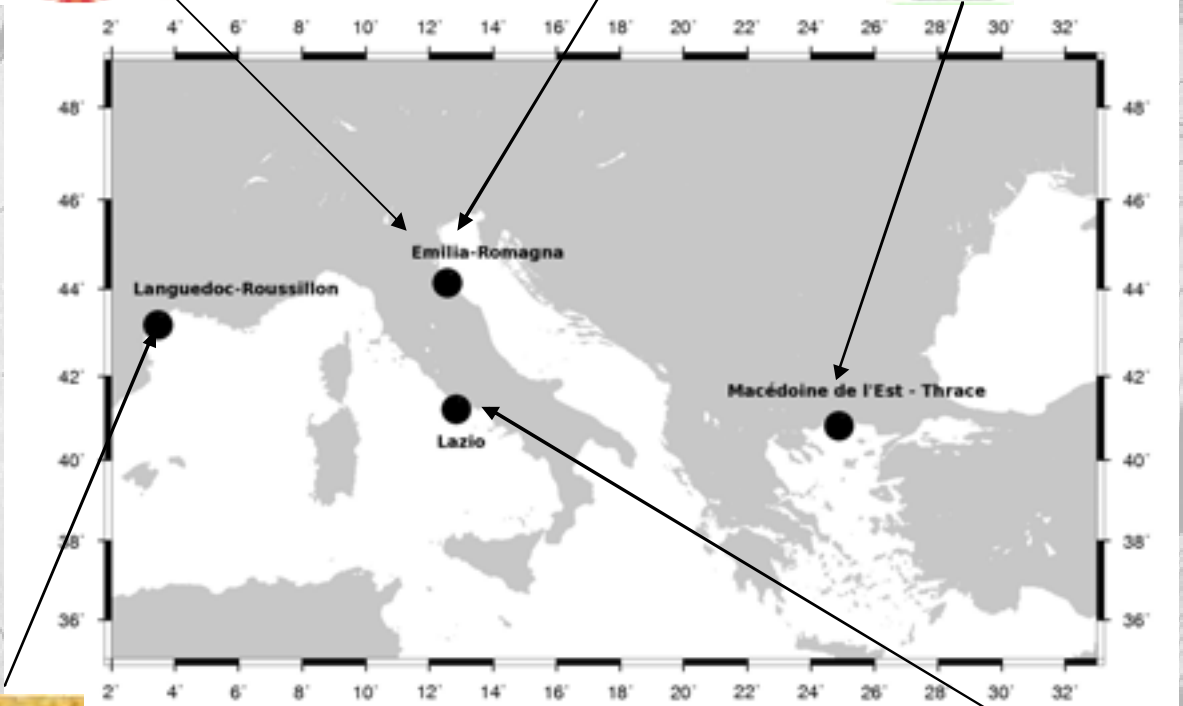
# NAUSICAA

MEASURE 2.2

ARPA-SIM
UNIBO-DISTART

FRI-NAGREF




GEOSCIENCES-M

UNIVERSITY LA SAPIENZA

# STAFFS

**PARTNER 1: GEOSCIENCES-MONTPELLIER**
8 permanent researchers
2 post-docts
3 PhD students
1 technicians
3 scuba divers

**PARTNER 2: UNIBO DISTART**
5 permanent researchers
3 PhD students

**PARTNER 3: FRI-NAGREF**
2 permanent researchers
2 experts
2 other permanent people

**PARTNER 4: ARPA-SIM**
4 permanent researchers

**PARTNER 5: UNIROMA LA SAPIENZA**
5 permanent researchers
2 experts
3 other permanent people
3 scuba divers

**TOTAL: 48 people**

# CALENDAR / INFORMATIONS

Official meetings of the component 2

4 specific meetings for NAUSICAA:

| | | | |
|---|---|---|---|
| February | 2007 | DISTART / ARPA-SIM | final meeting phase B for component 2 |
| June/july | 2007 | FRI-NAGREF | specific meeting: ongoing collaborations |
| December | 2007 | GEOSCIENCES-M | intermediate meeting phase C comp 3 |
| February | 2008 | LA SAPIENZA | intermediate meeting phase C comp 2 |

To be confirmed (not included in BEACHMED-E project):
A post-doc from january 2007 to april 2008 dedicated to NAUSICAA fellowship management

**Detailled** documents for phase A, B and C.

# NAUSICAA

**Determination of coastal to nearshore marine climates**

**Analysis of coastal hazards,
of defence structure behaviour and
of Posidonia oceanica field dynamics.**

**MAIN ACTIVITIES :**

In-situ measurements of coastal / nearshore hydrodynamics

Conception and/or deployment of new equipments for hydrodynamics

Tools and concepts for a better understanding of coastal/nearshore morphodynamics: - CSI Coastal State Indicators
- (new) numerical models
- documents: hydrodynamics, sedimentary or biological processes → Coastal management

Online database

**OUT AT SEA...**

FRI-NAGREF Vessel

UNIROMA Vessel with towed underwater video cameras

Tethys vessel, used by GEOSCIENCES-M

GEOSCIENCES-M vessel

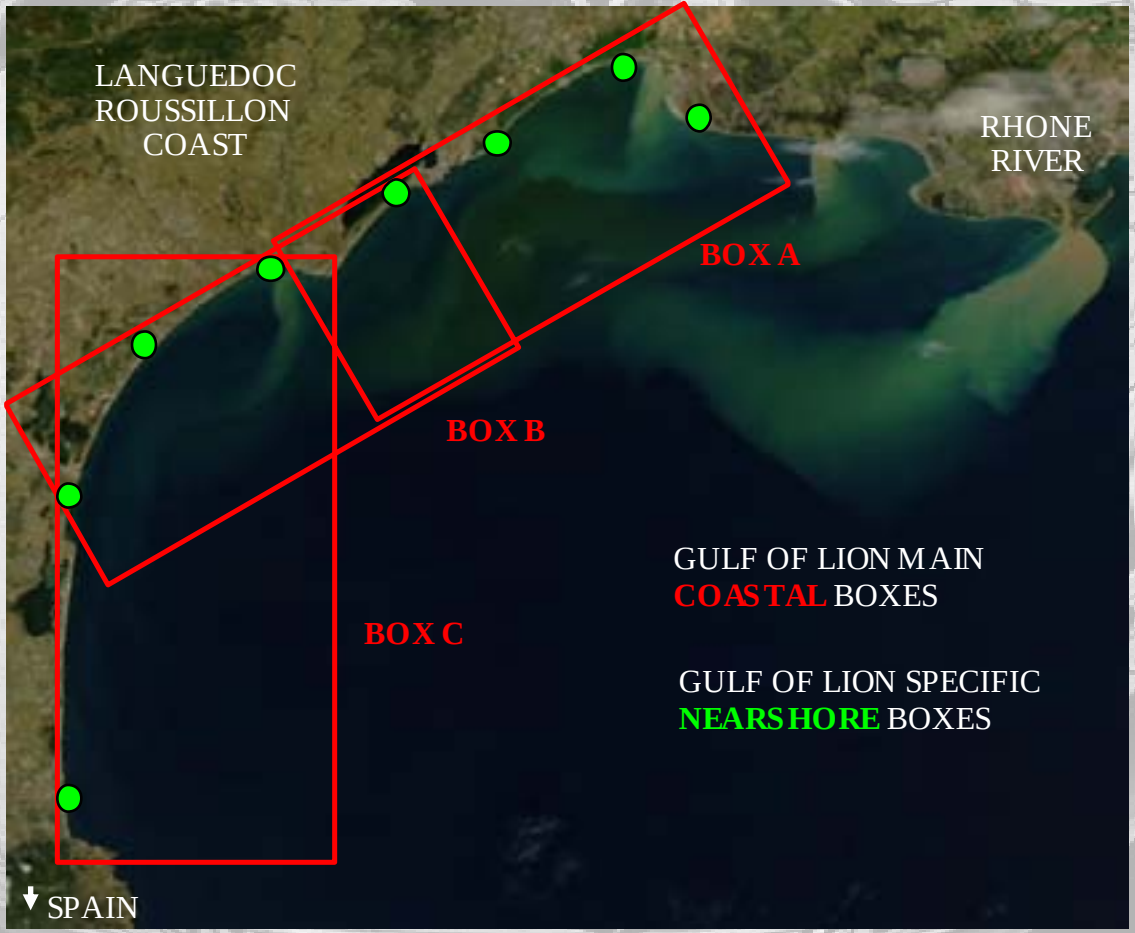
**UNDER...**

*Posidonia oceanica* meadows regression

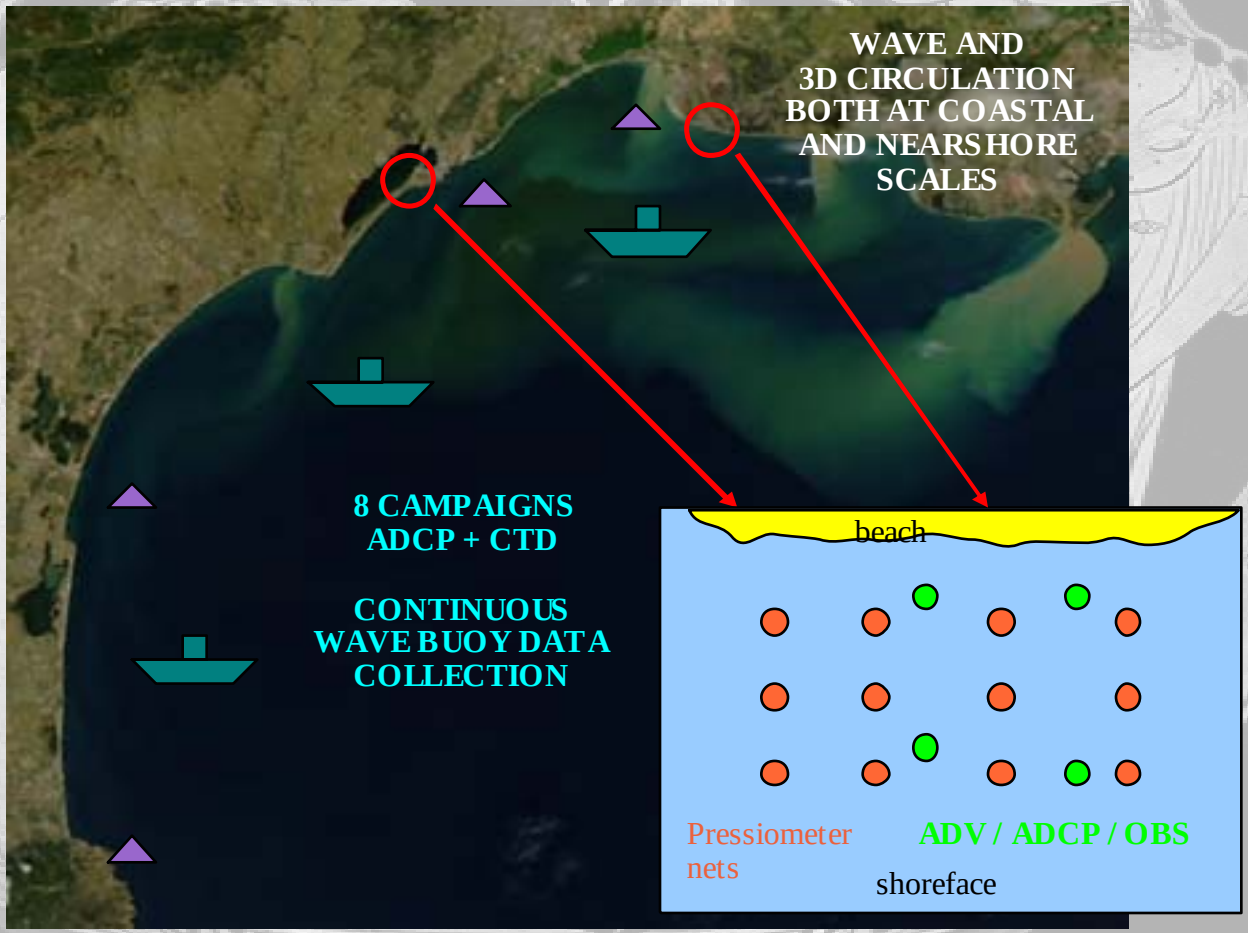
**AND HYDRODYNAMICS**

Two coupled ADV used in surf zone

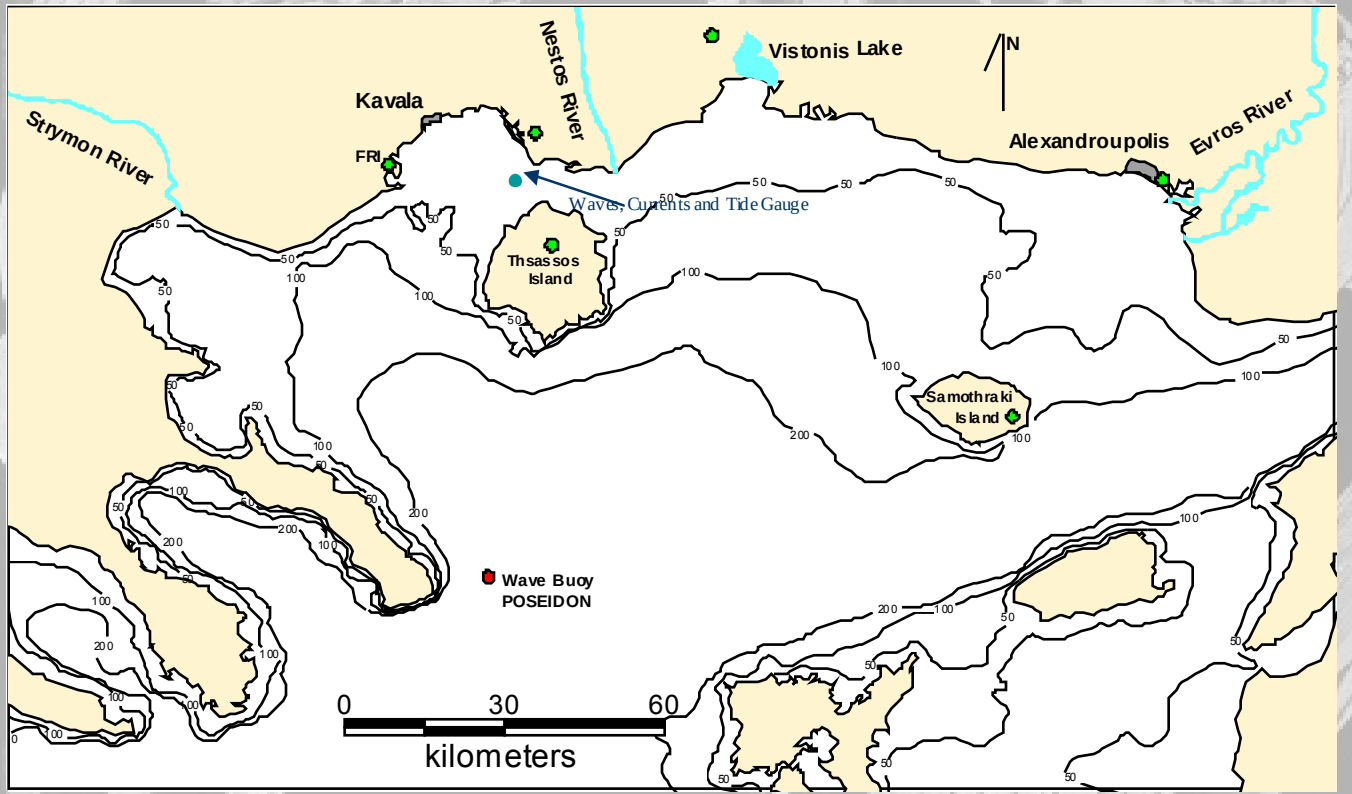
**STUDIED AREAS AND PLANNED DEPLOYMENTS**
**PARTNER 1: GEOSCIENCES-M**



## STUDIED ZONES AND PLANNED DEPLOYMENTS
## PARTNER 1: GEOSCIENCES-M



# STUDIED AREAS AND PLANNED DEPLOYMENTS
## PARTNER 3: FRI-NAGREF



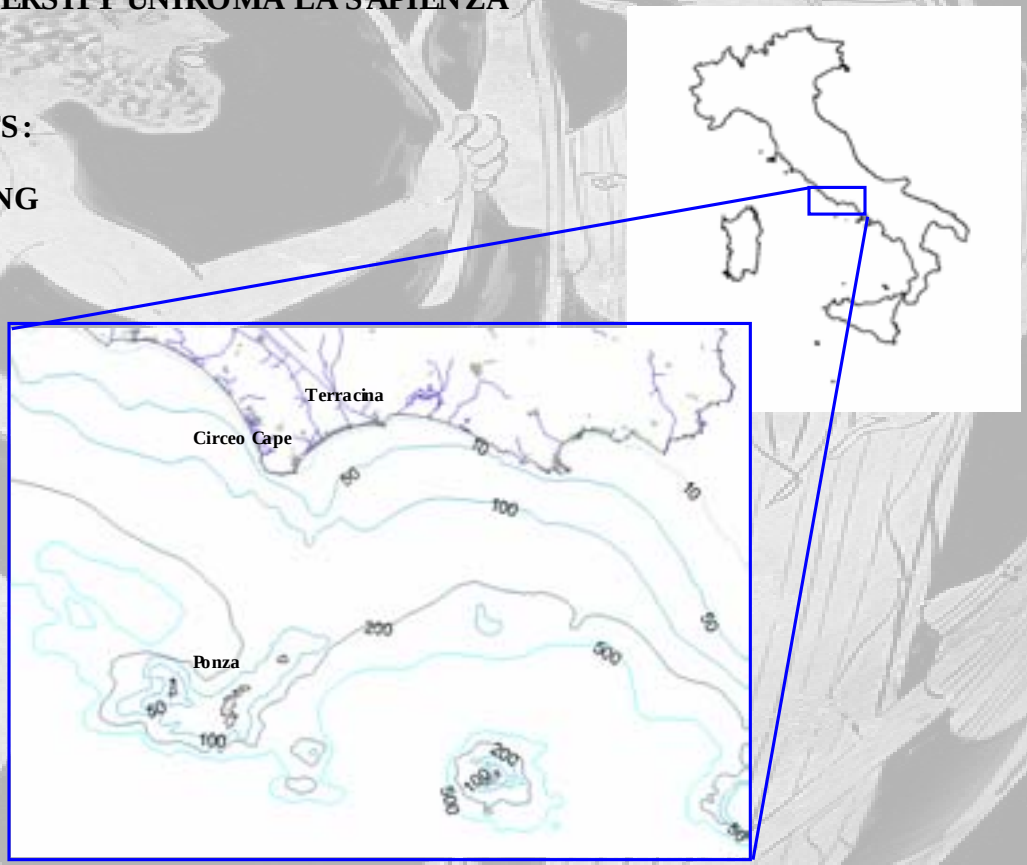
**STUDIED ZONES**

**PARTNER 5: UNIVERSITY UNIROMA LA SAPIENZA**

**MEASUREMENTS:**

**REMOTE SENSING**

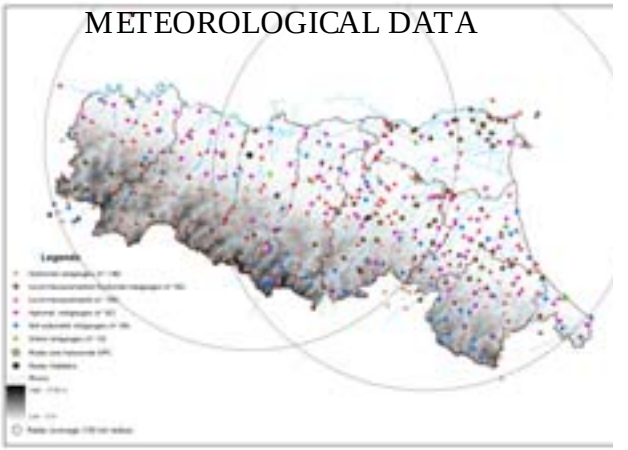
**WAVE BUOYS**




**Area of Study**: from Circeo Cape to Terracina and Ponza island

**STUDIED AREAS AND MEASUREMENTS**
**PARTNER 4: ARPA-SIM**

METEOROLOGICAL DATA



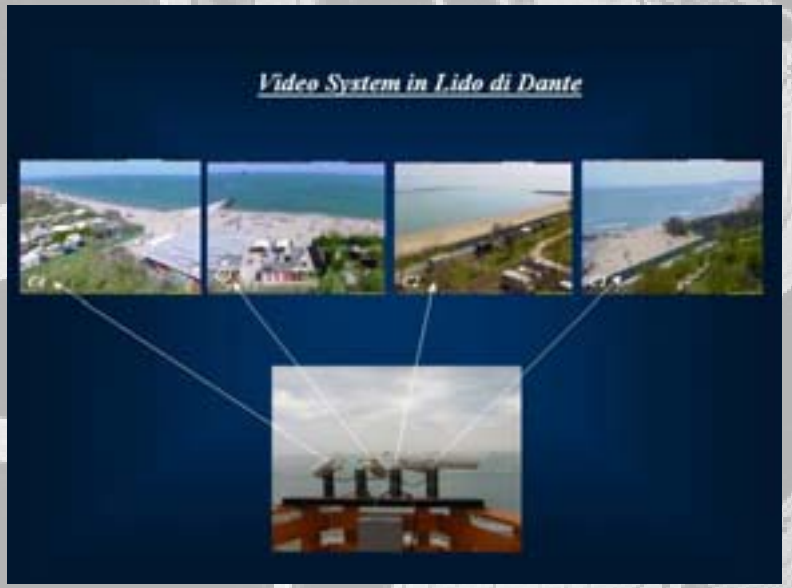
HYDRODYNAMIC

**STUDIED ZONES AND DEPLOYMENTS**
**PARTNER 4: ARPA-SIM**

## INSTALL AND MANAGE A NEW OCEANOGRAPHIC STATION FOR THE MONITORING OF WAVES AND OCEANOGRAPHIC PARAMETERS

- will be part of the Emilia Romagna meteo-hydrological network
- will provide data for the verification of the wave and oceanographic numerical models, running by ARPA-SIM
- will provide input data for the future versions of the operational wave and oceanographic models.
- will provide data to compile the wave climatology for the Emilia Romagna coastal zone.
- will provide input data to the coastal model, developed by partner DISTART UniBO, to calculate the impact of waves on the coastal area of the Emilia Romagna region.
- The data will be stored in the SIM data base and made available to the users by the internet interface (Dexter).

**STUDIED ZONES AND PLANNED DEPLOYMENTS**
**PARTNER 2: UNIBO-DISTART**

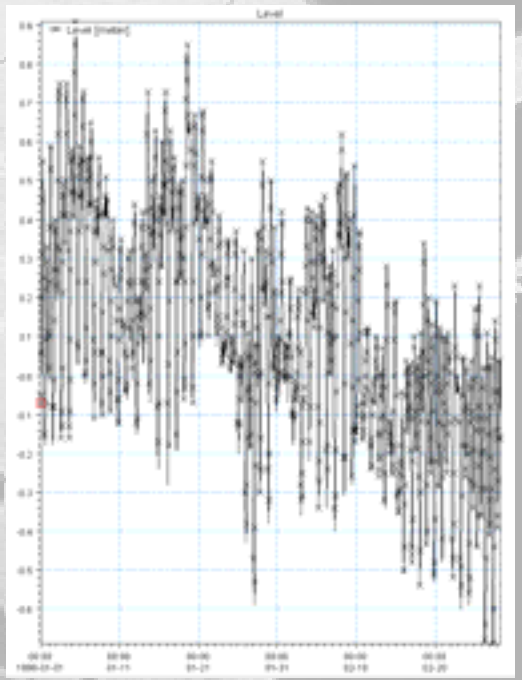


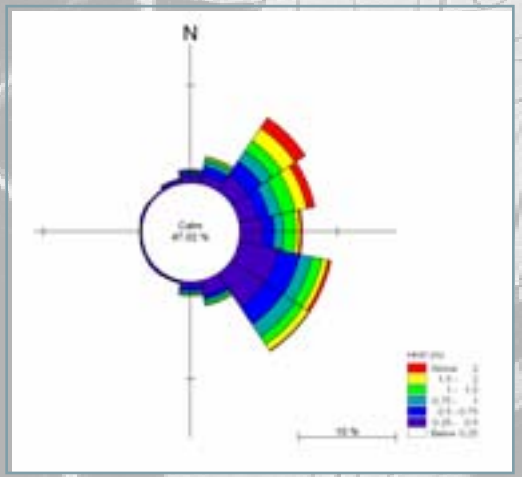

**+ ADCP CAMPAIGNS**

**SAME ACTIVITIES ON A SECOND AREA: IGEA MARINA**

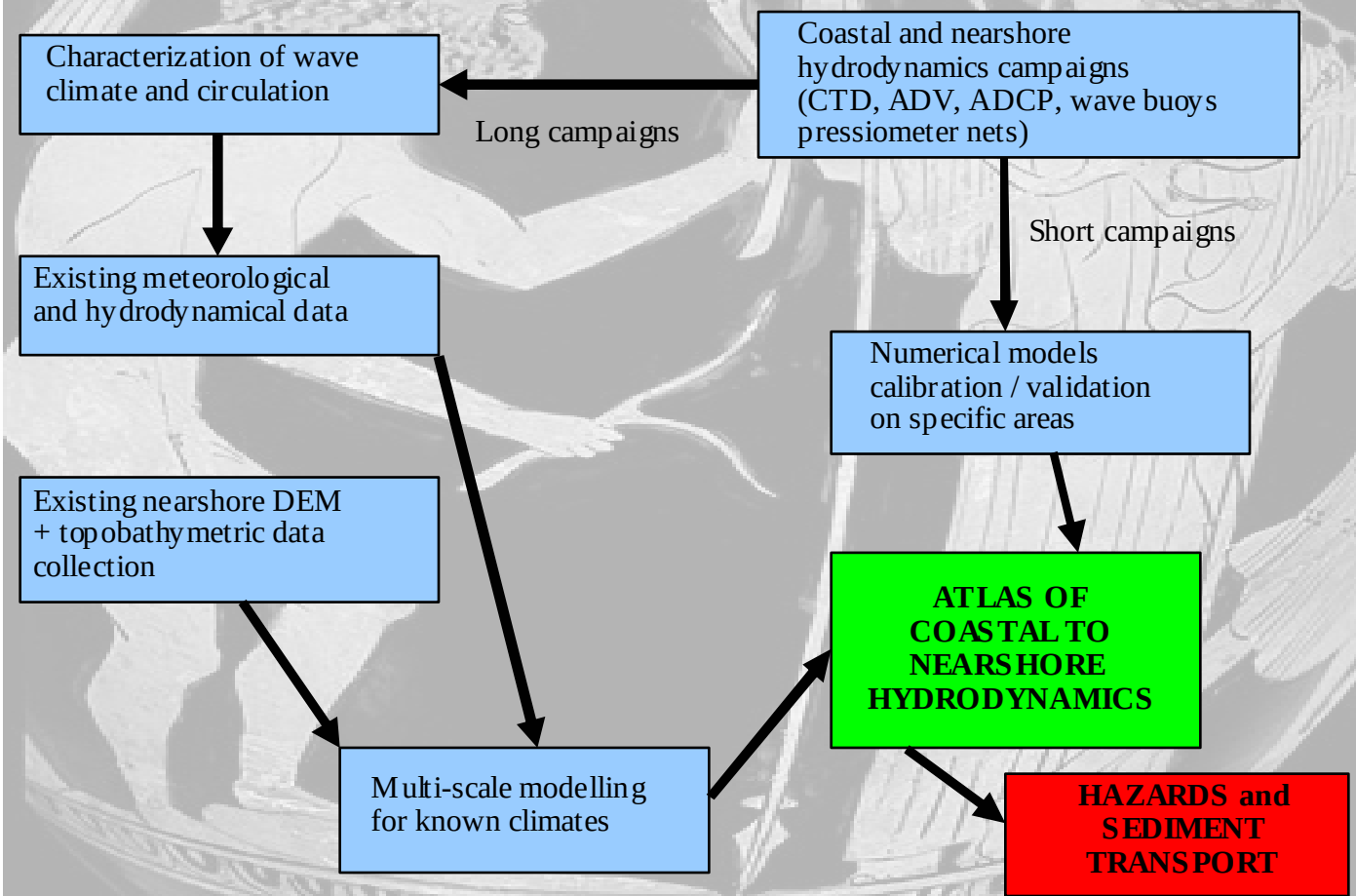
**STUDIED ZONES AND PLANNED DEPLOYMENTS**
**PARTNER 2: UNIBO-DISTART**

## COLLECTION AND ELABORATION OF METEOMARINE DATA (WAVE DATA PROVIDED BY ARPA-SIM)



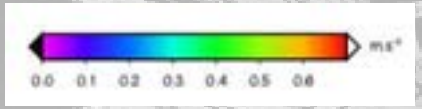


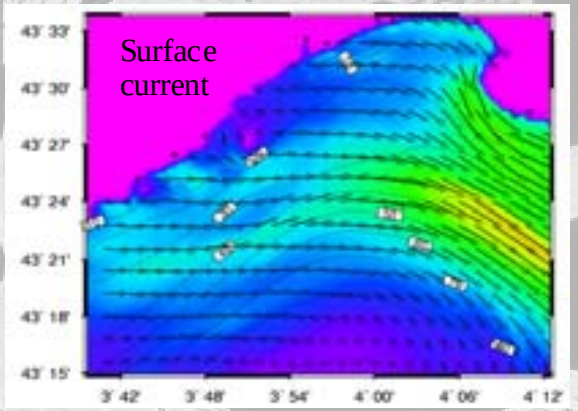
**PARTNERS 1 and 3: GEOSCIENCES-MONTPELLIER AND FRI-NAGREF**

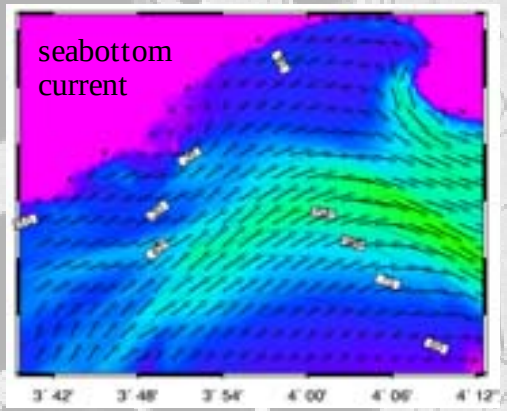


**PARTNERS 1 : GEOSCIENCES-MONTPELLIER**

## COASTAL PROCESSES

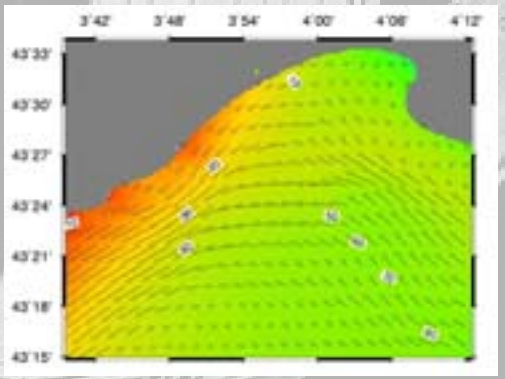



5 km

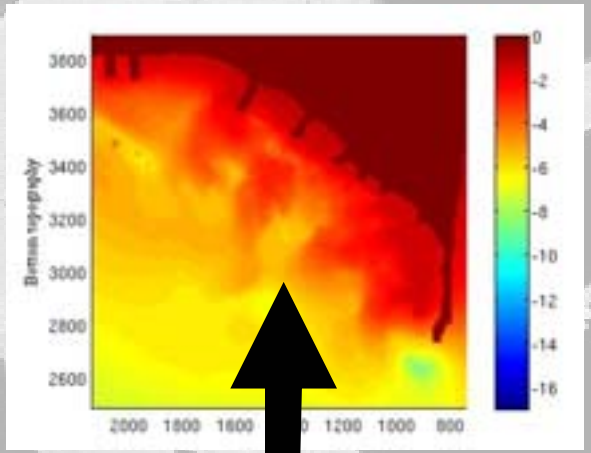
3D circulation forced by strong North-West Wind




Mean wave-induced current and sea-surface elevation for waves from South-East

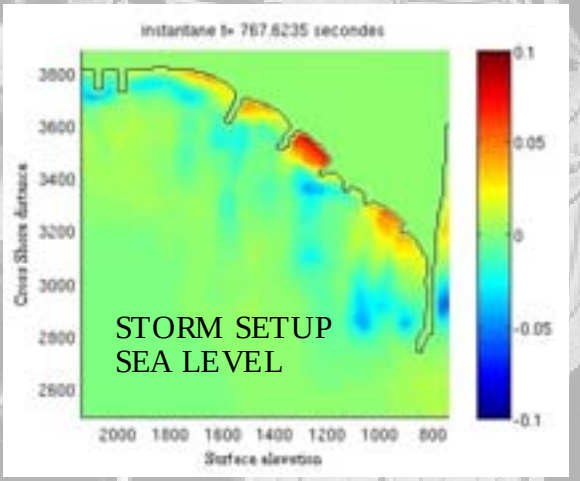
**PARTNERS 1 : GEOSCIENCES-MONTPELLIER**

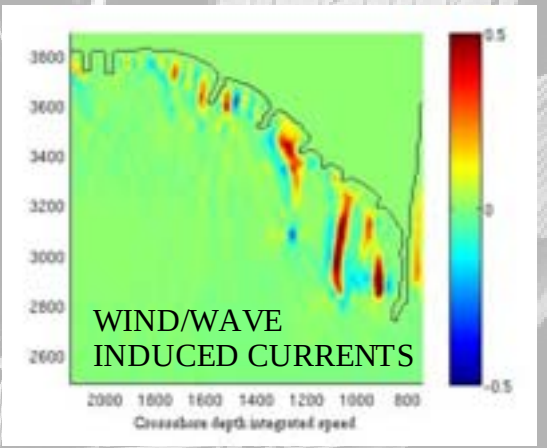
**NEARSHORE PROCESSES**




REAL WATER DEPTH
AND REALISTIC CLIMATES

200 m



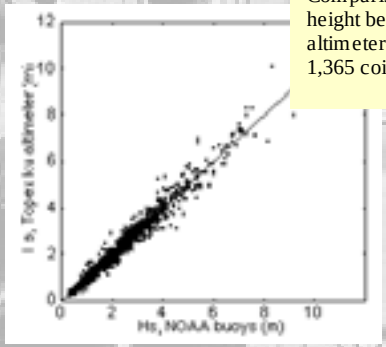



## PARTNER 5: UNIVERSITY UNIROMA LA SAPIENZA

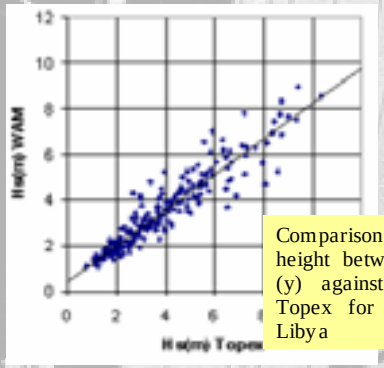
***Aim: to collect reliable information on wave parameters in the area of interest.***

**1 – VALIDATION OF REMOTELY SENSED MEASUREMENTS**
comparison between buoy and satellite data

**2 – MODEL DATA CALIBRATION**
comparison between model and satellite data




Comparison of significant wave height between the Topex altimeter and NOAA buoys for 1,365 coincident data




Comparison of significant wave height between WAM model data (y) against altimeter data from Topex for the Mediterranean off Libya

**PARTNER 5: UNIVERSITY UNIROMA LA SAPIENZA**

## COASTAL CLIMATE CHARACTERIZATION

**3 – EXCTRACTION OF TIME SERIES (Hs, T, θ)**

**4 – STATISTICAL ANALYSIS:** one- and two-dimensional distributions to thoroughly describe the wave climate

**5 – TRANSFER OF THE WAVE CLIMATE TO THE COAST by the 3rd generation wave model SWAN**

**6 – Computation of stresses for bed mobilization factor and as input for the hydrodynamical model**

**RESULTS BENEFICIAL TO:**
**. CIRCULATION**
**.SEDIMENT TRANSPORT**

**PARTNER 5: UNIVERSITY UNIROMA LA SAPIENZA**

## LOCAL CIRCULATION CHARACTERIZATION

**7 – Computation of local circulation by the 3D ROMS model**

**8 – Estimation of the influence of Posidonia on the wave climate in shallow water**

**9 – Analysis of the correlations between modelled local currents/waves and Posidonia regression/accretion**

**RESULTS BENEFICIAL TO:**
**.SEDIMENT TRANSPORT**
**.COASTAL PROTECTION**
**.COASTAL ZONE MANAGEMENT**

## PARTNER 4: ARPA-SIM

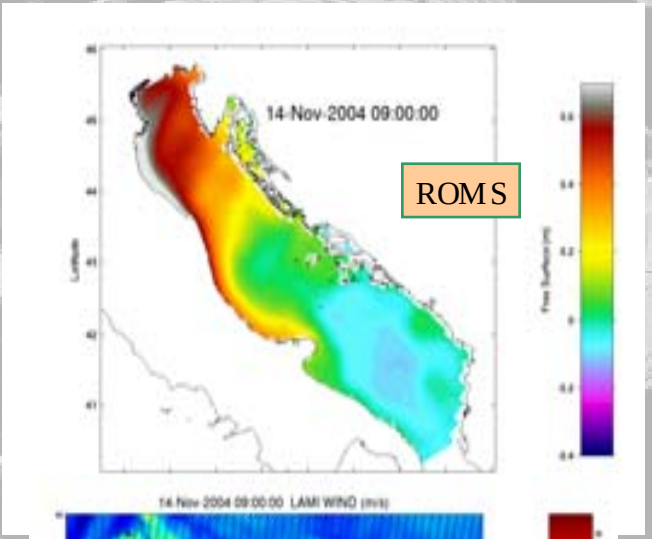
Wind storm
+
Wave storm
+
Surge

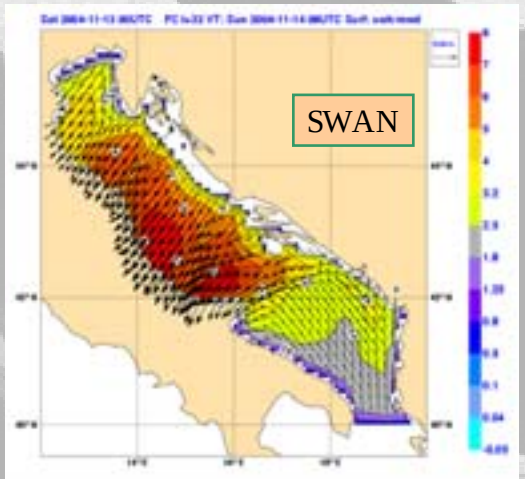
⇒ Coastal Hazards Early Warnings

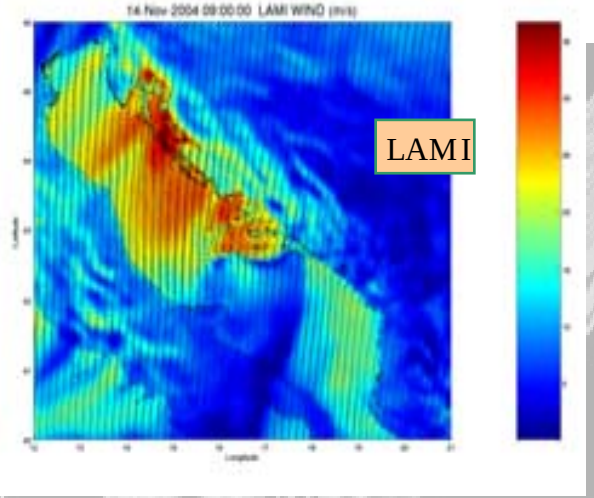
+ FORCINGS FOR NEARSHORE MODELLING AND MEASUREMENTS

Meteo-oceanographic models (SIM):

- LAMI (Limited Area Model Italy)
- WAM-SWAN (wave models driven by LAMI)
- AdriaROMS (sea level and currents model)



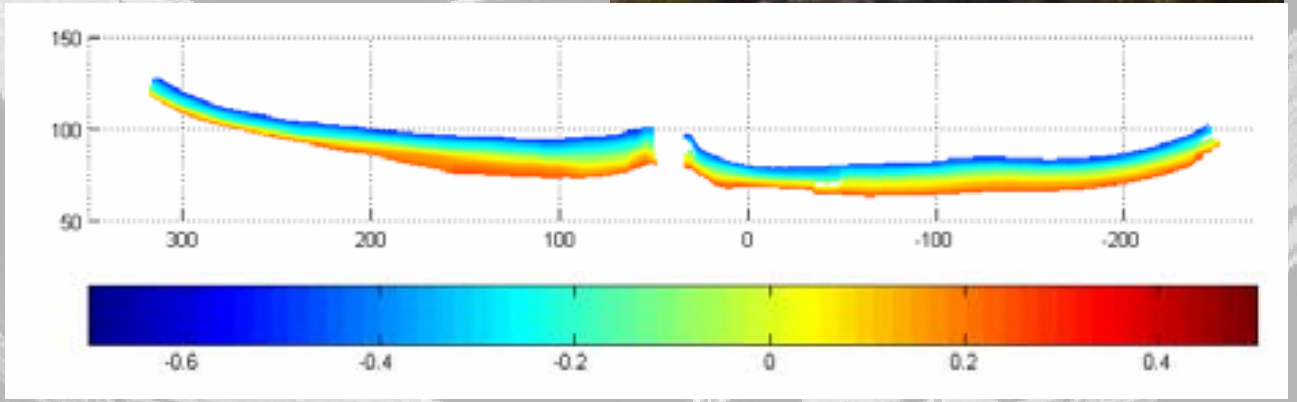



**PARTNER 2: UNIBO-DISTART**

## IDENTIFICATION AND COLLECTION OF CSIs: SHORELINE POSITION AND INTERTIDAL BEACH MAP

At each hour/day:

- we identify the shoreline position
- we associate to it the simultaneous sea level
- we obtain an intertidal beach map



**PARTNER 2: UNIBO-DISTART**

## NUMERICAL SIMULATIONS WITH MIKE 21

**NSW** (Nearshore Wind Spectral Waves)

- Wave propagation from off-shore to near-shore areas

**PMS** (Parabolic Mild Slope)

- Wave propagation in presence of structures

**HD** (Hydrodynamic)

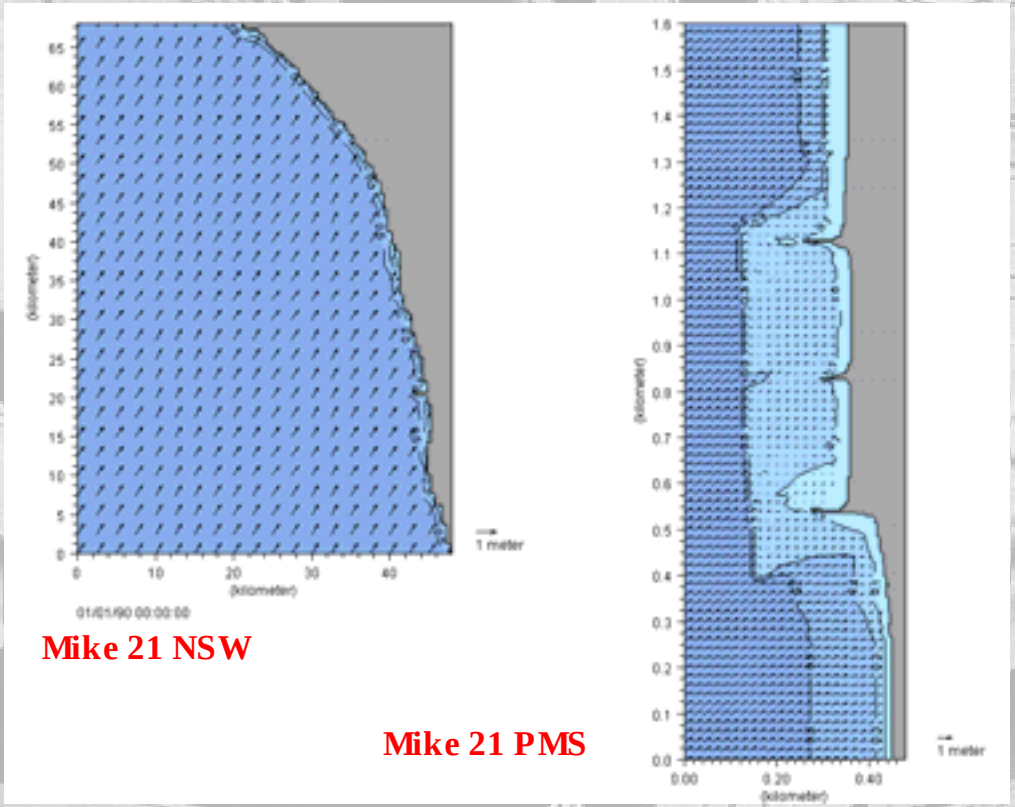
- Hydrodynamic circulation induced by waves

**ST-Q3** (Sediment Transport)

- Sediment fluxes
- Deposition/erosion trends

**PARTNER 2: UNIBO-DISTART**

# WAVES TRANSFORMATION FROM OFFSHORE TO NEARSHORE

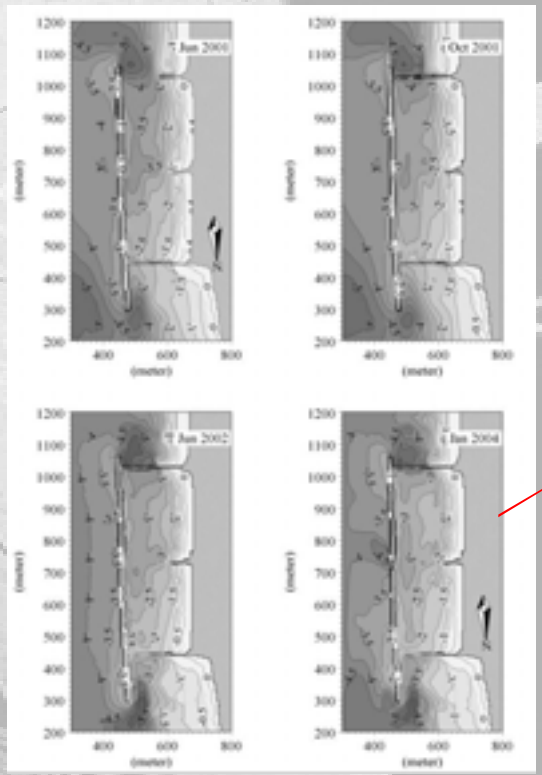


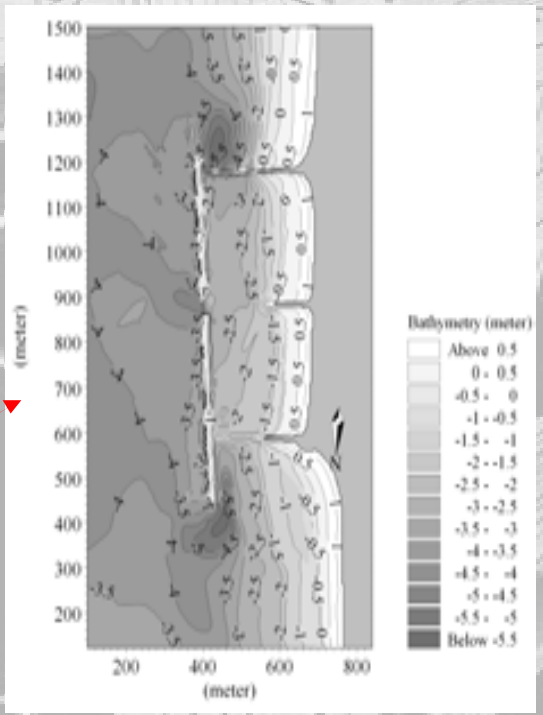

**Mike 21 NSW**

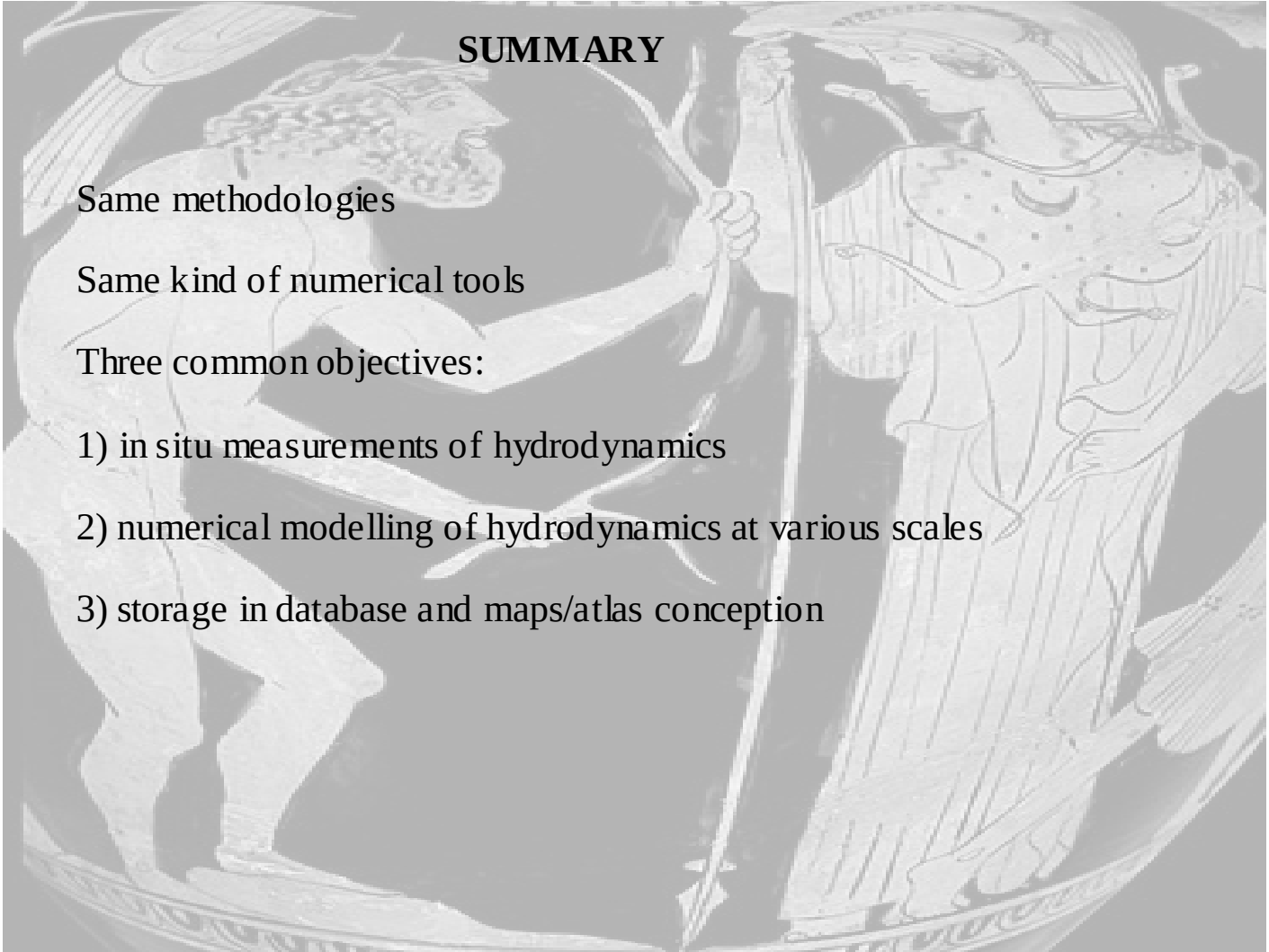
**Mike 21 PMS**

**PARTNER 2: UNIBO-DISTART**

## FIELD SURVEYS AND SIMULATED BED CHANGES





## SUMMARY

Same methodologies

Same kind of numerical tools

Three common objectives:

1) in situ measurements of hydrodynamics

2) numerical modelling of hydrodynamics at various scales

3) storage in database and maps/atlas conception