Euro-Argo:

European contribution to worldwide ocean monitoring

2007 - 2012

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Euro-Argo: A new European Research Infrastructure

Coordinator: Ifremer

Institut Français de Recherche pour l'Exploitation de la Mer - France



Outline

- Argo & Euro-Argo
- The New European Research
 infrastructure:
 - Euro-Argo Preparatory Phase
 - The future long-term organization of Euro-Argo: European Research Infrastructure Consortium (ERIC)







• Euro-Argo array is the European component of a world wide in situ global ocean observing system (Argo), based on autonomous profiling floats.

• The Argo objective is to develop a global array of floats throughout the ice-free areas of the deep ocean (about 3,000 floats).

• The floats are battery powered, with a design life of between 3/4 to 5 years \rightarrow about 800 floats must be deployed per year to maintain the target array.

• The data are transmitted in real time by satellite to data centres for processing, management, and distribution.



Argo & Euro-Argo



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Argo global ocean monitoring using profiling autonomous floats



Argo & Euro-Argo

Argo profiling floats : PROVOR, ARVOR, APEX, NEMO



Near real time data (every 5 or 10 days):



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Pressure, temperature, conductivity (salinity) Oxygen, chlorophyll, turbidity, etc. Medium cost (15-20 K€) Long-lived (> 3 years) Argos or Iridium data telemetry

eld:

The Argo global ocean observatory (> 3000 floats) 555 European floats (17%)

Argo & Euro-Argo

OIC





Argo in European Marginal Seas: Mediterranean and Black Sea (20 floats)

Argo & Euro-Argo

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MEDARGO FLOAT POSITIONS AS OF 13-Oct-2011



Euro-Argo Preparatory Phase (January 2008 - June 2011) (Budget: €3M)



FP7 project. New European research infrastructure (RI) (ESFRI roadmap)

Objectives :

- Undertake the work needed to ensure that Europe will be able to:
 - Deploy, maintain and operate an array of 800 floats. This will require Europe to deploy 250 floats per annum worldwide.
 - Continue to provide a world-class service to the research (climate) and operational oceanography (GMES Marine Core Service) communities.



see http://www.euro-argo.eu/

Argo contribution to climate change research



T and S large scale variations







Change in ocean heat content (Watts/m²) from 2003 to 2007 derived from Argo data





Source: http://www.euro-argo.eu/

Operational monitoring systems GMES Marine Core Service (MCS)



Combining in situ and satellite data, with models to deliver regular and systematic reference information on the state of the oceans and regional seas

Argo is an essential/critical component of GMES MCS



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- Physical state of the ocean, and primary ecosystem
- For global ocean, and main European basins and seas
- Large and basin scale ; mesoscale physics
- Hindcast, Nowcast, Forecast
- Data, Assimilation and Models



Euro Argo Preparatory Phase partnership 12 countries, 15 partners

- <u>France:</u> IFREMER (representing the multiagency Coriolis project) + SHOM
- <u>Germany:</u> BSH + Konsortium Deutsche Meeresforschung (KDM)

Ifremer

Met Office

- <u>UK : Met Office and</u> NERC.
- <u>Netherlands</u>: KNMI
- <u>Spain:</u> IEO
- <u>Italy:</u> OGS



- <u>Greece</u> : HCMR
- <u>Bulgaria</u> : USOF
- Ireland: Marine Institute

<u>Norway</u> : IMR

- Portugal : FCCUL
- <u>Poland</u> : IOPAS



Euro-Argo PP specific goals

- Develop/consolidate long term national plans for Euro-Argo and attract new countries.
- Maintain links with GMES Marine Core Service MyOcean project.
- Work on the development of a **long term EC funding** (10-20 years)
- Continue technical developments and improvements of the Argo data system.
- Test new float technology : Arvor-Iridium, Argos3, Sea Ice and O2 sensors
- Strengthening the user community in Europe (user meetings)



Education and capacity building (educational WWW site, training)
 e-IRG Workshop, Poznan Poland, 12-13 October 2011



The Euro-Argo long term RI

The RI will comprise :

□ A central facility (Central RI) at Ifremer, Brest, France

Distributed national facilities (as of today but with coordination via the C-RI)

Floats will be procured through the C-RI and through national facilities

The Central RI will be a European legal entity (Euro-Argo ERIC):

Provides the overall coordination for the programme and organizes and distributes the work in the national facilities





Status

- Start of the ERIC: 1 January 2012 (our objective).
- Full members \rightarrow annual membership dues: \in 20K or \in 30K , + 3 floats
- Observers → annual observer dues: €10K
- Contribution of different countries defined:
 - Float procurement (global, regional)
 - Deployment capabilites
 - Contribution to the data processing system (delayed mode QC)
 - Contribution to the international structure



Euro-Argo Funding Given existing national contributions (from 4 to 5 Meuros/year), a direct EC funding (GMES, DG Research) of 3.3 Meuros/year is necessary.

Category	Member States	EC	TOTAL
Float procurement			
Global	1400	1400	2800
Regional	850		850
Operations			
Telecommunications	160	160	320
Personnel for management/coordination	500		500
Personnel for technical/logistic support	600		600
Misc (e.g. freighting)	50		50
Equipment and consumables	50		50
Dedicated ship time		300	300
Data management (part of GMES Marine Core			
Service)			
Personnel	950	950	1900
Equipment, other	50	50	100
Euro-Argo central infrastructure (CI)			
Personnel for management/coordination	200		200
Personnel for technical/logistic support		300	300
Missions (users workshops, board, council), equipment,	50	50	100
etc			
International infrastructure support			
Support to Argo Information Centre		40	40
Support for Argo Project Office/Director		30	30
Total without MCS	3850	2280	6140
Total with MCS	4860	3280	8140



Euro-Argo European Research Infrastructure Consortium (ERIC) Why a European Research Infrastructure ?

- Maintenance and evolution of the system requires high level of cooperation between European partners
- Efficiency in all aspects of implementation:
 - Operations at sea
 - Organize float procurement and coordinate float deployments
 - Array performance monitoring and evolution (array design, sampling strategy)
 - Scientific/technological developments
 - Facilitate data access for user
 - Coordinate the European contribution to the international management of the Argo programme.



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Sampling strategy for the Mediterranean Sea and the Black Sea

(Poulain et al., 2009 - Quadfasel, 2010)



Figure 23. Proposed minimum distribution of the float array in the Mediterranean and Black Seas for the continuation of the Argo project. Numbers indicate the quantity of proposed floats in the sub-basins.





ARGOS-3 TELEMETRY

- System onboard 1 satellite
- 2 floats (Arvor)
- 2-way communication
- 10-15 data messages (32 bytes each). 10 times faster than Argos-2 (4.8 kb/s)



• wait for satellite passage



IRIDIUM TELEMETRY

- 66 satellites constellation
- 5 floats (Arvor)
- 2-way communication
- 4 data messages (200 bytes each)
- complete coverage



Facilitate data access to users

DORII project \rightarrow Grid portal (VCR) and data managment

 Use the grid e-infrastructure to get access to MedArgo float historical data in order to check technical parameters and plot T/S profiles

www.dorii.eu





Facilitate data access to users Virtual Control Room \rightarrow Float managment

Multipurpose Cooperative Environment -	Mozilla Firefox	Elect 952/4 TellBarchive
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What kind of e-Infrastructure could be required to support the management of the MedArgo network of profiling float?

Development of a scientific and technical operational application aimed at the instrumentation remote control, deployment strategy and data management:

• <u>decision support</u> (where/when to deploy a float if a specified sea area results not covered by the instruments due to technical failures, battery exhaustion or ocean currents)

• <u>mission management</u> (the next generation of floats will be equipped with a bi-directional transmission protocol, that will give the user the possibility to remotely control and change the mission parameters, e.g. parking depth, transmission cycle)

www.dorii.eu

Users will be allowed to operate over selected databases:

Statistics can thus be computed automatically on-demand





Euro-Argo Web site: www.euro-argo.eu



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