ILICO – A FRENCH RESEARCH INFRASTRUCTURE FOR COASTAL OCEAN AND SEASHORE OBSERVATIONS

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Abstract: ILICO, a French Research Infrastructure (RI) for Coastal Ocean and Nearshore Observations is a notable example of national and pan-institutional efforts to expand knowledge of the complex processes at work within the critical coastal zone in line with the European Ocean Observing System perspective. Providing a forum for its community to work together on priority issues is a challenge, and ILICO's organizational structure and governance is designed accordingly. Future challenges for this RI include the question of whether France's original model of combining both land and nearshore in its study of the coastal domain is transferable to the pan-European context and how far we can go in integrating overseas and ultramarine issues.

Keywords: French national research infrastructure, coastal ocean and seashore, multidisciplinary observation

1. Introduction

ILICO, a French Research Infrastructure for Coastal Ocean and Nearshore Observations is a notable example of national and pan-institutional efforts to expand knowledge of the complex processes at work within the critical coastal zone in line with the European Ocean Observing System perspective.

At the interface between land and sea, ILICO is necessarily multiscale and pluri-disciplinary. It federates complementary distributed observation services (networks) monitoring coastline dynamics, sea level evolution, physical and biogeochemical water properties, coastal water dynamics, phytoplankton and benthos composition and coral reef health in order to address a wide range of scientific questions.

Each network is accredited and receives funding from the French Ministry for Higher Education, Research and Innovation and national public research institutions. In addition to the sustained and long-term nature of its time-series data, ILICO's observation sites have unique geographical coverage spanning both metropolitan coastlines and those of overseas national territories.

Significantly, although its scope is not strictly limited to coastal *marine* systems, ILICO is the French-node of the Joint European Research Infrastructure for Coastal Marine systems (JERICO-RI) led by France. Here we present ILICO's latest advances to (1) federate networks to maximize the return on investment for the community across sites and disciplines (2) foster scientific interactions and integration of its overseas and metropolitan observation practices through the development of multiple-network instrumented sites (3) develop an open data policy, aggregating multisource data to ensure optimal access and re-use by the scientific community, for operational ocean observing and forecasting, and by public authorities and citizens.

ILICO federates nine established observation networks, and these are the essential building blocks of our response strategy.

Table I. ILICO's nine complementary distributed observation networks, 8 accredited as National Observation Systems ('SNO') through a peer-reviewed evaluation process led by the CNRS (France's national agency for basic research) since 1990s.

NETWORK	ESTABLISHED	ESTABLISHED
COAST-HF	2016	Physico-chemical, nutrients, high frequency
CORAIL	1985	Biodiversity (corals, fish…), Physico-chemical (South Pacific) – regional network
DYNALIT	2014	Coastal bathymetry, topography, shoreline position
MOOSE	2008	Bio-physico-chemical, surface currents… (NW Mediterranean) – regional network
PHYTOBS	2016	Phytoplankton diversity
REEFTEMPS	2010	Temperatures (6 to 60m depth) (Pacific, Indian ocean) – regional network
SOMLIT	1996	Bio-physico-chemical parameter
SONEL	2003	Sea level, levelling height
BENTHOBS	Network in incubation (preparing 2022 accreditation)	Benthic macroinvertebrate diversity

The success of the accreditation process was adopted by other national research organisms and is a pan-institutional process. ILICO's main partners include Ifremer, IRD, SHOM, IGN, MNHN and many French universities (not extensive list).

The co-localisation of sampling sites from a number of different networks yields a more holistic picture of local and nested processes at work in the environments ILICO targets to understand. A noteworthy example is the north west Mediterranean region. Not only is the MOOSE regional integrated network focusing observations in this area, but all of ILICO's other metropolitan networks are present in the area.

ILICO is actively fostering the organization of regionally integrated sites.

Another example is ongoing overseas. ILICO's objective for the Hermitage lagoon site on Réunion Island is to design a multi-network integrated site. Three networks (Sonel, Reeftemps and Dynalit) collaborate to equip the site with the goal of understanding the impacts of extreme events. The Hermitage pilot site is a keystone of ILICO's cross-cutting action focusing on Overseas challenges.

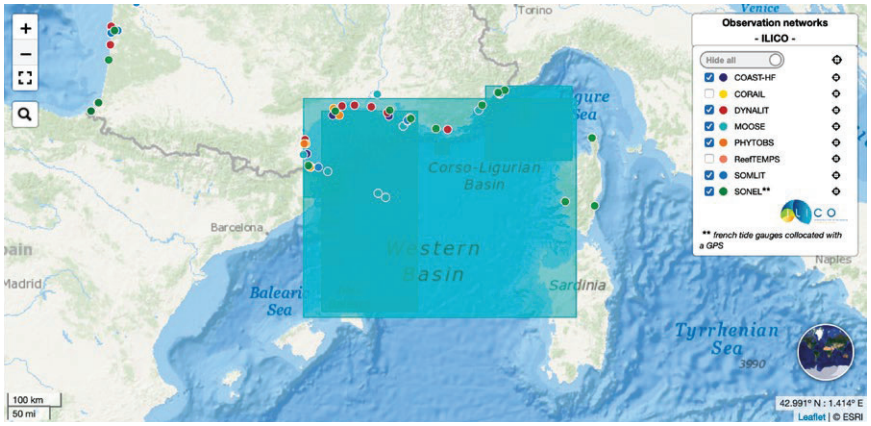

Fig. 1. The north west mediterrenean is a hotspot for ILICO network sampling sites and activities. As well as the dedicated MOOSE network, all other ILICO metropolitan netwroks have sampling sites in the region.

Fig. 2. Hermitage lagoon site, one of ILICO's overseas integrated multiple instrumented pilot sites involving SONEL, DYNALIT and REEFTEMPS networks. Discussions and planning to integrate other networks (such as SOMLIT and CORAIL) are ongoing.

The long-term data series produced facilitate another of ILICOs missions which is to foster interactions between our *in situ* observation community with members of other communities such as modelling, remote sensing, experimental approaches. ILICO's pluri-disciplinary research community, and its members are distributed in over 50 French research laboratories in Metropolitan France and overseas. Providing a forum for its community to work together on priority issues is a challenge, and ILICO's organizational structure and governance is designed accordingly. The strength of this network is to feed scientific synergy and drive 10 working groups on cross cutting priority actions.

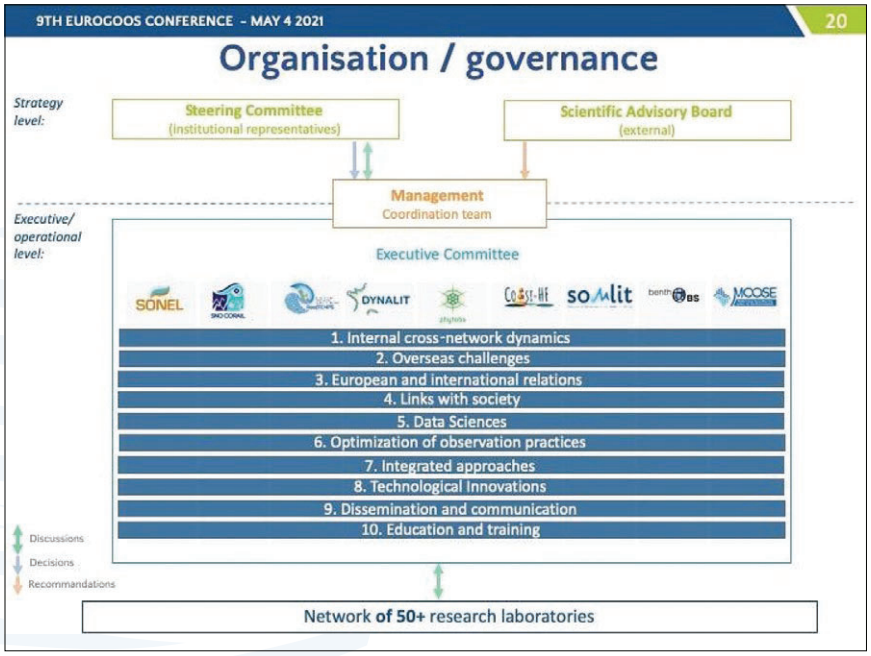

Fig. 3. Organizational structure and governance of the ILICO Research Infrastructure detailing federated observation networks and priority cross cutting actions.

ILICO is the French node of the ESFRI candidate JERICO-RI – the joint European research infrastructure for coastal observatories. ILICO's capacity to integrate a diversity of players and to secure long term resources for observation have helped drive the JERICO initiative. ILICO's principal contributions to JERICO-RI include sharing best practices with other National Research Infrastructures on:

- Integrating a diversity of players;
- Addressing common Key Scientific Challenges;
- Allocating long-term resources to observation.

Further perspectives include the question of whether France's original model of combining both land and nearshore in its study of the coastal domain is transferable to the pan-European context and how far we can go in integrating overseas and ultramarine issues.

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