Optimizing and Enhancing the Integrated Atlantic Ocean Observing System

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Budget: 21 Mio. Euros in 4 years
Coordinator: GEOMAR; Partner: 62

Horizon 2020 call BG-8-2014: Developing in-situ Atlantic Ocean Observations for a better management and sustainable exploitation of the maritime resources.

The project: AtlantOS is a research and innovation project that proposes the integration of ocean observing activates across all disciplines for the Atlantic, considering European as well as non-European partners.

Goal: Integration of the so far loosely-coordinated set of existing ocean observing activities to a more sustainable, more efficient, and fit-for-purpose Integrated Atlantic Ocean Observing System.
EU Marine Research Institutes
Multiinstitutional Organisations

International Partners
Private Sector

- Tellab
- Blue Lobster
- Develologic
- Daithi O’Murchu Marine Research Station
- ETT
- RiboCon
- Contros Systems & Solutions GmbH
- Bruncin
- Acri ST
- CLU
- Nke Instrumentation
- Maris
Why do we need more ocean observations?

Who are our partners in Atlantic Observing?

What frameworks can we build on?

www.atlantos-h2020.eu
Ocean and Climate
Life in the Ocean
Deep Sea
Marine Services
Proposed goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Targets are discussed and agreed to by the nations.

How to measure progress against targets?

The need to derive indicators building on a smart index framework, based on reliable open access ocean information.
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Galway Statement on Atlantic Ocean Cooperation

The European Union, the United States and Canada agreed to join forces on Atlantic Ocean research. The agreement focuses on aligning the ocean observation efforts of the three partners.

The goals are to better understand the Atlantic Ocean and to promote the sustainable management of its resources. The work will also study the interplay of the Atlantic Ocean with the Arctic Ocean, particularly with regards to climate change.
Contribution to GEO
Contribution to GEO
Why do we need more ocean observations?

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Future of Sustained Observations

- OceanObs’ 09 identified tremendous opportunities, significant challenges

- Called for a framework for planning and moving forward with an enhanced global sustained ocean observing system over the next decade, integrating new physical, biogeochemical, biological observations while sustaining present observations
Framework for Ocean Observing
A simple system

Input (Requirements)

Process (Observations)

Output (Data & Products)

http://www.oceanobs09.net/foo/
Driven by requirements, negotiated with feasibility in mind

Essential Ocean Variables

- We cannot measure everything, nor do we need to
- basis for including new elements of the system, for expressing requirements at a high level
- Driven by requirements, negotiated with feasibility
- Allows for innovation in the observing system over time

http://www.oceanobs09.net/foo/
Towards sustained system: requirements, observations, data management

Readiness

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Concept

Attributes:
Peer review of ideas and studies at science, engineering, and data management community level.

Pilot

Attributes:
Planning, negotiating, testing, and approval within appropriate local, regional, global arenas.

Mature

Attributes:
Products of the global ocean observing system are well understood, documented, consistently available, and of societal benefit.

More Research

More Operations
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Global to Regional to Coastal

- Time: Centuries, Decadal, Inter-annual, Seasonal, Daily, Hourly
- Space: 1Km², Regional/10⁶ Km², Ocean basin, Globe

- Coastal: Subsea observatories, Ship Time Series, Gliders, Ferrybox, HF Radars, VOS Surface Data, Floats, Moored Time Series, In network
- Regional: Repeat Trans-Basin Sections, VOS Surface Data, Remote Sensing
- Global: Subsea observatories, Ship Time Series, Gliders, Ferrybox, HF Radars, VOS Surface Data, Floats, Moored Time Series, In network
Scientific Missions
- SMOS
- Swarm
- GOCE
- CryoSat-2
- ADM-Aeolus
- EarthCARE

Operational Missions
- MSG
- Sentinel 1
- MetOp
- Sentinel 2
- Sentinel 3
- Sentinel 4
- Sentinel 5
- ERS-1
- ERS-2
- ENVISAT
Integrated system designed to meet many requirements:

- Climate
- Weather prediction
- Global and coastal ocean prediction
- Marine hazards warning
- Transportation
- Marine environment and ecosystem monitoring
- Naval applications
- 8 of 9 Societal Benefits

- Tide gauge stations
- Drifting Buoys
- Tropical Moored Buoys
- Profiling Floats
- Ships of Opportunity
- Ocean Reference Stations
- Ocean Carbon Networks

- Dedicated Ship Support
- Data & Assimilation Subsystems
- Management and Product Delivery
- Satellites -- SST, Surface Topography, Wind, Color, Sea Ice
Operational oceanography and ocean and climate change research rely on an integrated sustained multidisciplinary observing system.
AtlantOS Work Packages

WP1: Observing system requirements and design studies
WP2: Enhancement of ship-based observing networks
WP3: Enhancement of autonomous observing networks
WP4: Interfaces with coastal ocean observing systems
WP5: Integrated regional observing systems
WP6: Cross-cutting issues and emerging networks
WP7: Data flow and data integration
WP8: Societal benefits from observing/information systems
WP9: System evaluation and sustainability
WP10: Engagement, Dissemination and Communication
WP11: Management

13 EU countries (DE, UK, IE, DK, FR, PL, NO, ES, PT, NL, BE, IT, HR) participating in AtlantOS and 5 (CA, US, BR, SA, FO) non-EU countries
Highest level objective for all WPs

to carry out the research and innovation needed to deliver the framework and tools for a fit-for-purpose, efficient, integrated and sustainable Integrated Atlantic Ocean Observing System – leaving a legacy for GEO/GEOSS and GOOS

- Achieve a significant change in planning, observations, data systems, and leave a legacy for the countries around the basin
- Steering a voluntary collaboration of investment two orders of magnitude greater than that in the project itself
WP1 Observing System requirements and design studies

Objectives:

- **Requirements** – identification of major societal challenges requiring sustained observations, and scientifically rigorous requirements for Essential Ocean Variables

- **Evaluation** - gap analysis, assessing capacity and feasibility (technical readiness, cost and sustainability by funding agencies)

- **Design studies** – using models in OSSEs to guide scientific design -> feeding into compromise systems design

Strong links to WP 9 (for evaluation), 10 (for stakeholder engagement / sustainability)
WP1 Observing System requirements and design studies

Essential Ocean Variables

- We can not measure everything nor do we need to
- Including new variables is driven by requirements, negotiated with feasibility
- Allows for information in the observing system over time
WP2 Enhancement of ship-based observing networks

Objectives:

• Enhance, coordinate and support vessel-based observations – including programs like Go-Ship and others

• Enhance delivery of biochemical and ecological variables using new technology

• Improve the fish survey data availability

• Integrate the national European deep seafloor mapping results and enhance the accessibility of sea floor data
WP3 Autonomous observing networks

Objectives:

• Network enhancement: quantitative and qualitative improvement of measurements
• Data flux: format requirements and accessibility
• Network sustainability beyond AtlantOS
WP3 Autonomous observing networks

Autonomous observing networks:

1. Argo (ERIC Euro-Argo)
2. OceanSites
   - Network of fixed point biogeochemical observatories
   - Pirata mooring Array
   - Transport Mooring Array
3. Glider network
4. Surface Drifters
5. European Animal Telemetry Network
WP4 Interfaces with costal ocean observing systems

Objectives:

• Conduct gap analysis for the connection between costal and deep ocean networks
• Optimize shelf sampling over seasonal timescales
• Strengthen access to sea level data networks
• Share best practice
WP5 Integrated regional observing systems

Objectives:

• Optimize the regional observing systems
• Application of regional ocean observing: climate and ecosystem
• Regional Observing system simulation experiments and process modelling

Showcase the power of integrated trans-Atlantic observing to provide information necessary to cope with global challenges such as climate change, increased pressures on natural resources, and global-scale hazards
WP6 Cross cutting issues and emerging networks

Objectives:

• Coordination and integration of existing instrumentation and sensor development
• Common metrology and best practice
• Coordinating testing, deployment, maintenance and operation of the Integr. Atlantic Ocean Observing System infrastructure
• Maximizing international collaboration and dissemination of observing system best practices
• Development of new and emerging observational activities
WP7 Data flow and data integration

Objectives:

• Data harmonization with data providers
• Integration and dissemination with users
WP7 Data flow and data integration

Towards and integrated data system

Integration

Data exchange backbone

Standardization between networks from acquisition to service to users

Users

Improvement of existing synthesis

Impact on Copernicus Marine Service
WP8 Societal benefits from observing/information systems

Objectives:

- Demonstrate the value and societal benefit of the existing observing systems
- Integrate data from the Copernicus Marine Service and EMODnet – produce decision support tools
- Produce data adequacy reports from the different pilot actions
WP8 Pilot Actions

- HABs
- Coastal flooding
- Ship routing
- Oil Spills
- Offshore aquaculture
- Tuna modelling
- MSFD
- POGO-AtlantOS collaboration

Coordination
WP9 System evaluation and sustainability

Objectives:

• Provide quantitative and near real time information of the state of the in-situ Atlantic Observing System

• Analyze and properly document for each EOV the adequacy of the current observing and information system

• Develop a long-term sustainability plan for Integrated Atlantic Ocean Observing Systems
WP9 Engagement, Communication and Dissemination

Main Objectives:
- Develop a results-oriented dialogue with key stakeholders communities to enable a meaningful exchange between the products and services that Integrated Atlantic Ocean Observation Systems can deliver and the demands and needs of the stakeholder communities

Services:
- AtlantOS Engagement and Communication Strategy
- Data dissemination and exploitation
- Science – Policy engagement
- Communicating project results
AtlantOS structure
62 Partners, 20.7 M€

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Outcome:
Blueprint to be ready for OceanObs19

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