

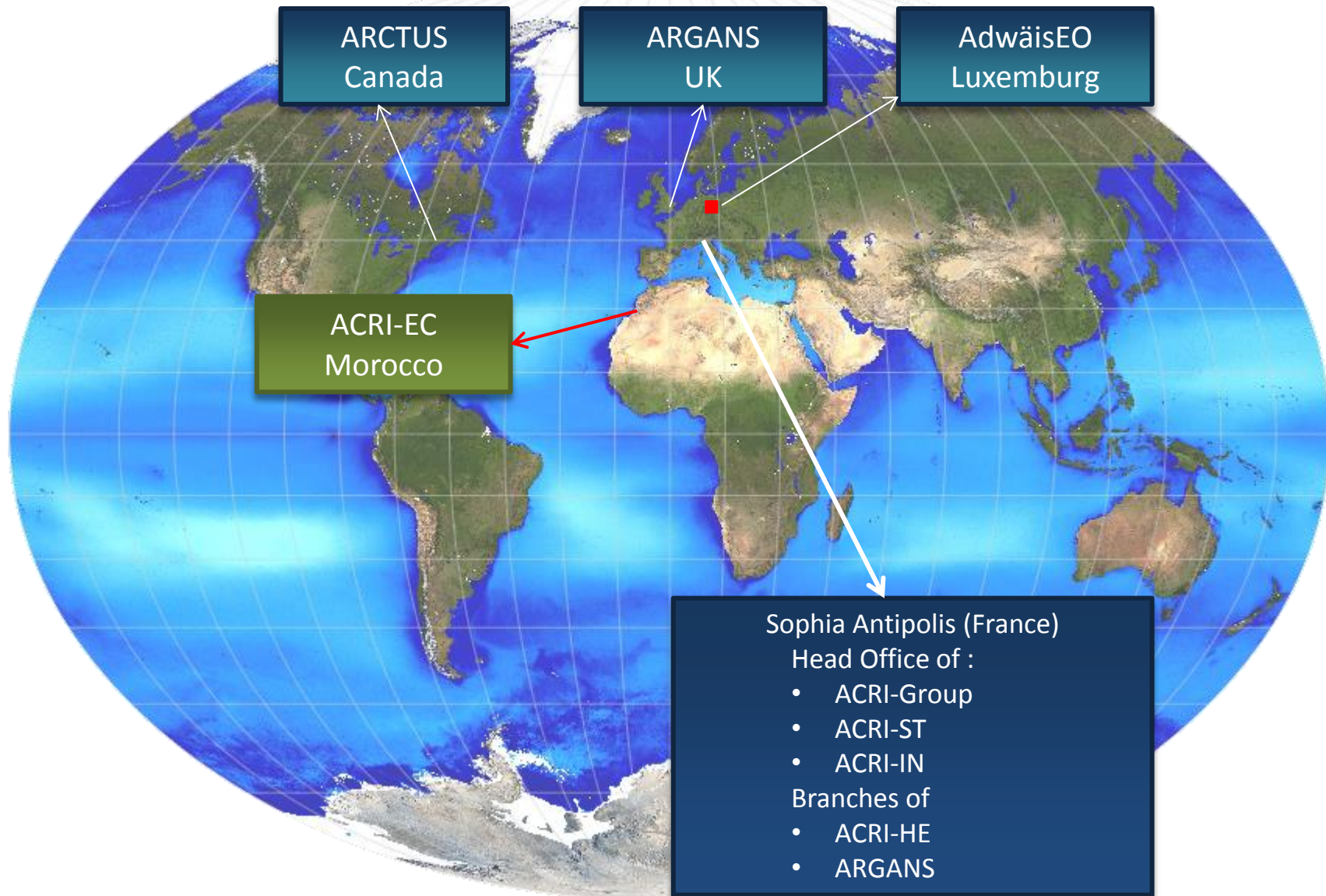
Copernicus in Africa – some initiatives

*Antoine Mangin – ACRI
Provence Alpes Cote d’Azur - France*

ACRI Group

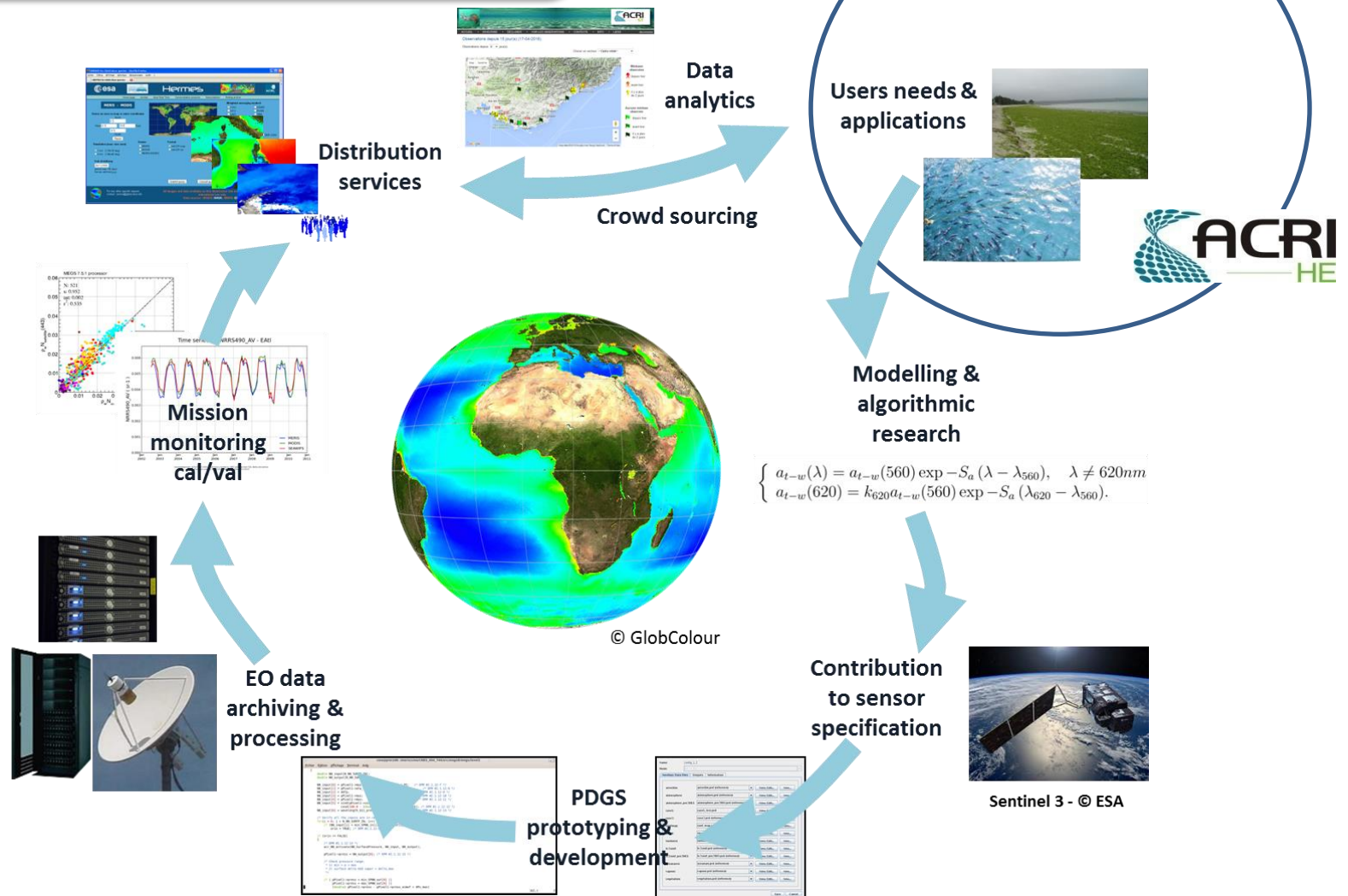
Since 1989

Turnover 2015: 10,3 M€



We play a role in the whole chain

- From sensors measurements' definition
- To production of information of relevance to scientists, policy-makers, economic stakeholders,...



EO export capacity : expandable outside Europe

From local to regional to global

Copernicus : sustainable EO data access

From projects to services

Expertise for EO applications – creation of complementary chain of expertise

From one simple scheme of 1 EO provider for 1 type of users to a more complete and efficient scheme for a collaborative framework of expertise

Also, GEOSS – AfriGEOSS... networking is increasing and larger/easier access to data in Africa

Water quality monitoring – eutrophication of inland water (France, Europe, large lakes in Africa)

Health care and sustainability concern

Promotion of EO uptake for a regional environmental monitoring in the Mediterranean (*support to Marine Strategy Framework Directive and Action Plan for the Med*).

Upscale of environmental protection

Support to Aquaculture & Fisheries

Food/resources/biodiversity sustainability

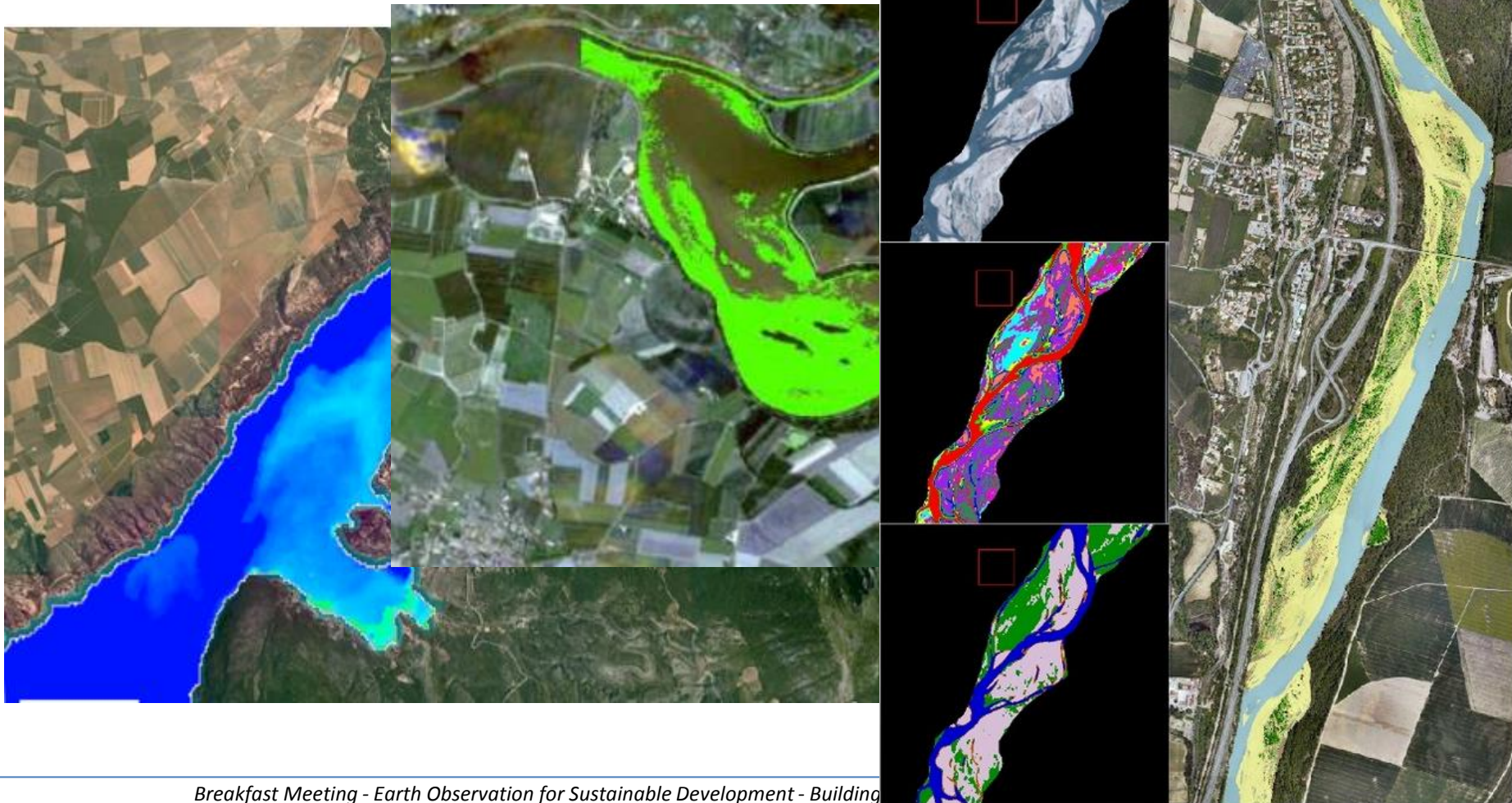
Flood monitoring

How to be prepared and to keep an eye on climate evolution

All these applications can largely benefit from Copernicus

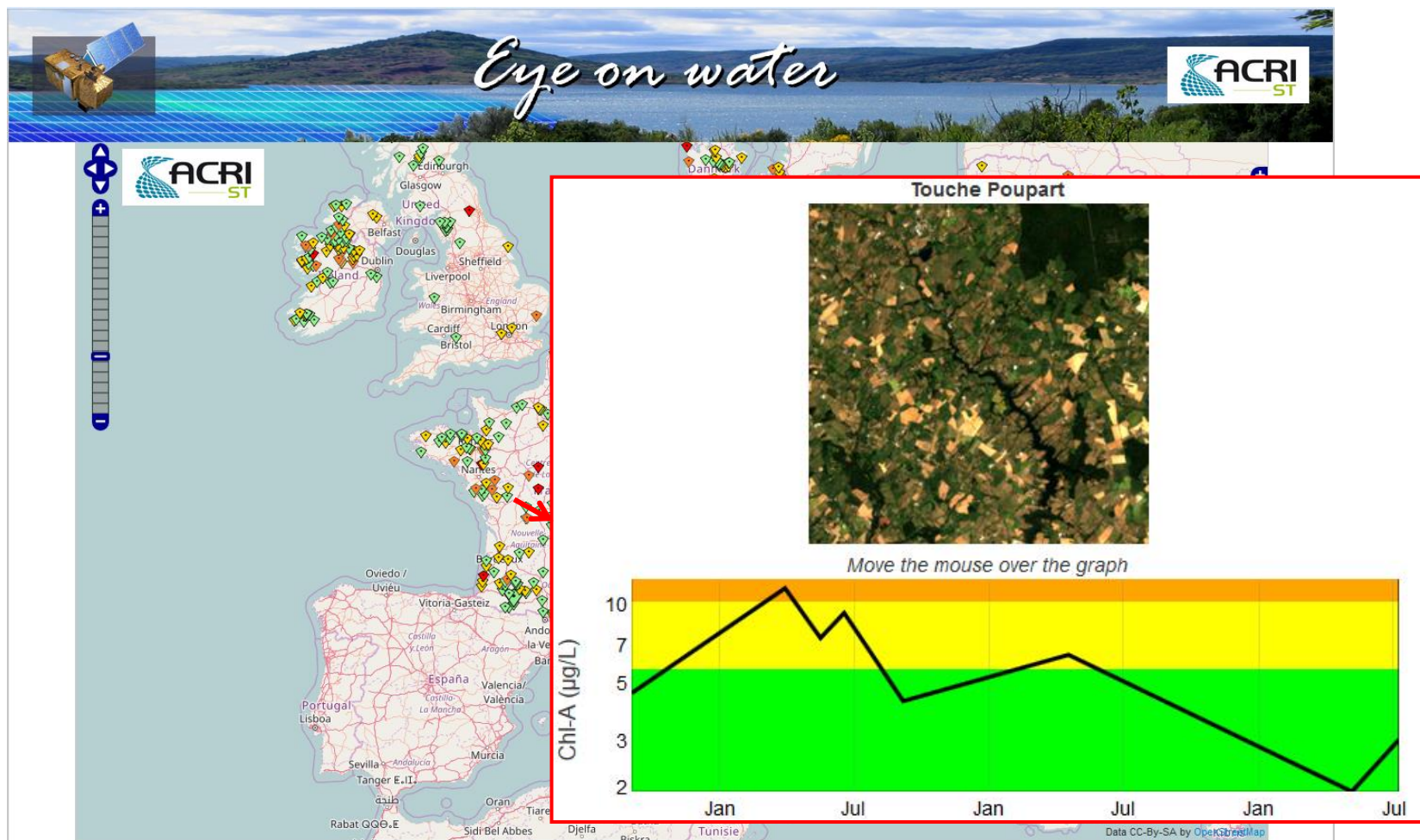
Water quality monitoring – eutrophication of inland water

France (Syrhios project – supported by French ministry of Env.) - Exploitation of Landsat 7/8 in preparation to Copernicus/Sentinel-2 data



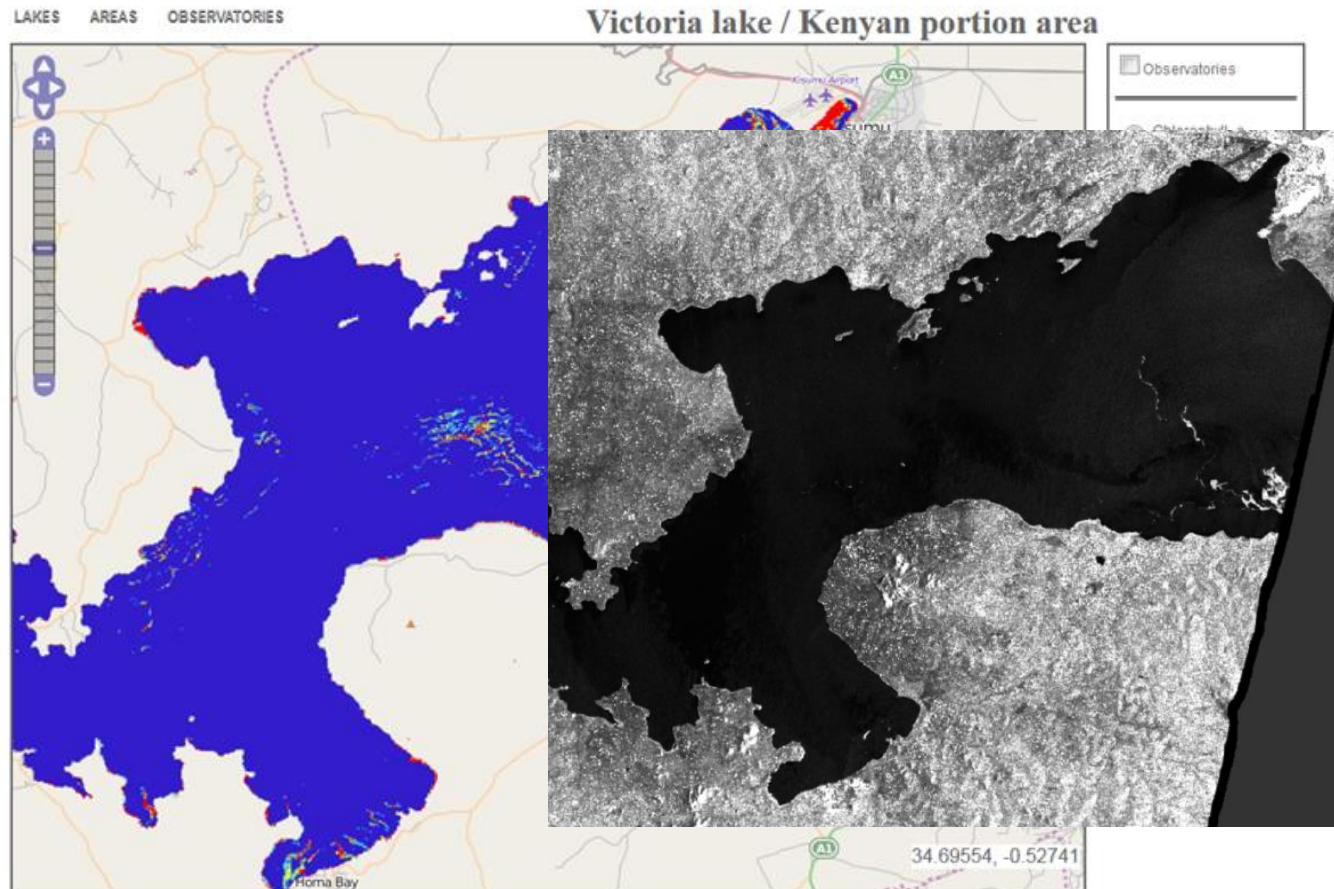
Water quality monitoring – eutrophication of inland water

Europe (Internal funding) - Exploitation of Copernicus/Sentinel-2 data at large scale



Water quality monitoring – eutrophication of inland water

Large lake in Africa – lake Victoria (WB funding through ESA) - Exploitation of Copernicus/Sentinel-1&2



Promotion of EO uptake for a regional environmental monitoring

[FP7-MEDINA](#) project (Marine ecosystem dynamics and indicators for North Africa) led by Università Ca' Foscari Venezia, Venice.

Enhance **North African** countries' monitoring capacity of their marine coastal ecosystems and to comply with the environmental reporting duties (MSFD, MAP(EcAp)...))

This includes fish stock resources, and consequently their capacity to implement environmental policies and protocols.

Consortium members identified a subset of **EcAp ecological indicators** that could be implemented in a cost-effective way by combining field data, satellite data and simulation models. As a result, a methodology was developed for identifying drivers and pressures from satellite images.

Case studies in MEDINA (1/2)

Coastal erosion (Algeria, Bay of Bejaia: Geostatistical methods applied to the output of a high-resolution wave model, Morocco, Nador Lagoon: Geostatistical methods applied to the output of a high-resolution wave model)

Nutrients enrichment and eutrophication (Egypt, Lake Burullus: Eutrophication Indicators and Biogeochemical box model, Morocco, Nador Lagoon: Eutrophication indicators, High resolution biogeochemical model, Tunisia, Gulf of Gabes: Eutrophication indicators)

Fishery decline (Morocco, Nador Lagoon: Time series analysis of catches, Food web model, Front analysis from EO)

Sustainable aquaculture (Algeria, Bay of Bejaia: Environmental Impact Assessment and Food web models, Egypt, Lake Burullus: Environmental Impact Assessment and Food web models)

Conservation of Posidonia o. meadows (Algeria, Bay of Bejaia: Habitat Suitability (Species Distribution) model, Libya, Gulf of Sirte: Habitat Suitability (Species Distribution) model, Tunisia, Gulf of Gabes: Habitat Suitability (Species Distribution) model)

Case studies in MEDINA (2/2)

Sustainable aquaculture (Algeria, Bay of Bejaia: Environmental Impact Assessment and Food web models, Egypt, Lake Burullus: Environmental Impact Assessment and Food web models)

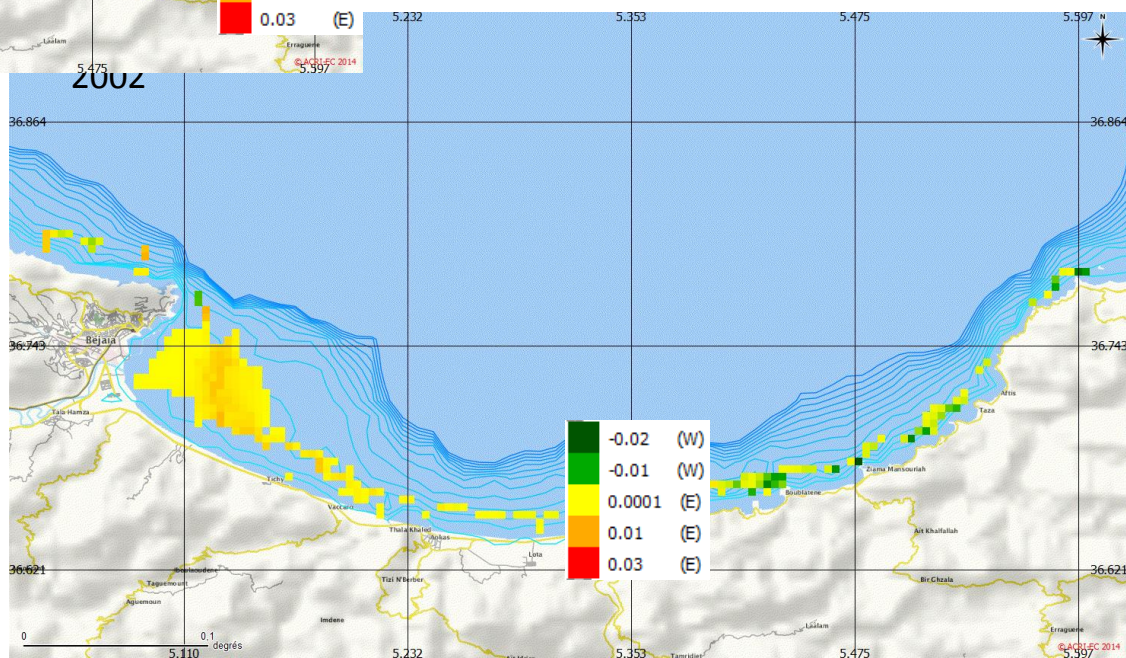
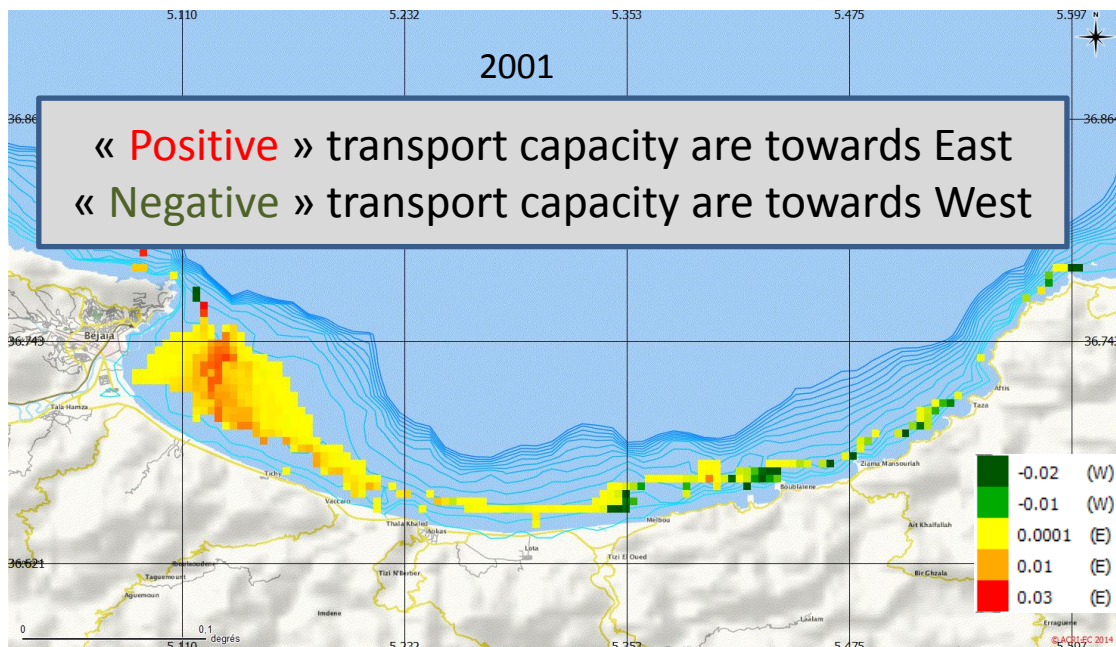
Conservation of Posidonia o. meadows (Algeria, Bay of Bejaia: Habitat Suitability (Species Distribution) model, Libya, Gulf of Sirte: Habitat Suitability (Species Distribution) model, Tunisia, Gulf of Gabes: Habitat Suitability (Species Distribution) model)

Impact of coastal urbanization (Morocco, Nador Lagoon: Urban metabolism indicators)



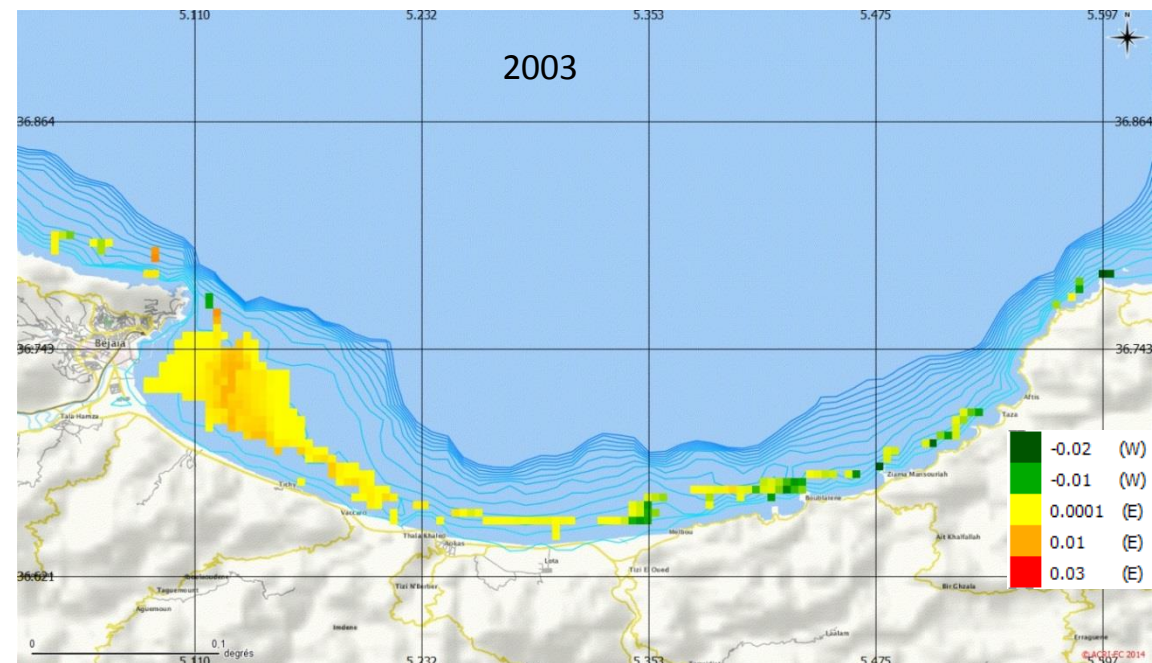
- the suitable areas for *P. oceanica* are strongly related to the coastal realm
- covers more or less continuously the coasts of Algeria , Tunisia and Lybia
- less important in Morocco and in Egypt
- importance of the eastern part of Tunisia as potential habitat for this species (Kerkennah and Gabes area)



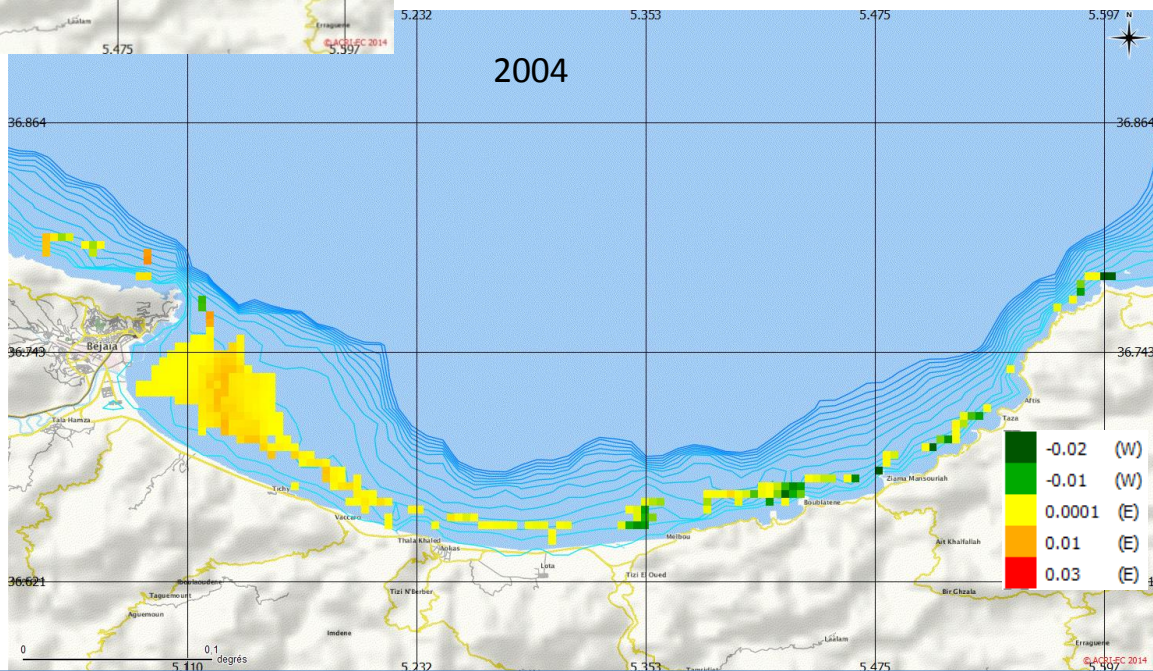


Main projects/services with Africa in which ACRI is/was involved

2003



2004



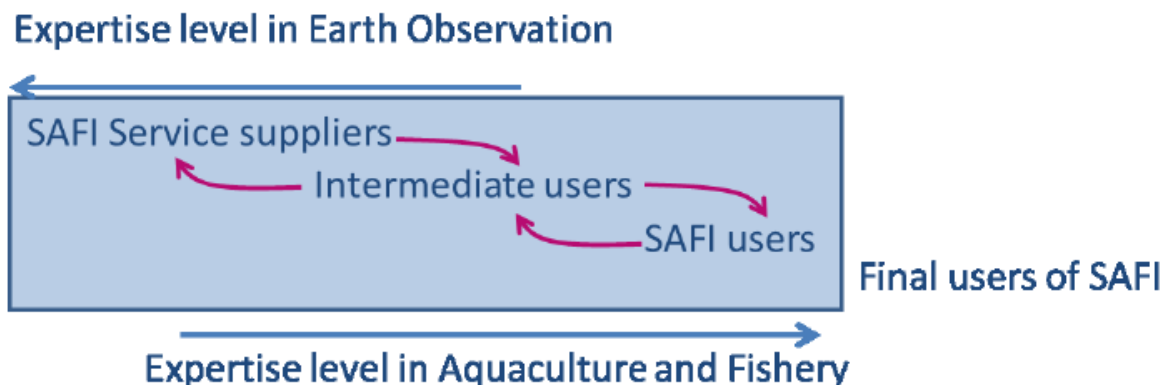


Support to aquaculture and fisheries

FP7-SAFI project (Support for Aquaculture and Fisheries Industries) led by ACRI-ST, France

Development and validation of indicators based (mainly on EO/Copernicus) that are exportable

Setting up of an “expertise chain” to ensure the deployment of SAFI services at the end of the project -> **toward a SAFI company**



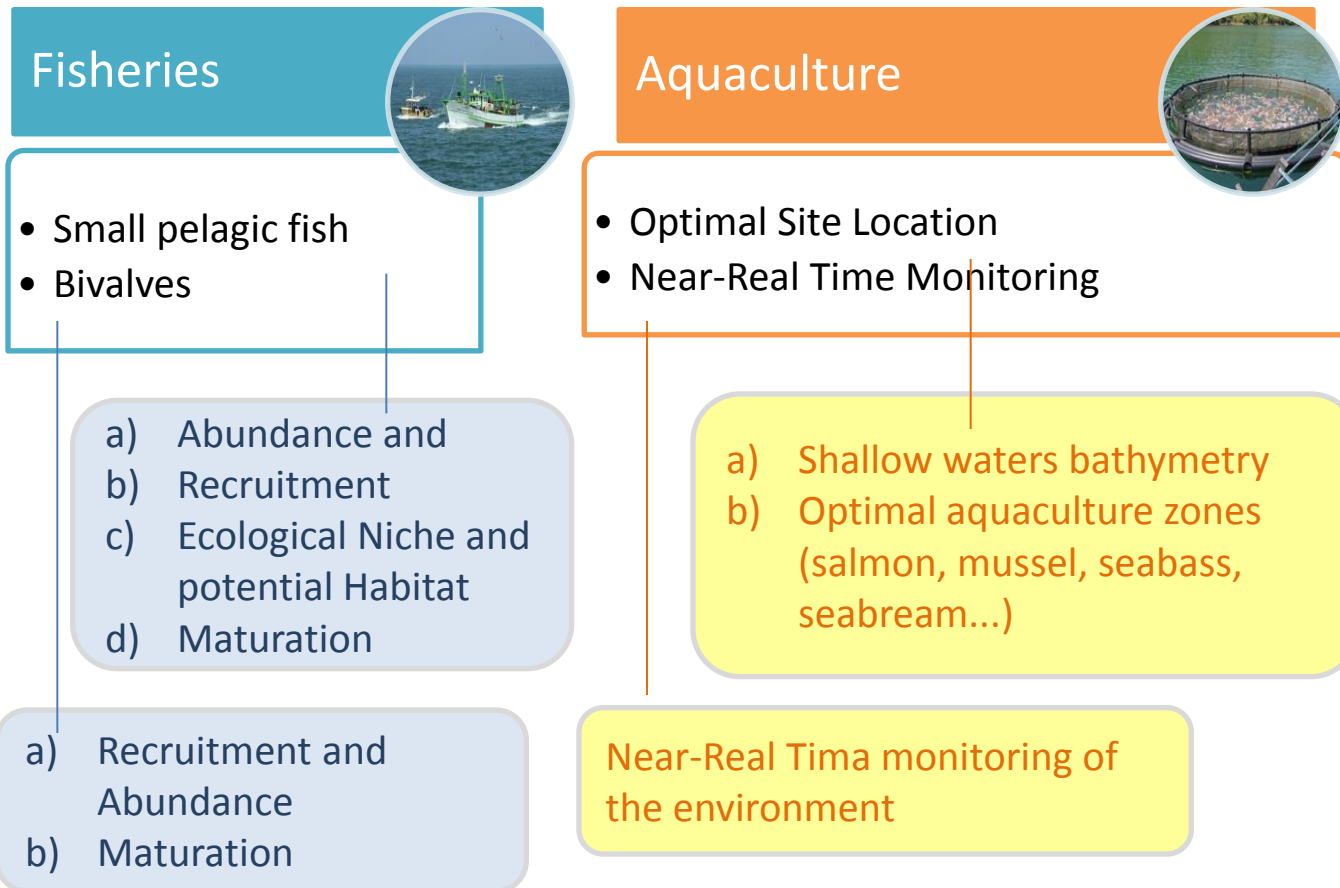
SAFI indicators



- 1 - SAFI indicators are **first developed on an European pilot site**.
- 2 - They are **demonstrated in Morocco (and Tunisia, Madagascar ...)** and/or elsewhere where validation data exist.
- 3 - Their **quality** and **exportability** are thus evaluated.

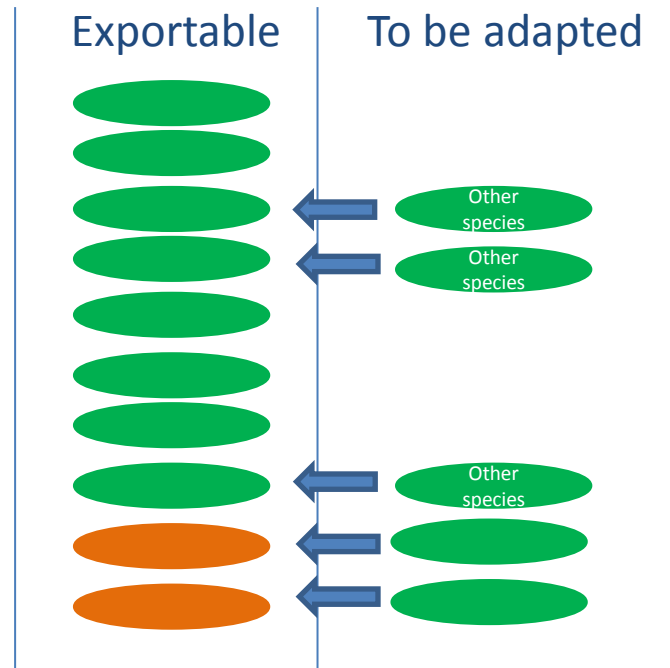
Exportation of the European expertise
through a mix of capacity building and commercial offer.

Services developed by FP7-SAFI



Status of exportability of SAFI Indicators

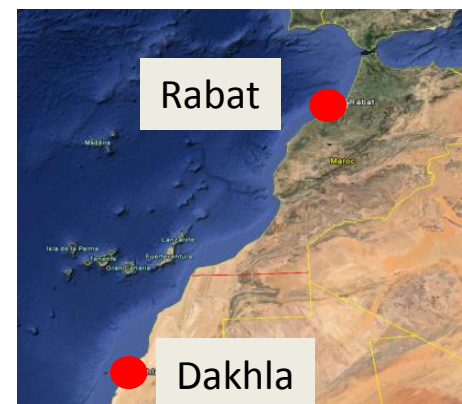
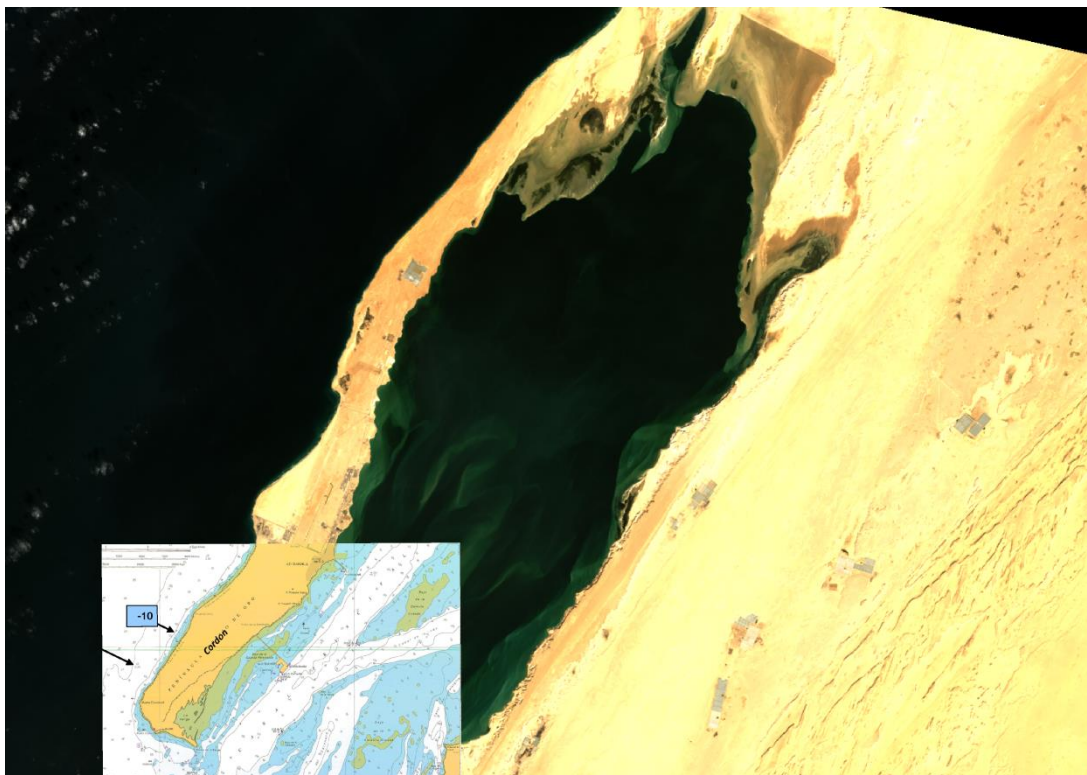
1. Shallow Water Bathymetry
2. Sea Surface Temperature Fronts
3. Green Harmful Algal Bloom Detection
4. Red Harmful Algal Bloom Detection
5. Mussel Farming Site Selection
6. Mussel Growth Indicators
7. Salmon Aquaculture Site Selection
8. Sea Bass/Sea Bream Aquaculture Site
9. Small Pelagic Spawning
10. Bivalve Maturation Indicators



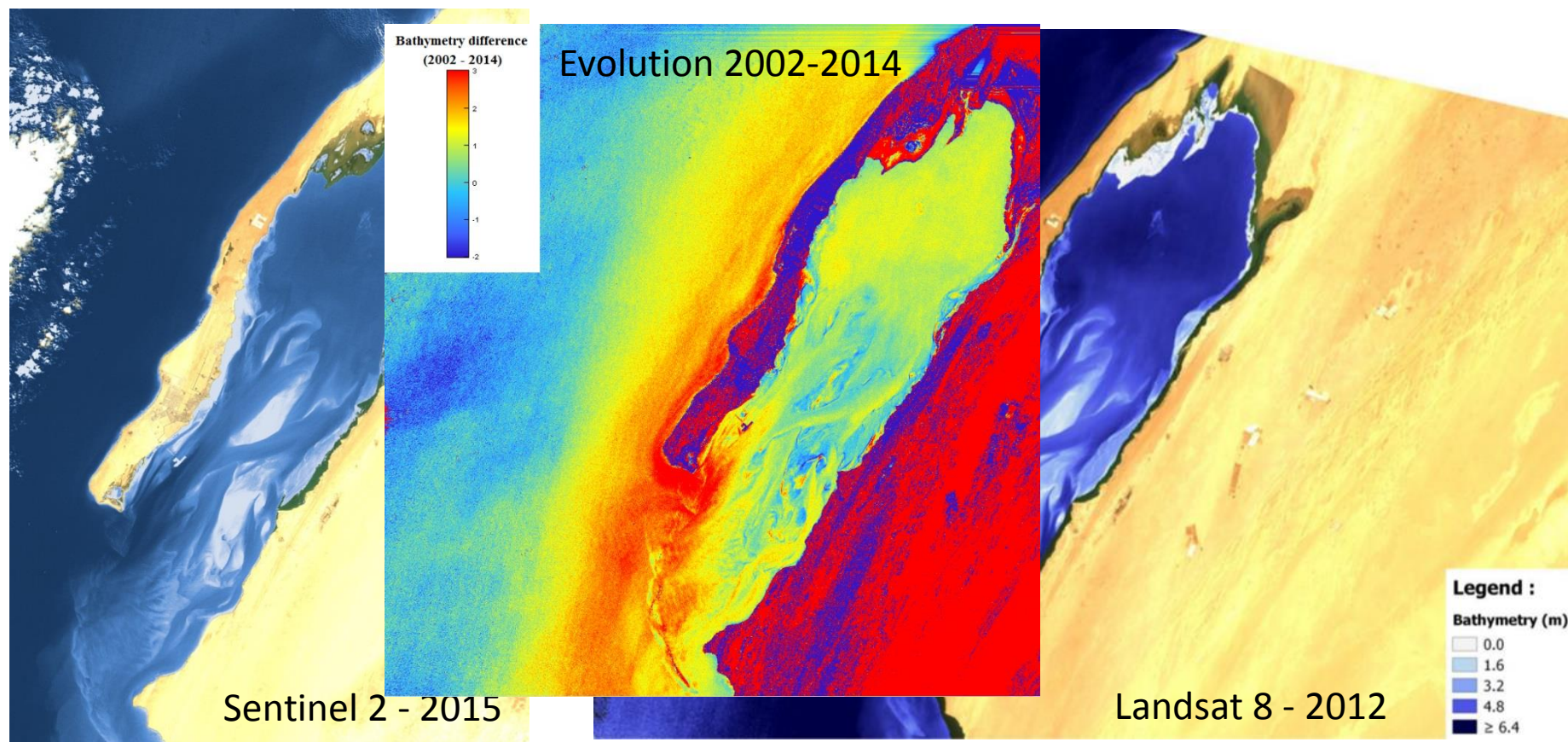
SAFI Indicators: Shallow Waters Bathymetry

Dakhla bay, South of Morocco:

studies on aquaculture development – test facilities (INRH, AQUALOG)



SAFI Indicators: Shallow Waters Bathymetry



SAFI Indicators: Optimal mussels farming location

Parameters used:

Chlorophyll-a GSM_CHL1

SST-ODYSSEA

Waves CERSAT

- Potential Habitat
- Potential weight (g)

Algorithm :

Y. Thomas et al. 2011

Yearly mean of GSM_CHL1 from 2003_2013

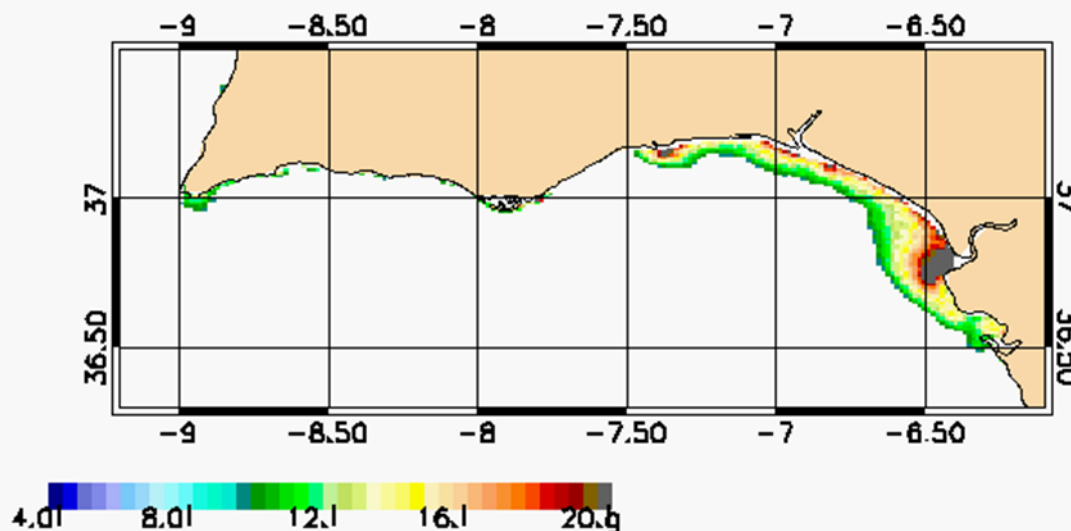
Yearly mean of SST-ODYSSEA from 2006_2014

Yearly mean of HSMOY from 1990_2013

Mytilus edulis – Map of potential habitat

Mytilus edulis – Potential weight after 2 years

Mytilus edulis – Potential weight after 2 years



- Indicator setup for potential mussel (*Mytilus edulis*) growth in French Brittany easily adaptable to other species with *in situ* data.

Limitations : Impact of specific events like production loss due to diseases or harmful algal bloom occurrence cannot be considered in this yearly growth estimation.

SAFI Indicators: Seabass/Seabream Optimal Site loc.

Parameters considered:

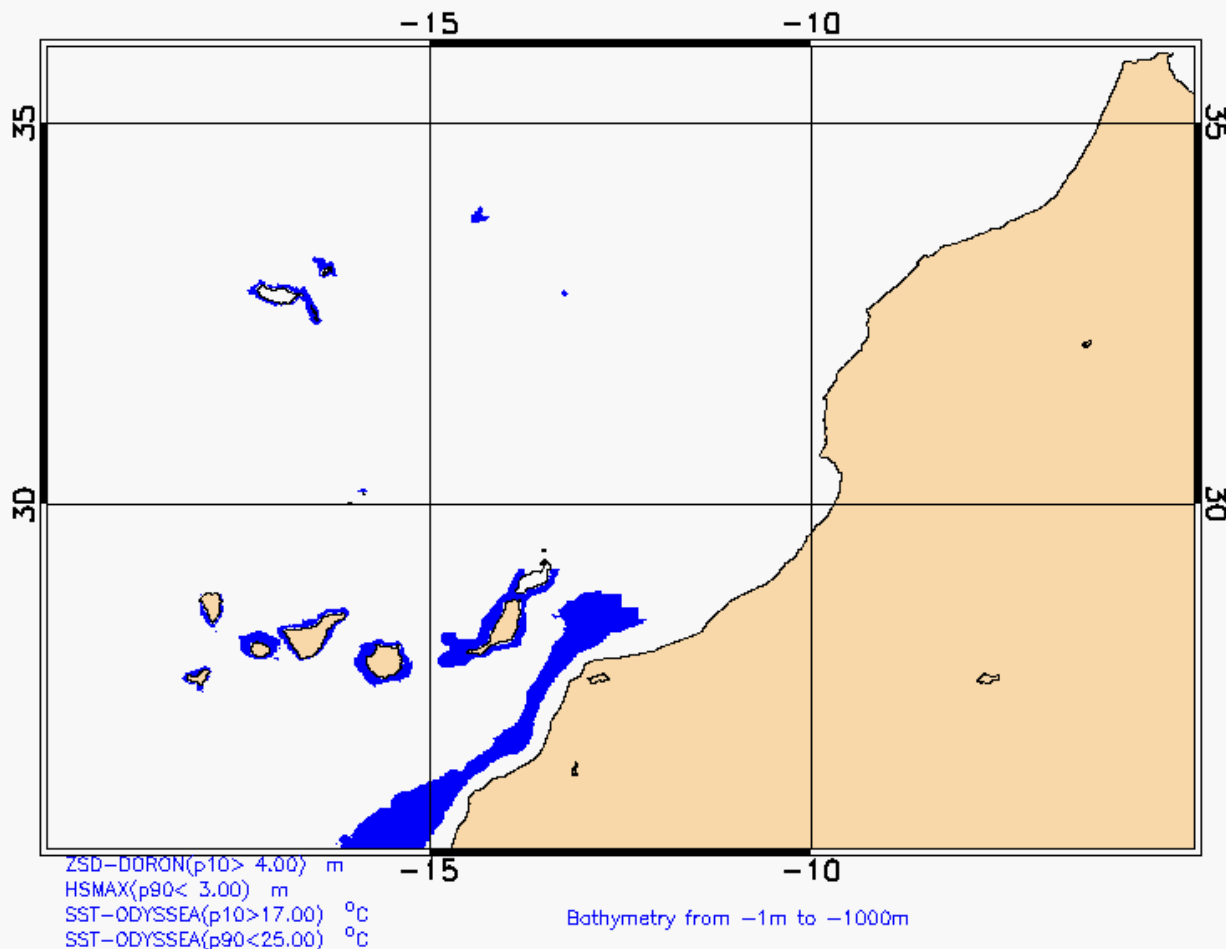
SST-max (P90)<25°

SST-min (P10)>17°

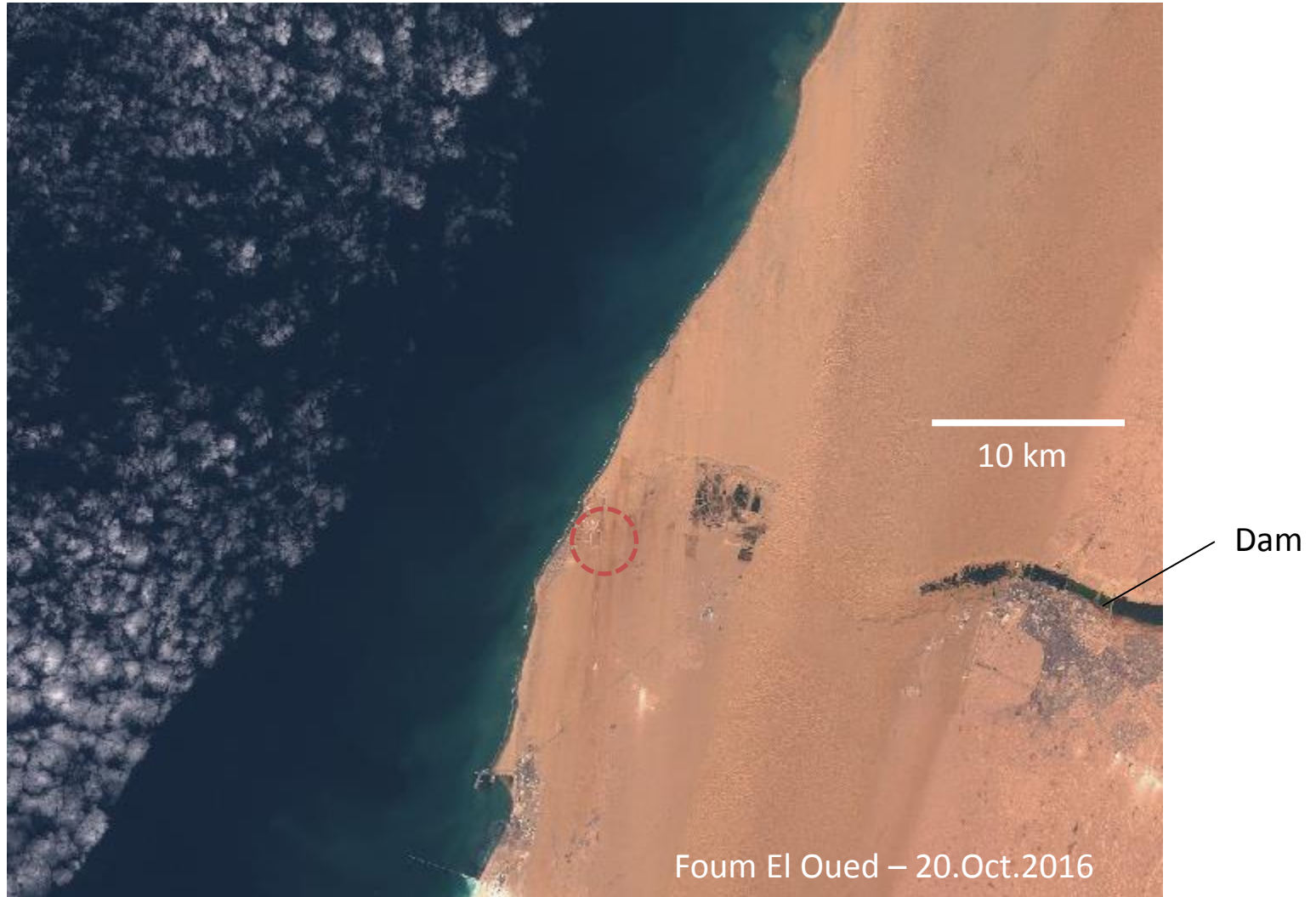
Waves (P90) <3m

Transparency
(SECCHI>4m)

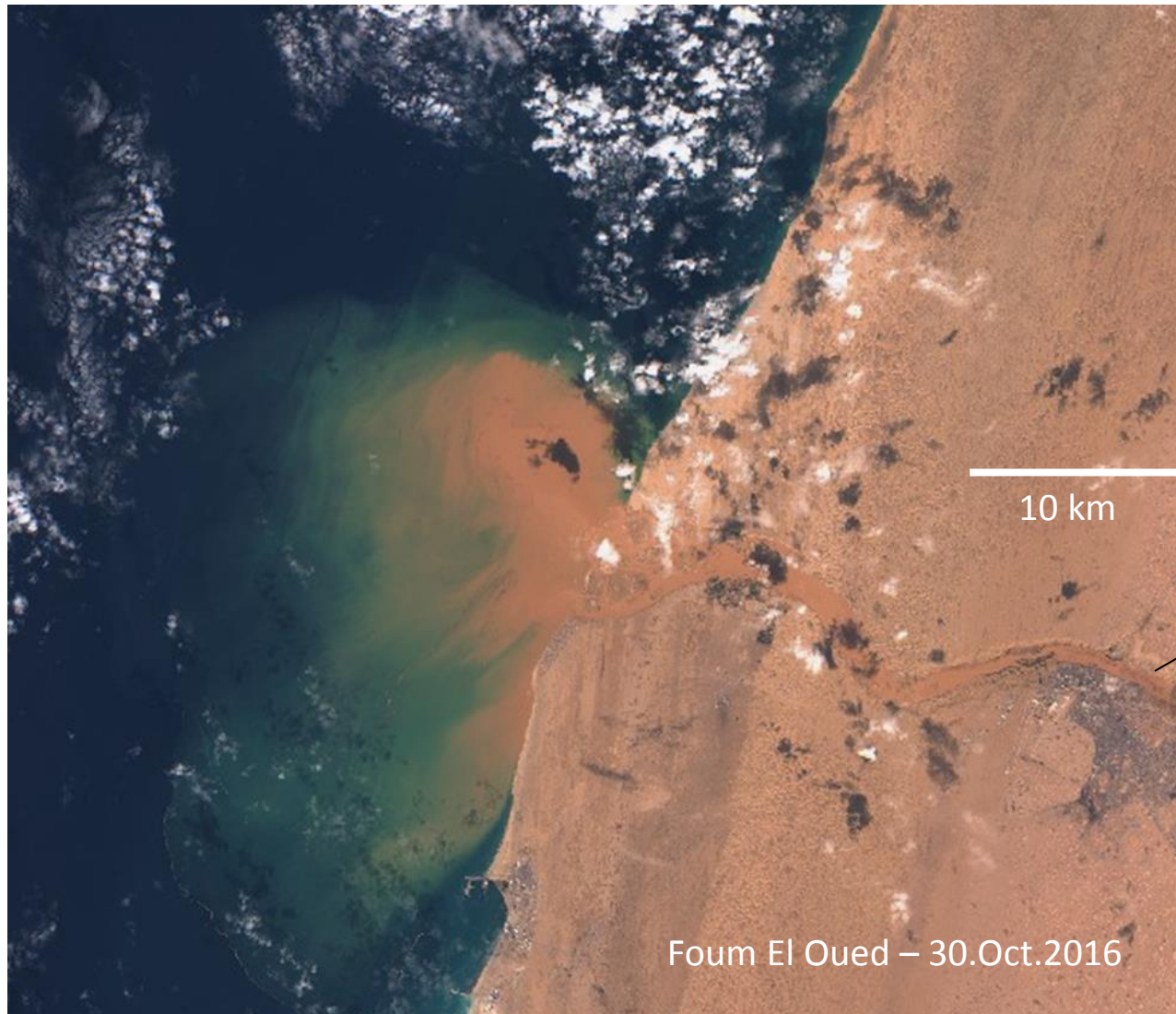
SEABASS-SEABREAM - MAP OF POTENTIAL FARMING



Flood monitoring ... One recent example – thanks to availability of Sentinel-2 imagery

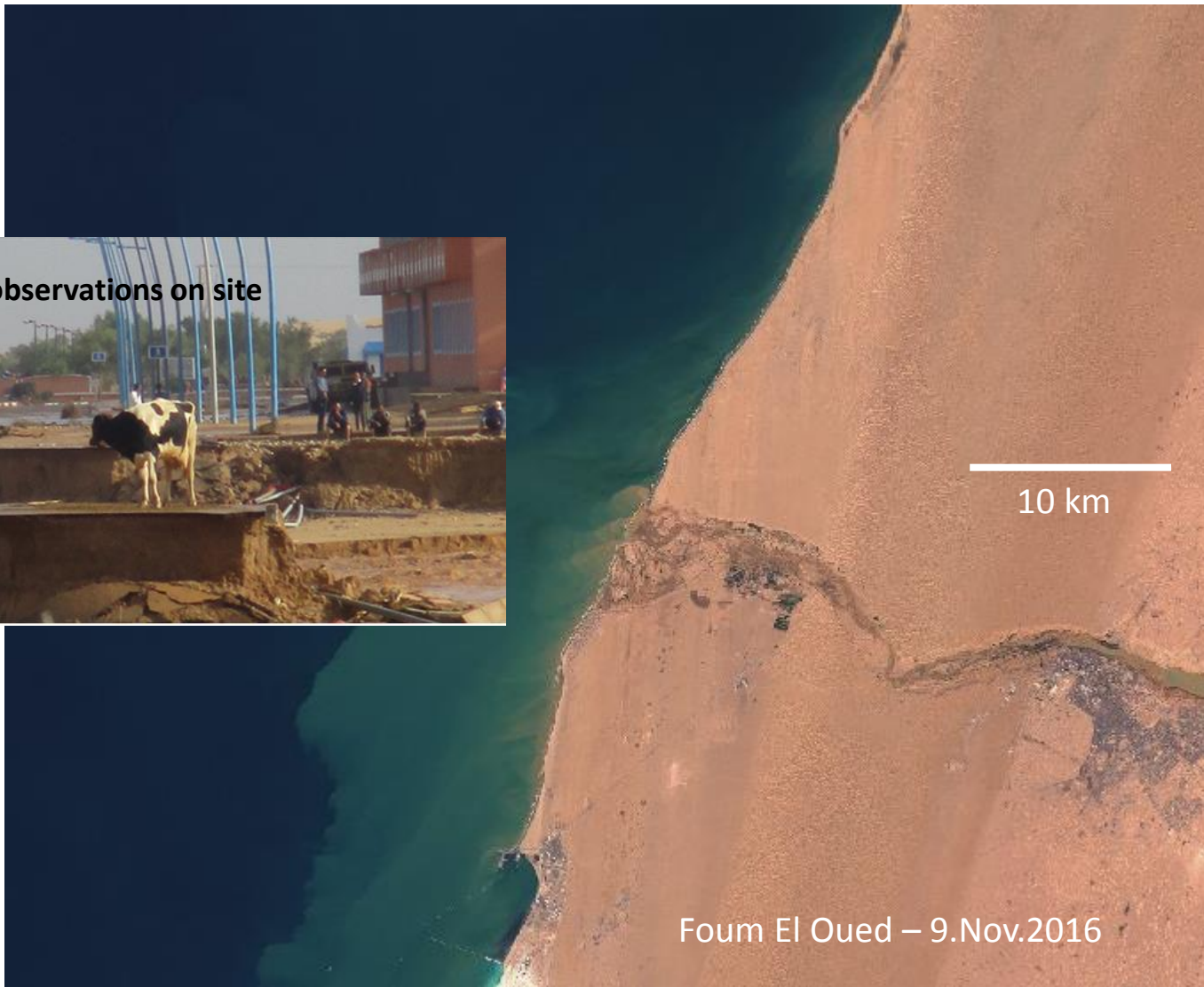


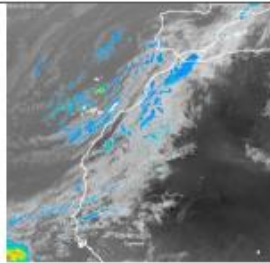
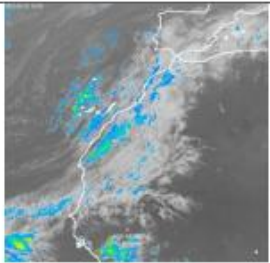
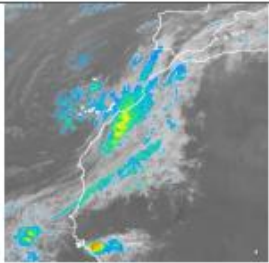
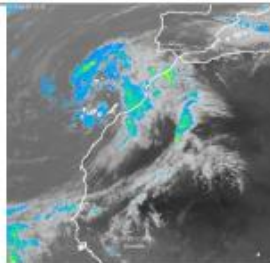
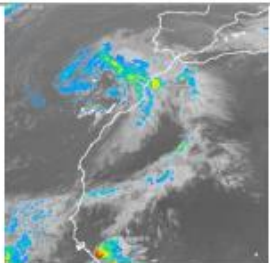
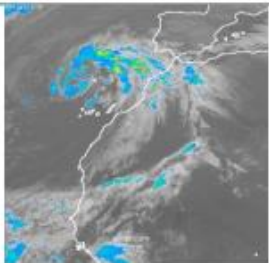
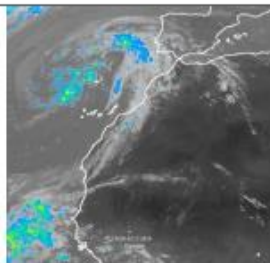
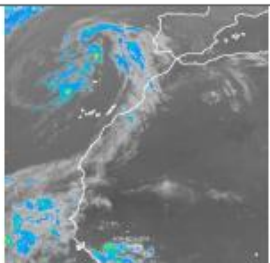
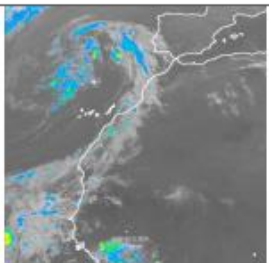
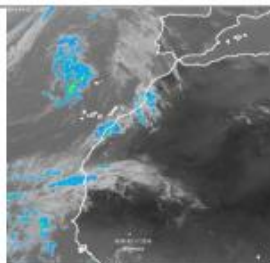
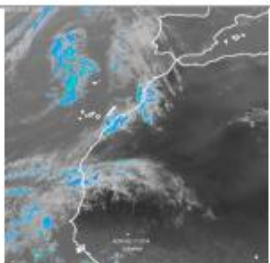
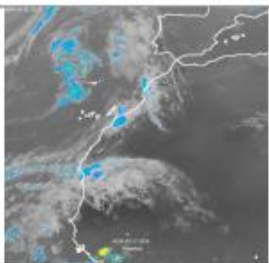
Historical flood – above 100yrs return period



No more
dam

River returns to its bed – which bed ?



25/10/2016	 12h00	 18h00	 23h45
26/10/2016	 13h15	 18h00	 21:30
27/10/2016	 12h00	 18h00	 20:00
28/10/2016	 12h00	 14h00	 16h30

Thanks to availability of CAMS (here MSG data) – we can propose a **diagnostic** of the 29/30 October and an early-warning system for the **mid-term operation of the dam**.

Water quality monitoring – eutrophisation of inland water (France, Europe, large lakes in Africa)

Public market (National/transnational entities)
Few private entities (on behalf of institutional)

Promotion of EO uptake for a regional environmental monitoring in the Mediterranean
(*support to Marine Strategy Framework Directive and Action Plan for the Med*).

Public market (National/transnational entities)

Support to Aquaculture & Fisheries

Public market for **fisheries** (resources, quotas)
but perspectives of mix with private (blue growth)
Private market for **aquaculture**

Flood monitoring

Public (monitoring) and private (expertise) market

Water quality monitoring – eutrophisation of inland water (France, Europe, large lakes in Africa)

Sentinel 1/2/3

Promotion of EO uptake for a regional environmental monitoring in the Mediterranean (*support to Marine Strategy Framework Directive and Action Plan for the Med*).

Sentinel 1/2/3, CMEMS modeling

Support to Aquaculture & Fisheries

Sentinel 1/2/3, CMEMS modeling

Flood monitoring

Sentinel 1/2/3, CAMS observations

Copernicus in Africa – some initiatives

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Thank you for your attention

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