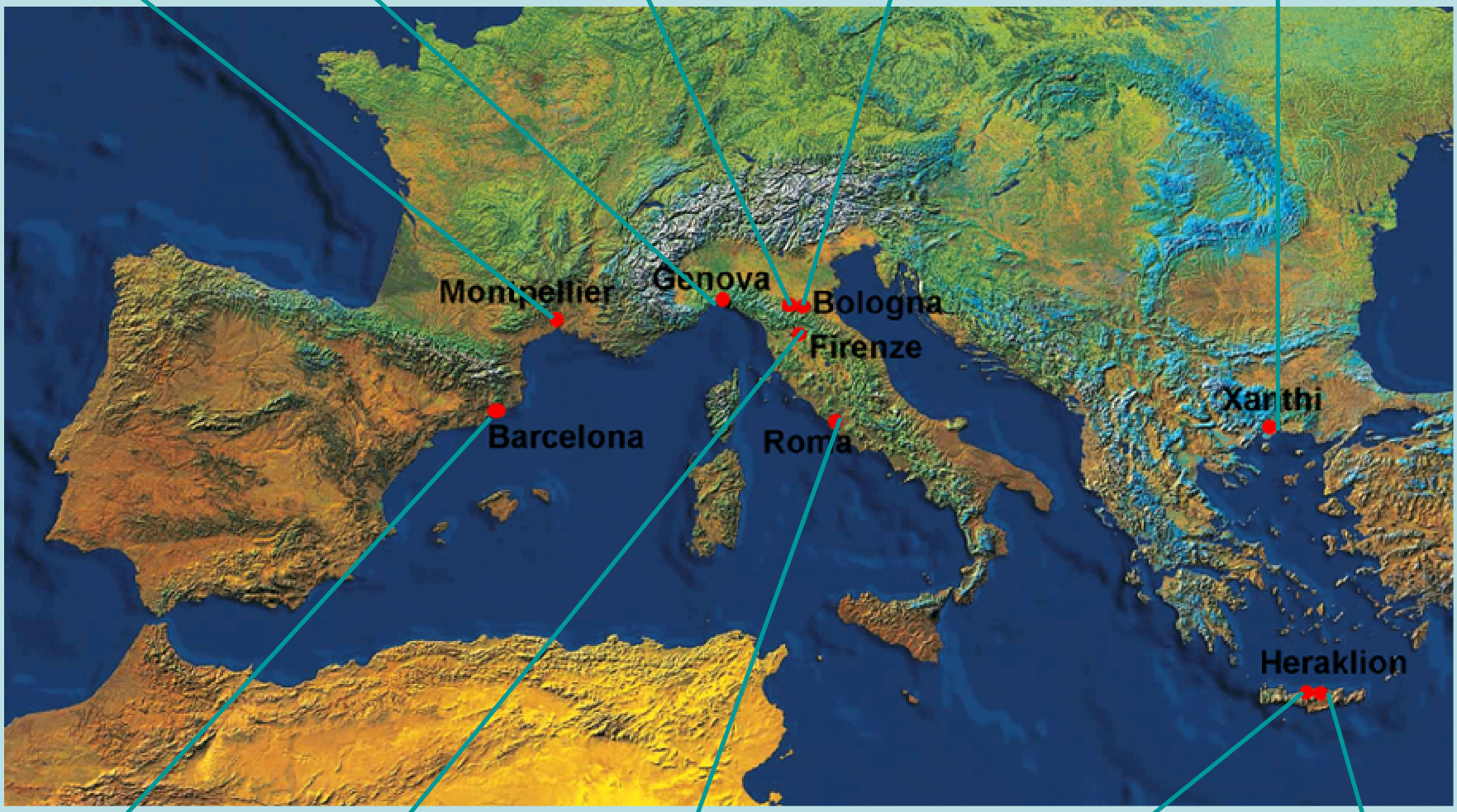
Nord Est SUD Ouest
INTERREG IIIC

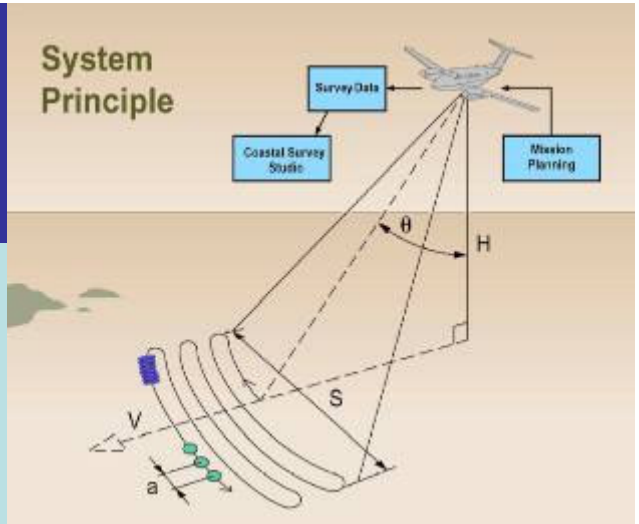
BEACHMED-e

OpTIMAL
Opération BEACHMED-e

Optimisation des Tecniques Integrées de Monitorage Appliquées aux Littoraux


EID
UNIGE
UNIBO
ARPA-IA
UNIDEMOCRITUS
Montpellier
Genova
Bologna
Firenze
Barcelona
Roma
Xanthi
Heraklion
ICM
UNIFI
UNIROMA L.S.
IACM/FORTH
OANAK

LIDAR (LIght Detection And Ranging)

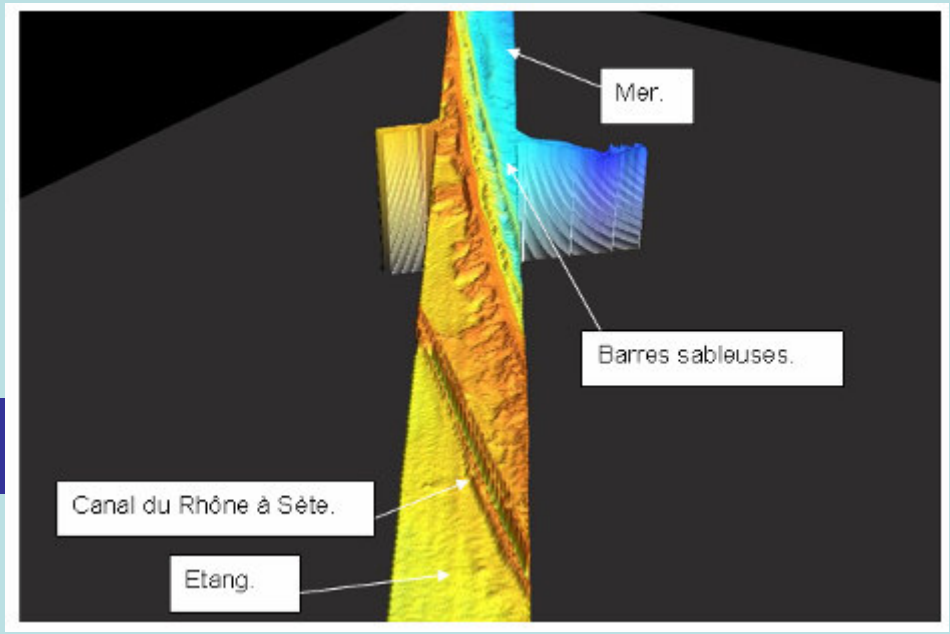


APPLICATIONS

- Survey of emerged beach, from swash line to dunes/structures
- Survey of submerged beach: from swash line to closure depth
- Survey of shoreline

ACCURACY

- Hydrographical mode: 15 - 25 cm (h) and 1,0 - 2,5 m (x,y)
- Topographic mode: 10 - 25 cm (h), 0,6 - 2.0 cm (x,y)



P(5) – ARPA, Emilia-Romagna

P(6) – EID, Hérault

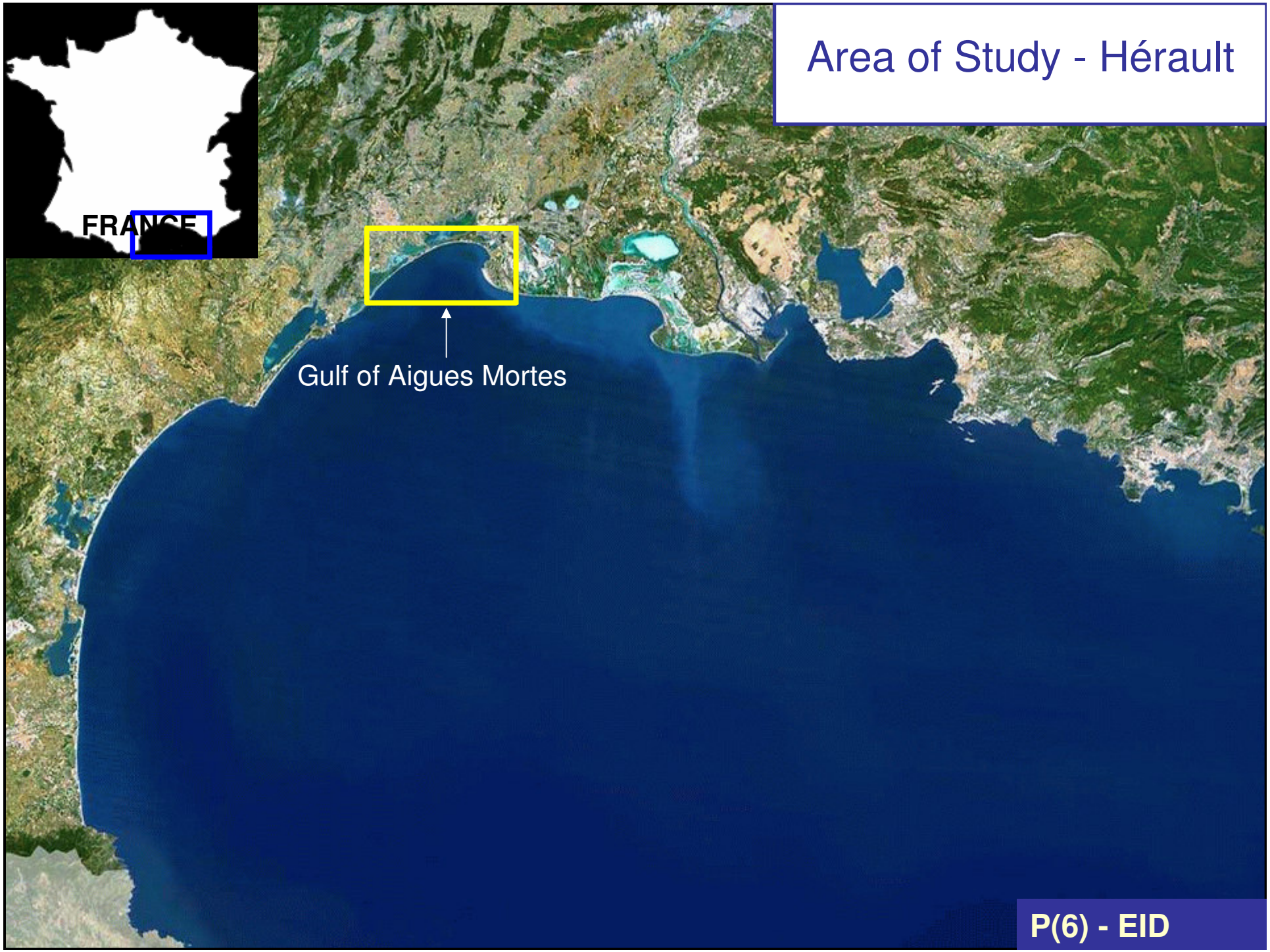
ADVANTAGES

- Speed, productivity, economy and simultaneity
- Simultaneous survey of emerged and submerged beaches
- Survey of points that are uniformly distributed within large areas and according to a reticulate that does not vary with depth
- Extended spatial coverage of the shore on land and sea altogether

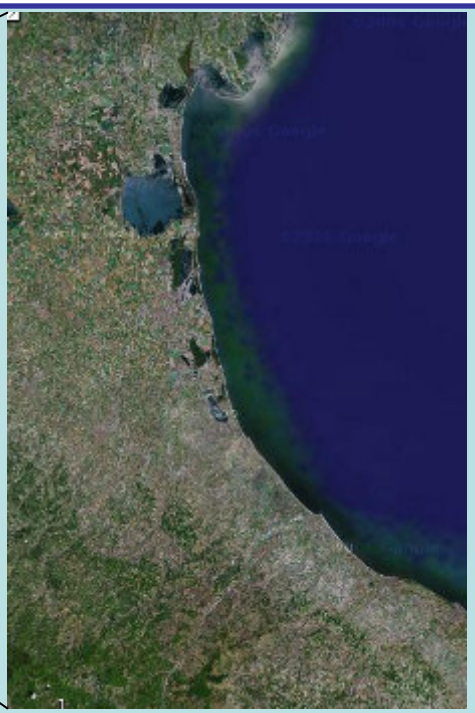
DISADVANTAGES

- Limited accuracy
- Expensive for limited areas
- Maximum depth for survey depends on the water transparency
- Accuracy depends of the conditions of sea surface and meteorological conditions

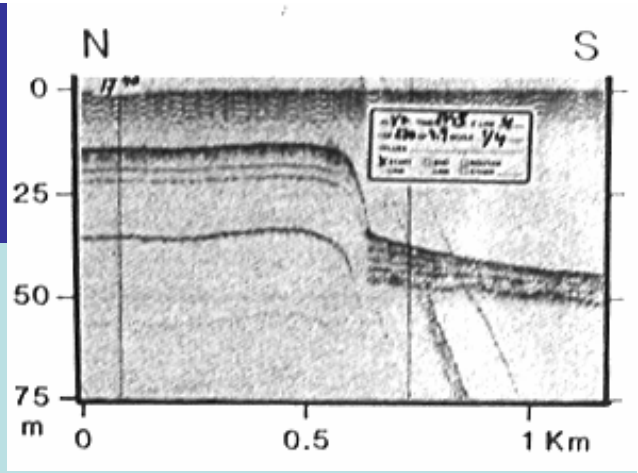
Area of Study - Hérault



Area of Study – Emilia-Romagna



SEISMIC

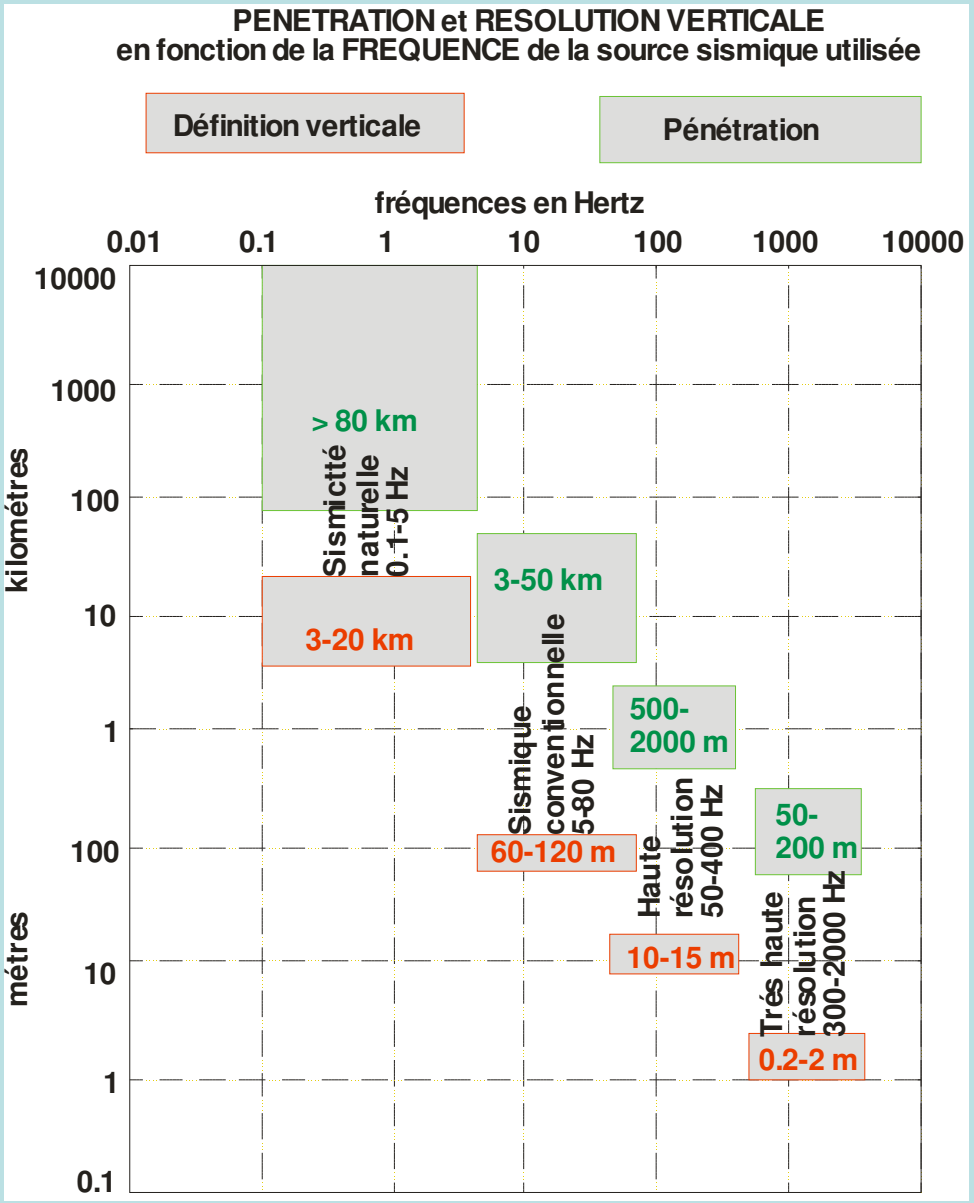


APPLICATION

Cartography and volume estimates of sandy sedimentary units.
Delimitation of accumulated sand against coastal structures.

DISADVANTAGES

Limited vertical resolution: penetration is enough for cartography of coastal prisme, but maybe not for evaluating the sand accumulated on the port entry. Bathymetric surveys will performed, before and after dredging, to see if seismic is capable of assessing the volume dredged each year.


PENETRATION et RESOLUTION VERTICALE
en fonction de la FREQUENCE de la source sismique utilisée
Définition verticale
Pénétration
fréquences en Hertz
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1000
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kilométres
métres
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100
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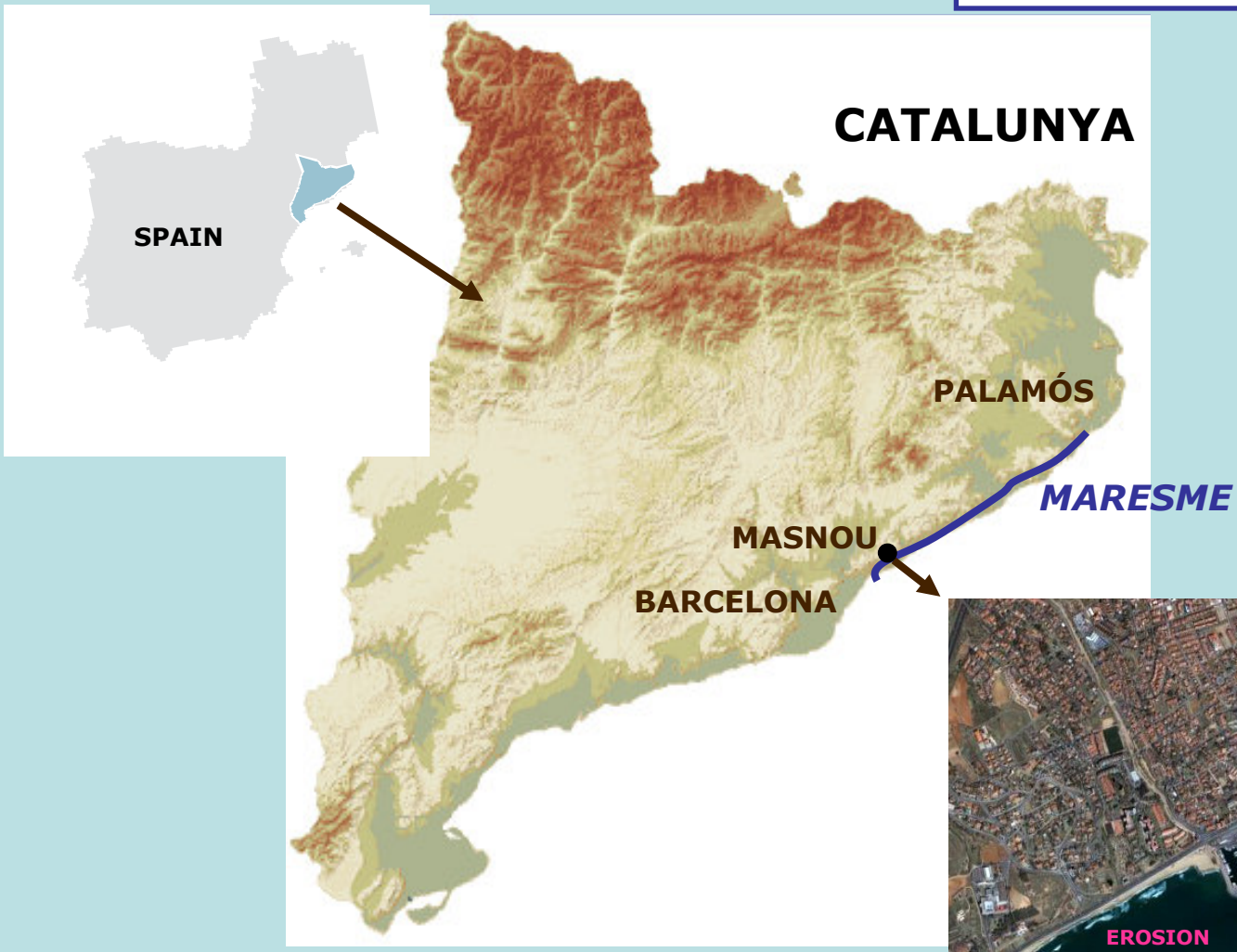
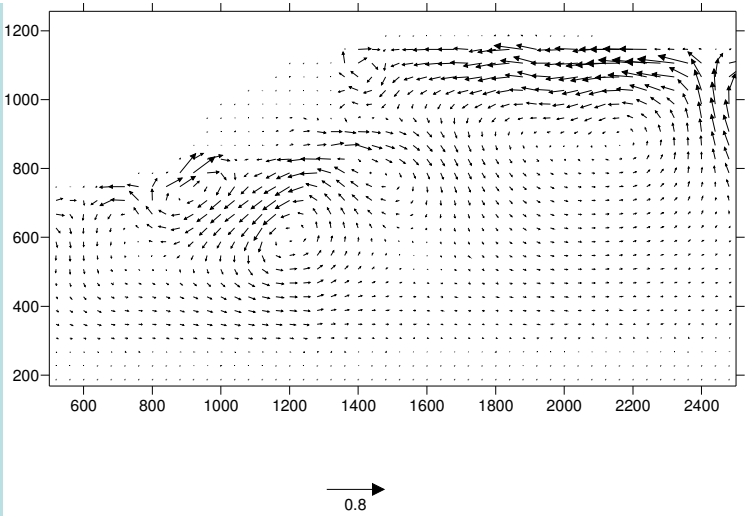
1
0.1
> 80 km
Sismictté naturelle 0.1-5 Hz
3-20 km
3-50 km
Sismique conventionnelle 5-80 Hz
60-120 m
500-2000 m
Haute résolution 50-400 Hz
10-15 m
50-200 m
Trés haute résolution 300-2000 Hz
0.2-2 m

Area of Study - Catalunya



MODELS



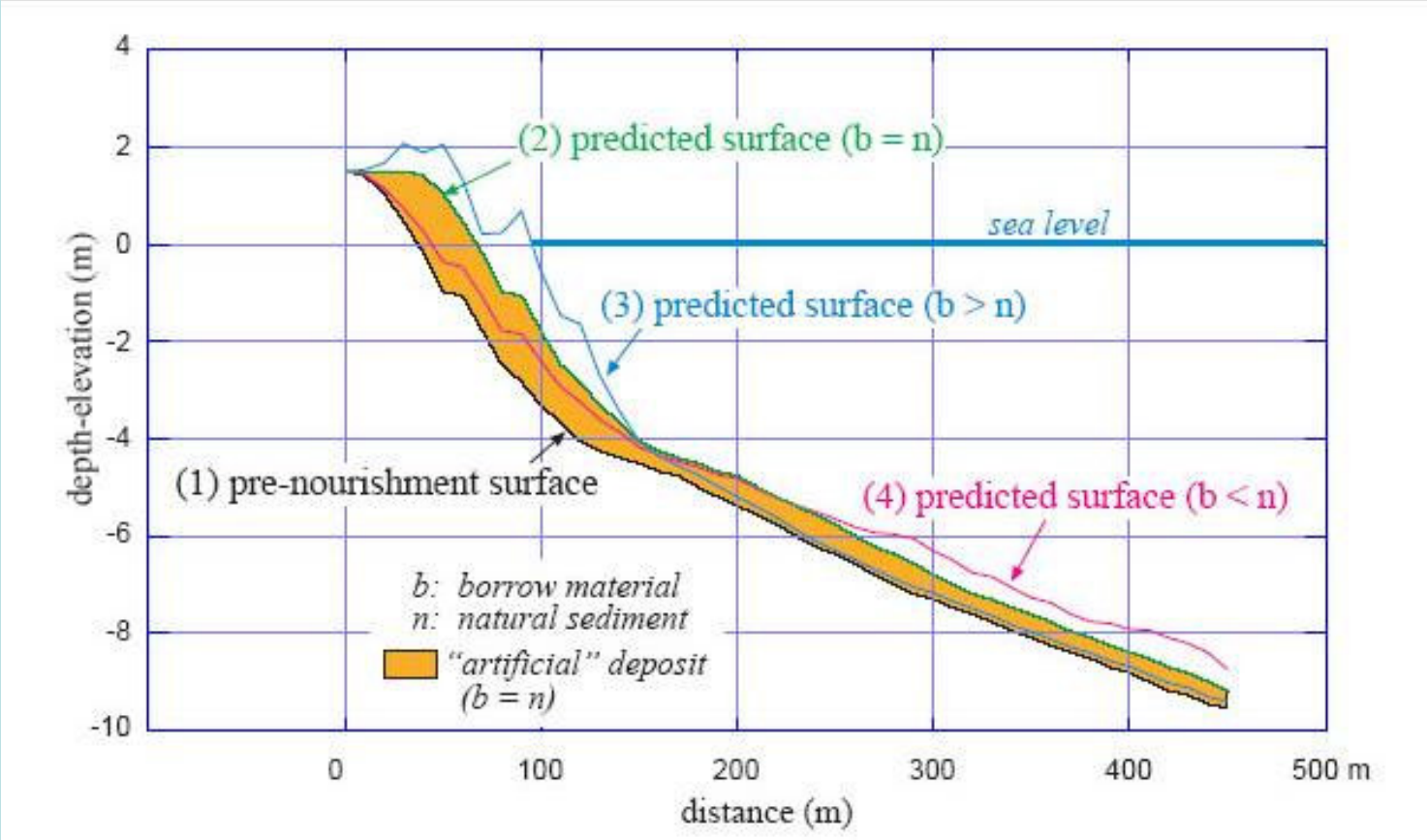
P(4) – UNIV. ROMA « LA SAPIENZA »

P(8) – IACM/FORTH

P(10) – ICM

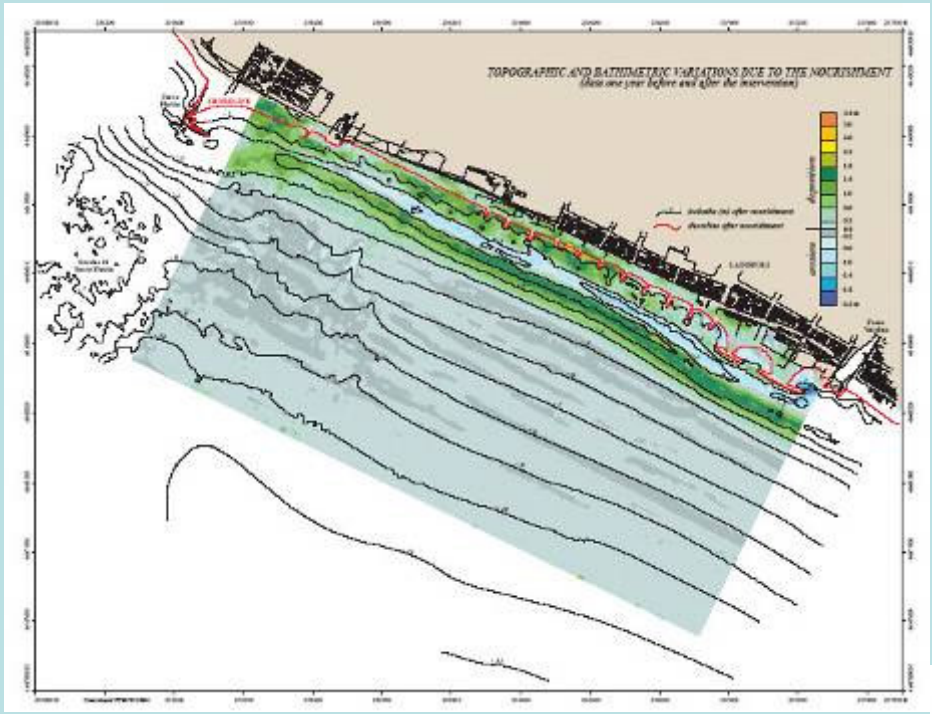
BEACH FILL MODEL

Development of a model useful in predicting beach profile after nourishment starting from native and borrow sediment grain-size, original beach slope and used volume.
The model can assist both the design and the monitoring phases; the latter can help in defining the refill time.

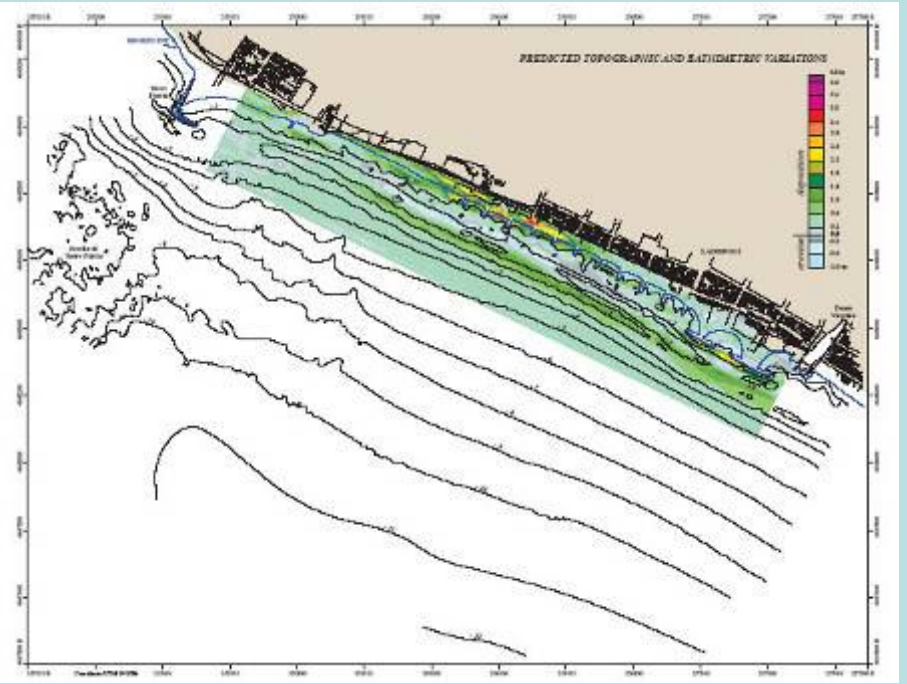


PROBLEMS

The accuracy of the prediction needs to be evaluated.
Three case studies will be considered where nourishment was recently performed (Ladispoli, Minturno e Fondi).



Ladispoli: monitored



Ladispoli: predicted

Area of Study - Lazio

Longshore transport model

The numerical model comprises of three submodels:

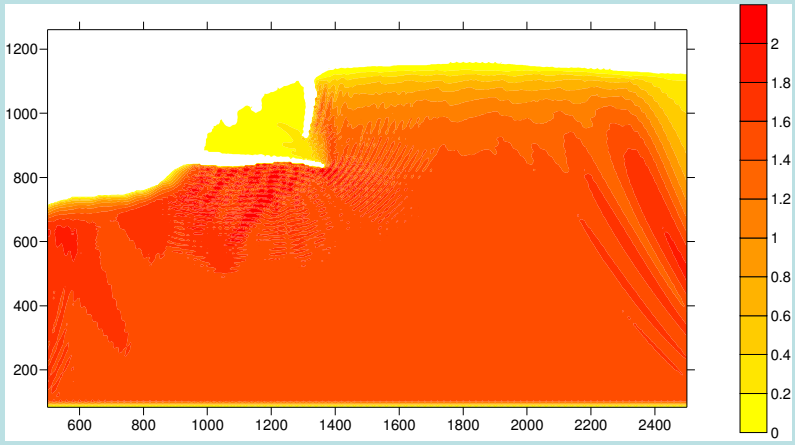
- the wave model
- the wave induced circulation model
- the sediment transport model or the one line model.
- The model is expected to provide numerical results describing qualitatively and not quantitatively the phenomena of erosion and deposition.

ADVANTAGES

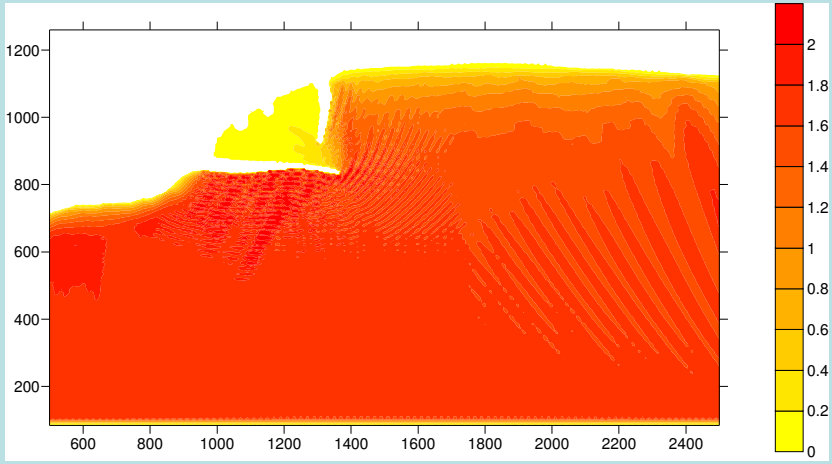
It is possible to examine various scenarios concerning construction of coastal structures, beach nourishment and dredging consuming only computational means.

It has been tested extensively in the past and has been applied with success in numerous field works concerning coastal design and monitoring in Greece.

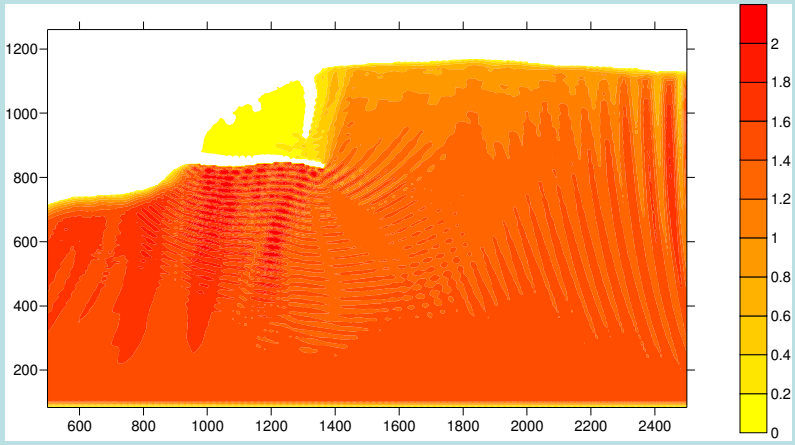
Specific submodels of the model are still under evolution in IACM.



Application of the wave model for S wind

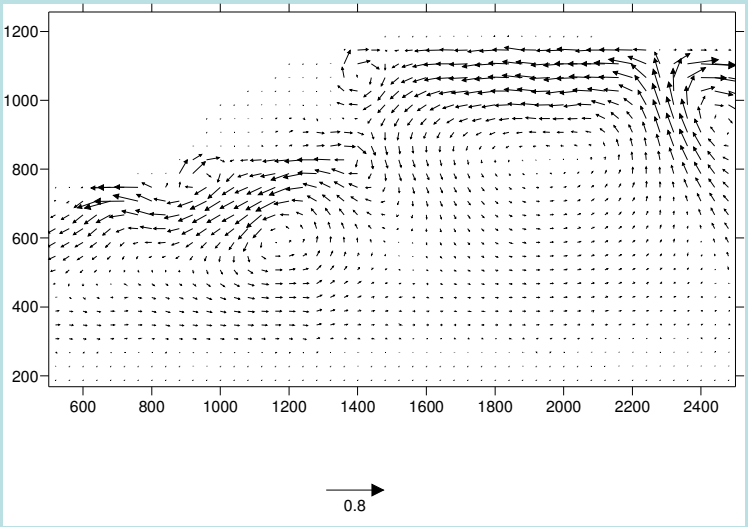


Application of the wave model for S-W wind

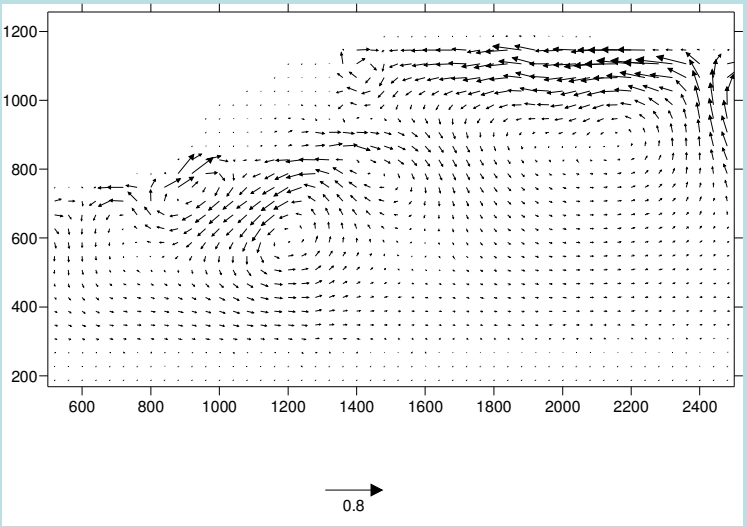


Application of the wave model for W wind

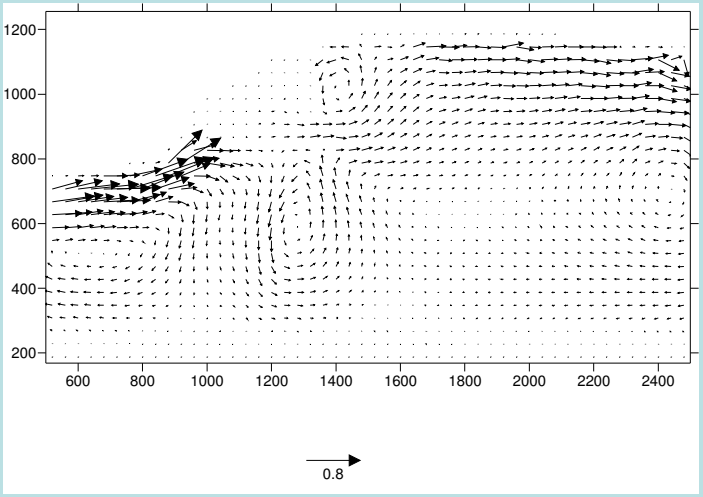
P(8) – IACM/FORTH



Application of the wave induced circulation model for South wind (Velocity vectors field)

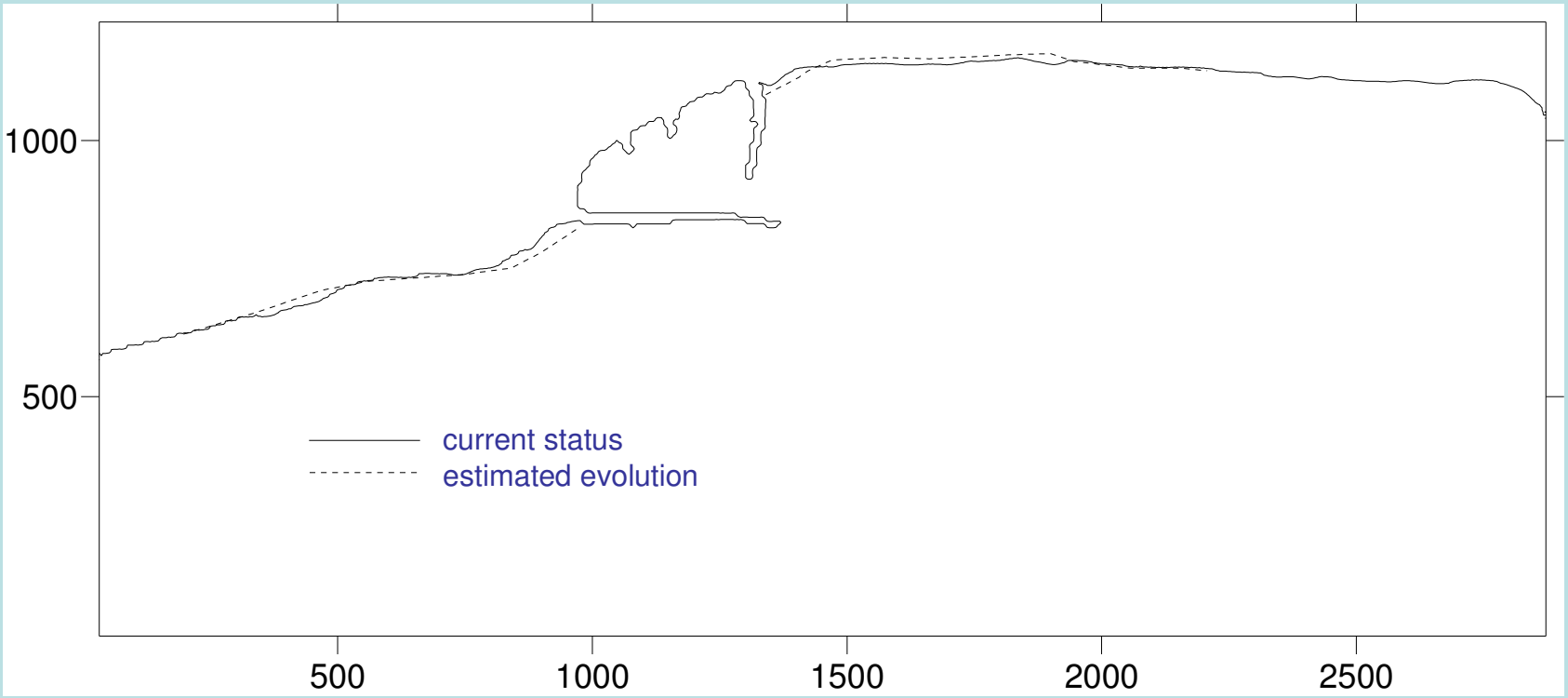


Application of the wave induced circulation model for SouthWest wind (Velocity vectors field)



Application of the wave induced circulation model for West wind (Velocity vectors field).

P(8) – IACM/FORTH



Application of the sediment transport for the prediction of the coastline evolution

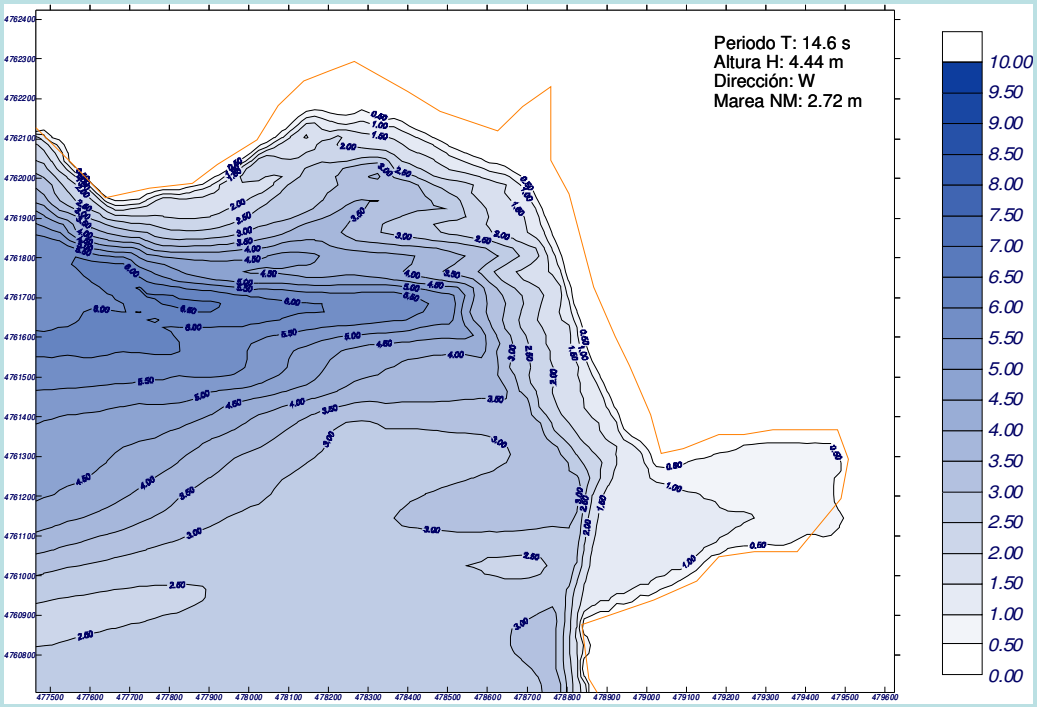
Area of Study - Crete

The methodology (numerical modeling) will be applied by IACM mainly in regions of north Crete such as coasts of Rethymno, Iraklio and Agios Nikolaos that are tourist developed and therefore of great interest.

SYSTEME DE MODELISATION COTIERE

Long term shoreline evolution analysis based on available time-series.

Analysis of shoreline evolution induced by coastal structures.



Carte de isohautes de houle de la plage de Nemiña (Espagne) effectuée avec le modèle MOPLA de SMC.

ADVANTAGES

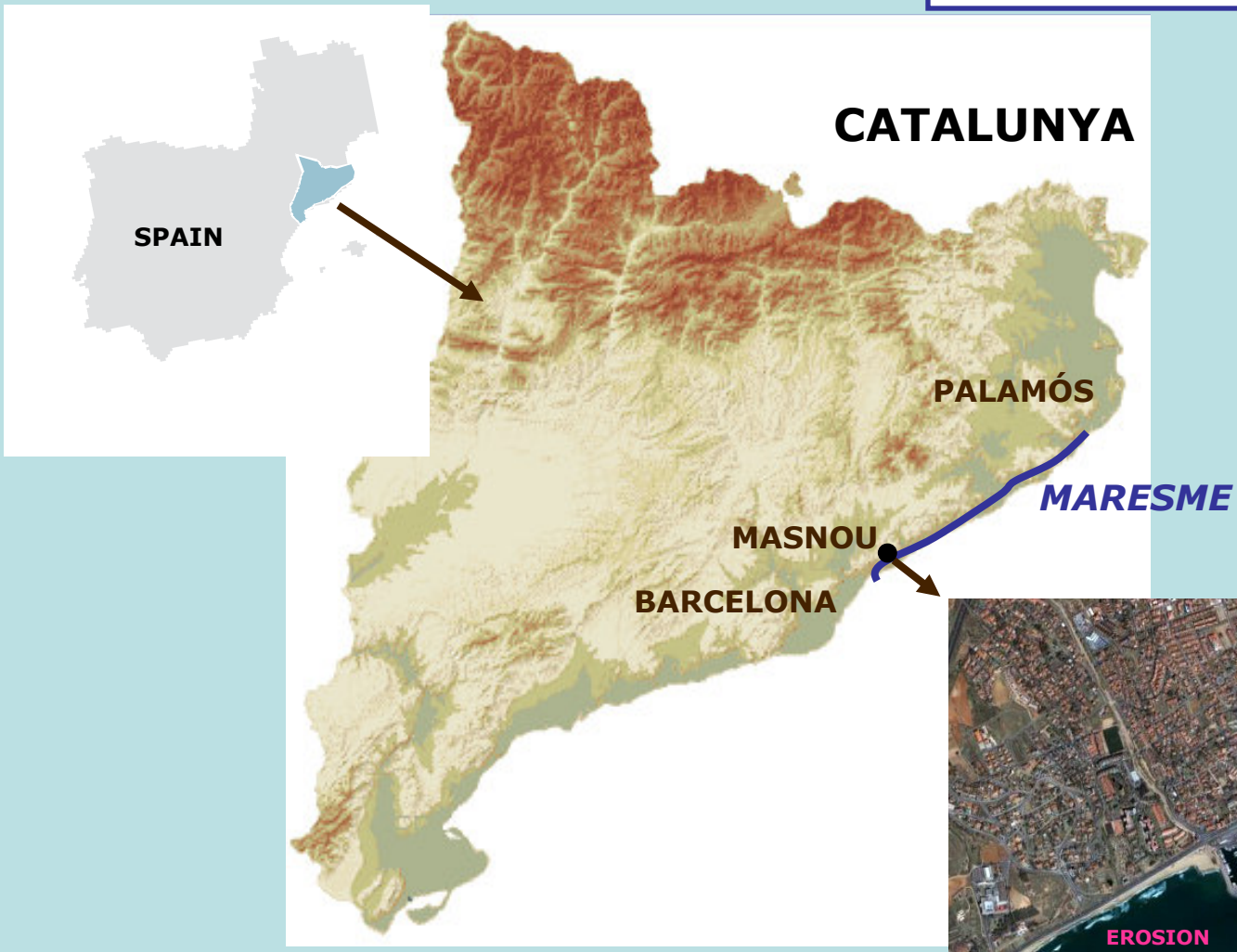
Unified model to be applied by all public entities in Spain.

Apply this model to all the Mediterranean coast.

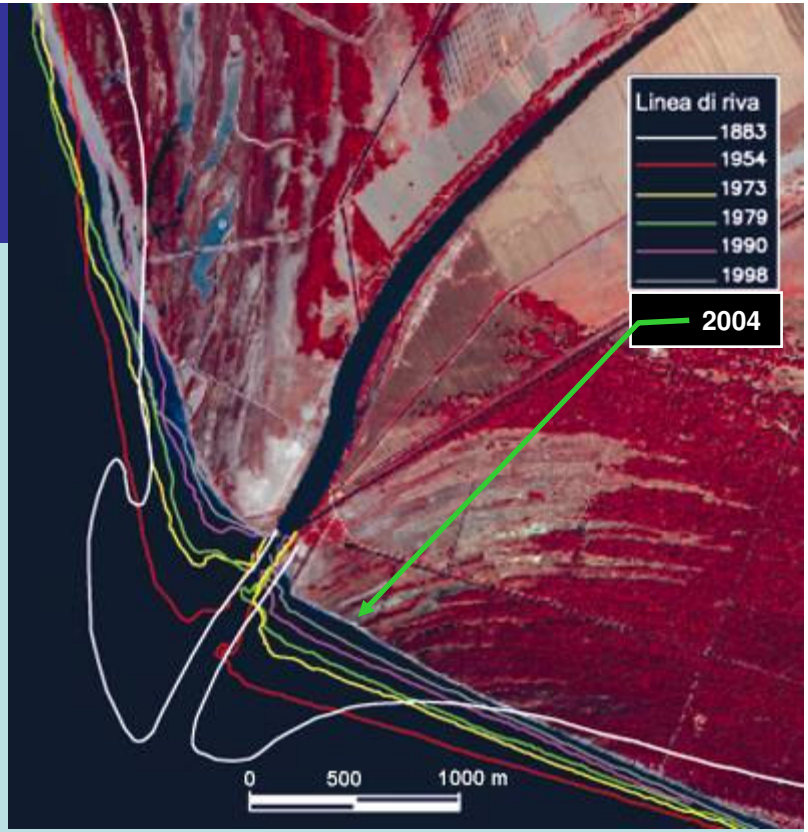
PROBLEMS

High quality data are essential (bathymetry, wave data, history of coastal structures, etc.)

Area of Study - Catalunya



SATELLITE REMOTE SENSING



P(1) – UNIV. FIRENZE

P(4) – UNIV. ROMA « LA SAPIENZA »

P(9) – UNIV. DEMOCRITUS

SATELLITE REMOTE SENSING

HIGH RESOLUTION SATELLITE IMAGES FOR SHORELINE MONITORING

APPLICATIONS

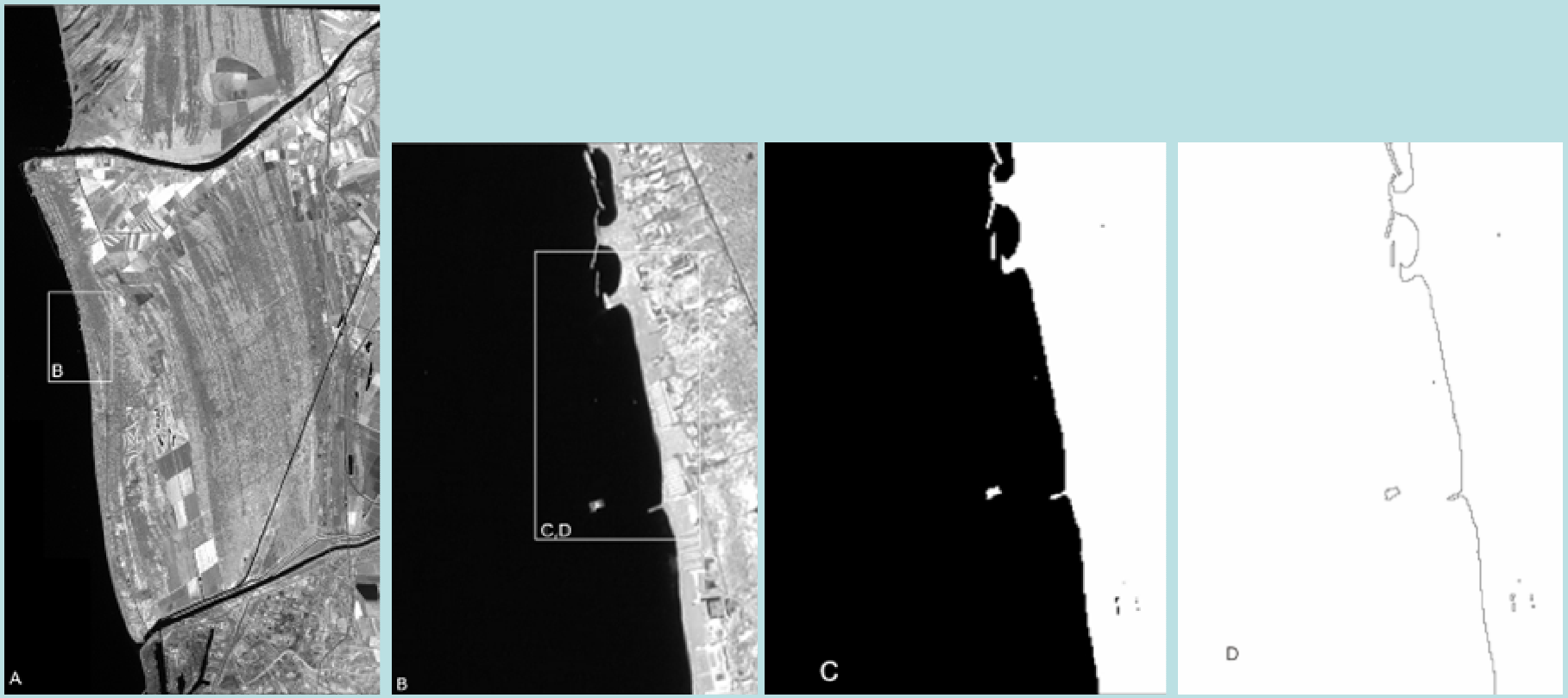
- The high spatial resolution of aerial photograph is greater than Quickbird and Ikonos images, but satellite data have four channel of multi-spectral data.
- Shoreline detection and positioning could be standardized
- Synoptic view.

ADVANTAGES

- High spatial resolution (Max. multi-spectral 2.44 m – panchromatic 0.61 m)
- Near Infrared (good boundary water/soils discrimination)
- Image processing elaborations (classifications, edge detection, etc.)
- Low cost
- Pan-sharpened images to improve spatial resolution of multi-spectral data
- Multi-temporal data

DISADVANTAGES

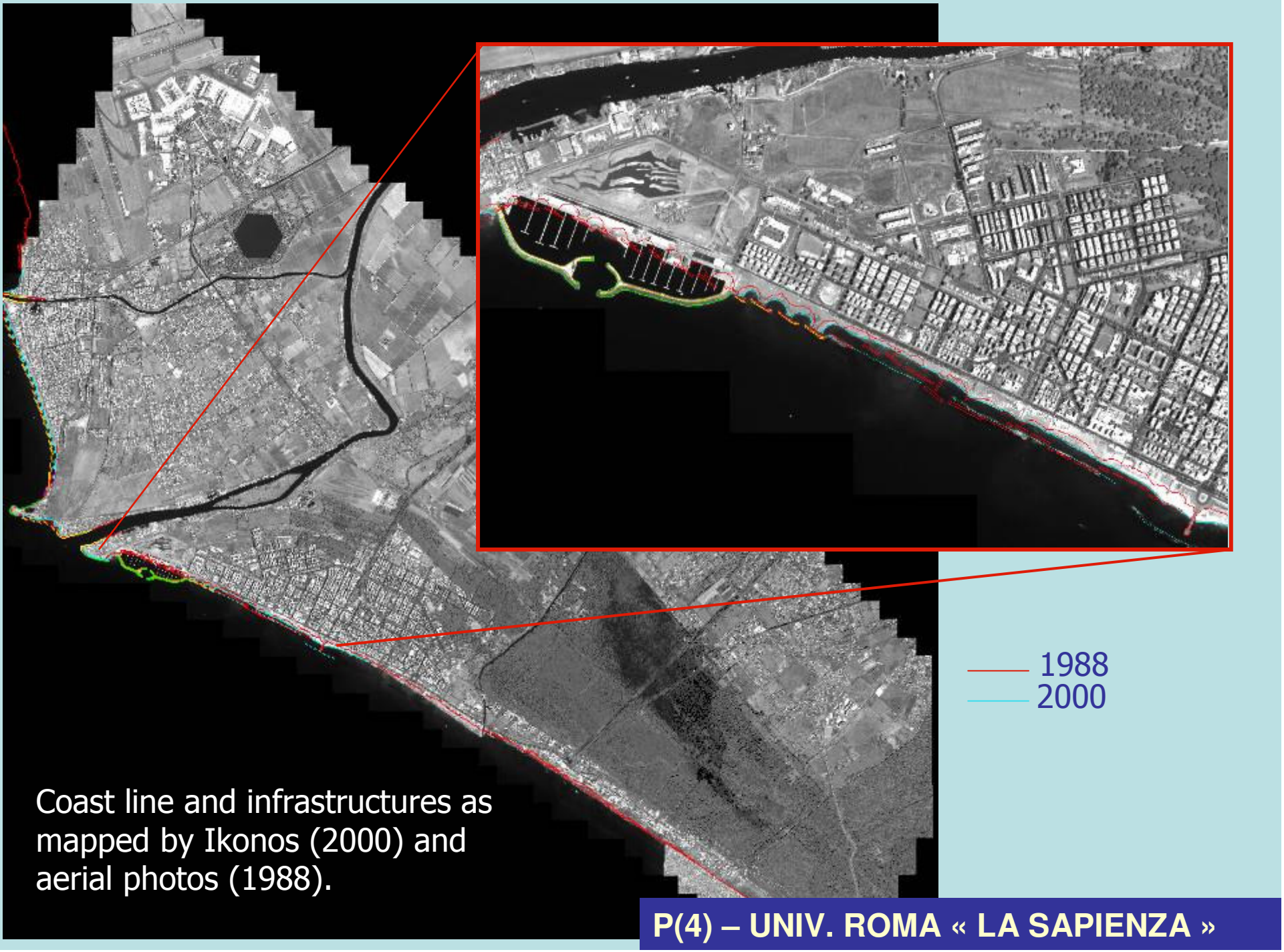
- Optical data depends by atmospheric conditions
- Acquisition time is predetermined.
- Necessity of *in situ* data for corrections (tide, set-up, beach slope, etc.)



Ubicazione area studio

Estrazione linea di riva
con filtro passa alto

Extraction of shoreline from satellite image



Coast line and infrastructures as mapped by Ikonos (2000) and aerial photos (1988).

Blue

Quickbird

16 08 2004

Green

Red

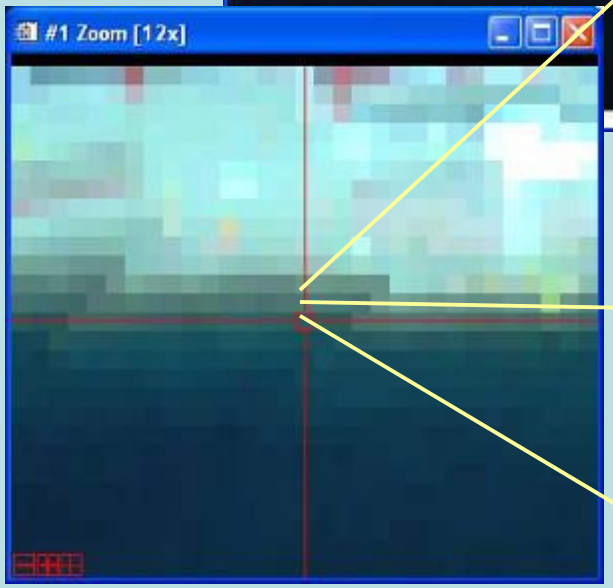
P(1) – UNIV. FIRENZE

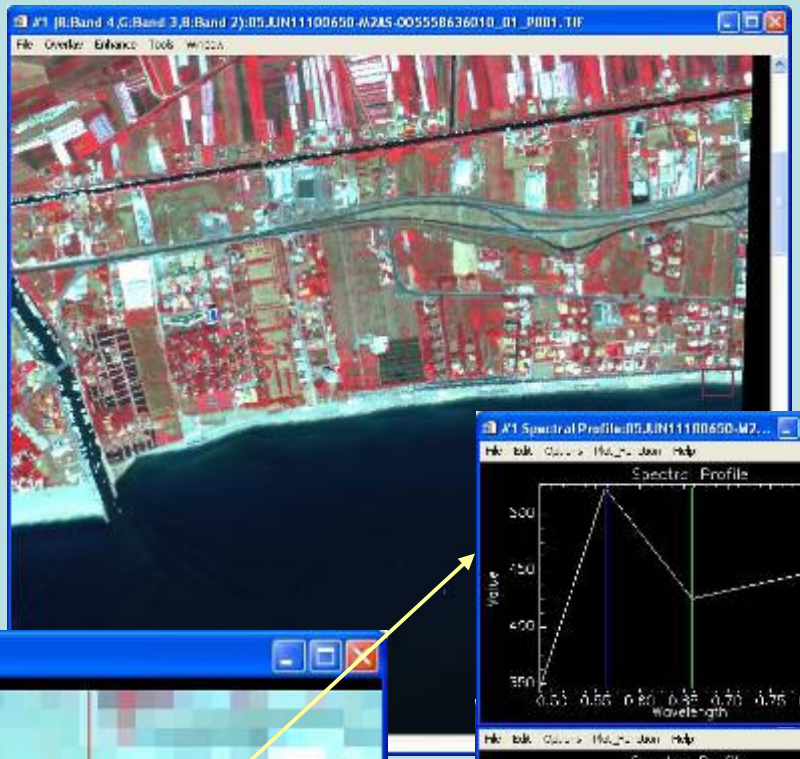
IR

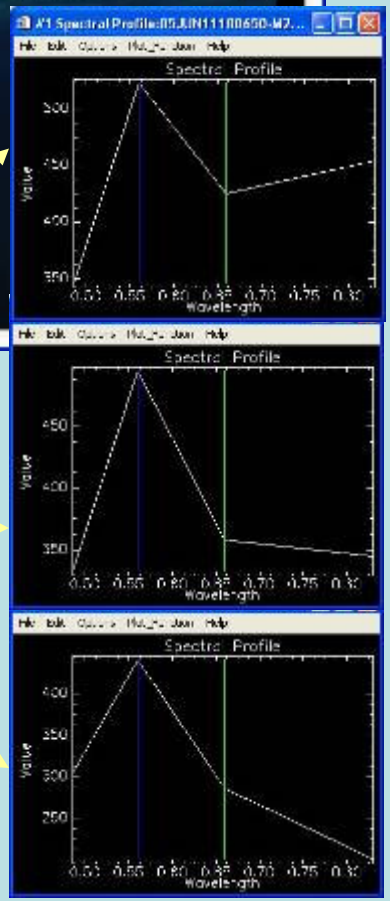
SHORELINE IDENTIFICATION BY MIXED-PIXEL CLASSIFICATION

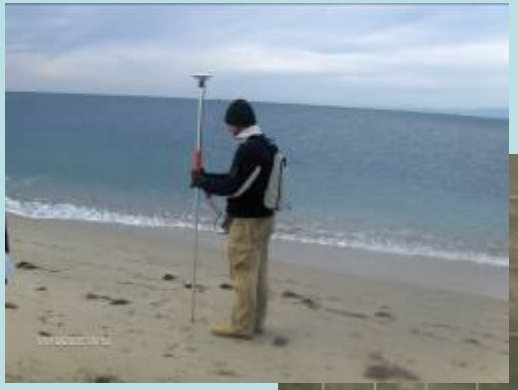
Quickbird image

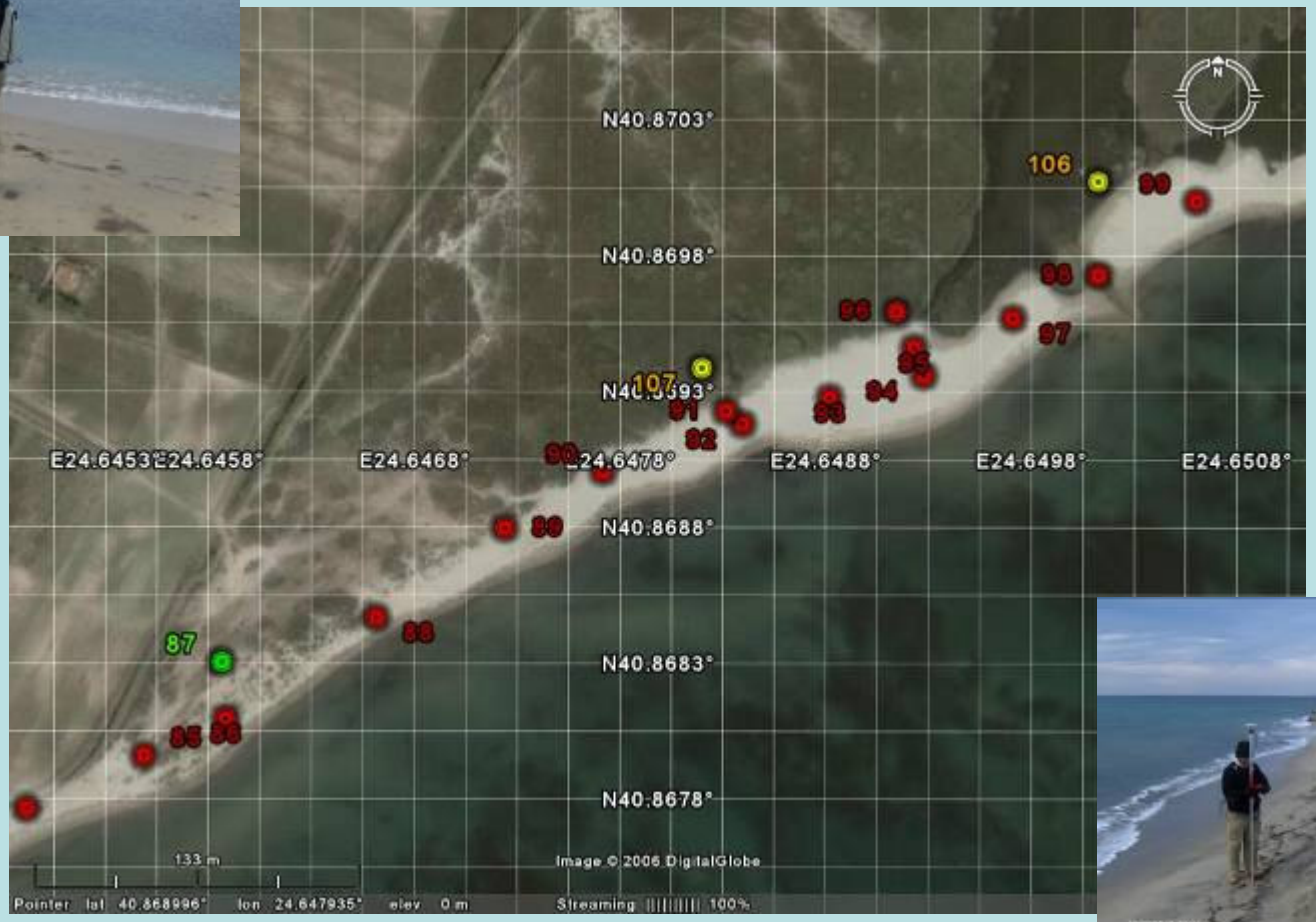
R 4 (0.76-0.90)
G 3 (0.63-0.69)
B 2 (0.45-0.52)











Comparison of the high precision global position measurements using GPS with a Quickbird image.

P(9) – UNIV. DEMOCRITUS

WEB-CAMS

P(2) – UNIV. BOLOGNA

P(3) – UNIV. GENOVA

P(7) – OANAK

P(9) – UNIV. DEMOCRITUS

APPLICATIONS

The following information is obtainable on hourly basis:

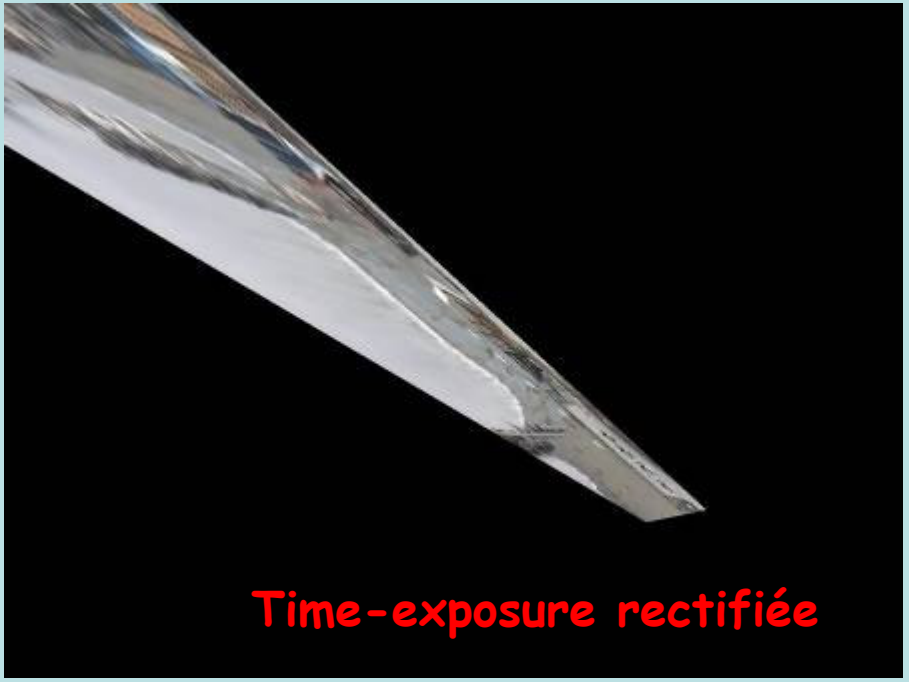
- Position, movement and morphology of submerged bars
- Position of breaking line, width of beach and its changes;
- Bathymetry of intertidal zone;
- Hydrodynamics of waves and superficial currents, period and angle of approach of waves, intensity of longshore drift current and rip currents

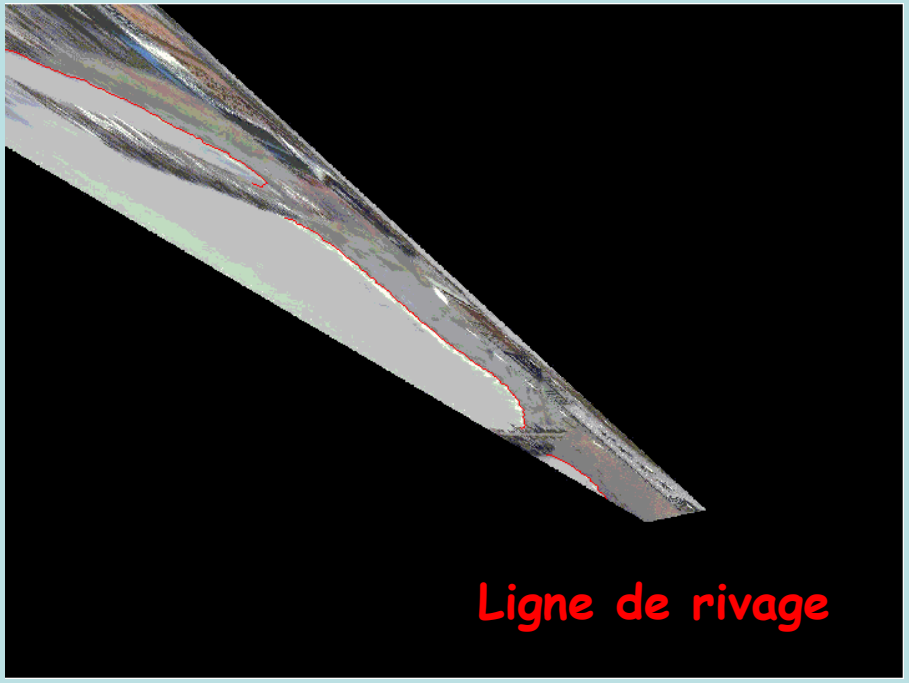
ADVANTAGES

- Low costs
- Applicability during bad weather conditions


snapshot
Time exposure
Day-timex

Levanto: 16 01 2006 h 8:00





P(3) – UNIV. GENOVA

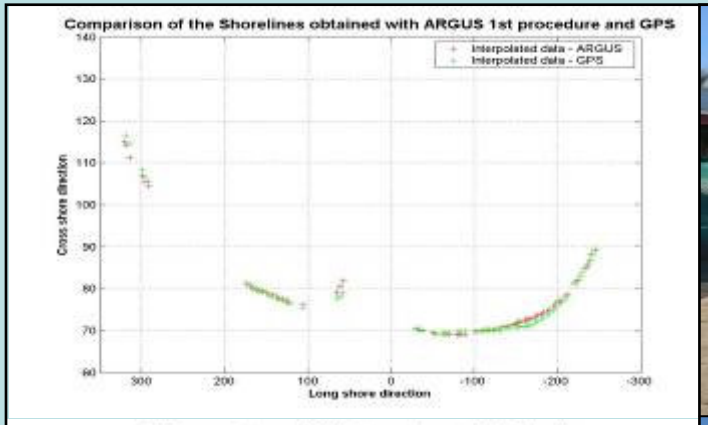
Lido di Dante

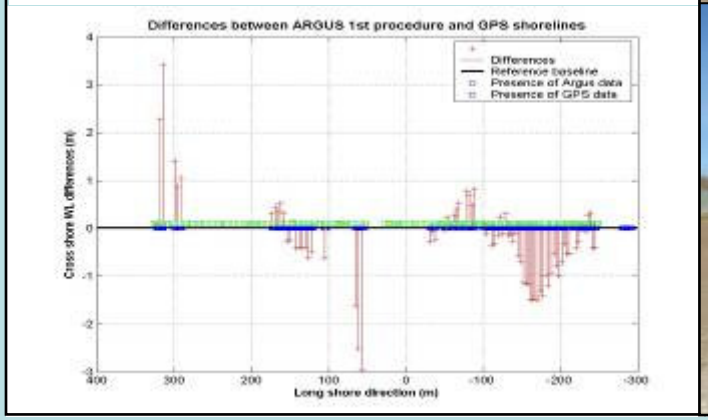
P(3) – UNIV. BOLOGNA

Igea Marina

P(3) – UNIV. BOLOGNA

VALIDATION OF VIDEO SURVEY WITH GPS DATA

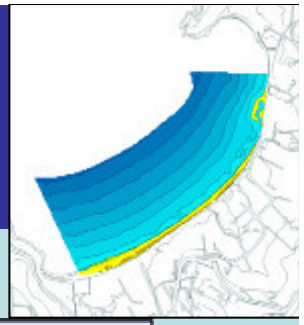


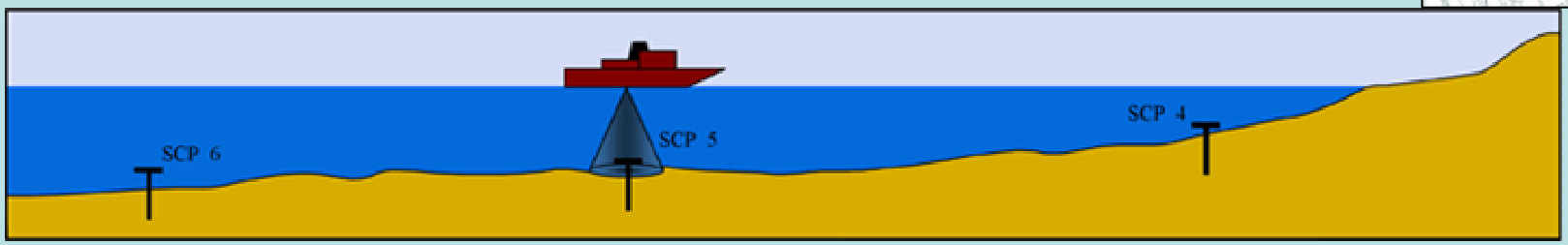


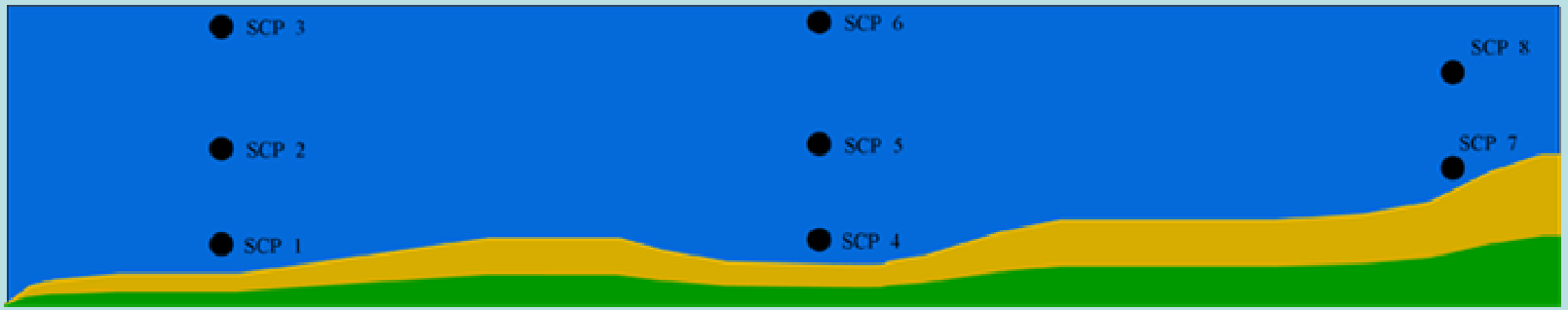
The confrontation over a sample of 45 shorelines using video system and GPS has determined a dispersion of video data of circa 0,7 m, a value acceptable since it is within the shoreline dynamics.

P(2) – UNIV. BOLOGNA

SEA CONTROL POINTS







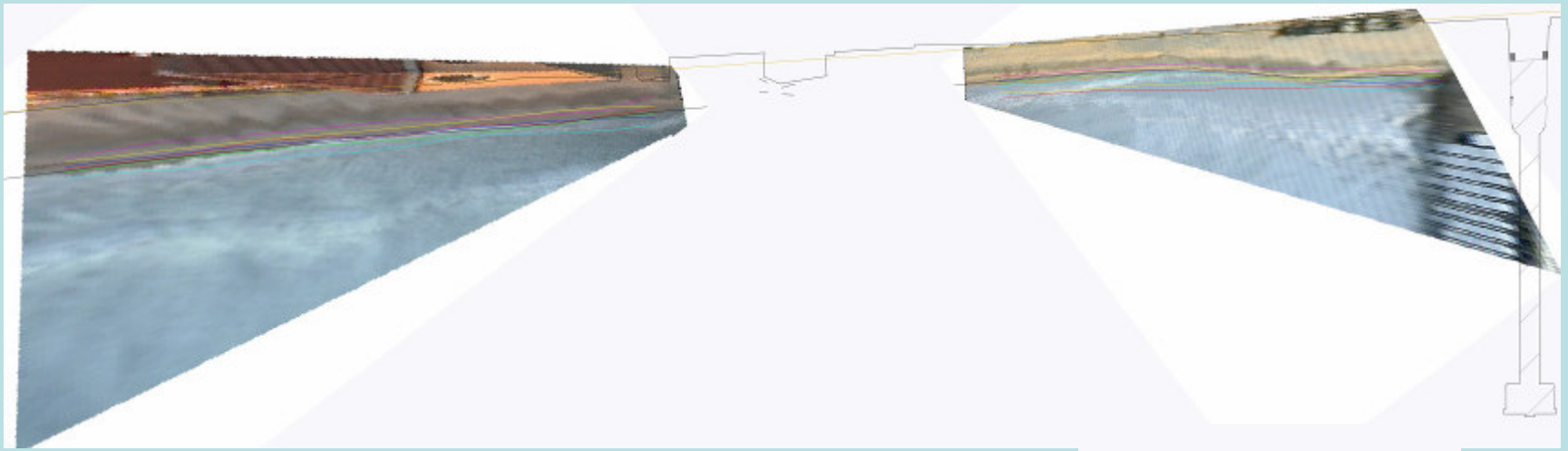
Improve the accuracy of bathymetryc surveys both in the position of the points and, especially, in the depth data

APPLICATIONS

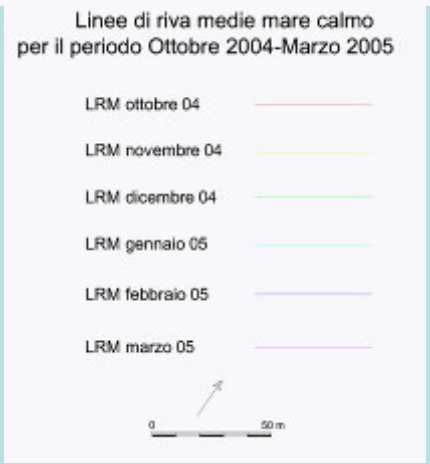
Beach sediment budget analysis in natural conditions and after beach fill.

P(1) – UNIV. FIRENZE

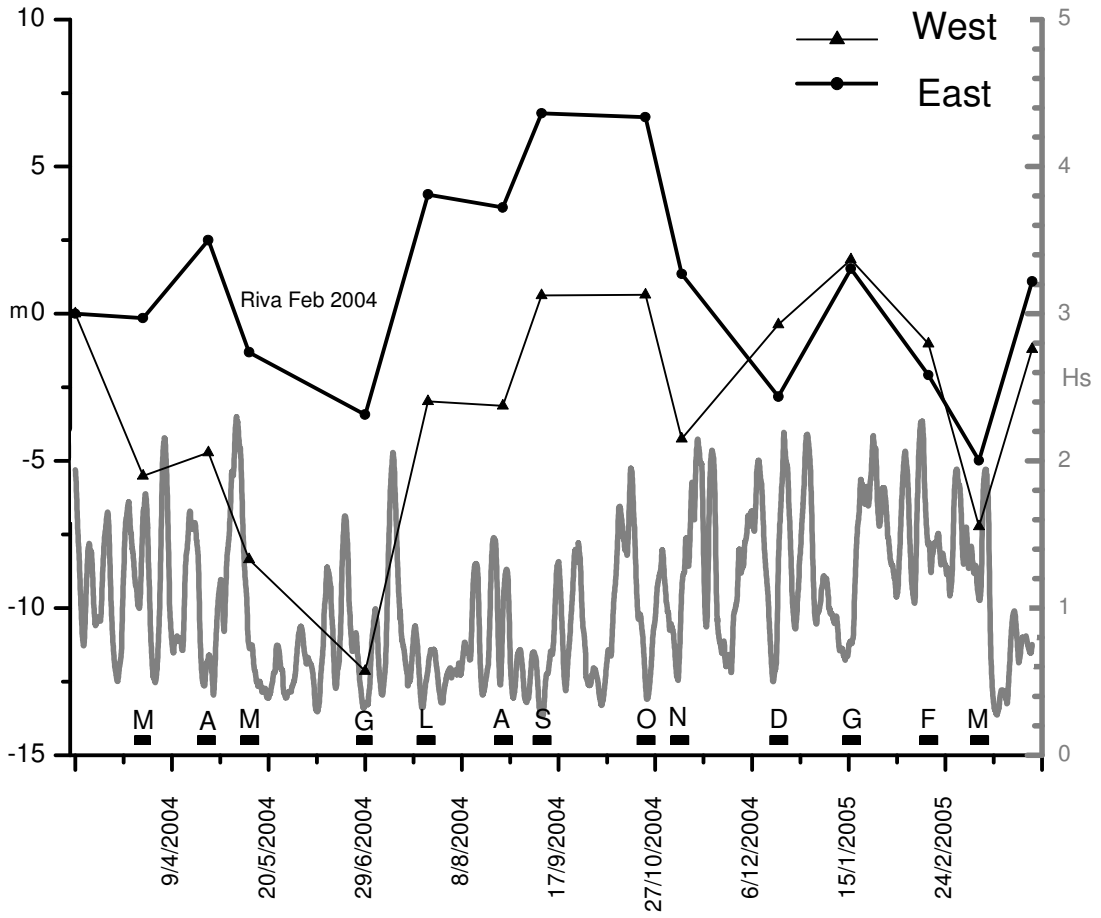
INTRINSIC VARIABILITY INDEX



Optimize the monitoring scheme



P(1) – UNIV. FIRENZE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9/4/2004
20/5/2004
29/6/2004
8/8/2004
17/9/2004
27/10/2004
6/12/2004
15/1/2005
24/2/2005

OpTIMAL
Opération BEACHMED-e

thanks for your attention!