

# Fixed point Coastal Observations around Italy



## *A preliminary overview*

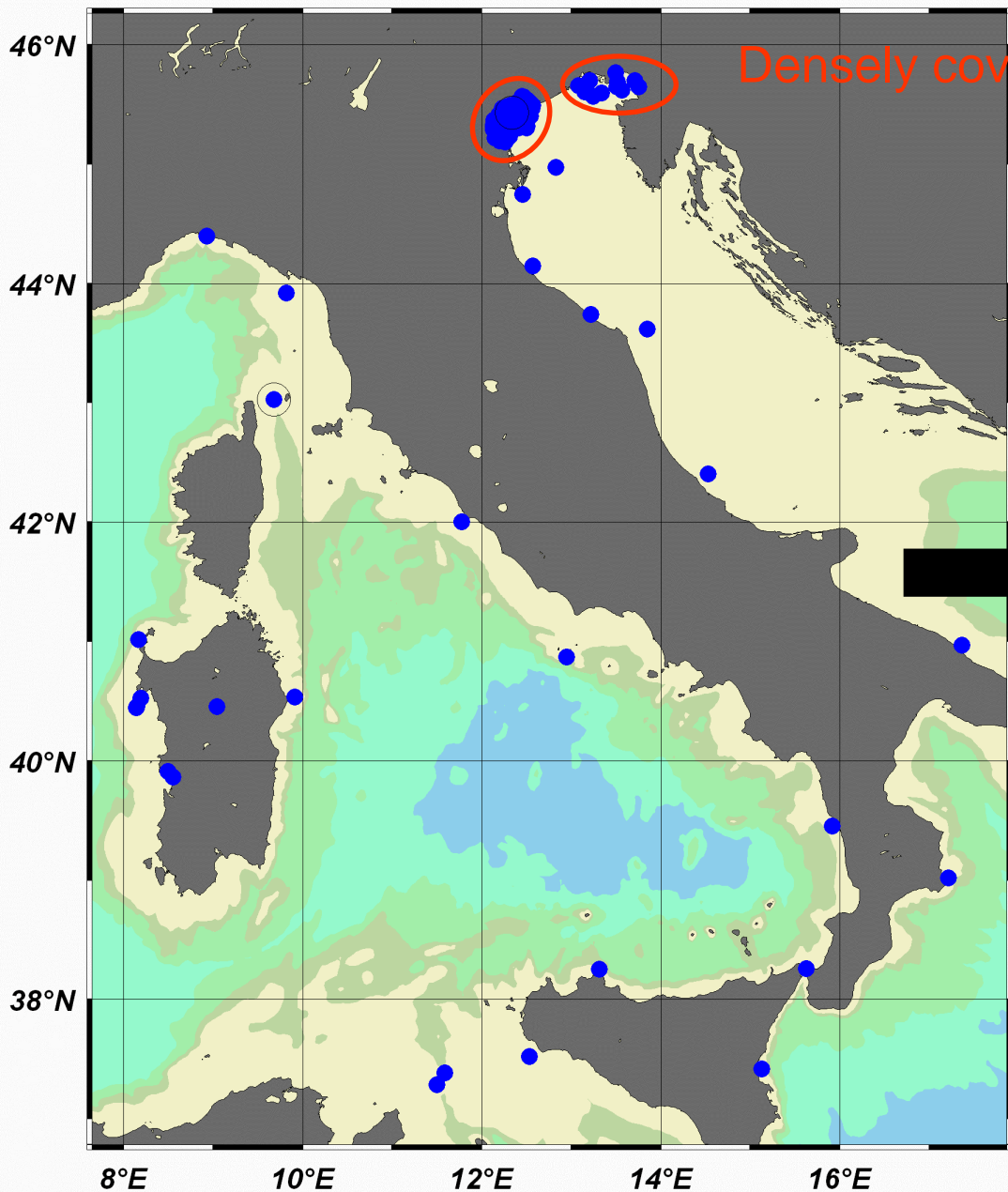
Stefania Sparnocchia (CNR) and Rajesh Nair (OGS)  
stefania.sparnocchia@ismar.cnr.it, rnair@ogs.trieste.it

# Outline

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- 1. Overview from the EDIOS database and the JERICO WP3 questionnaire**
  - Station distributions
  - Measured variables
- 2. The CNR Coastal Fixed Platforms network (S. Sparnocchia et al.)**
- 3. The OGS North Adriatic Coastal Observatory (R. Nair & S. Kuchler)**



Densely covered

# Italian stations



## JERICO Zoho Sheet # 128 records

- OGS (JERICO) [9]
- CNR (JERICO) [15+7]
- ISPRRA (Inst. Environmental Protection and Research) [58]
- Venice Water Authority [25]
- Venice Municipality [8]
- Province of Sassari [5]
- International Marine Center [1]

*Most of them are outdated and probably replicated*



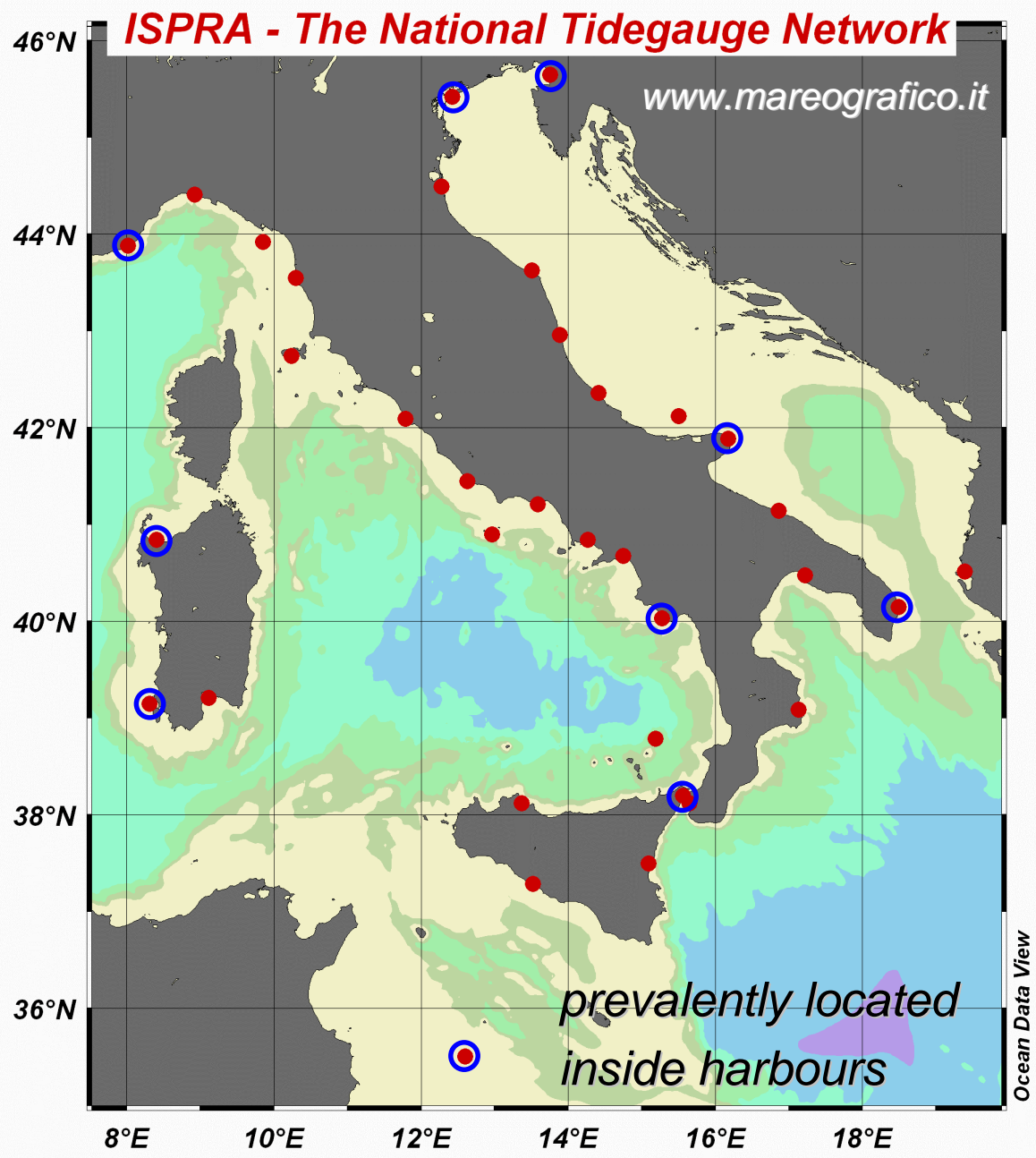
# Italian stations

## ISPRA

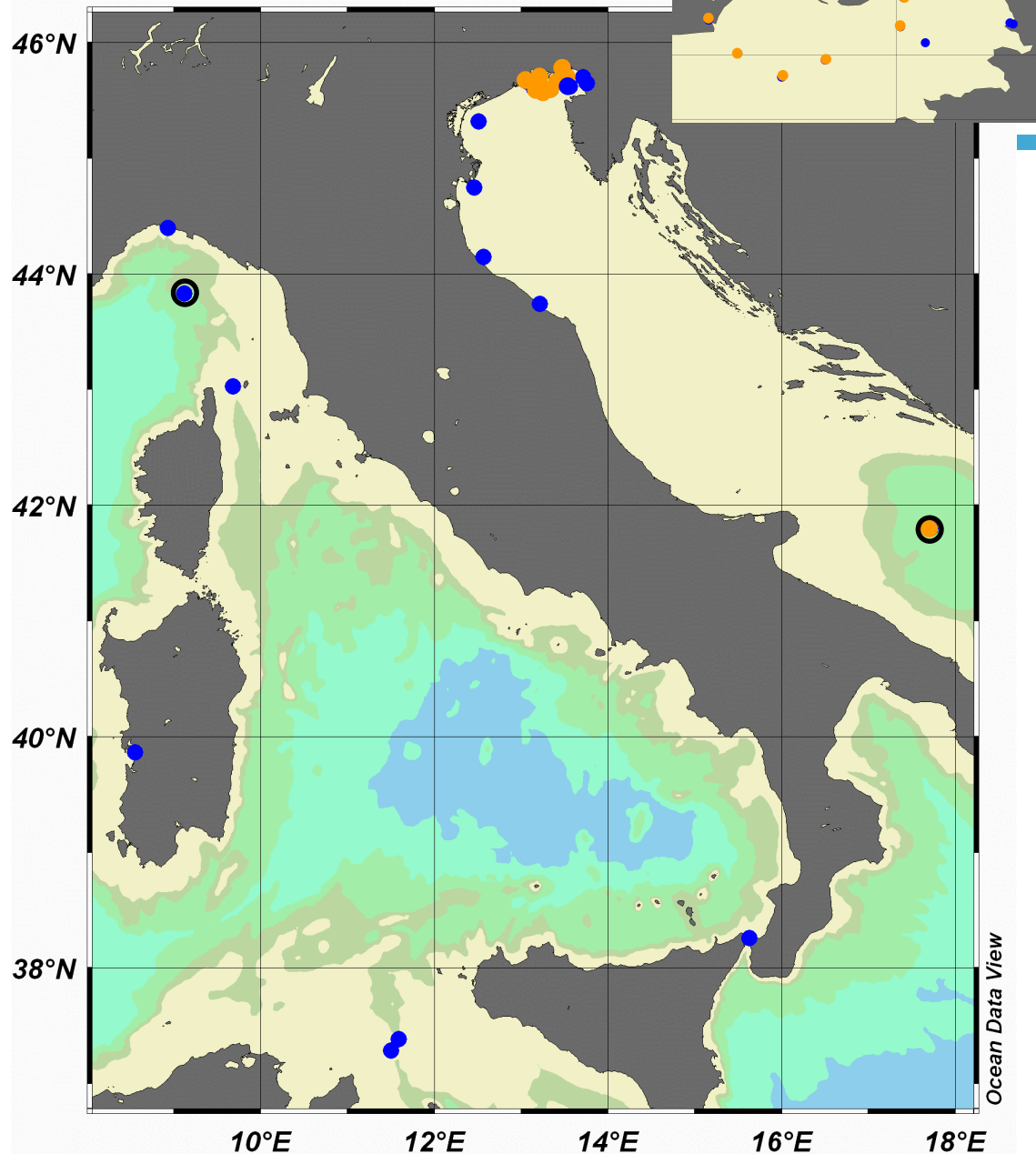
- Sea level
- Sea temperature
- Air temperature
- Relative humidity
- Atm. Pressure
- Wind speed and dir.

## Water Quality Network

- pH
- Conductivity
- Redox







# Italian stations



● CNR

& OGS ●

● **Harbour stations (4)**

● **River stations (2)**

● **Offshore stations**

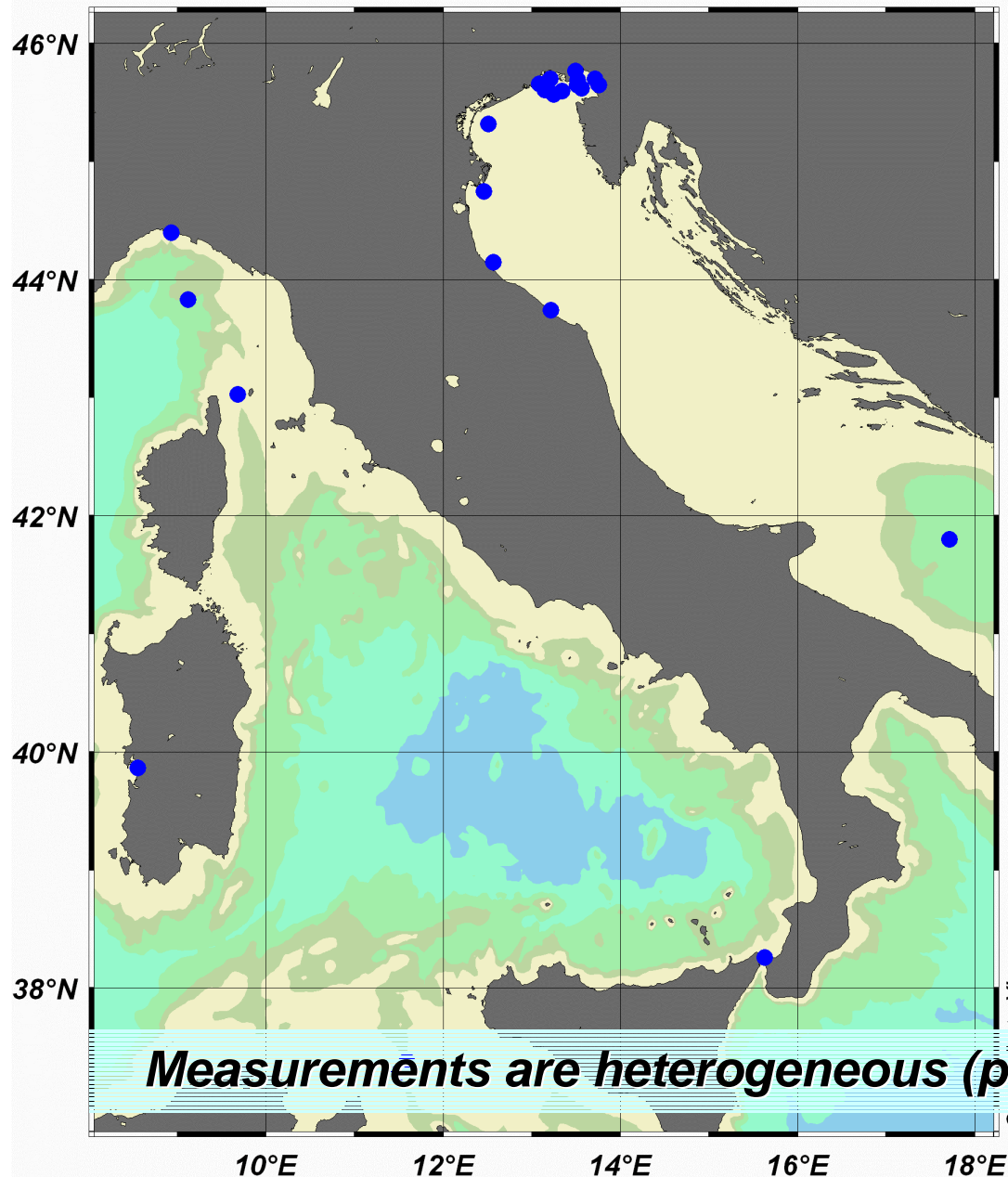
(0.5-12.5 nmiles)

*buoys, piles, subsurface moorings, floating and fixed platforms.*

○ **FixO3 stations (EuroSITES)**



# Measured variables



## # 23 coastal stations

- Sea Temperature
- Meteor. params
- Currents
- Salinity
- DO
- Waves
- pH
- Sea level
- Turbidity
- (pCO<sub>2</sub> in summer)

14

11

1

**Measurements are heterogeneous (parameters and types of sensor)**

# Does heterogeneity pose a problem for effective networking?



## What do I mean?

*Let's look at a simple, standard variable such as temperature, for example.*

- *Modern temperature sensors are, as a rule, exceptionally reliable but they are also extremely diversified: factory specifications can vary by orders of magnitude - just accuracy can vary from 0.1 °C to 0.002 °C.*
- *The choice of temperature sensor class by infrastructure operators is often dictated by a variety of motives: objectives, mandatory requirements, cost, historical continuity, etc.*

***If this is the case for temperature, it is easy to imagine the situation for other, more complex, variables.***

# Does heterogeneity pose a problem for effective networking?

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## What can we do?

***Homologize technology (sensors, measuring principles, etc)?***

- *Unreasonable, impractical, restrictive, unwise in the long run.*

***Set and standardize expected performance requirements for measured variables? (minimum thresholds to meet for specified operating characteristics?)***

- *Realistic, useful, flexible, fairly straightforward to implement.*

***Other solutions?***

- *Possible theme for discussion?*

# Summary

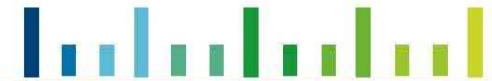
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- *Present information full of holes:*
  - *send questionnaire to other relevant research and private/public bodies*
- *Even so, gaps evident in both geographical distribution (below 42°) and the number & kinds of measured variables (chemical, biological and dynamical parameters are often lacking):*
  - *JERICO can help in evaluating needs and suggesting implementation (link with WP2 and WP9 – talk by S. Dobricic, this afternoon)*



# Fixed point Coastal Observations around Italy



JOINT EUROPEAN RESEARCH INFRASTRUCTURE NETWORK FOR COASTAL OBSERVATORIES

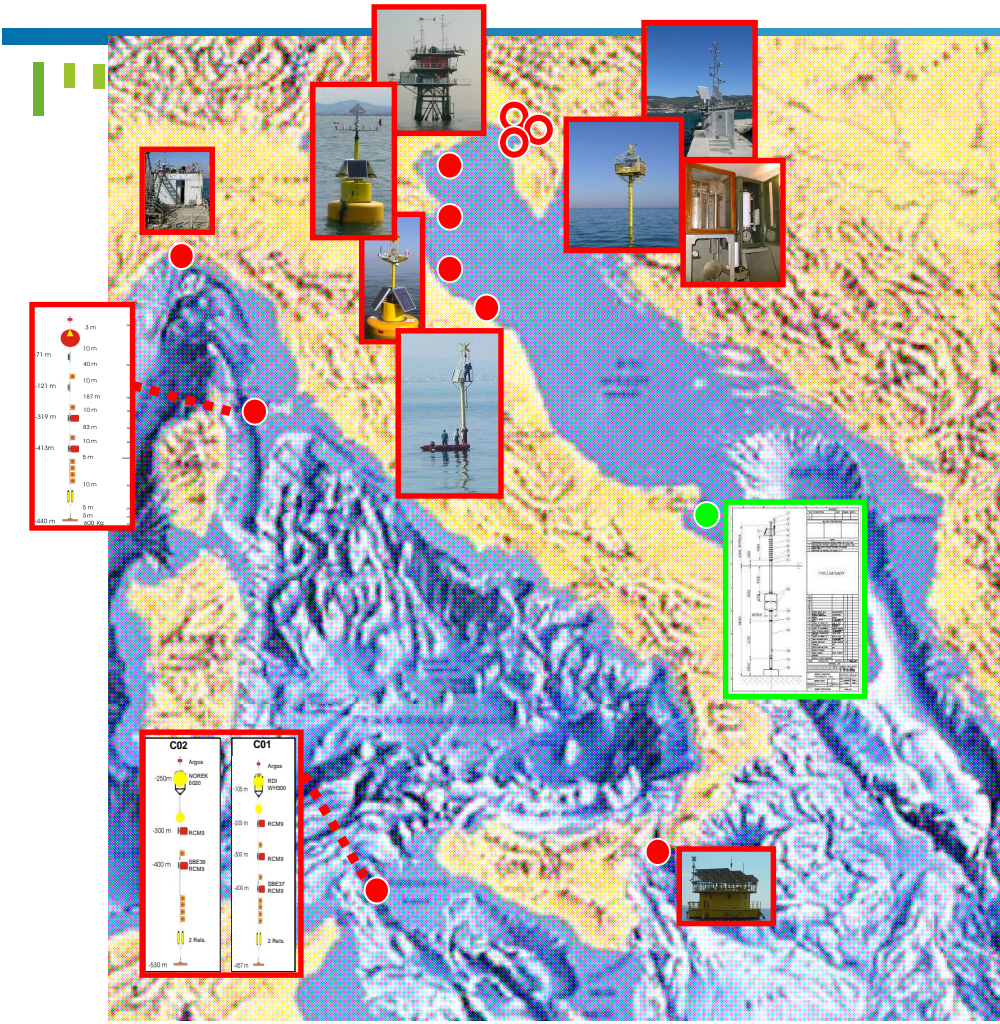
## *The CNR coastal fixed platforms network*

Stefania Sparnocchia, Mauro Bastianini, Carolina Cantoni,  
Marco Faimali, Francesco Riminucci  
(CNR – ISMAR)

[name.surname@ismar.cnr.it](mailto:name.surname@ismar.cnr.it)



# Geographical distribution and types of platforms



- Existing installations:**
- Underwater moorings
  - Buoys and floating platforms
  - Platforms fixed at the sea bed
  - Shore/harbour stations

- **Under construction**  
(ready at the end of 2012)

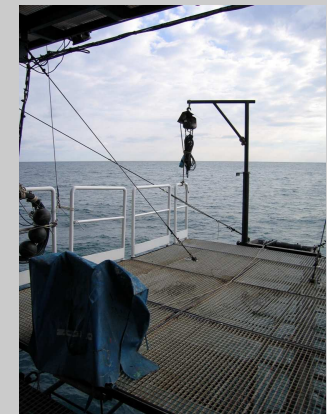
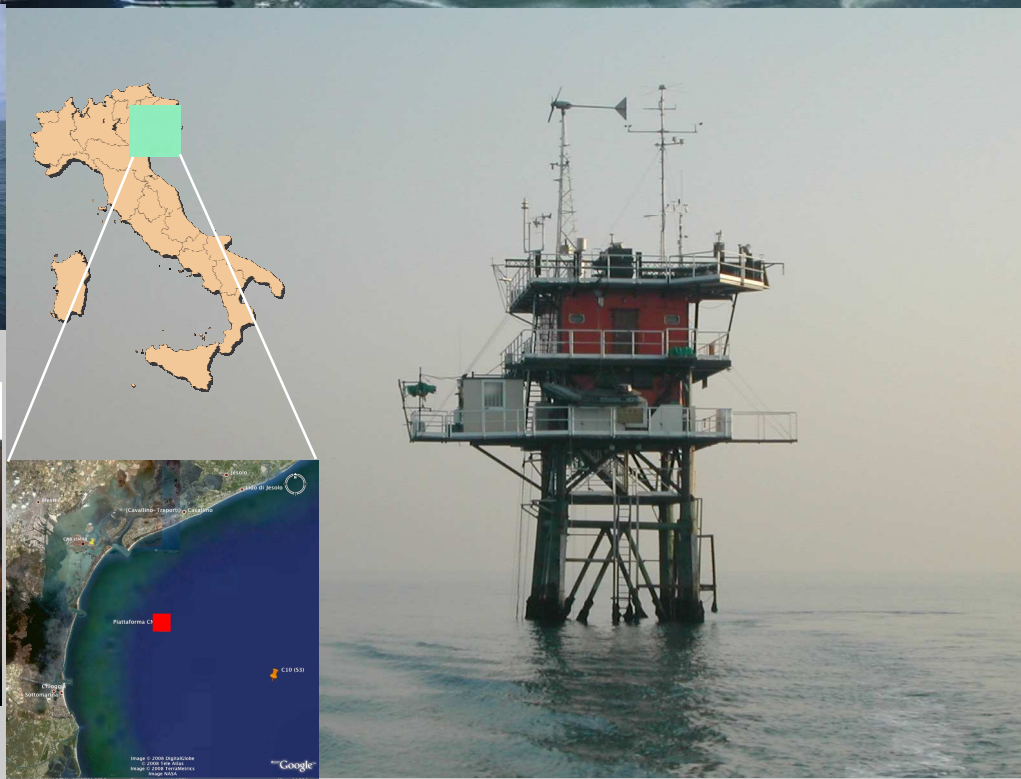
Fixed platforms more prevalent in the Adriatic





# Aqua Alta

Oceanographic Tower 12 30'N 45 18'51E



<http://www.ismar.cnr.it/infrastrutture/piattaforma-acqua-alta/>

# Main variables

## *Coastal platforms*

- *Atmospheric pressure, Air temperature, Wind direction & intensity, precipitation*
- *Sea Temperature, Conductivity/Salinity, Dissolved oxygen*
- *Waves*
- *Sea level*
- *Current (discrete levels and profiles)*

## *NRT/RT transmission to land*

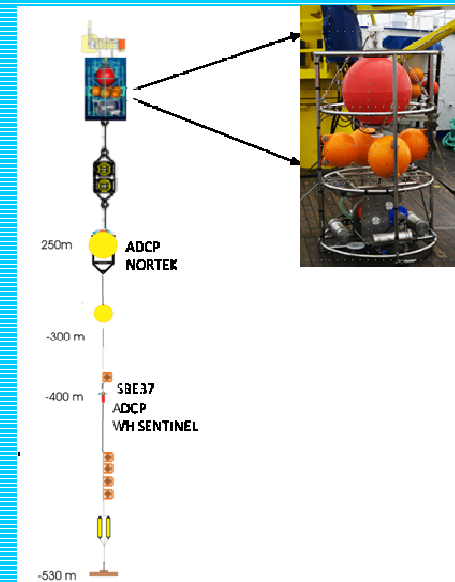
- *UMTS/GPRS/GSM*
- *Acqua Alta: Broadband wireless bridge (RT, remote control of sensors)*

## *Underwater Moorings*

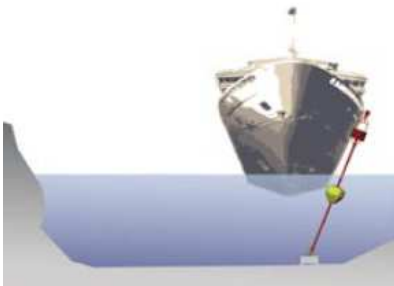
- *Current profiles*
- *Temperature*
- *Conductivity/Salinity*

*Data manually recovered every 6 months*

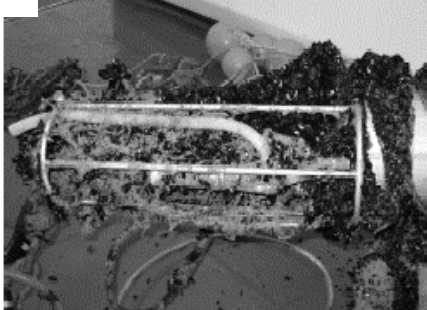
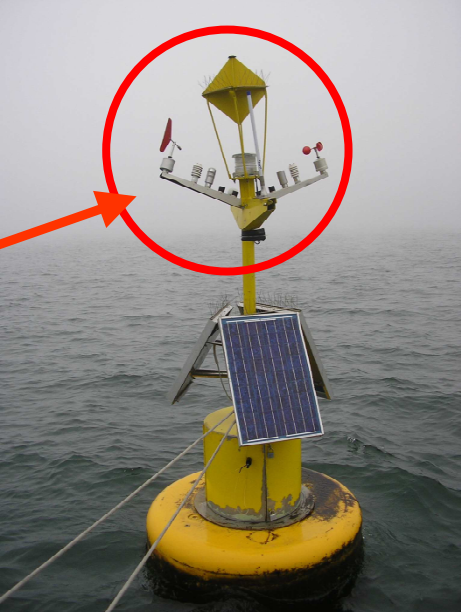
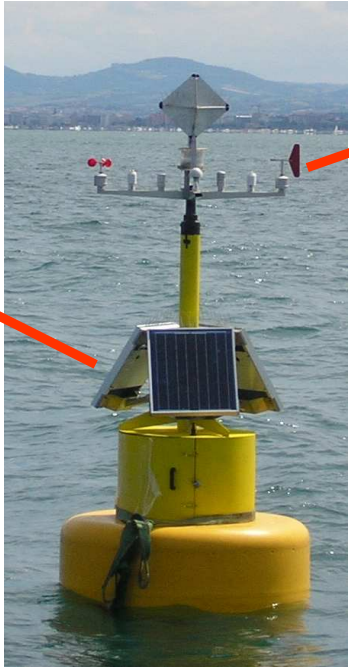
*towards NRT*



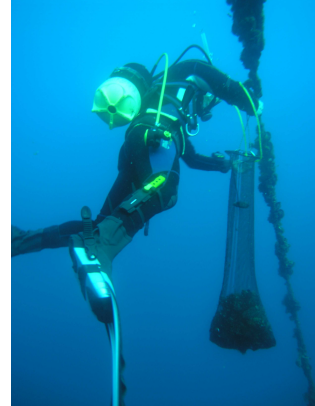
# Most common problem



ship/boat impact



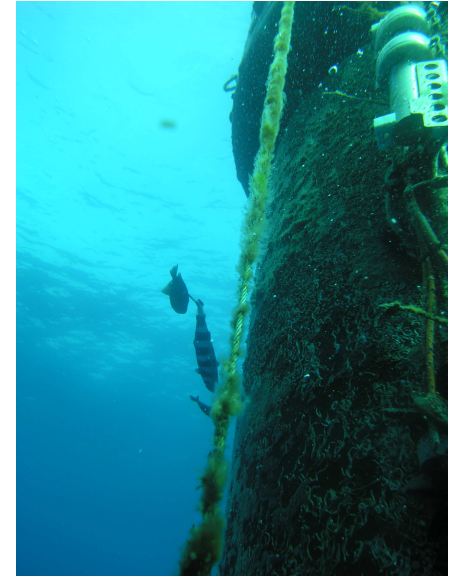
biofouling



corrosion



# Home for marine organisms



# Data storage and visualization

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- *Data from each installation are stored on a local server by each laboratory*
- *Visualized on the Institute website*  
<http://www.ismar.cnr.it/infrastructures/observational-sites>
- *Accessible on request (no download tool available at the moment)*

*We are working on internal harmonization, common procedures for data management and visualization and JERICO will be helpful*



# People involved

P. Traverso  
P. Letardi  
G. Luciano  
F. Garaventa  
M. Faimali

A. Boldrin  
F. Bernardi  
Aubry  
S. Carniel  
G. Arcari  
M. Bastianini

F. Raicich  
R. Colucci  
E. Caterini  
M. Iorio  
C. Cantoni  
S. Sparnocchia



E. Paschini  
F. Grilli  
M. Marini  
P. Penna

M. Ravaioli  
G. Bortoluzzi  
P. Focaccia  
G. Stanghellini  
F. Riminucci

M. Borghini  
G. Gasparini  
K. Schroeder  
A. Vetrano  
S. Sparnocchia

A. Bergamasco  
E. Crisafi  
F. Decembrini



Thank you!

# Fixed point Coastal Observations around Italy



## The North Adriatic Coastal Observatory

Rajesh Nair and Stefano Kuchler  
rnair@ogs.trieste.it, skuchler@ogs.trieste.it  
Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS



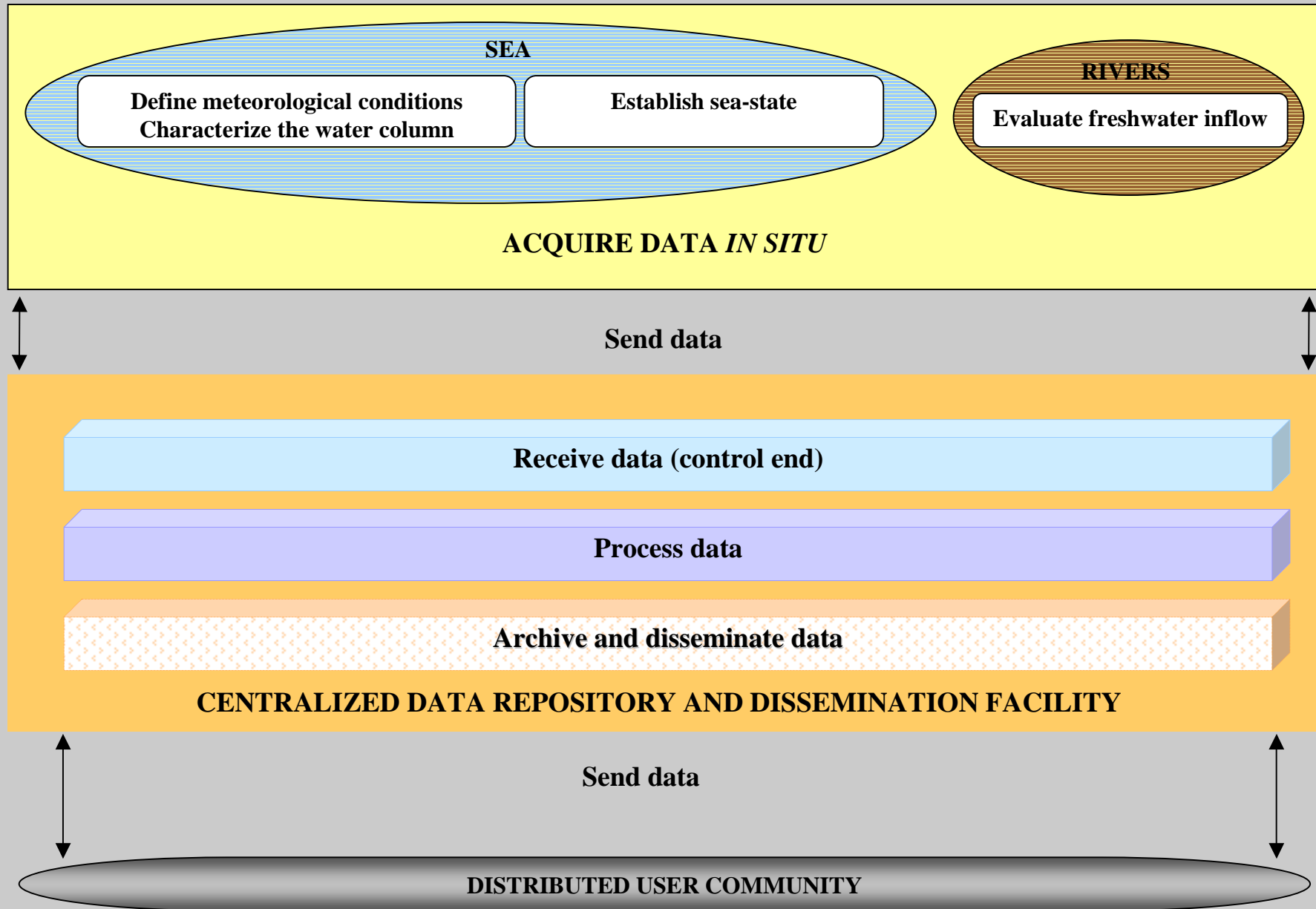
## Talk Outline

1. Background and goals.
2. System overview.
3. Managing the system.
4. Lessons learnt.

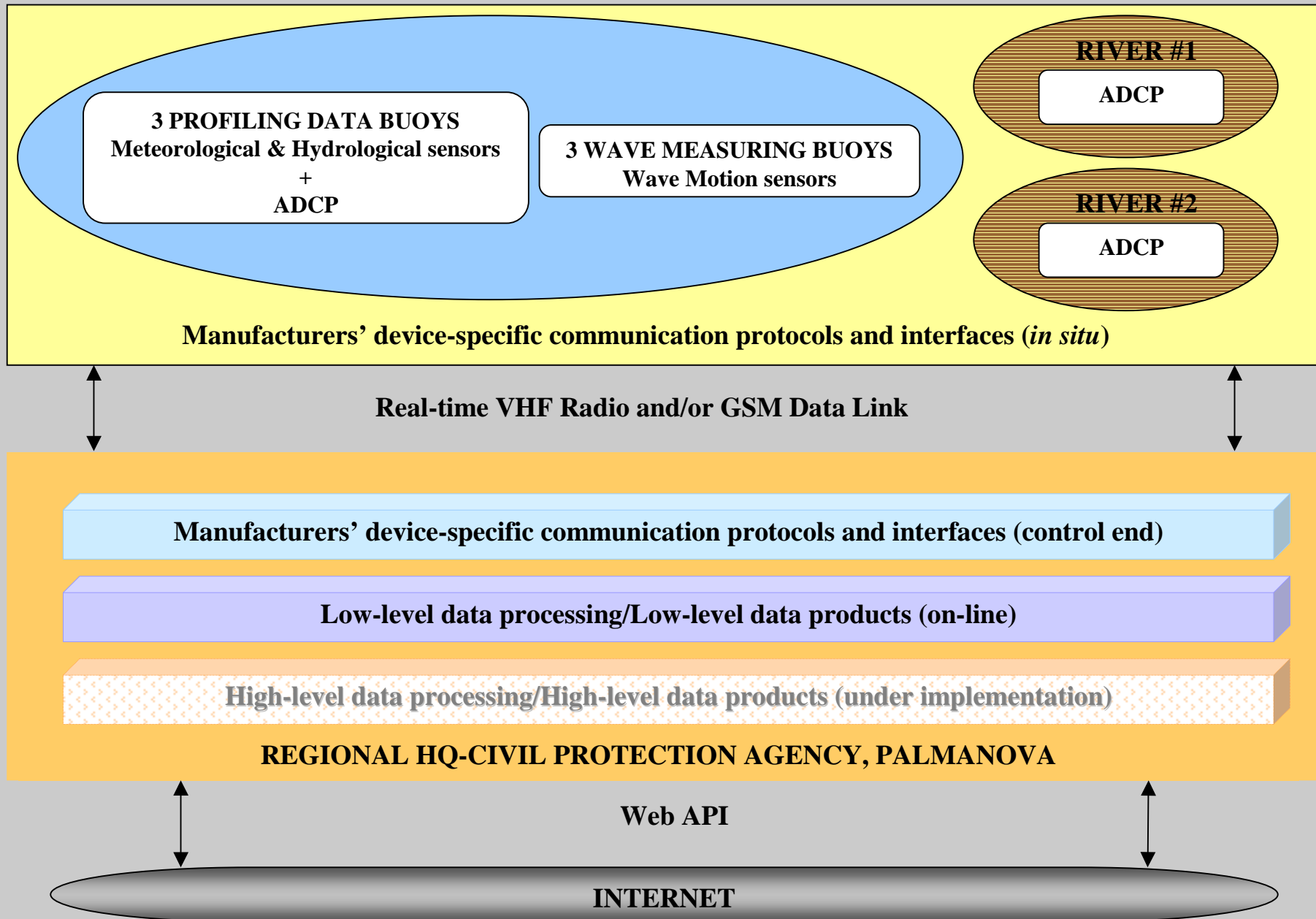
# 1. Background and goals

- **In 2003, we were asked to develop a coastal marine observing system in the Friuli-Venezia Giulia region of north-east Italy by the local wing of the Protezione Civile, the Italian national civil protection agency.**
- **The system had to provide continuous real-time monitoring capabilities for key variables relating to the coastal marine environment under the agency's jurisdiction in the region.**
- **The system had to be easily integrable with the existing regional monitoring infrastructure.**

## 2. System overview: operating rationale

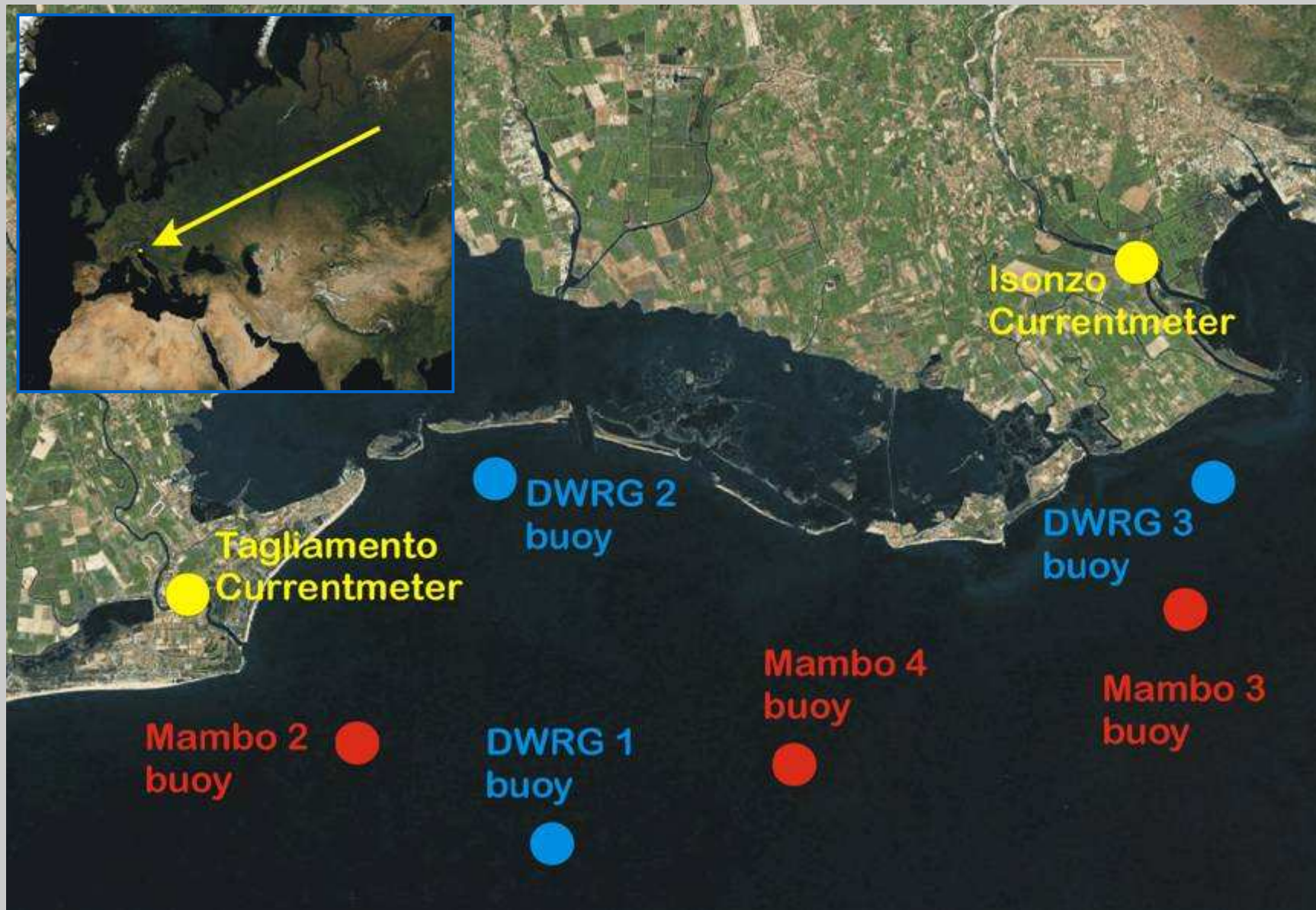


## 2. System overview: architecture





## 2. System overview: station locations



## 2. System overview: main variables

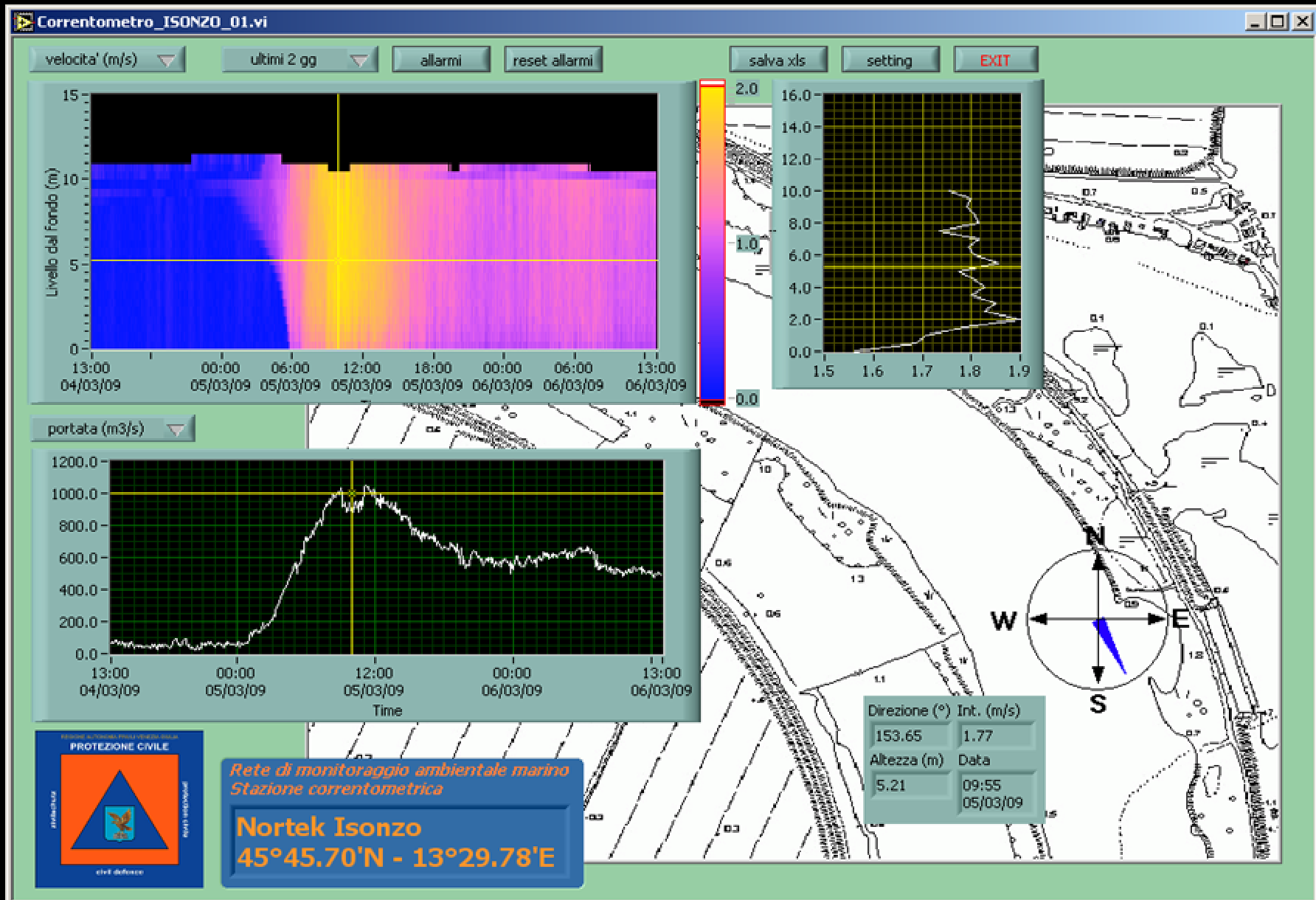
### *Inshore*

- *Bottom temperature & pressure*
- *Stage*
- *Streamflow*
- *Discharge*

### *Offshore*

- *Atmospheric pressure*
- *Air temperature*
- *Wind direction & intensity*
- *Water-column profiles of temperature, conductivity, salinity, dissolved oxygen & pH*
- *Mean & significant wave heights*
- *Wave direction and spectra*
- *Current profiles*

## 2. System overview: custom data-visualization tools





## **2. System overview: centralized data management**



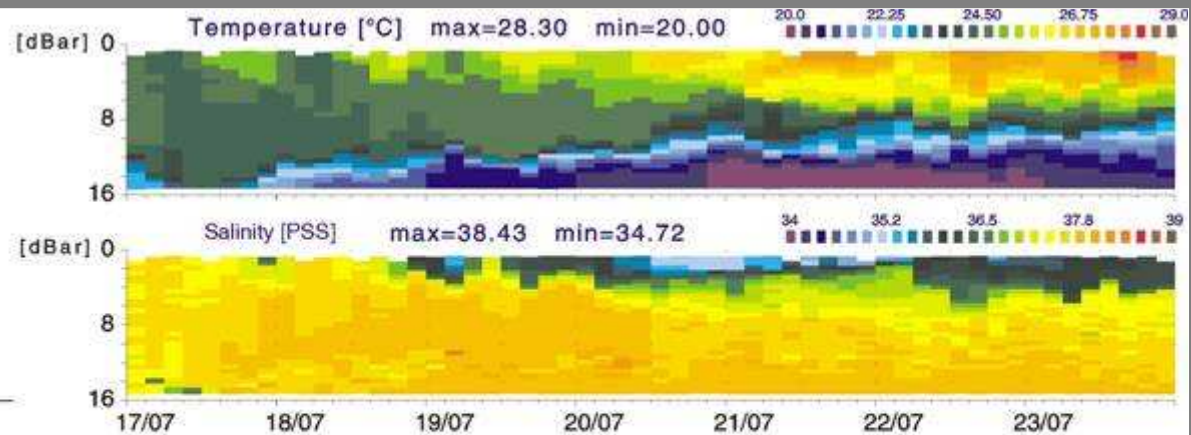
**Command room, Regional HQ, Civil Protection Agency, Palmanova**

## 2. System overview: examples of data



Mambo 2 buoy

T & S Profiles

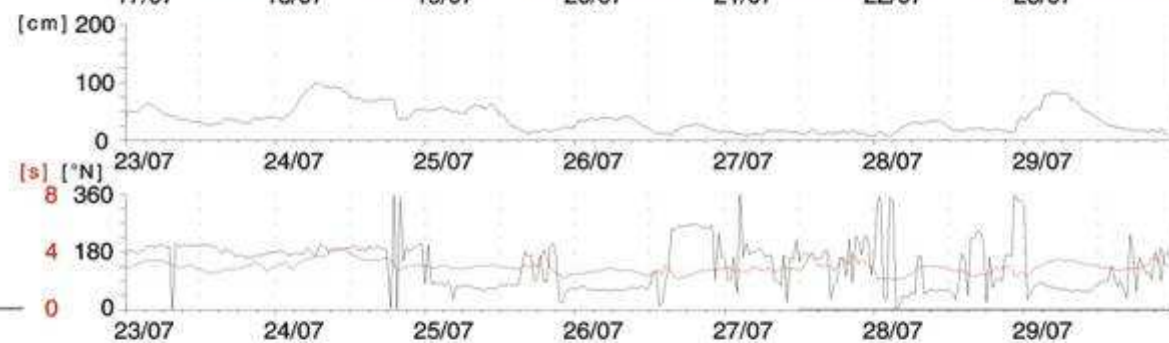


DWRG1 buoy

Significant wave height

Wave period

+  
Direction



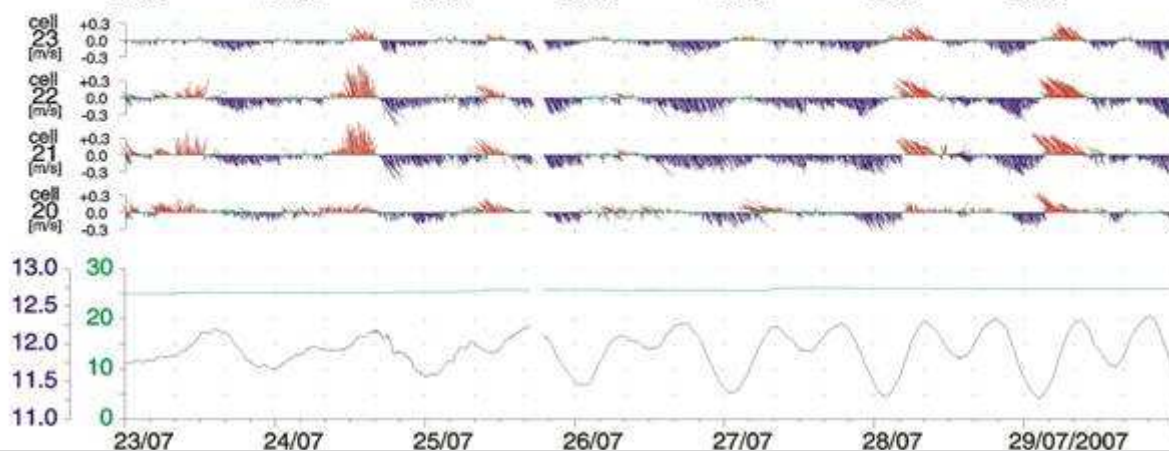
Isonzo station

Acoustic Doppler Current Profiler

$V_z > 0.05 \text{ m/s}$   
 $0.05 > V_z > -0.05 \text{ m/s}$   
 $V_z < -0.05 \text{ m/s}$

Pressure [dBar]

+  
Temperature [°C]





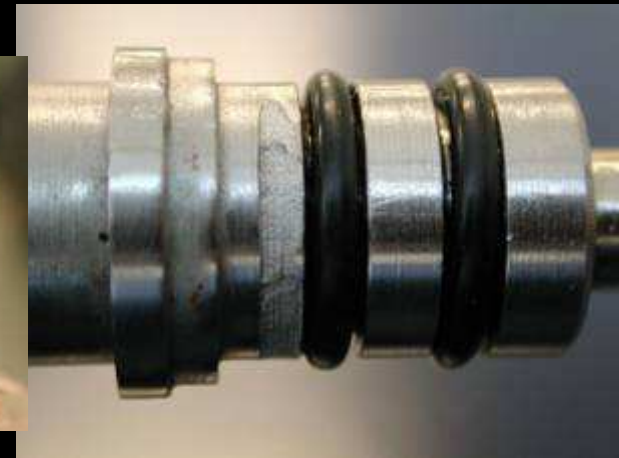
### 3. Managing the system



Keeping everything working...



### 3. Managing the system



...is hard...

### **3. Managing the system**



**Laboratory testing & calibration**

**Field testing & calibration**



**...but keeping everything working as they should is harder still!**



### 3. Managing the system



**Its a team effort...**

**and keeping a happy face helps!**



### 3. Managing the system



**Some well-deserved rest helps too!**



## 4. Lessons learnt

### **Management issues:**

- **set clear and articulate goals.**
- **recognize and accept shared responsibility for all actions.**
- **start small and expand slowly.**
- **identify key people and contact-persons for rapid problem-solving.**
- **ensure funding: cut costs intelligently without compromising system functionality.**

## 4. Lessons learnt

### **Operational issues:**

- **problems may be site-specific and/or season-specific.**
- **instrumentation: the right instrument need not be the best instrument on the market.**
- **biofouling is the main short-term constraint on instrument performance.**
- **mechanical wear and tear, and corrosion are the main long-term limits on system reliability.**
- **Unforeseen events like collisions, acts of vandalism, fishing activity, storm damage, etc. are an ever-present danger.**
- **keep on top of the data: don't bite on more than you can chew!**
- **try not to cut corners on personnel and training.**
- **teamwork is essential.**

