD cruise data uploaded by PIs within your country to the CCHDO website in the past year. These cruises could be used for Argo calibration purposes only or could be cruises that are open to the public as well**

Since 2000, data from 4 French cruises have been uploaded to the CCHDO website.

Line	Cruise name	Ship	Cruises dates yyyy/mm/dd		Chief scientist	Country
			From	to		
AR15	EQUALANT	THALASSA	2000/07/24	2000/08/21	Yves Gouriou	FRA
IR06E		MARION DUFRESNE	2000/09/09	2000/10/03	Michèle Fieux	FRA
A025	OVIDE02	THALASSA	2002/06/11	2002/07/11	Herlé Mercier	FRA

A025	OVIDE04	THALASSA	2004/06/05	2004/07/06	Thierry Huck	FRA
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## 7. List of publications in which a french scientist is involved.

### Peer reviewed publications

- Balmaseda, M., Anderson, D., Vidard, A. Impact of Argo on analyses of the global ocean (2007) *Geophysical Research Letters*, 34 (16), art. no. L16605
- Barré, N., Provost, C., Sennechael, N., Lee, J.H. Circulation in the Ona Basin, southern Drake passage (2008) *Journal of Geophysical Research C: Oceans*, 113 (4), art. no. C04033.
- Bosc, C., T. Delcroix, and C. Maes, 2009: Barrier layer variability in the western Pacific warm pool from 2000 to 2007. *Journal of Geophysical Research-Oceans*, **114**, 14
- Bouruet-Aubertot, P., H. Mercier and F. Gaillard, 2005: Evidence of strong inertia-gravity wave activity during POMME experiment. *J. Geophys. Res.*, 110 (C7): Art. No. C07S06.
- Boutin, J. and L. Merlivat, 2009: New in situ estimates of carbon biological production rates in the Southern Ocean from CARIOCA drifter measurements. *Geophysical Research Letters*, **36**, 6.
- Caniaux, G, Giordani, H., Prieur, L., Hernandez, F., 2001: Observations of an Intense Anticyclonic Warm Eddy in the Newfoundland Basin. *Geophysical Research Letters*, 28, 2649-2652.
- Cazenave A., K. Dominh, S. Guinehut, E. Berthier, W. Llovel, G. Ramillien, M. Ablain and G. Larnicol, 2008: Sea level budget over 2003-2008: A reevaluation from GRACE space gravimetry, satellite altimetry and Argo, *Glob. Planet. Change*, doi:10.1016/j.gloplacha.2008.10.004.
- Claustre, H., Bishop, J., Boss, E., Stewart, B., Berthon, J.-F., Coatanoan, C., Johnson, K., Lotiker, A., Ulloa, O., Perry, M.-J., Dortenzio, F., Hembise Fanton D'Andon, O. & J. Uitz (2010). "Bio-optical profiling floats as new observational tools for biogeochemical and ecosystem studies", in *Proceedings of the "OceanObs'09: Sustained Ocean Observations and Information for Society" Conference (Vol. 2)*, Venice, Italy, 21-25 September 2009, Hall, J., Harrison D.E. and Stammer, D., Eds., ESA Publication WPP-306, in press.
- Cummings, J., L. Bertino, P. Brasseur, I. Fukumori, M. Kamachi, M. Martin, K. Mogensen, P. Oke, C. E. Testut, J. Verron and A. T. Weaver, 2009: Ocean data assimilation systems for GODAE. *Oceanography*, 22, 96-109.
- Daget, N., A. T. Weaver and M. A. Balmaseda, 2009: Ensemble estimation of background-error variances in a three-dimensional variational data assimilation system for the global ocean. *Q. J. R. Meteorol Soc.*, 135, 1071-1094, DOI: 10.1002/qj.412.
- De Boyer Montégut, C., Madec, G., Fischer, A.S., Lazar, A., Iudicone, D.: Mixed layer depth over the global ocean: An examination of profile data and a profile-based climatology, *Journal of Geophysical Research C: Oceans* 109 (12), pp. 1-20

- de Boyer Montégut, C., Mignot, J., Lazar, A., Cravatte, S. Control of salinity on the mixed layer depth in the world ocean: 1. General description (2007) *Journal of Geophysical Research C: Oceans*, 112 (6), art. no. C06011
- De Boyer Montégut, C., J. Vialard, S.S.C. Shenoi, D. Shankar, F. Durand, C. Ethé and G. Madec, 2007, Simulated seasonal and interannual variability of mixed layer heat budget in the northern Indian Ocean, *Journal of Climate*, 20, 3249-3268.
- Dombrowsky, E., L. Bertino, G. B. Brassington, E. P. Chassignet, F. Davidson, H. E. Hurlburt, M. Kamachi, T. Lee, M. J. Martin, S. Mei, and M. Tonani, 2009: GODAE Systems in Operation. *Oceanography*, **22**, 80-95.
- Durand, F., Reverdin, G. A statistical method for correcting salinity observations from autonomous profiling floats: An ARGO perspective (2005) *Journal of Atmospheric and Oceanic Technology*, 22 (3), pp. 292-301.
- Foltz, G. R., J. Vialard, Praveen Kumar B. and M. J. McPhaden, 2009 : Seasonal mixed layer heat balance of the southwestern tropical Indian Ocean, *J. Clim.*, in press.
- Forget, G., H. Mercier, B. Ferron, 2008: Combining Argo Profiles with a general circulation model in the North Atlantic. Part 1: Realistic transports and improved hydrography, between spring 2002 and spring 2003. *Ocean Modelling*, 20 (1), 17-34.
- Forget, G., H. Mercier, B. Ferron, 2008: Combining Argo Profiles with a general circulation model in the North Atlantic. Part 2: Estimation of hydrographic and circulation anomalies from synthetic profiles, over a year. *Ocean Modelling*, 20 (1), 1-16.
- Freeland H. J., Dean Roemmich, Silvia L. Garzoli, Pierre-Yves Le Traon, Muthalagu Ravichandran, Stephen Riser, Virginie Thierry, Susan Wijffels, Mathieu Belbéoch, John Gould, Fiona Grant, Mark Ignazewski, Brian King , Birgit Klein, Kjell Arne Mork, Breck Owens, Sylvie Pouliquen, Andreas Sterl, Toshio Suga, Moon-Sik Suk, Philip Sutton, Ariel Troisi, Pedro Joaquin Vélaz-Belchi, and Jianping Xu, 2009. Argo – A decade of progress. Community white paper for the Ocean Obs 2009 conference. Venice.
- Gaillard, F., H. Mercier and C. Kermabon, 2005: A synthesis of POMME physical data set: one year monitoring of the upper layer. *J. Geophys. Res.*, 110, C07S07, doi:10.1029/2004JC002764 .
- Gaillard, F., E. Autret, V. Thierry, P. Galaup, C. Coatanoan, and T. Loubrieu, 2009: Quality Control of Large Argo Datasets. *Journal of Atmospheric and Oceanic Technology*, **26**, 337-351.
- Gourdeau, L., Kessler, W.S., Davis, R.E., Sherman, J., Maes, C., Kestenare, E. Zonal jets entering the coral sea (2008) *Journal of Physical Oceanography*, 38 (3), pp. 715-725.
- Griffa, A., Molcard, A., Raicich, F., Rupolo, V. Assessment of the impact of TS assimilation from ARGO floats in the Mediterranean Sea (2006) *Ocean Science*, 2 (2), pp. 237-248.
- Guinehut, S., G. Larnicol, and P.-Y. Le Traon, 2002: Design of an array of profiling floats in the North Atlantic from model simulations, *J. Mar. Sys.*, 35, 1-9.
- Guinehut, S., P.-Y. Le Traon, G. Larnicol and S. Philipps, 2004: Combining Argo and remote-sensing data to estimate the ocean three-dimensional temperature fields- A first approach based on simulated observations, *J. Mar. Sys.*, 46 (1-4), 85-98.

- Guinehut, S., P.-Y. Le Traon and G. Larnicol, 2006: What can we learn from Global Altimetry/Hydrography comparisons?, *Geophys. Res. Lett.*, 33, L10604, doi:10.1029/2005GL025551.
- Guinehut, S., C. Coatanoan, A.-L. Dhomps, P.-Y. Le Traon and G. Larnicol, 2009: On the use of satellite altimeter data in Argo quality control, *J. Atmos. Oceanic. Technol.*, Vol. 26, No. 2, pp 395-402.
- Hénoqc C., J. Boutin, F. Petitcolin, !g ; Reverdin, S. Arnault and P. Lattès, 2010: Vertical variability of near-surface salinity in the Tropics: consequences for L-Band Radimeter calibration and validation. *J. Atmos. Oceanic. Technol.*, Vol. 27, No. 1, pp 192-209, doi:10.1175/2009JTECHO670.1.
- Lankhorst, M., D. Fratantoni, M. Ollitault, P. Richardson, U. Send, and W. Zenk, 2009: The mid-depth circulation of the northwestern tropical Atlantic observed by floats. *Deep-Sea Research Part I-Oceanographic Research Papers*, **56**, 1615-1632.
- Le Traon, P. Y., G. Larnicol, S. Guinehut, S. Pouliquen, A. Bentamy, D. Roemmich, C. Donlon, H. Roquet, G. Jacobs, D. Griffin, F. Bonjean, N. Hoepffner, and L. A. Breivik, 2009: DATA ASSEMBLY AND PROCESSING FOR Operational Oceanography 10 YEARS OF ACHIEVEMENTS. *Oceanography*, **22**, 56-69.
- Maes, C. 2008: On the ocean salinity stratification observed at the eastern edge of the equatorial Pacific warm pool. *Journal of Geophysical Research*, 113, C03027, doi: 10.1029/2007JC004297.
- Maes, C., L. Gourdeau, X. Couvelard, and A. Ganachaud, 2007: What are the origins of the Antarctic Intermediate Waters transported by the North Caledonian Jet? *Geophys. Res. Lett.*, 34, L21608, doi:10.1029/2007GL031546.
- Maes, C., K. Ando, T. Delcroix, W. S. Kessler, M. J. McPhaden, and D. Roemmich (2006), Observed correlation of surface salinity, temperature and barrier layer at the eastern edge of the western Pacific warm pool, *Geophys. Res. Lett.*, 33, L06601, doi:10.1029/2005GL024772
- Marchand, P., Servain, J. NOR-50: Fast research vessel for operational oceanography: Implementing PIRATA & argo programs in the tropical & South Atlantic in a practical, economic way (2002) *Sea Technology*, 43 (6), pp. 49-54.
- McPhaden, M., J., G. R. Foltz, V. S. N. Murty, M. Ravichandran, G. A. Vecchi, J. Vialard, J. D.. Wiggert and L. Tu, 2009: Ocean-Atmosphere Interactions During Cyclone Nargis, *Eos Trans. AGU*, 90, 53-54.
- Mignot, J., de Boyer Montégut, C., Lazar, A., Cravatte, S. Control of salinity on the mixed layer depth in the world ocean: 2. Tropical areas (2007) *Journal of Geophysical Research C: Oceans*, 112 (10), art. no. C10010
- Núñez-Riboni, Ismael, Olaf Boebel, Michel Ollitault, Yuzhu You, Philip L. Richardson and Russ Davis, 2005: Lagrangian circulation of Antarctic Intermediate Water in the subtropical South Atlantic. *Deep-Sea Research II*, 52/3-4 545-564.
- Oke, P. R., M. A. Balmaseda, M. Benkiran, J. A. Cummings, E. Dombrowsky, Y. Fujii, S. Guinehut, G. Larnicol, P. Y. Le Traon, and M. J. Martin, 2009: OBSERVING SYSTEM EVALUATIONS USING GODAE SYSTEMS. *Oceanography*, **22**, 144-153.

- Ollitrault, M. M. Lankhorst, D. Fratantoni, P. Richardson, and W. Zenk, 2006: Zonal intermediate currents in the equatorial Atlantic Ocean. *Geophysical Research Letters*. 33(5), L05605, 000236269100007
- Poulain, P.-M., Barbanti, R., Font, J., Cruzado, A., Millot, C., Gertman, I., Griffa, A., Molcard, A., Rupolo, V., Le Bras, S., De La Villeon, L.P. MedArgo: A drifting profiler program in the Mediterranean Sea (2007) *Ocean Science*, 3 (3), pp. 379-395
- Reverdin, G. P. Blouch, J. Boutin, et al, 2007: Surface salinity measurements – COSMOS 2005 experiment in the Bay of Biscay. *Journal of Atmospheric and Oceanic Technology* 24 (9): 1643-1654.
- Roemmich, D., Boebel, O., Desaubies, Y., Freeland, H., King, B., Le Traon, P.-Y., Molinari, R.L., Owens, W.B., Riser, S., Send, U., Takeuchi, K., Wijffels, S., 2001: Argo - The global Array of profiling floats. pp248-258 In. *Observing the Oceans in the 21st Century*. Eds Chester J Koblinsky and Neville R. Smith. GODAE Project Office, Bureau of Meteorology, Melbourne, Australia. ISBN 0642 70618 2.
- Roemmich, D., Riser, S., Davis, R., Desaubies, Y. Autonomous profiling floats: Workhorse for broad-scale ocean observations (2004) *Marine Technology Society Journal*, 38 (2), pp. 21-29.
- Roemmich, M. Belbeoch, P.J.V. Belchi, H. Freeland, W.J. Gould, F. Grant, M. Ignaszewski, B. King, B. Klein, K.A. Mork, W.B. Owens, S. Pouliquen, M. Ravichandran, S. Riser, A. Sterl, T. Suga, M.-S. Suk, P. Sutton, V. Thierry, P.-Y. LeTraon, S. Wijffels, J. Xu, 2009: Argo: the challenge of continuing 10 years of progress. *Oceanography Magazine*, vol 22, 3, 46-55.
- Sallée, J.B. ; Wienders, N. ; Morrow, R. and Speer, K. Formation of Subantarctic mode water in the Southeastern Indian Ocean, *Ocean Dynamics*, 2006 , 56 , 525-542
- Sallée, J.B; Morrow, R.; Speer, K. Eddy heat diffusion and Subantarctic Mode Water formation, *Geophys. Res. Lett.*, 2008, 35, L05607, doi:10.1029/2007GL032827
- Sallée, J.B., K. Speer, and R. Morrow, 2008: Response of the Antarctic Circumpolar Current to Atmospheric Variability. *Journal of Climate*, 21 (12), 3020-3039.
- Schroeder, K., V. Taillandier, A. Vetrano, and G.P. Gasparini, 2008: The circulation of the western Mediterranean Sea in spring 2005 as inferred from observations and from model outputs. *Deep-Sea Research Part I*, 55 (8), 947-965.
- Skachko, S., Brankart, J.-M., Castruccio, F., Brasseur, P., Verron, J. Improved turbulent air-sea flux bulk parameters for controlling the response of the ocean mixed layer: A sequential data assimilation approach (2009) *Journal of Atmospheric and Oceanic Technology*, 26 (3), pp. 538-555
- Taillandier, V., Griffa, A., Poulain, P.-M., Béranger, K. Assimilation of Argo float positions in the north western Mediterranean Sea and impact on ocean circulation simulations (2006) *Geophysical Research Letters*, 33 (11), art. no. L11604
- Taillandier V, Griffa A, Poulain PM, Béranger K., Assimilation of Argo float positions in a Mediterranean circulation model, *Geophys. Res. Let.* 3, L11604, doi:10.1029/2005GL025552.

- Taillandier V, Griffa A. Implementation of position assimilation for ARGO floats in a realistic Mediterranean Sea OPA model and twin experiment testing, *Ocean Sciences* 2(2), 223-236.
- Taillandier V, Dobricic S., Testor P, Pinardi N, Griffa A, Mortier L, Gasparini GP. Integration of ARGO trajectories in the Mediterranean Forecasting System and impact on the regional analysis of the Western Mediterranean circulation. *Journal of Geophysical Research*, in press.
- Taillandier, V., A. Griffa, A. Molcard, 2006: A variational approach for the reconstruction of regional scale Eulerian velocity fields from Lagrangian data. *OCEAN MODELLING*, 13(1), 1-24
- Thierry, V., E. de Boissésou and H. Mercier, 2008: Interannual variability of the Subpolar Mode Water properties over the Reykjanes Ridge during 1990-2006. *Journal of Geophysical Research*, 113, C04016, doi:10.1029/2007JC004443.
- Treguier, A.M., Hogg, N.G., Maltrud, M., Speer, K., Thierry, V., 2003. The Origin of Deep Zonal Flows in the Brazil Basin. *Journal of Physical Oceanography*, 33, 580-599.
- Vage, K., R. S. Pickart, V. Thierry, G. Reverdin, C. M. Lee, B. Petrie, T. A. Agnew, A. Wong, and M. H. Ribergaard, 2009: Surprising return of deep convection to the subpolar North Atlantic Ocean in winter 2007-2008. *Nature Geoscience*, 2, 67-72.
- Vialard, J., J-P. Duvel, M. McPhaden, P. Bouruet-Aubertot, B. Ward, E. Key, D. Bourras, R. Weller, P. Minnett, A. Weill, C. Cassou, L. Eymard, T. Fristedt, C. Basdevant, Y. Dandoneau, O. Duteil, T. Izumo, C. de Boyer Montégut, S. Masson, F. Marsac, C. Menkes, S. Kennan, 2009, Cirene: Air Sea Interactions in the Seychelles-Chagos thermocline ridge region, *Bull. Am. Met. Soc.*, 90, 45-61.
- Vialard, J., G. Foltz, M. McPhaden, J-P. Duvel and C. de Boyer Montégut, 2008, Strong Indian Ocean sea surface temperature signals associated with the Madden-Julian Oscillation in late 2007 and early 2008, *Geophys. Res. Lett.*, 35, L19608, doi:10.1029/2008GL035238.
- Von Schuckmann, K., F. Gaillard, and P. Y. Le Traon, 2009: Global hydrographic variability patterns during 2003-2008. *Journal of Geophysical Research-Oceans*, 114, 17.
- Wiggert, J.D., J. Vialard, and M.J. Behrenfeld, 2009: Basin-wide modification of dynamical and biogeochemical processes by the Indian Ocean Dipole. In: *Indian Ocean Biogeochemical Processes and Ecological Variability*, J.D. Wiggert, R.R. Hood, S.W.A. Naqvi, S.L. Smith, and K.H. Brink (ed.), American Geophysical Union, Washington, D. C, in press.

### **Other publications**

- Autret, E. and F. Gaillard, 2006 : Use of the analysis system for monitoring the ARGO sensors drifts. *Coriolis newsletter* , 2.
- Autret, E., F. Gaillard, 2004 : Les analyses Coriolis et le suivi climatologique : mise en œuvre sur l'Atlantique Nord. *La lettre Mercator*, 11.
- Benkiran, M. and S. Guinehut, 2006: Impact of the assimilation of Argo data in the Atlantic Mercator Operational Ocean Forecasting System, *Coriolis Newsletter*, 2, 12-14.

- Béranger K, Taupier-Letage I, Alhammoud B, Lellouche J-M, Emelianov M, Mortier L, Millot C, (2007) Analysis of two mesoscale eddies in the southern Ionian and Cretan basins in 2006, CIESM 38e Congress, Istanbul, Turkey, April.
- Béranger K, Testor P, Crépon M (2007) Interannual variability of deep water formation in the Gulf of Lion CIESM 38e Congress, Istanbul, Turkey, April.
- COATANOAN C. V. THIERRY, 2009. Progress in Argo Delayed Mode Quality Control. Coriolis News Letter n°5. January.
- COATANOAN C., P. GALAUP & V. THIERRY, 2006. Delayed Mode Quality Control on the Argo floats. Coriolis Newsletter n°2. February.
- COATANOAN C., 2005. Contrôle qualité temps différé sur les flotteurs Argo au centre de données Coriolis. La Lettre du Sismer n°3
- Forget G., B. Ferron and H. Mercier, 2005: Potentiel du réseau Argo pour la reconstruction de la circulation océanique de l'Atlantique Nord par assimilation 4-D variationnelle. La lettre Mercator, 17.
- Gabaldon, J., F. Gaillard and T. Carval, 2002: Temperature profiles contained in the Coriolis database during its two first years (2000-2001). CLIVAR Exchanges, 25.
- Gaillard, F. and E. Autret, 2005 : Coriolis real-time analysis system : validation over the North-Atlantic. Coriolis , newsletter 1.
- GALAUP P., F. GAILLARD, E. AUTRET , THIERRY V. & C. COATANOAN, 2006. Consistency of the ARGO data set in the North Atlantic. Coriolis News Letter n°3. July
- Guinehut, S., G. Larnicol, and P.-Y. Le Traon, 2000: Design of an array of profiling floats in the North Atlantic from model simulations - Preliminary results -, CLIVAR Exchanges Newsletter, 5 (3), 6-8.
- Guinehut, S. and G. Larnicol, 2003: Utilisation combinée des données satellites (SLA, SST) et in-situ pour l'estimation des champs de température de l'Océan Atlantique Nord, MERCATOR Newsletter, 10, 11-16.
- Guinehut, S., G. Larnicol and P.-Y. Le Traon, 2003: Combining Argo and remote-sensing data in the North Atlantic, Argonautics: Newsletter of the international ARGO project, 2, 2-4.
- Guinehut, S., 2008: When satellite altimetry is called for to help on Argo quality control issues, Argonautics: Newsletter of the international ARGO project, 10.
- Guinehut, S., 2009: When satellite altimetry is called for to help on Argo quality control issues, Coriolis Newsletter, 5, 13-14.
- Henocq, C., J. Boutin, F. Petitcolin, S. Arnault, P. Lattes, 2008: Vertical variability of Sea Surface Salinity and influence on L-band brightness temperature. International Geoscience and Remote Sensing Symposium (IGARSS), art. no. 4422966, pp. 990-993.

Larnicol, G., S. Guinehut, M.-H. Rio, M. Drevillon, Y. Faugere and G. Nicolas, 2006: The Global Observed Ocean Products of the French Mercator project, Proceedings of 15 Years of progress in Radar Altimetry Symposium, ESA Special Publication, *SP-614*.

PERTUISOT C., E. BRION & C. COATANOAN, 2009. IN-SITU Delayed Mode at the Coriolis Data Center : 1990-2007 Reference dataset. Coriolis News Letter n°5. January

von Schuckmann, K., F. Gaillard and P-Y. Le Traon, 2009 : Estimating global Ocean indicators from a gridded hydrographic field during 2003-2008 . Mercator Newsletter.

### **Reports**

Autret, E. and F. Gaillard, 2004 : Systèmes d'analyse des champs de température et de salinité mis en œuvre au centre de données CORIOLIS. Version 3. Document CORIOLIS – cordo-zzz-04-009.

Autret E et. Gaillard F., 2004: Système opérationnel d'analyse des champs de température et de salinité mis en oeuvre au centre de données Coriolis. Version 3.02. Rapport Coriolis cordo-zzz-04-094.

Autret, E. and F. Gaillard: Diagnostics on residuals and sensor drifts estimates. MERSEA Del. 3.6.4. Ref : IFR-STR-003. Janvier 2006.

Billant A., H. Mercier, 2002: Contribution à l'évaluation des la métrologie des profileurs PROVOR CT-F2, Rapport interne DRO/DOPS/LPO 0é-13.

Billant A., 2003: Complément à l'évaluation des la métrologie des profileurs PROVOR CT-F2, Rapport interne DRO/DOPS/LPO 03-03.

Charraudeau R. et F. Gaillard, 2007 : Bilan du contrôle qualité effectué lors de la préparation de l'analyse ISAS-V4. Rapport interne LPO 07-08.

Charraudeau, R. , Gaillard, F.: ISAS-V4, Mise en place de la configuration. Rapport LPO-07-09.

David N., 2007 : Traitement en temps différé des flotteurs Argo des campagnes Ovide04 et Ovide06. Rapport de Projet de Fin d'Etude ENSIETA, Encadrement V. Thierry.

Gabalton, F. Gaillard, T. Carval : Evaluation of the Coriolis data base, first analysis for year 200-2001. Rapport Coriolis, mai 2002

Gaillard, F. :Synthesis of indicators over the gloal ocean: Data/model comparison. MERSEA del. 5.4.8. July 2008.

Gaillard, F. and R. Charraudau: ISAS-V4: Organisation et mise en oeuvre. Rapport LPO-08-02.

Gaillard, F. and R. Charraudeau: ISAS-V4.1b: Description of the method and user manual. Rapport LPO 08-03

Gaillard, F. and R. Charraudeau: New climatology and statistics over the global ocean. MERSEA del. 5.4.7. June 2008.

Gaillard, F. et E. Autret : Climatologie et statistique de l'Atlantique Nord. Projet GMMC 2003. Septembre 2006.

Gaillard, F.: Collection of new climatologies and statistics over the Atlantic, identification of key data for the physical parameters. MERSEA Del. 5.4.2 (D8.1.2) Ref: [MERSEA-WP05-IFR-STR-0022-00A, April 2007.

Galaup P., 2006 : Contrôle qualité en temps différé des profils Argo en Atlantique Nord. Rapport interne OPS/LPO 06-05.

Galaup, P. F. Gaillard and V. Thierry: Comparison of ARGO profilers corrections with calibrations. MERSEA Del 3.6.6. Ref: CNRS-STR-002, février 2006;

Mattio S., 2007: Fonctionnement à la mer des flotteurs Argo déployés par Coriolis- Bilan 2006. Rapport d'étude du SHOM, n°480 EPSHOM/CIS/IES/NP.

Poulain, P.-M.; Barbanti, R.; Taupier-Letage, I. Comparison between ship-based and Argo CTD profiles in the Eastern Mediterranean Sea (April 2006) - EGITTO . REL. OGS 2007/20 OGA 5 SIRE, Trieste, Italy, 45 pp. 2007 [ Rapporto di ricerca ]

Thierry V. and S. Le Reste, 2009: Surface pressure in the Argo fleet of the Coriolis DAC. CREST Argo projet. LPO report 09-05.

Thierry, V., F. Gaillard, H. Mercier, M. Ollitrault, S. Speich. Avril 2009. Commentaires et recommandations sur le développement de flotteurs profileurs profonds. Rapport LPO 09-04.

### Thesis

Barré, N, 2008: Variabilité de l'océan austral au Passage de Drake à partir de données in situ et satellitales, Thèse de l'Université Pierre et Marie Curie, Paris VI, Paris, France. Encadrement :C. Provost.

De Boissésou E., 2010 : Les eaux modales du gyre subpolaire de l'Atlantique Nord : origine, formation et variabilité. Thèse de l'Université de Bretagne Occidentale, spécialité : océanographie physique, Brest, France. Encadrement : V. Thierry, H. Mercier.

De Boyer Montégut C., 2005 : Couche mélangée océanique et bilan thermohalin de surface dans l'océan Indien Nord. Thèse de l'Université Pierre et Marie Curie, Paris VI, Paris, France. Encadrement : G. Madec.

Forget G., 2004 : Profils Argo et assimilation 4DVAR pour le suivi climatique de l'océan Nord Atlantique. Thèse de l'Université de Bretagne Occidentale, spécialité : océanographie physique, Brest, France. Encadrement : B. Ferron, H. Mercier.

Guinehut, S., 2002: Vers une utilisation combinée des données altimétriques et des mesures des flotteurs profilants. Thesis, Toulouse University, France.

Hénocq C., 2009 : Préparation de l'étalonnage et de la validation des mesures de salinité SMOS : de l'influence de la stratification verticale de la salinité. Thèse de l'Université Pierre et Marie Curie, Paris VI, Paris, France. Encadrement : J. Boutin.

Sallée J.-B., 2007: Les eaux modales de l'océan Austral. Thèse de l'Université III Paul Sabatier, spécialité : océanographie physique, Toulouse, France. Encadrement R. Morrow.

Tanguy, Y (thèse en cours) : Variabilité des transferts océaniques en Atlantique tropical (ARAMIS).  
Thèse de l'Université Pierre et Marie Curie, Paris VI, Paris, France. Encadrement : S. Arnault.

Wade M., (thèse en cours) : Caractérisation des couches limites atmosphériques et océaniques lors des expériences EGEE/AMMA. Thèse de l'Université III Paul Sabatier, spécialité : océanographie physique, Toulouse, France. Encadrement : Yves du Penhoat et Guy Caniaux (Meteo-France)