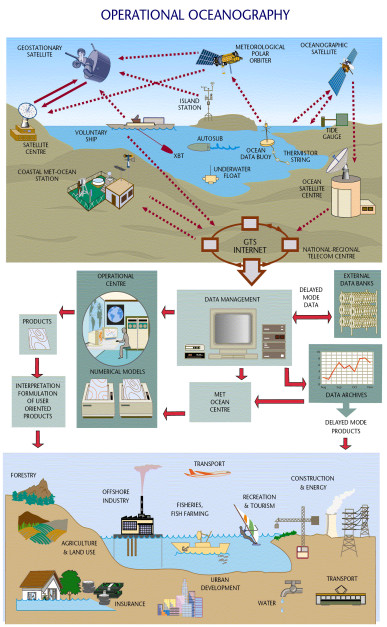
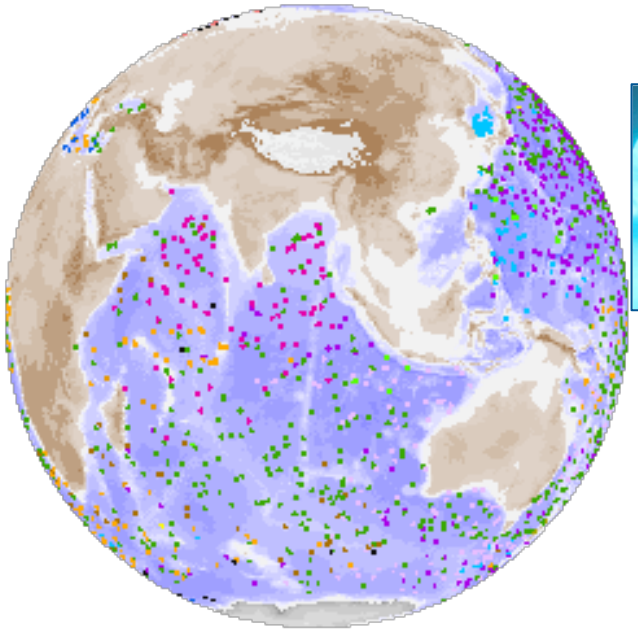
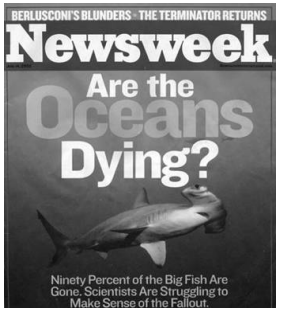
Summary – **Environment**, with focus on

Marine Research Infrastructures

- An overview of the questions/objectives;
- An overview of main cross-cutting themes discussed;
- An overview of main recommendations.







IRI 2014
International Conference on Research Infrastructures

Speakers Marine Research Infrastructures

Chair

Maria UHLE
Director for International Activities, GeoSciences Directorate, (NSF), United States

Rapporteur

Barak HERUT
Director General, Israel Oceanographic & Limnological Research Ltd (IOLR), Israel

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Scientific Coordinator, Royal Swedish Academy of Sciences/Göteborg University/ Sweden

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Donatella CASTELLI
iMarine Project Director, Information Science &Technologies Institute, Italian National Research Council (ISTI-CNR), Italy

Kostas NITTIS
Secretary General, European Global Ocean Observing System (EuroGOOS), Association Internationale Sans But Lucratif (AISBL)

Ian WRIGHT
Director, National Oceanography Centre (NOC), Science and Technology Directorate, United Kingdom

Gelsomina PAPPALARDO
Senior researcher, National Research Council (CNR), Italy

Peter HAUGAN
Professor, Geophysical Institute, University of Bergen, Norway

Terry CALLAGHAN
Professor, Royal Swedish Academy of Sciences, Sweden

Sigi GRUBER
Head of the Marine Resources Unit, Directorate General for Research and Innovation, European Commission (EC)

Nicole BIEBOW
Head of International Cooperation Unit, Alfred-Wegener-Institut, Helmholtz Zentrum für Polar- und Meeresforschung, Germany

John GUNN
Chief Executive Officer, Australian Institute of Marine Science (AIMS), Australia

Speakers – expertise in different disciplines: oceanography, marine biology, geology, terrestrial, information science & technology, scientific directors, CEOs, international cooperation, funding – head EU marine resources

IRI 2014
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The following Questions/Objectives were discussed

- How to address the complexity of the marine system through current and future RIs. Suggest mechanisms to improve the resolution: spatial, temporal, type of parameters, extreme events and integration.
- How to promote international collaboration (connectivity, access) in the use of marine infrastructures. Identify barriers and suggest mechanisms to overcome those barriers.

- How to maximize the impacts of MRIs products.
- How to promote data sharing and harmonization.
- How to ensure standardization and QC/QA across MRIs.
- How to link MRIs to the atmospheric and terrestrial domains.
- How to develop a funding policy.

Overview of the cross-cutting themes

MRIs
Marine Research Infrastructures

- Science driven
- Societal driven

Balance between these

- Cover global, regional and local scales
- Cover natural and anthropogenic variability (incl. extreme events)
- Integrated between disciplines
- Linked to terrestrial and atmosphere domains

- Data sharing at all scales, connectivity
- Exchange programs/activities

- Long-term funding and commitment
- Develop a funding policy

Recommendations

- Build on existing **successful** RIs wherever possible; **develop** new RIs that are needed to address emerging scientific and societal challenges.
- More robust **linkages between all types of MRIs** (ships, stations, mesocosms, autonomous: Gilders/ Floats/AUVs etc.) is needed, which will basically a network of networks (e.g. expansion of GOOS, WAMS).
- The **Arctic** has its own set of challenges which can overcome through **global cooperation**. No one country is able to support the infrastructure need to understand the Arctic.

Recommendations

- The marine science community needs to make the public and decision makers more **aware of the relevance of the science to daily life and human wellbeing**. The marine community should be **more pro-active in providing more concrete solutions to address critical issues** (reduce the complexity of the message to the public and politicians) **by working in partnership** with decision makers to prioritize RQ/RIs.

Recommendations

- Develop **models and policy for cost-sharing and partnership**.

  The US-Canada and the EU provide a model for joining forces, exchanging best practice, discussing future research priorities and aligning of funding streams through the Atlantic Ocean Research Alliance. Anyone interested can join – it is an open platform.

  Such models should include regional seas like the Mediterranean, Baltic, Black…

Recommendations

- Incredibly important that outreach is coordinated regionally, nationally and internationally, in order to secure and maintain the financial and societal support needed.
- Develop **linking models between marine, terrestrial and atmospheric domains**. Facilitate better linkages between marine, terrestrial and atmospheric domains **through multidisciplinary research collaboration at all scales, local to global**.

Recommendations

- **Marine community needs to come to consensus on the long-term strategic vision for MRIs and a Framework for Ocean Observing, 1st by prioritizing research and societal challenges.** It should be flexible to take advantage of new and emerging needs and technologies where appropriate.

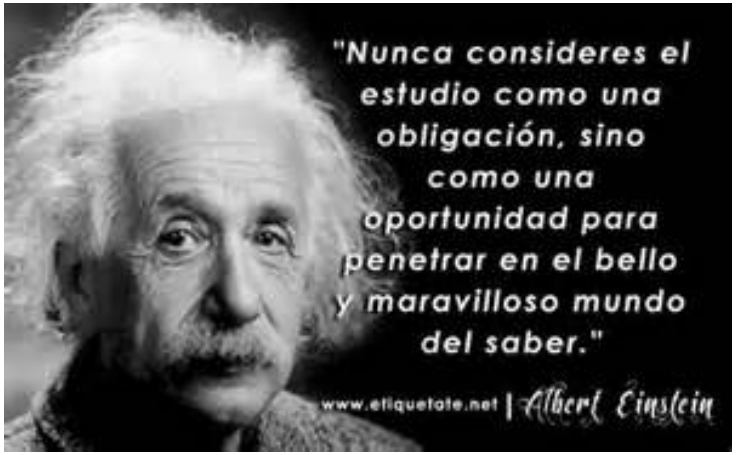
  Is it time for the marine community to do that? Can the marine community or parts of it achieve consensus?

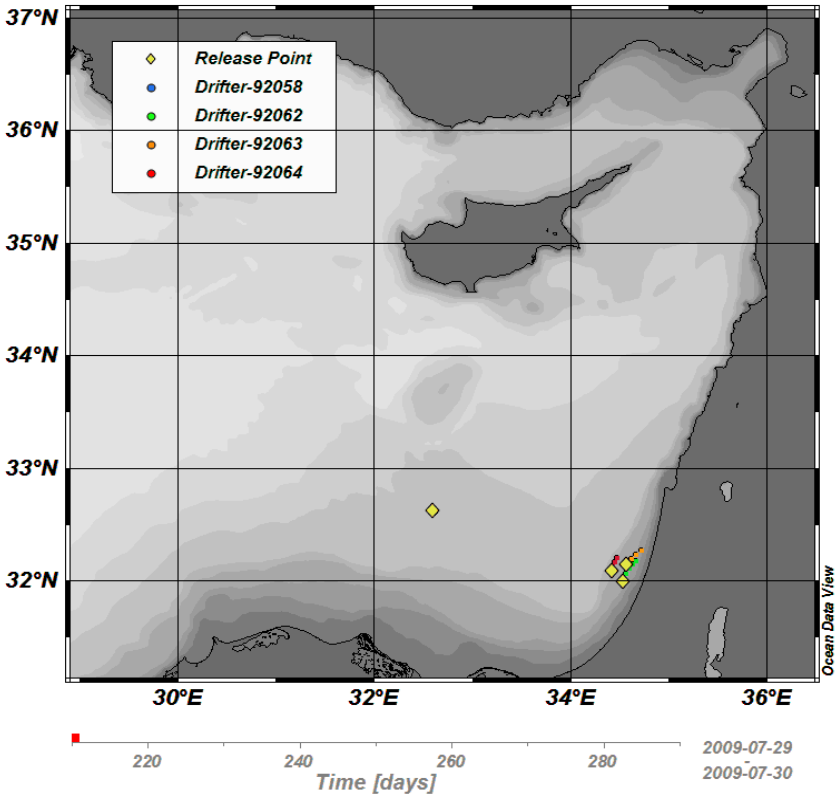
Good Environmental Marine Research Infrastructures and Networking

last Recommendation

Albert Einstein:

"Everything should be made as simple as possible, but not simpler."





Gertman I, IOLR

Michael Thorndyke

- Distribution of MRIs need to **reflect scales of climate change impact** (regional (bio)- (ecosystem)- (geophysical) diversity) and integrate currently fragmented consortia;

- **Use already available networks**:

  ESFRI:
  EMBRC (http://www.embrc.eu/index.php)
  Euro-Argo (http://www.euro-argo.eu/)
  EMSO (http://www.emso-eu.org/management/)
  Marine Station Networks:
  MARS: (http://www.marsnetwork.org/)
  WAMS: (http://www.marsnetwork.org/world-association-marine-stations-wams).

- **MRIs should reflect societal needs** - develop exchange programmes, sharing, training, activities across all categories.

Sara Iverson

- RI development and application **must be science-driven, flexible and adaptable aiming to integrate biological and physical/chemical components and that are of ecological and societal importance**. *(Cost-effective, build on existing "structures", visionary, with opportunities for innovation);*
- There must be fully **national and international commitment** to partnerships and cost-sharing for core infrastructure and its core operation and maintenance personnel. *(Must include data sharing and integration);*
- There must be vision for **long-term funding** of established and successful infrastructure that works to meet global **needs.**

Donatella Castelli

- **Cross-domain collaboration** and data sharing across RIs;
- A **better integration between RIs and e-Infrastructures** is needed;
- **Data sharing** and establishing clear publishing policies.

Ian WRIGHT

- Determine the linkage between natural variability and anthropogenic-induced change within an earth-system context;
- Provide the evidence base to understand interaction between global population growth and impact on oceans by underpinning sustainable exploitation of ocean resources, and mitigating the increasing urbanization of coastal zones;
- Develop marine observing infrastructure systems that have increasingly autonomy characterised by being in situ, instantaneous, intelligent, integrated, and international over all water-depths.

Gelsomina Pappalardo

- **Bring the existing RIs to work together**, to cluster, and ensure that new RIs complete the existing ones;

- **Integrated approaches** to address effectively societal challenges and basic research;

- Reach a better synchronization and **harmonization of funding mechanisms** by cost and data sharing.

Sigi Gruber

- **International Cooperation and governance models** for integrated implementation **of ocean policy**. The Canada-EU-US Atlantic Ocean Research Alliance as an example;
- **Connectivity and interoperability at European and global level,** facilitate data sharing;
- **Use RI to implement EU Strategies and EU Directives** (Integrated Maritime Policy, the Marine Strategy Framework Directive, or the new Approach International Research and Innovation Cooperation.)

Nicole Biebow

- The international polar science community must have **access to world-class marine research infrastructures in the Arctic**. Availability of heavy icebreakers is limited;
- Need for a more cost-effective usage of existing polar research vessels through transnational harmonisation of scientific and ship operational planning; ARICE – the Arctic Research Icebreaker Consortium for Europe aims to **create an international network for joint research icebreaker operations using existing ships**.

John GUNN

- **MRIs oriented to enhance understanding of our oceans** and the need to think at global scales **to ensure the sustainability of ocean ecosystems**, and avert the catastrophic impacts of climate change.
- A Framework for Investment in Global Ocean Observation System Infrastructure – lessons from the past and a blueprint for the future. **Need for a huge collaborative effort globally to build, deploy and operate observing and data infrastructure.**
- Australia's approach to a National Collaborative Research Infrastructure Facility for Ocean Observation - **As a global model**.

Peter M Haugan

- Major **progress in marine science has been technology driven**. The richness of incompletely understood phenomena in the ocean **suggest technology driven science will be the future trend as well**.
- Polar and marine environments are demanding and costly to physically access. **Development and testing of new measurement technologies should be accelerated**.
- **Need for cross-national access to ships and for developing, deploying and servicing distributed observation platforms** like drifting buoys and gliders as well as fixed point observatories.

Terry Callaghan, Margareta Johansson and Morten Rasch

- A key need is to **sustain the long term operation and growth of the network's activities**;
- A need to **develop interfaces and protocols** to enable the infrastructure **to become a rapid response tool for observing and sampling extreme events**, environmental pollution episodes, spread of pathogens and immigration of invasive species;
- A need to **better link the terrestrial with marine and atmospheric domains** and to provide a common forum for data providers and users;
- A need to **close the gap between scales** by developing better interactions between the remote sensing and research station communities and by extending the environmental study footprint of the research stations.

Session on Marine and Arctic Research Infrastructures

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Sigi GRUBER, Head of the Marine Resources Unit, DGRI, European Commission

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