

Coastline monitoring



*First BreTel Workshop
May 31 – June 1st 2012
Saint Malo, France*



GE  -Transfert

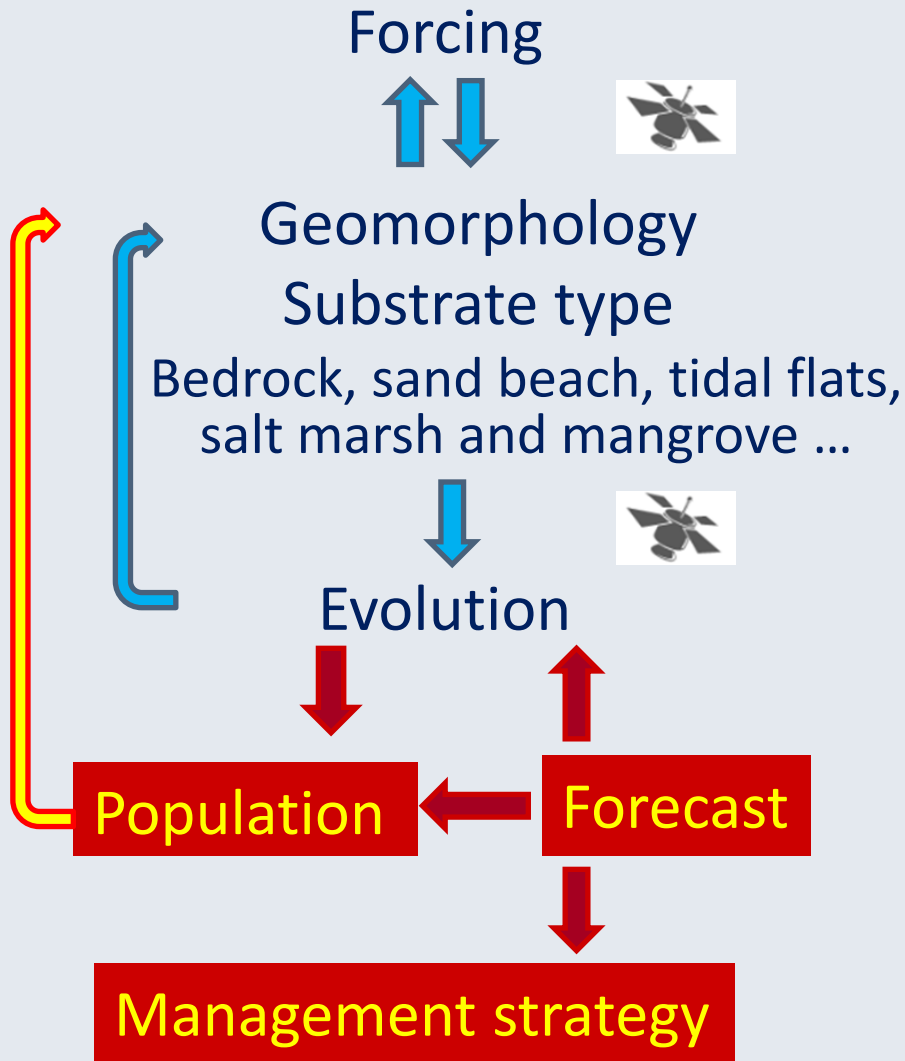
EPOC



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About the coastlines



Survey indicators

- Sandy beaches and dunes
 - *Shallow water sandbank*
 - *Dune foot*
- Rocky coasts
 - *Cliff foot*
- Maritime wetlands
 - *Salt marsh contour*
- Mangrove wetlands
- Artificial coasts
 - *Dykes, seawalls ...*

 - *Waterline (lakes, internal seas)*

Monitoring approaches

- Terrestrial acquisition
 - DGPS
 - Theodolite
 - Scanner 3D
 - Photo / video surveys
- Airborne RS
 - Pictures (RGB + NIR)
 - Hyperspectral imagery
 - Lidar
- Satellite RS
 - MS / Hyperspec Imagery
 - SAR Imagery



Dune foot monitoring

Partnership



Image NASA
© 2008 Europa Technologies
© 2008 Tele Atlas
© 2008 Cnes/Spot Image

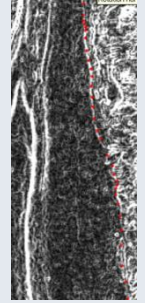
Radiometric calibration / Image mosaic

Unsupervised /Supervised classification

Sobel filtering

Raster facies / polylines

Validation (DGPS)



⚠ Mean coastline positioning error : 10 m (2 m resolution space image)

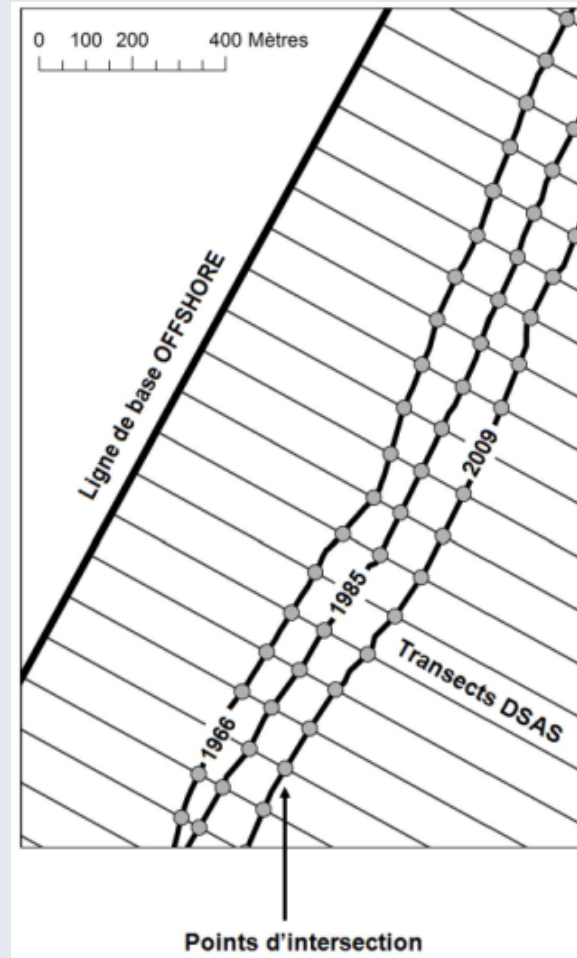
X JNGCGC, NEREUS publication, 2010



Dune foot forecast and management strategy



NEREUS publication, 2012

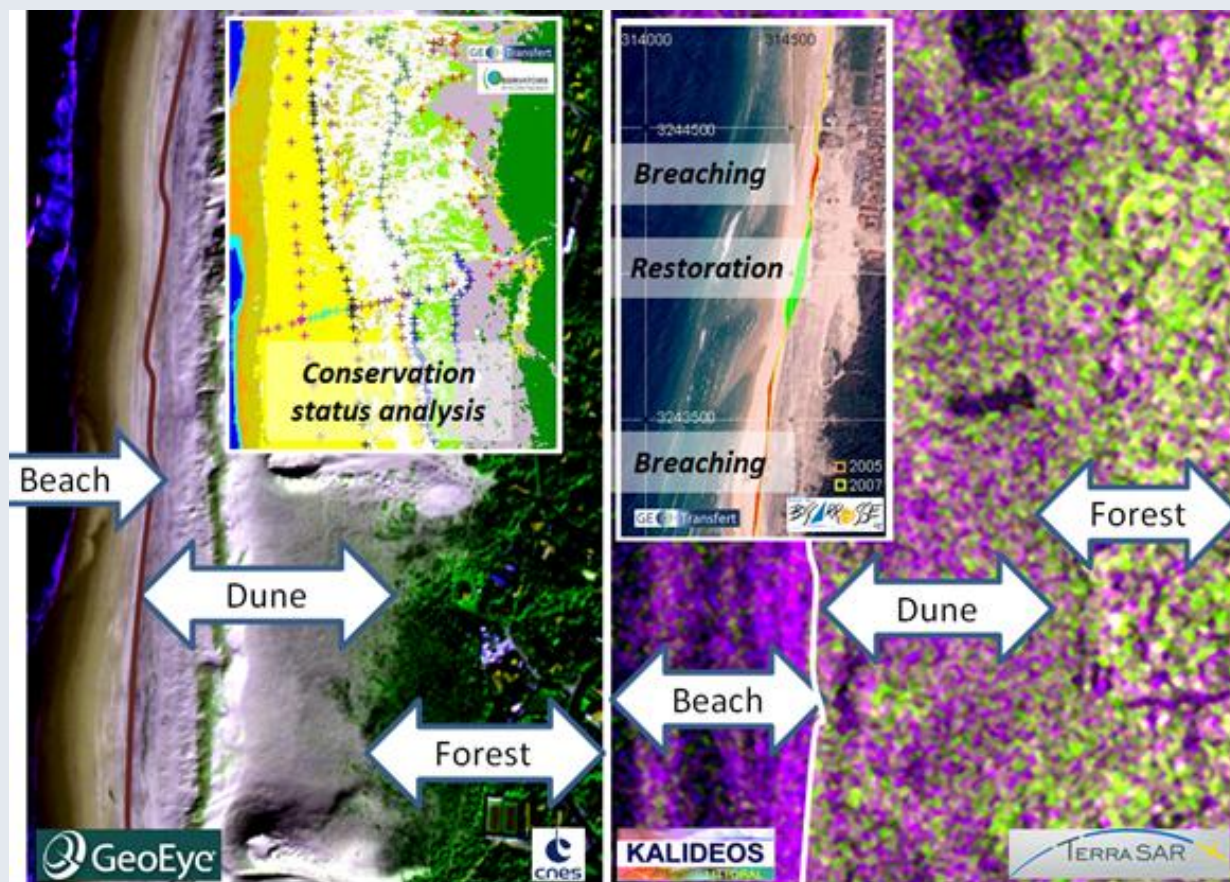


Hazard mapping

- Weak
- Medium
- Strong



Demonstrators of operational services



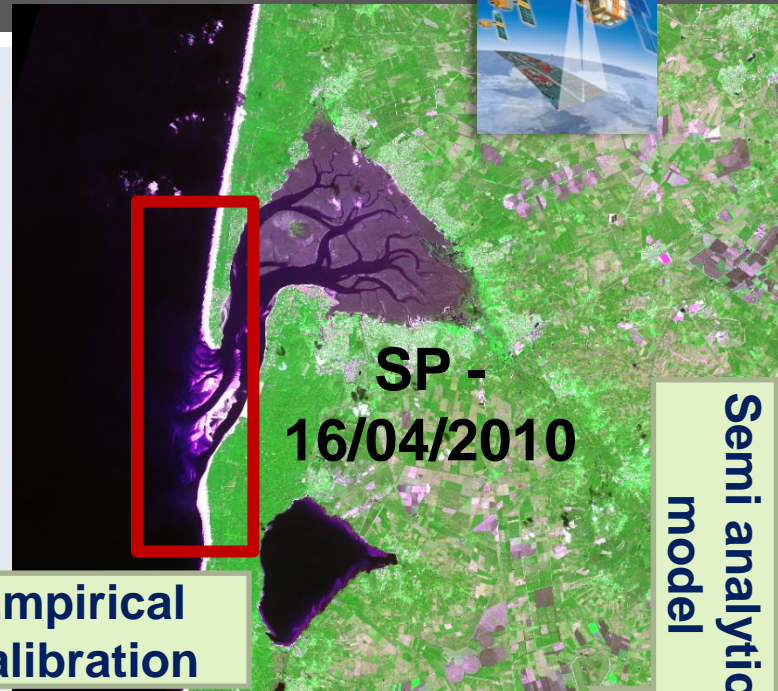
- Automatic detection
- Change detection analysis
- Conservation status analysis
- Dune erosion / restoration

Window on GMES publication, 2012

Shallow water bathymetry



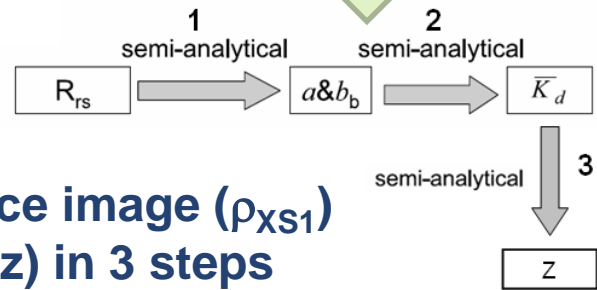
Empirical calibration



Semi analytical model

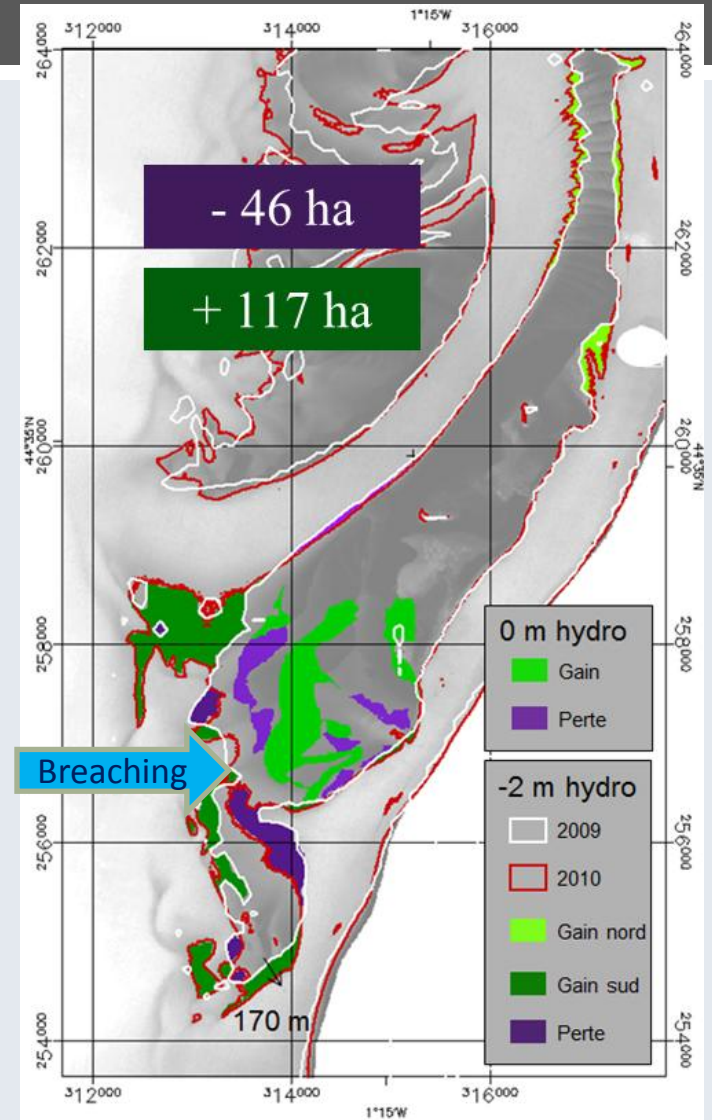
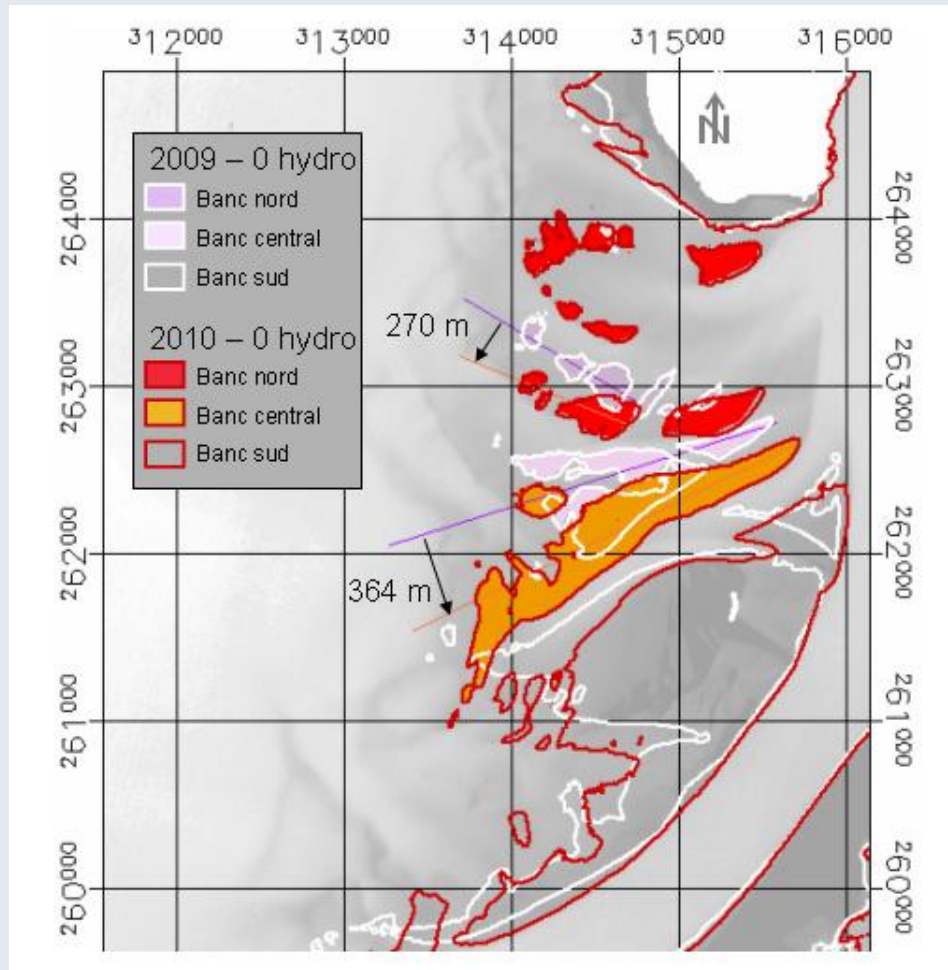
Sentinel-2 Preparatory Symposium, 2012

**Réflectance image (ρ_{XS1})
→ depth (z) in 3 steps**

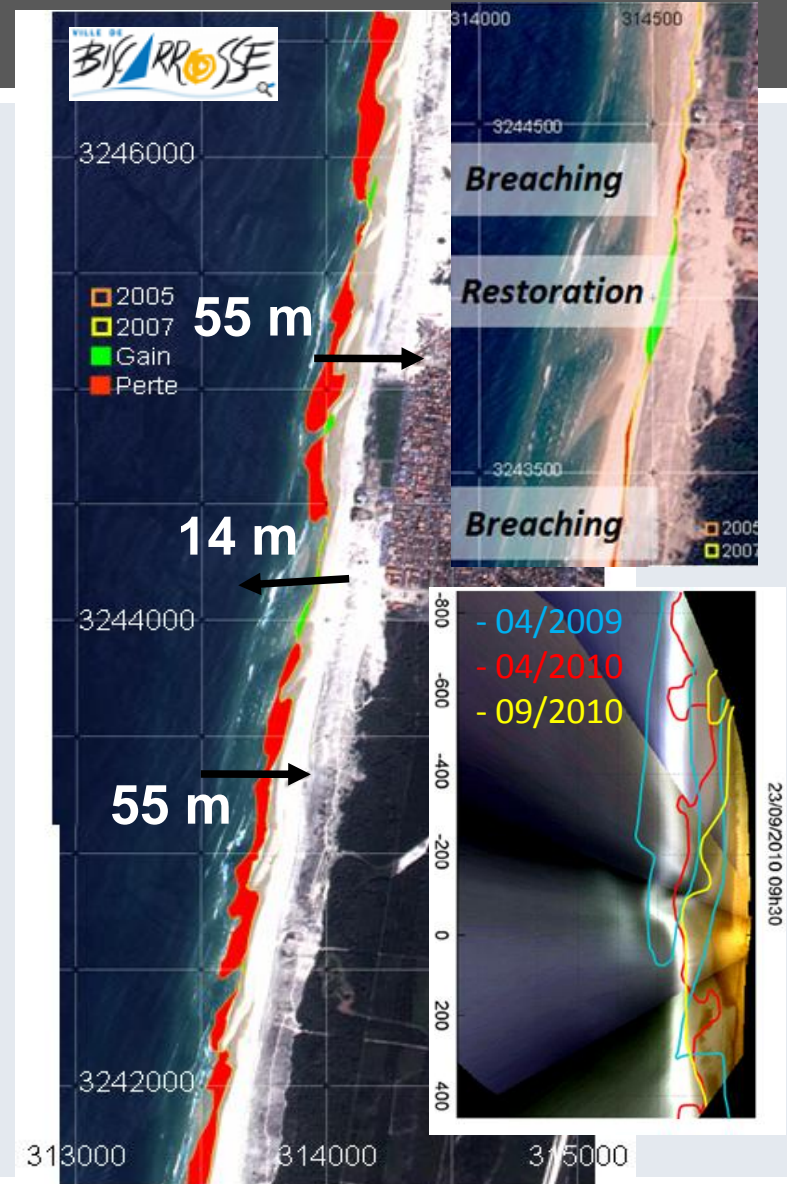
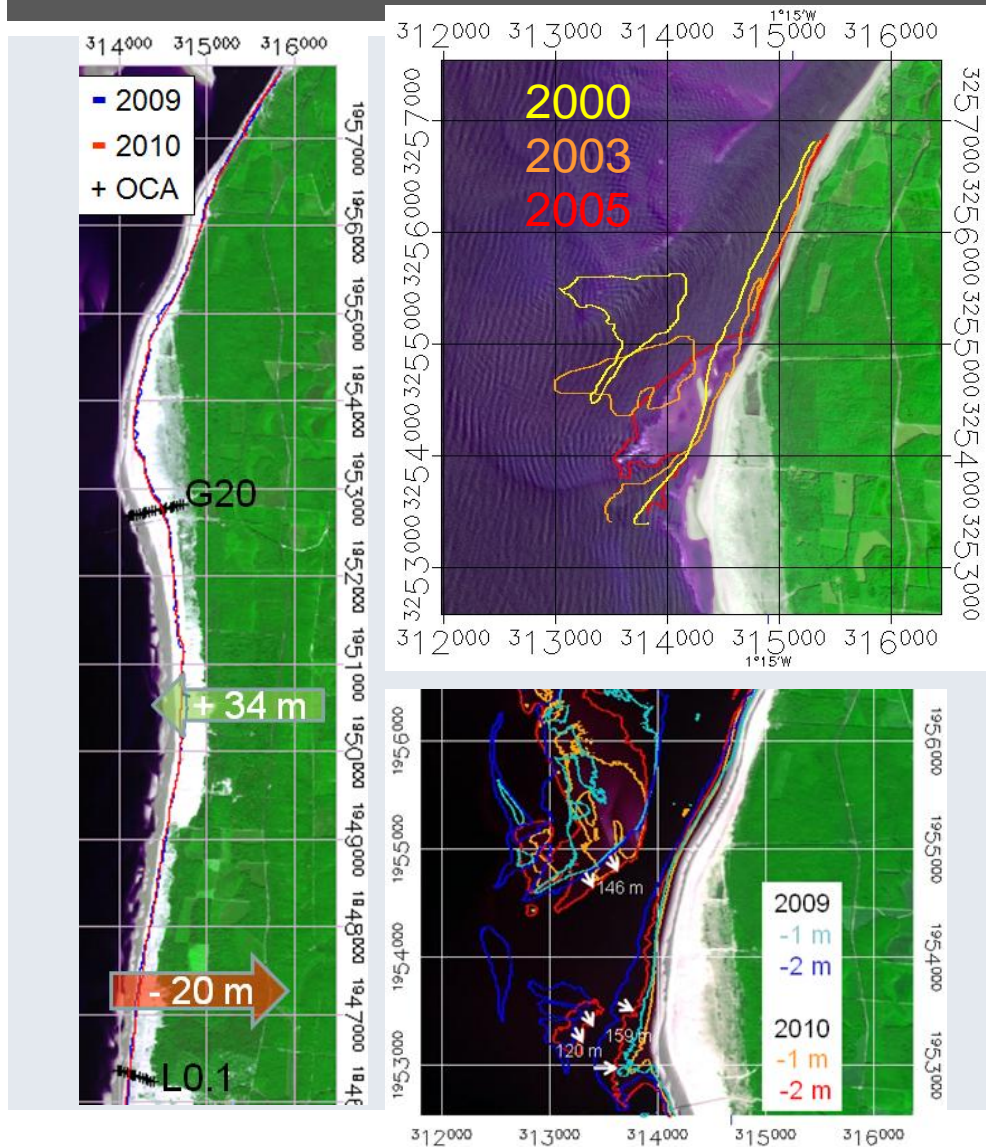


Sandbank monitoring

BASSIN D'ARCACHON
SYNDICAT INTERCOMMUNAL

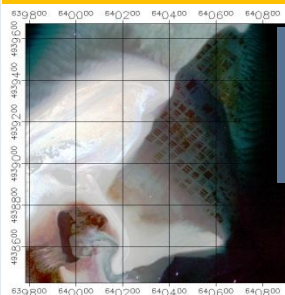


Integrated analysis



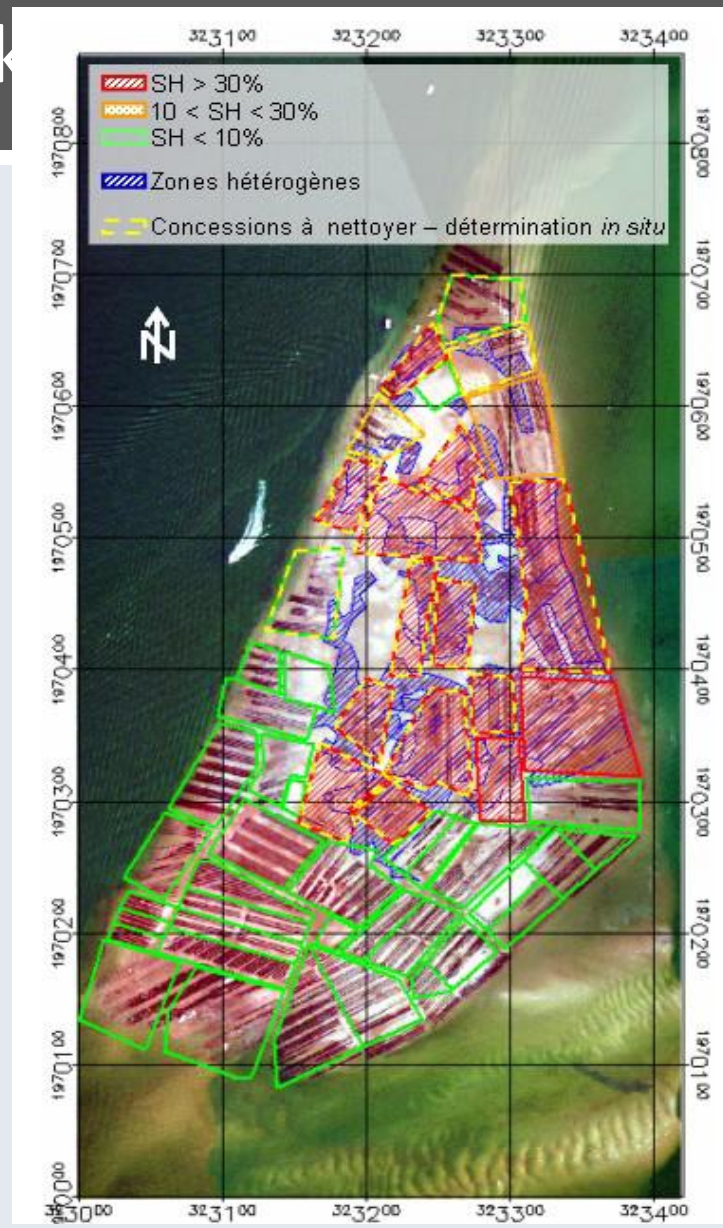
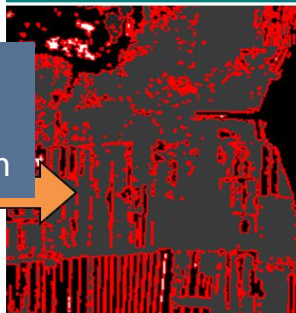
Oyster farming / oyster bank

THR Satellite data



Texture analysis + Segmentation

POLYGONES

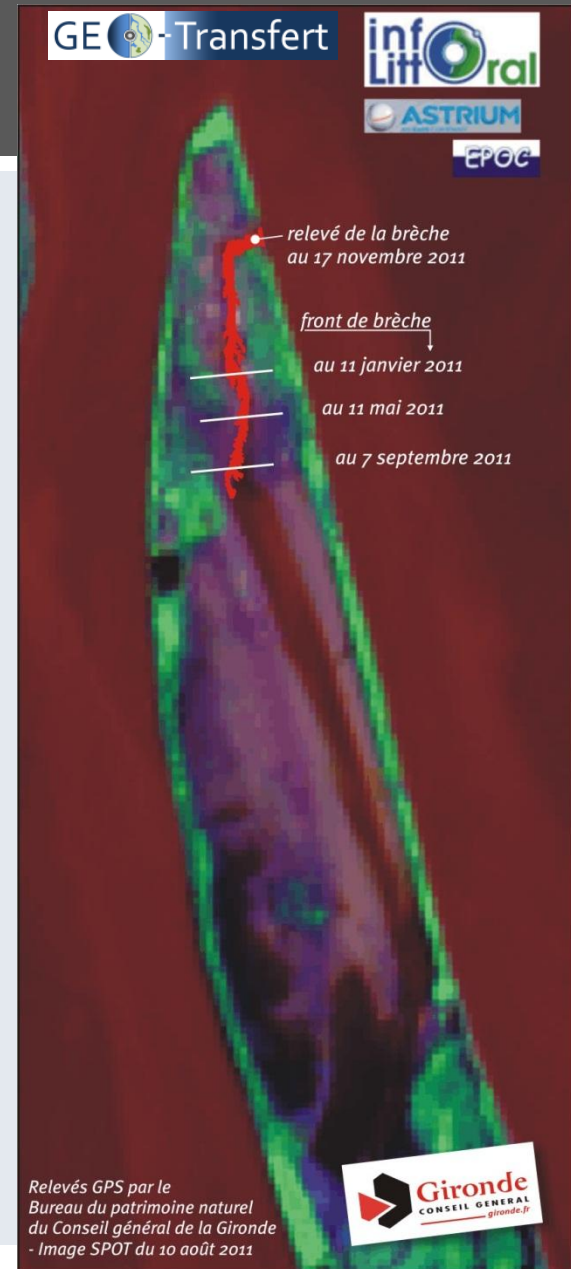


Polder monitoring

- Polder evolution survey
- Island breaching and flooding monitoring
 - Mecanism study
- Evolution scenarii proposition
- 3-year project (2012 -> 2015)

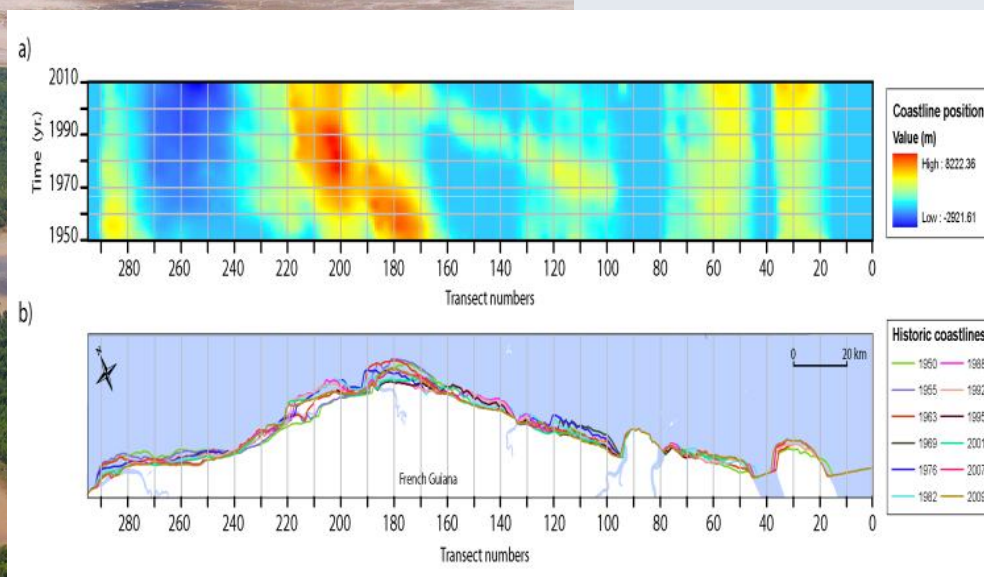
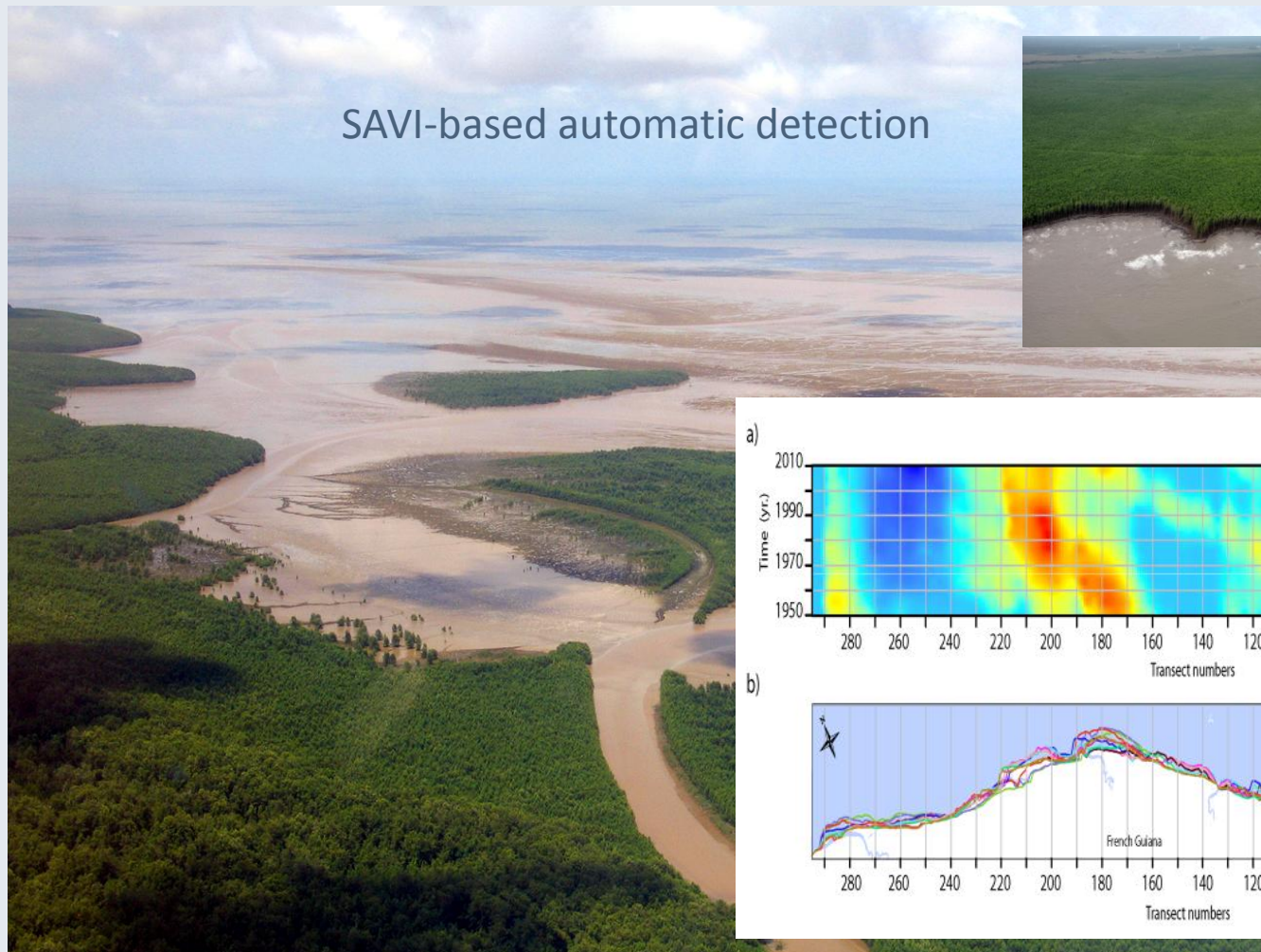


K2 18/03/2009 K2 05/03/2010 K2 15/03/2010



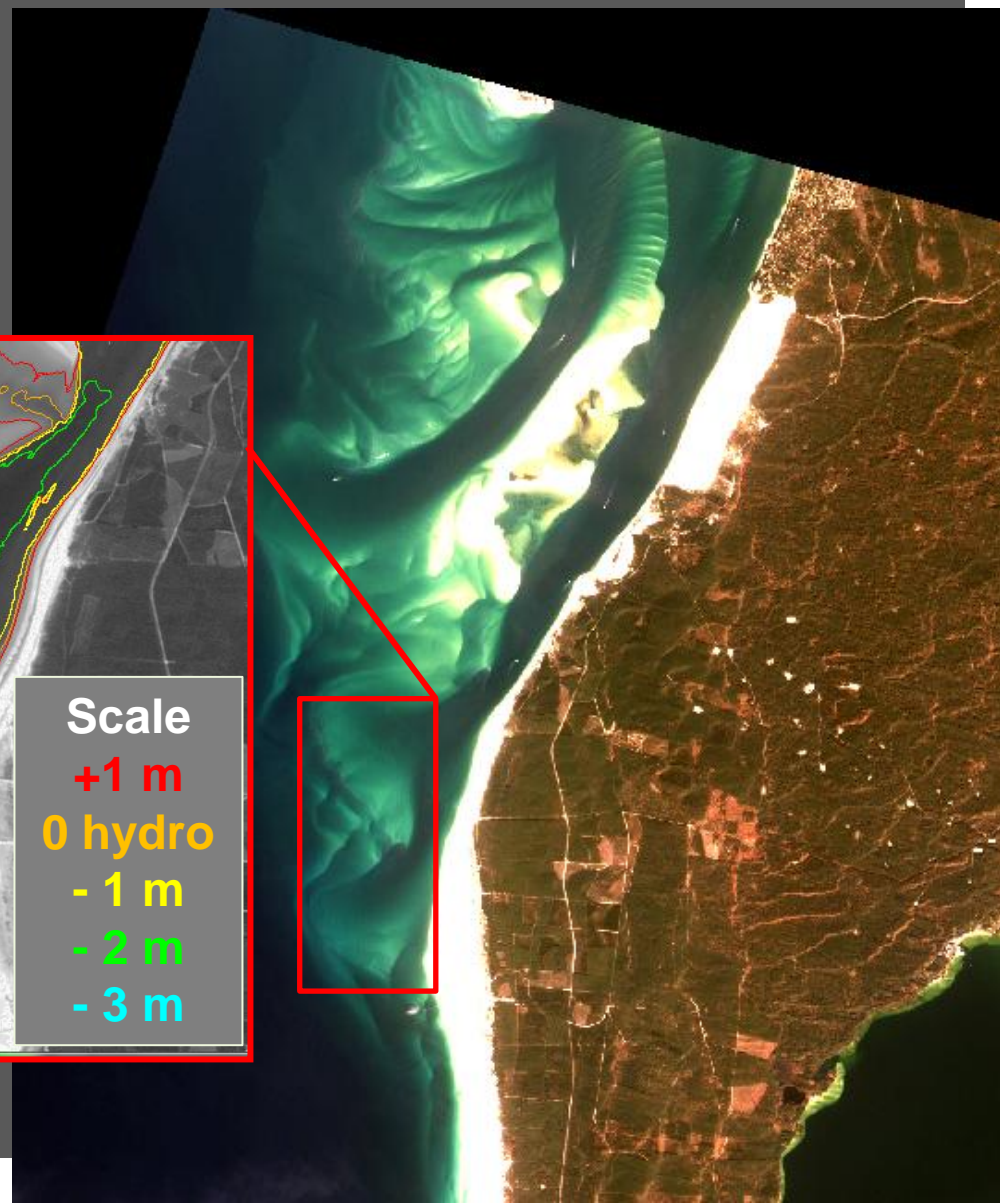
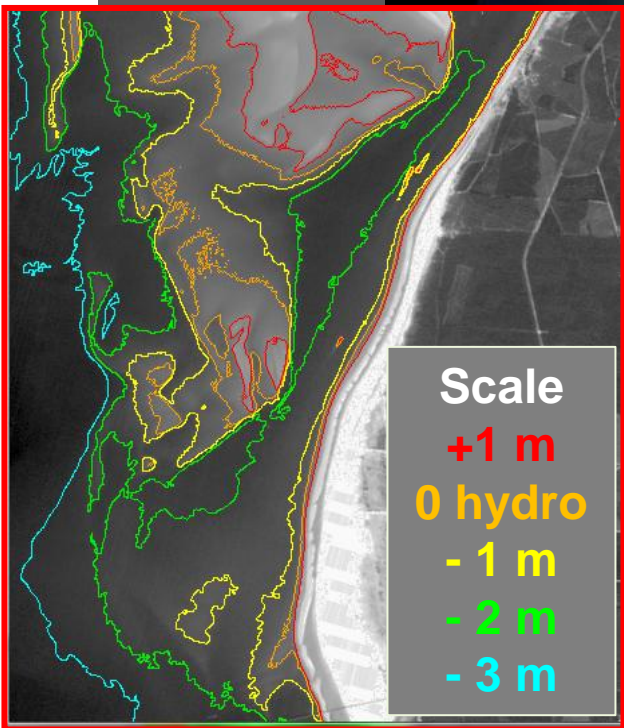
Mangrove monitoring

SAVI-based automatic detection



Conclusions

- Satellite imagery allows locating the coastline over large muddy sandy, rocky littoral (with / without vegetation cover)
- Satellite imagery allows describing time (historical) / space evolution of the coastline
- Satellite observation constitute a powerful and low cost solution for coastline surveying at a national scale
- Also, medium- to long-term satellite-based observations participate to evolution processes analysis and they provide numerical simulation validation cases
- Automatic operational services are being demonstrated e.g. in Aquitaine



Thank
you for
your
attention