Litto$_3$D®

and applications

Contents

- **Litto3D project**
- **Applications : modeling sea-land interaction**
  - ***Simulating the tide***
  - ***Cadastral management***
  - ***Sea-rising risk management***

Litto3D

Continuous, high resolution altimetric model on the littoral

Litto$_3$D ®

The coastal area is economically important

$Litto_3D$ ®

But the littoral is fragile

Litto$_3$D ®

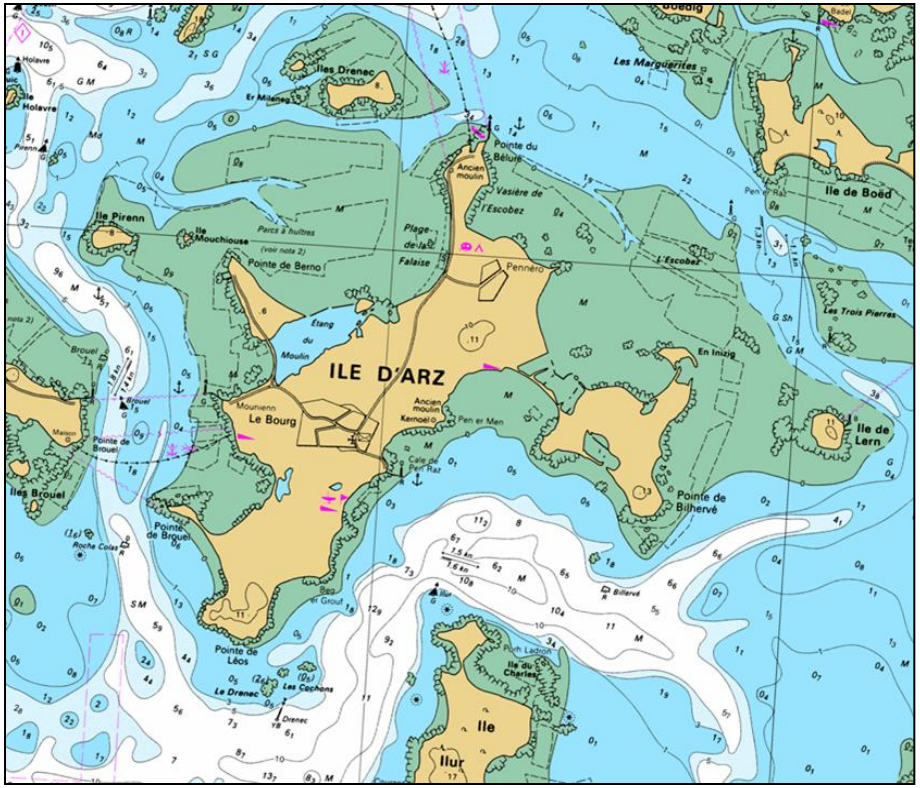
- **Recent catastrophes on the littoral pointed out the need for a specific mapping of this area**

- **In France, SHOM and IGN were appointed to elaborate a seamless altimetric model on the littoral : Litto$_3$D**

Litto$_3$D ®

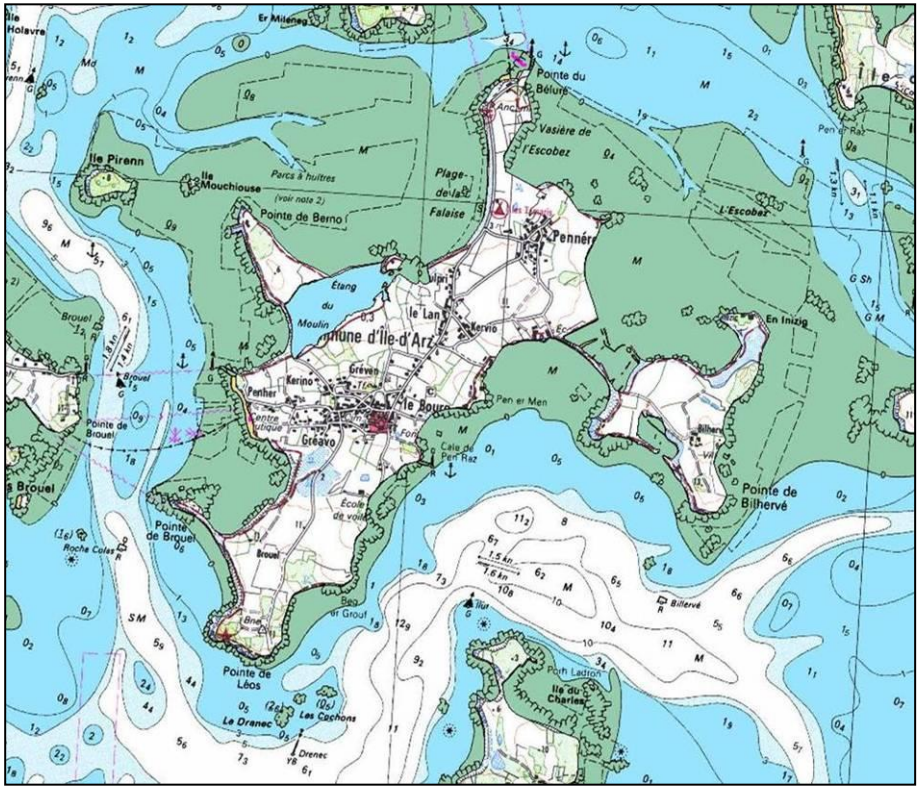
- **Two steps :**
  - ***Merging IGN and SHOM "historical" database for producing low-res DTM on the littoral : HistoLitt®***
  - ***Producing high-res seamless DTM with modern means***

HistoLitt ®



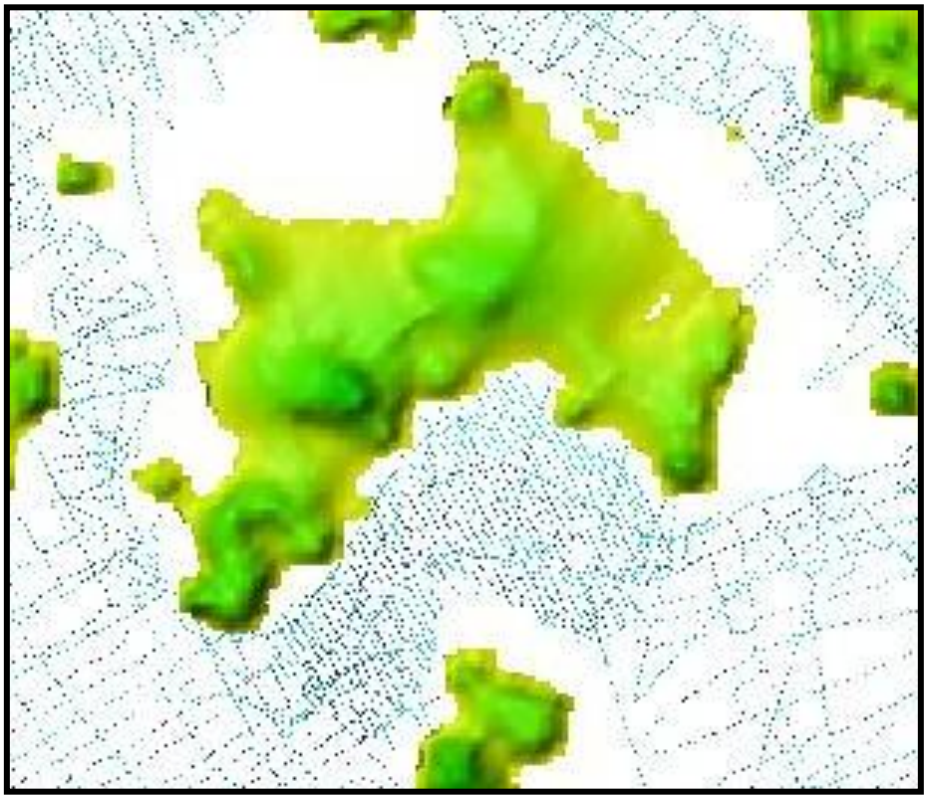
SHOM **IGN**

HistoLitt ®



Merged data

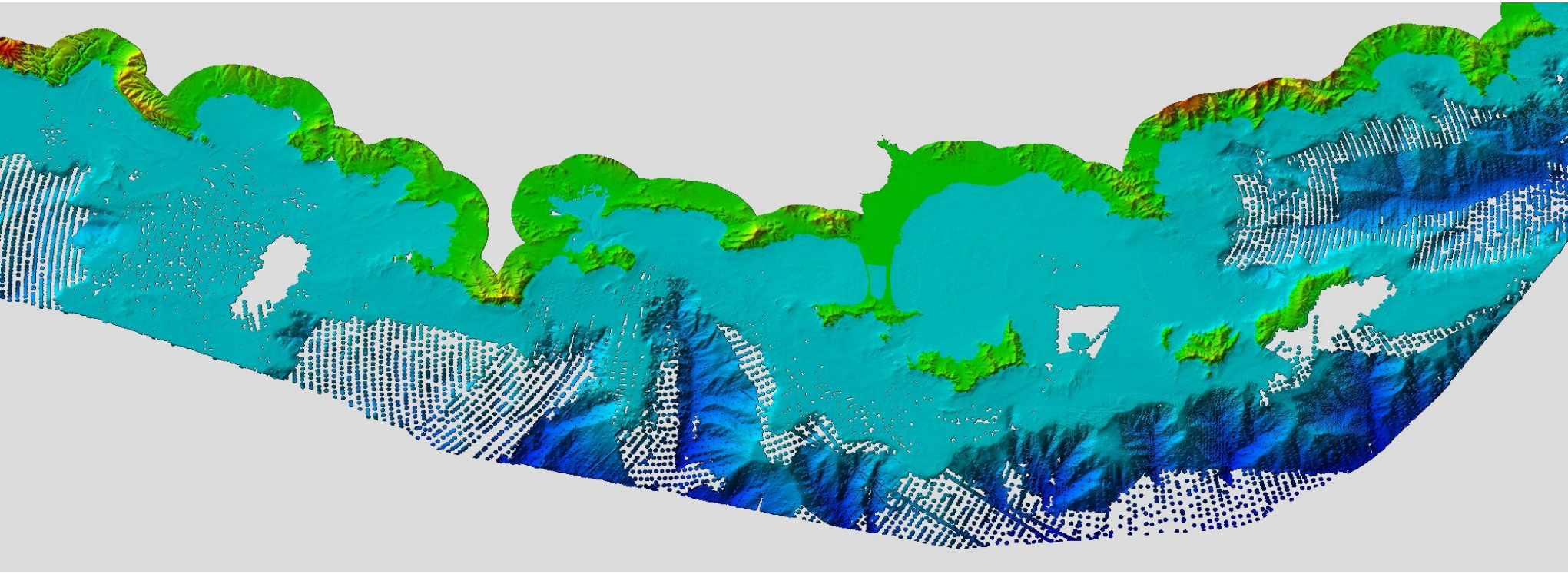
HistoLitt ®



Merged data

HistoLitt ®

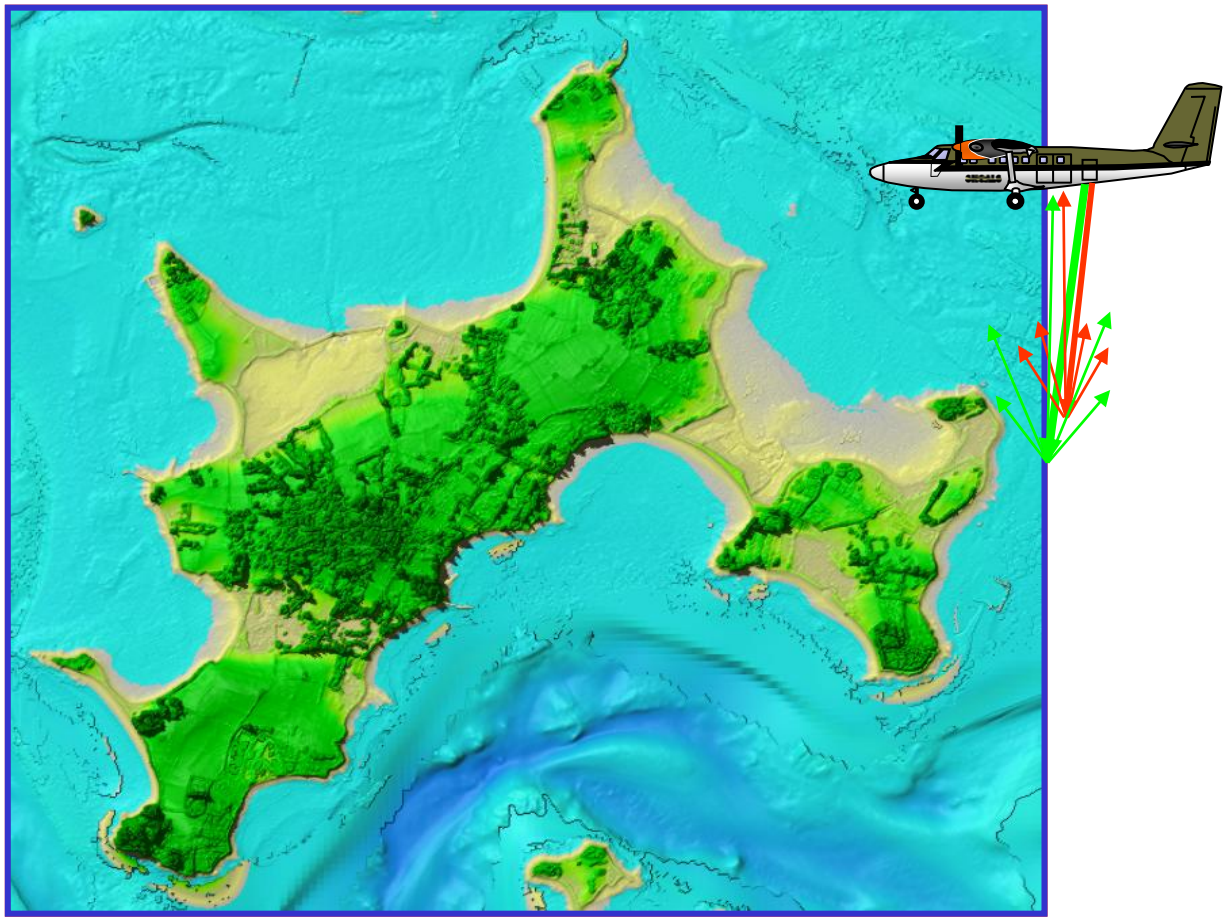
- **Quickly and widely available**
- **Fit many applications**
- **Resolution ~ 50m**
- **Holes in the sand**



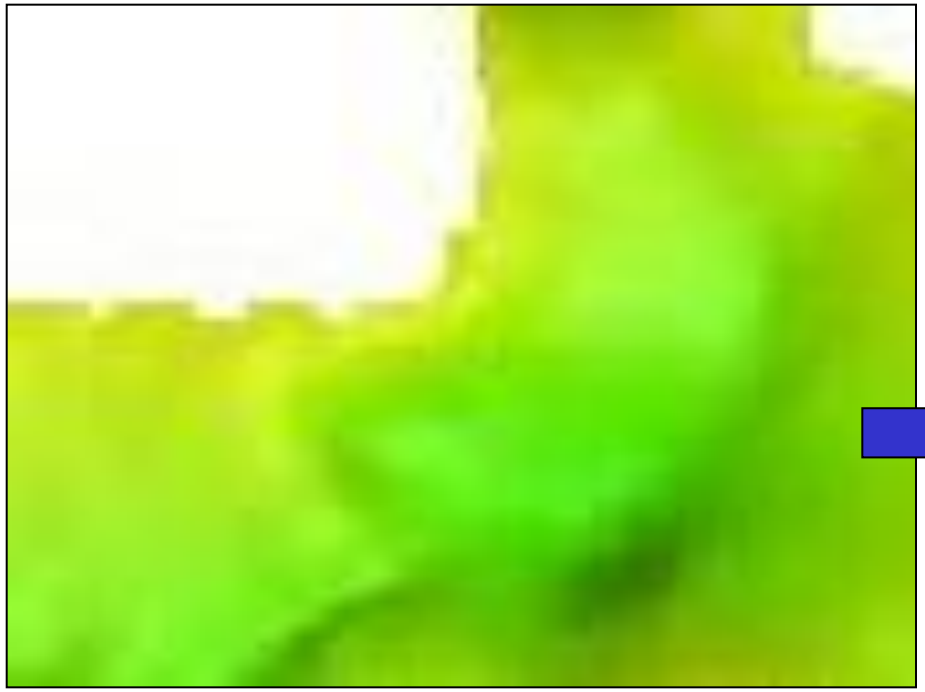
Litto$_3$D ®

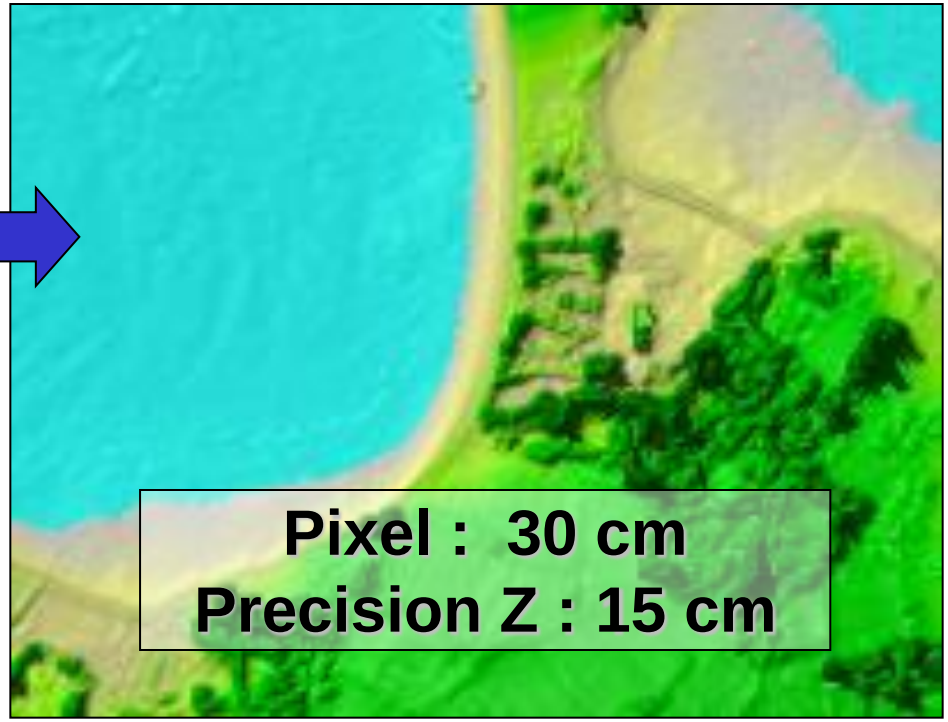
- **New surveys**
  - ***LIDAR, MBES, DGPS***
  - ***Sub-metric resolution***
  - ***Better coverage of low-water areas***

$Litto_3D$ ®



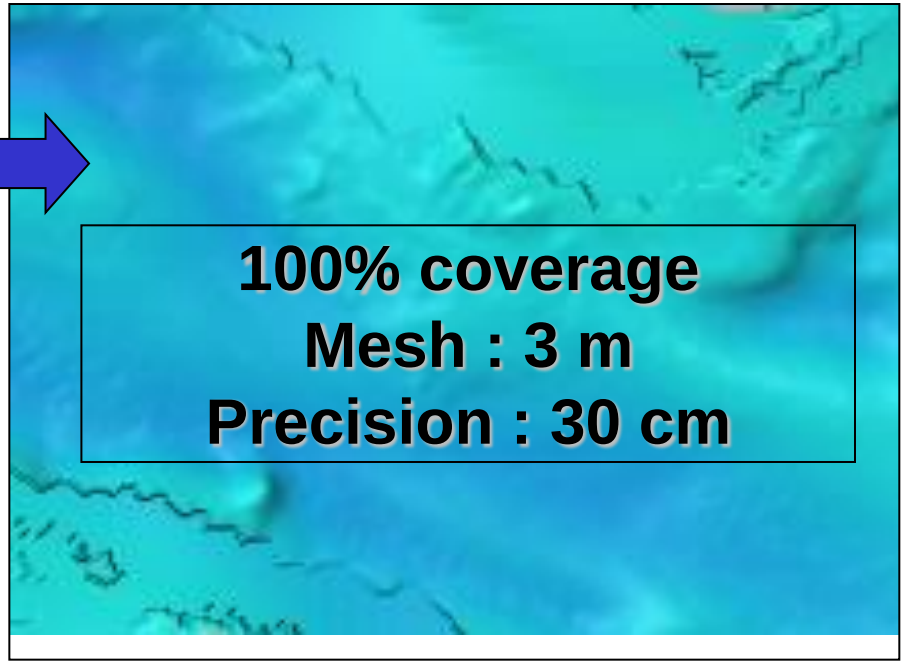
Litto$_3$D ®



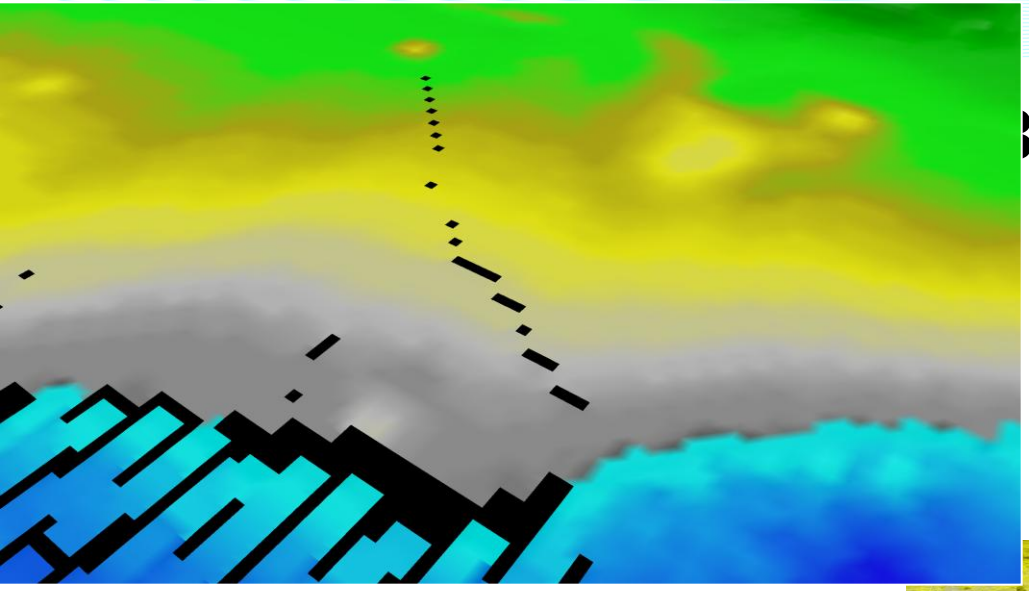


- **Landward : better resolution**

$Litto_3D$ ®

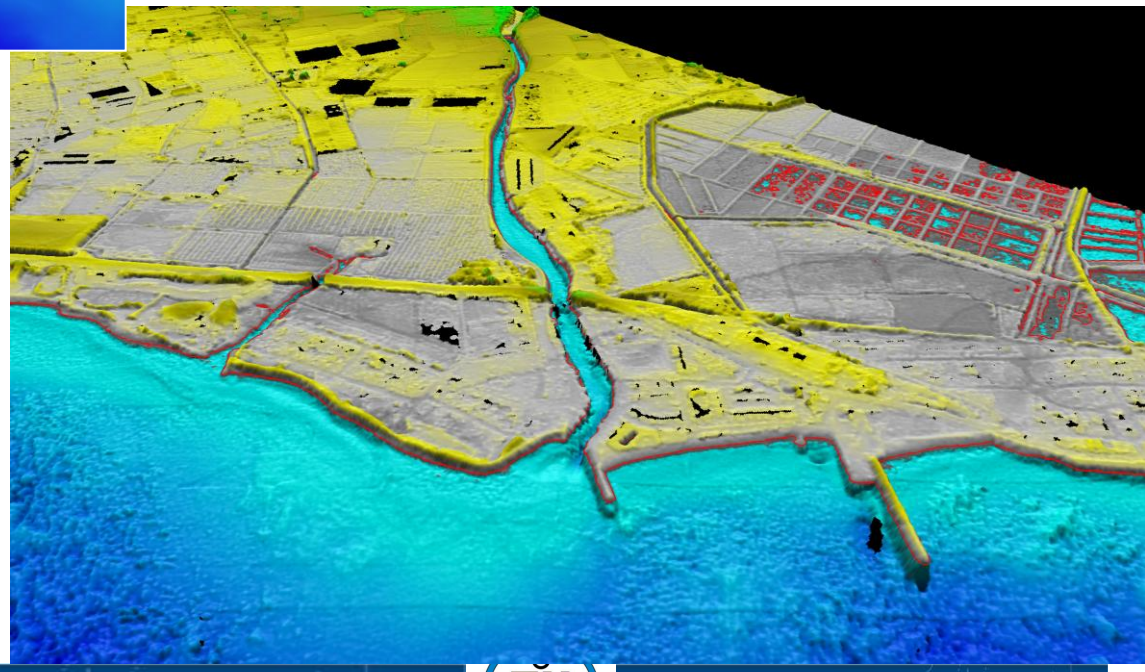


- **Seaward : better coverage**



...D ®

- **Before / After**



Litto$_3$D ®

Prototypes :

- **Golfe du Morbihan**
  - ***Validated and released***
- **Toulon area**
  - ***Released late 2009***

- **Ongoing**
  - ***La Réunion, Mayotte, Scattered Islands, Languedoc-Roussillon***
- **Projects**
  - ***North Finistère***
  - ***Martinique***
  - ***…***

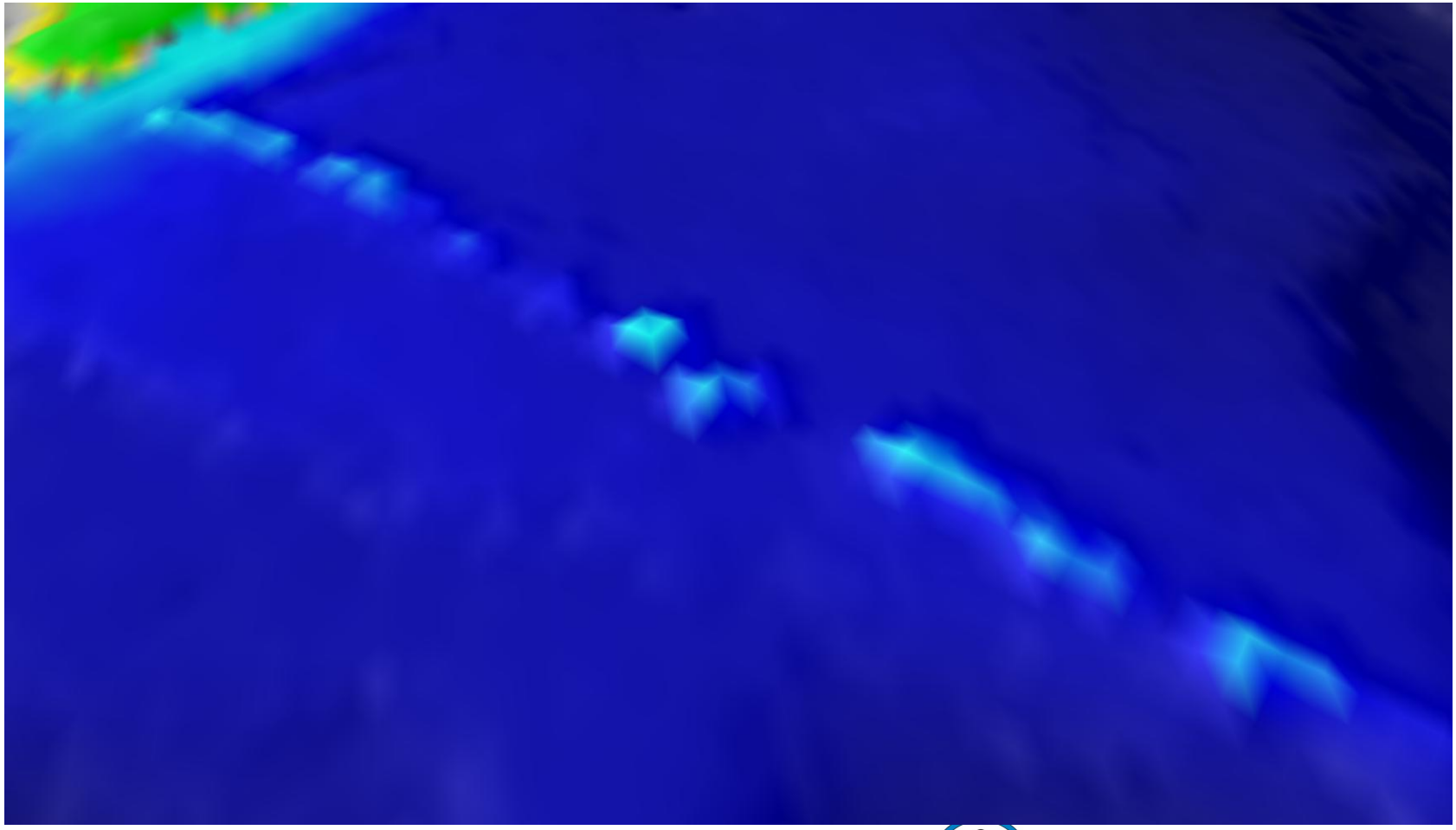
Litto$_3$D ® - Applications

Potentiality of these new data (example and prospects)

- ***Harbors infrastructures management***
- ***Sedimentology***
- ***Coupling with tide model***
  - ***Base for Integrated coastal zone management (ICZM)***

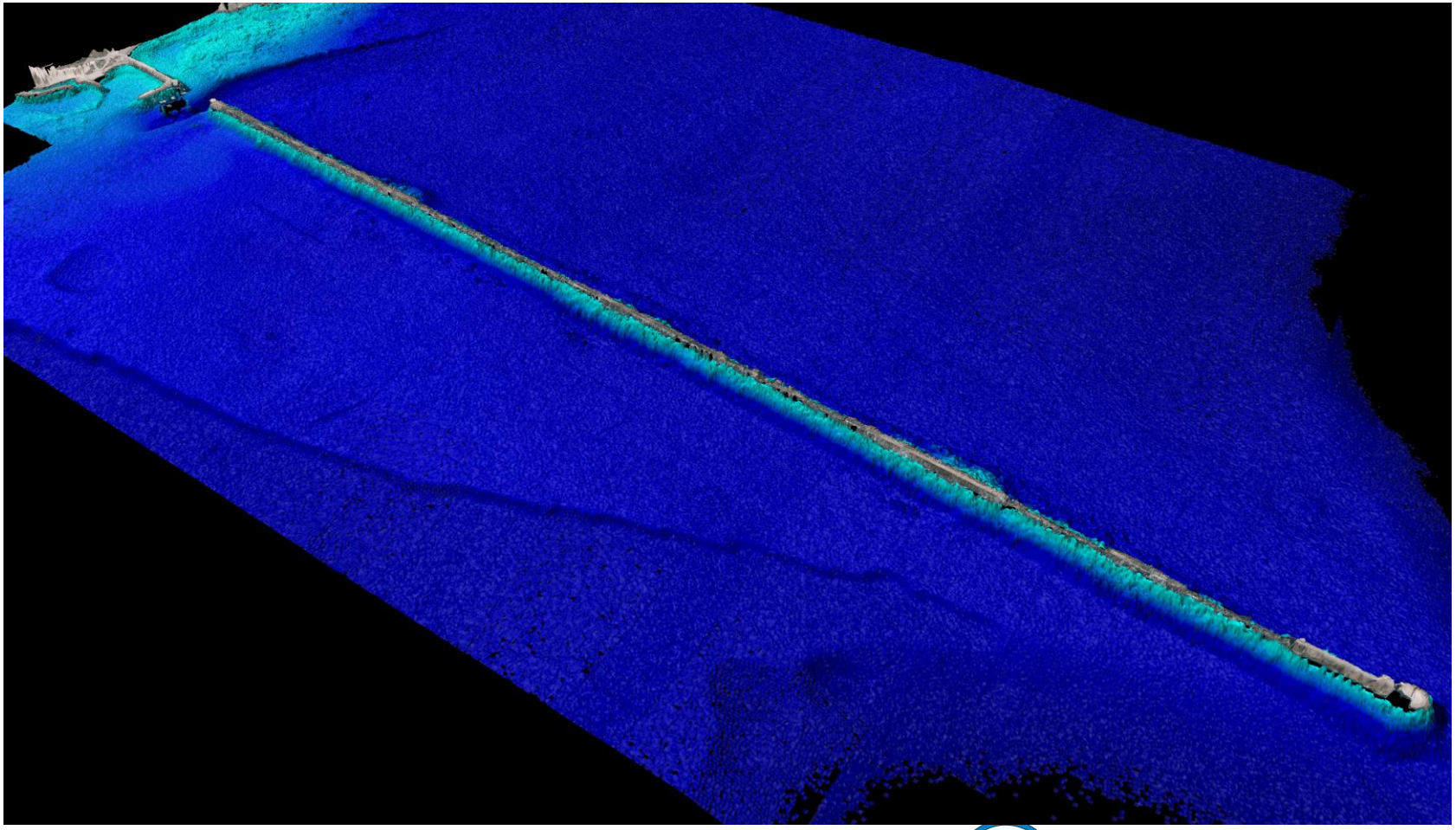
Litto$_3$D ® - Applications

Harbors infrastructure : Toulon's jetty



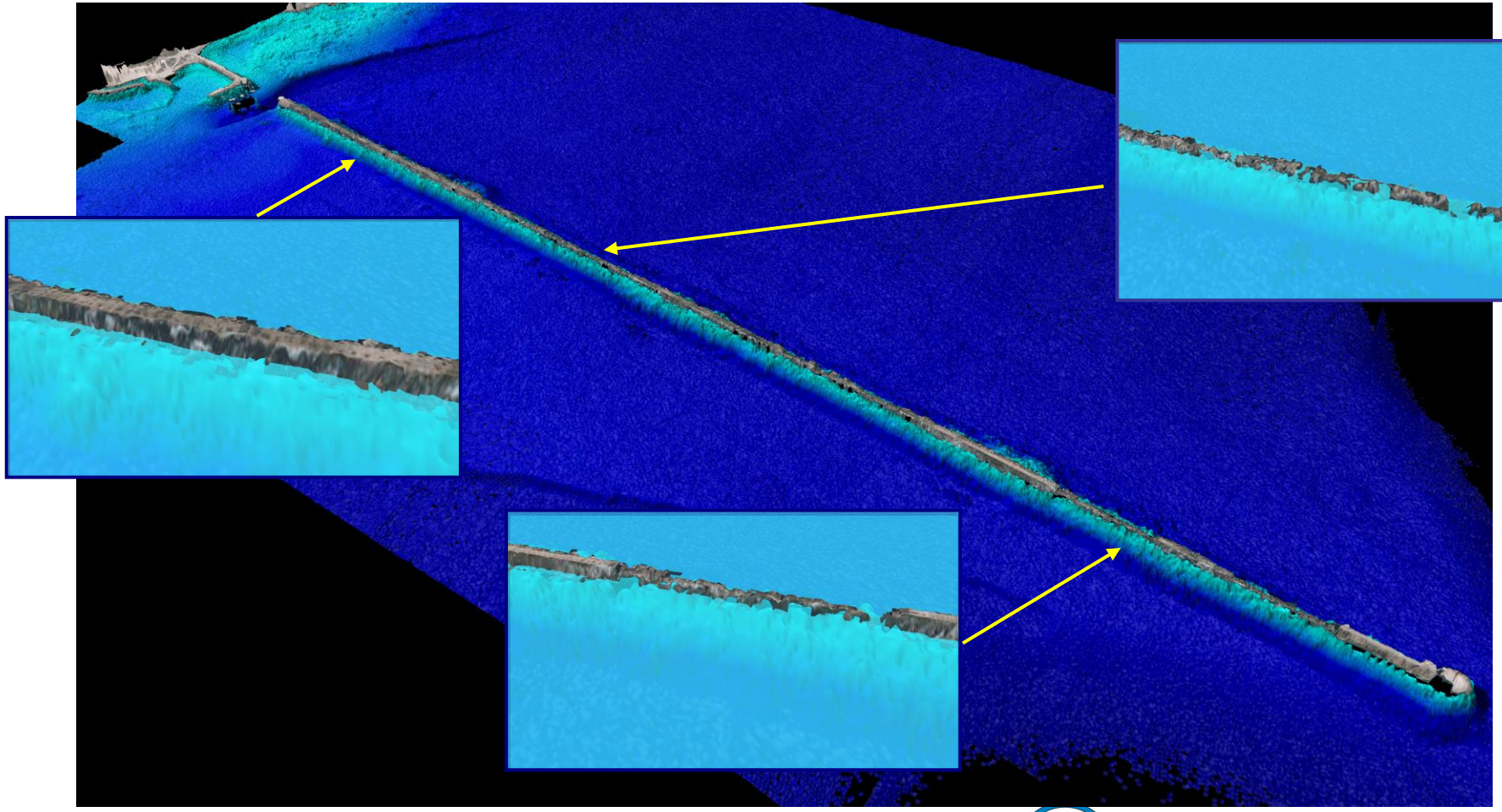
Litto$_3$D ® - Applications

Harbors infrastructure : Toulon's jetty



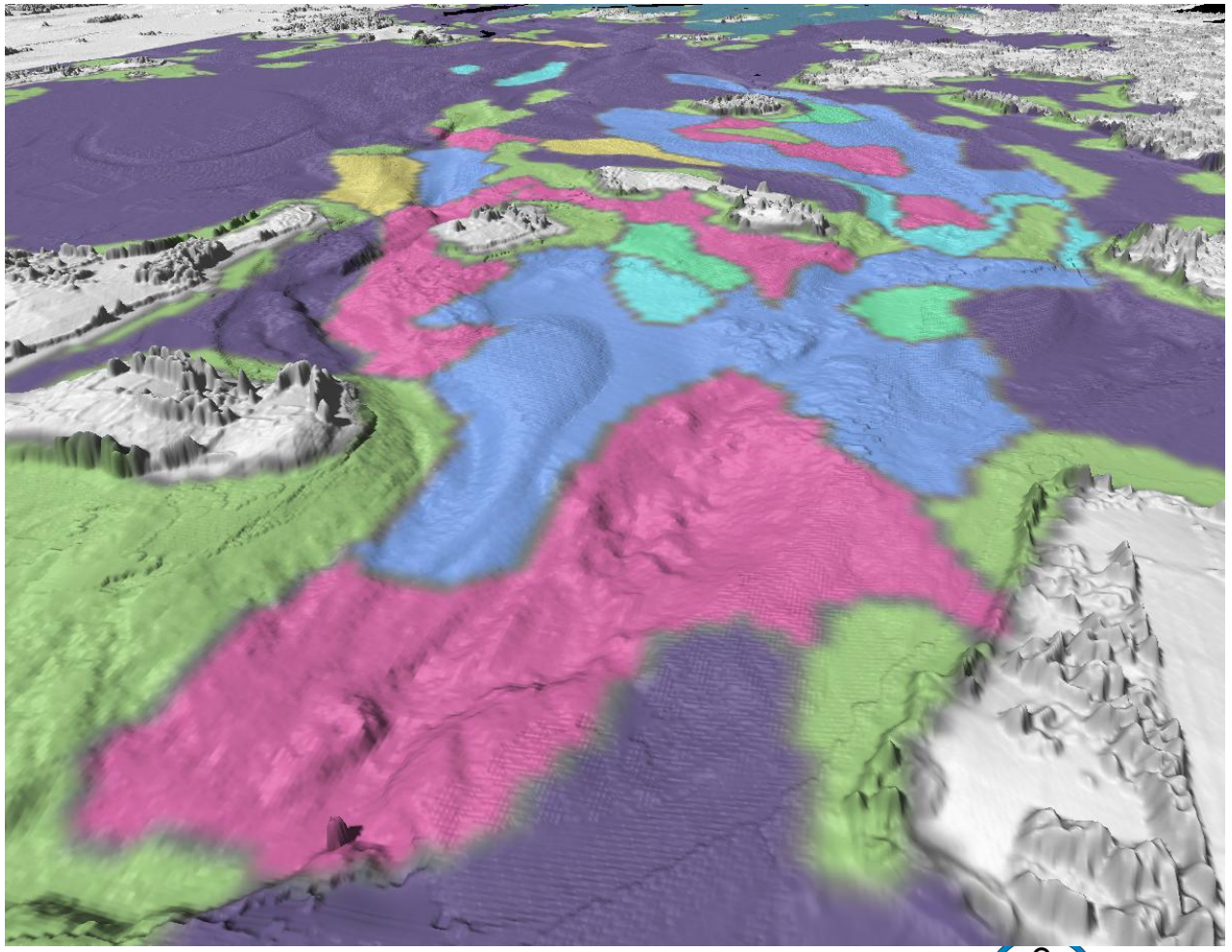
$Litto_3D$ ® - Applications

Harbors infrastructure : Toulon's jetty



Litto$_3$D ® - Applications

Sedimentology



Litto$_3$D ® - Applications

- **Realistic modeling of littoral environment**
  - ***Coupling Litto3D with hydrodynamic tide model***

- **Evaluating two use-cases**
  - ***Littoral d'Anglet - Bayonne***
  - ***Golfe du Morbihan***

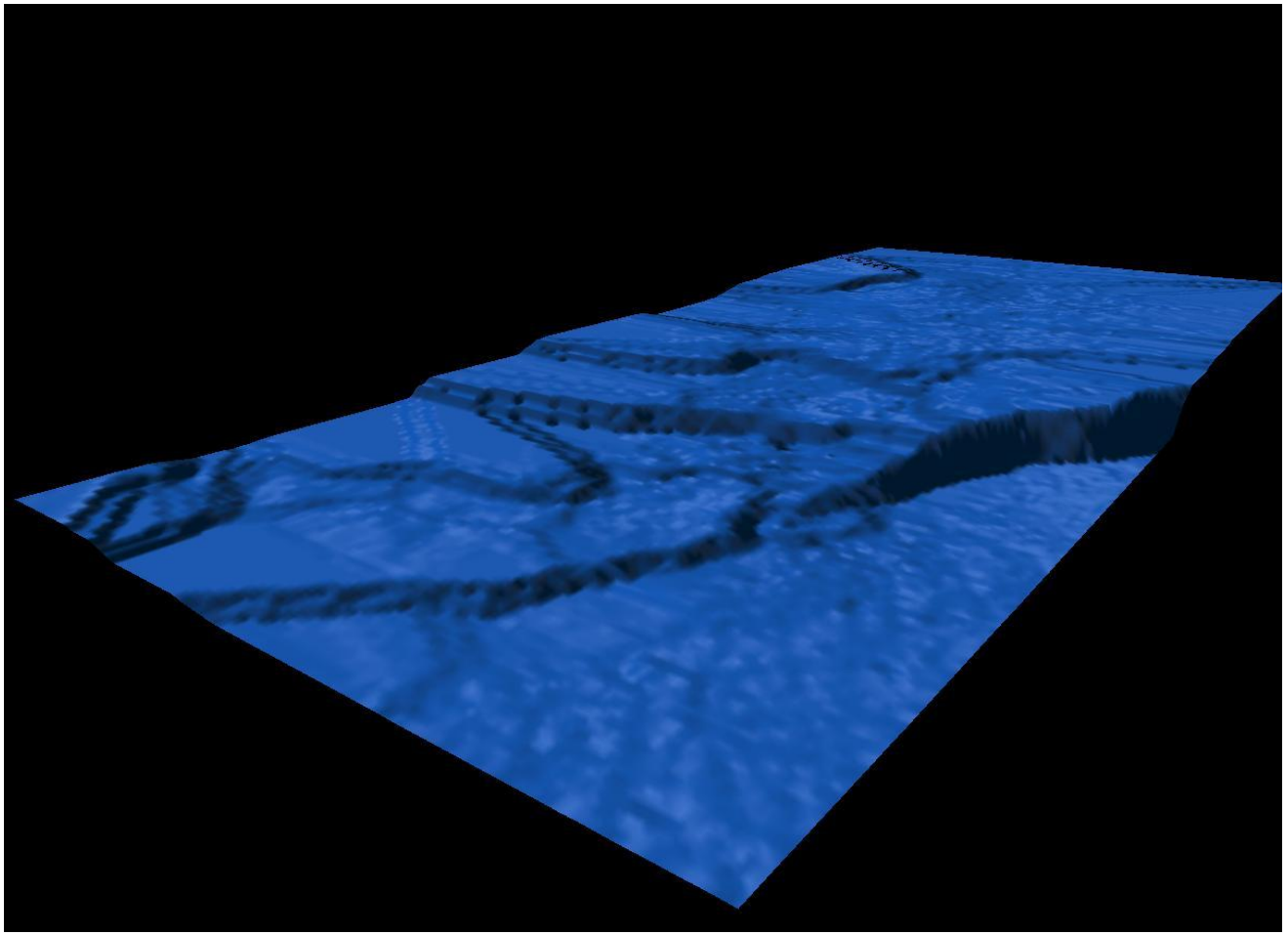
- **Applications**

Step 1 – Modeling the tide

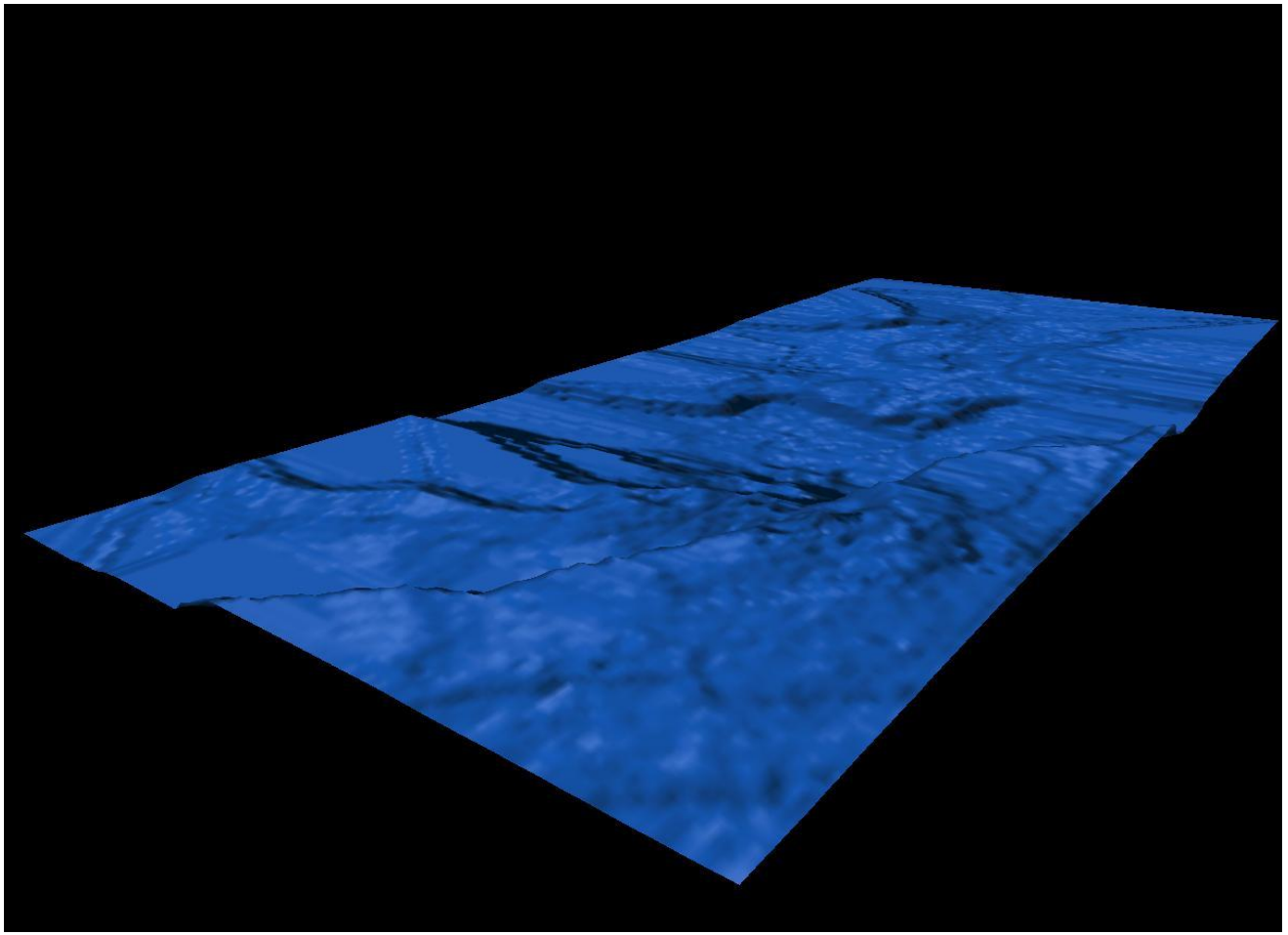
- **Simulation of a tide cycle – day and time are configurable**

- **Based on hydrodynamical models from HDC (SHOM)**

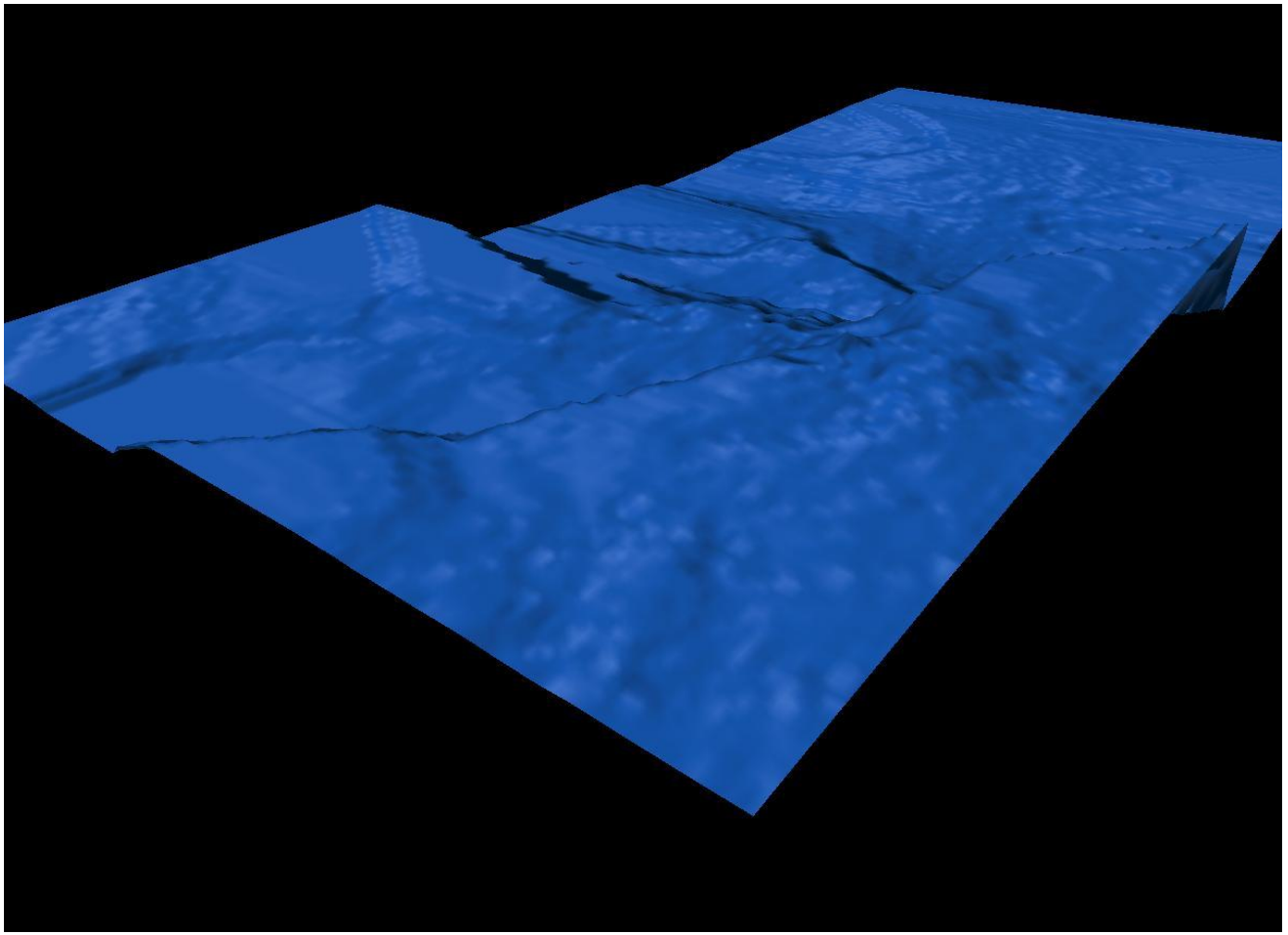
Step 1 – Modeling the tide



Step 1 – Modeling the tide



Step 1 – Modeling the tide



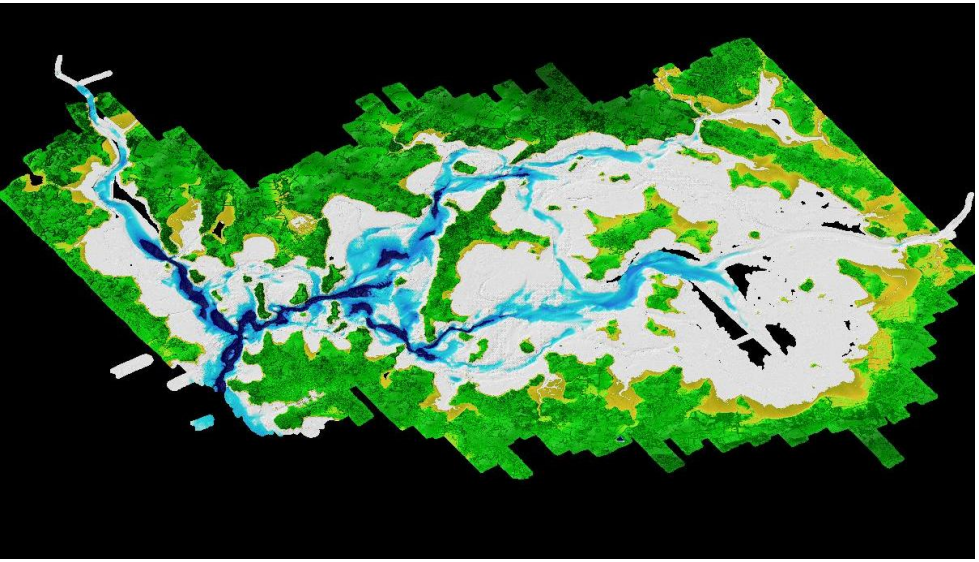
Step 1 – Modeling the tide

Demo

Step 2 – Modeling the coast

- **Golfe du Morbihan - Litto3D®**
- **Bayonne – HISTOLITT®**

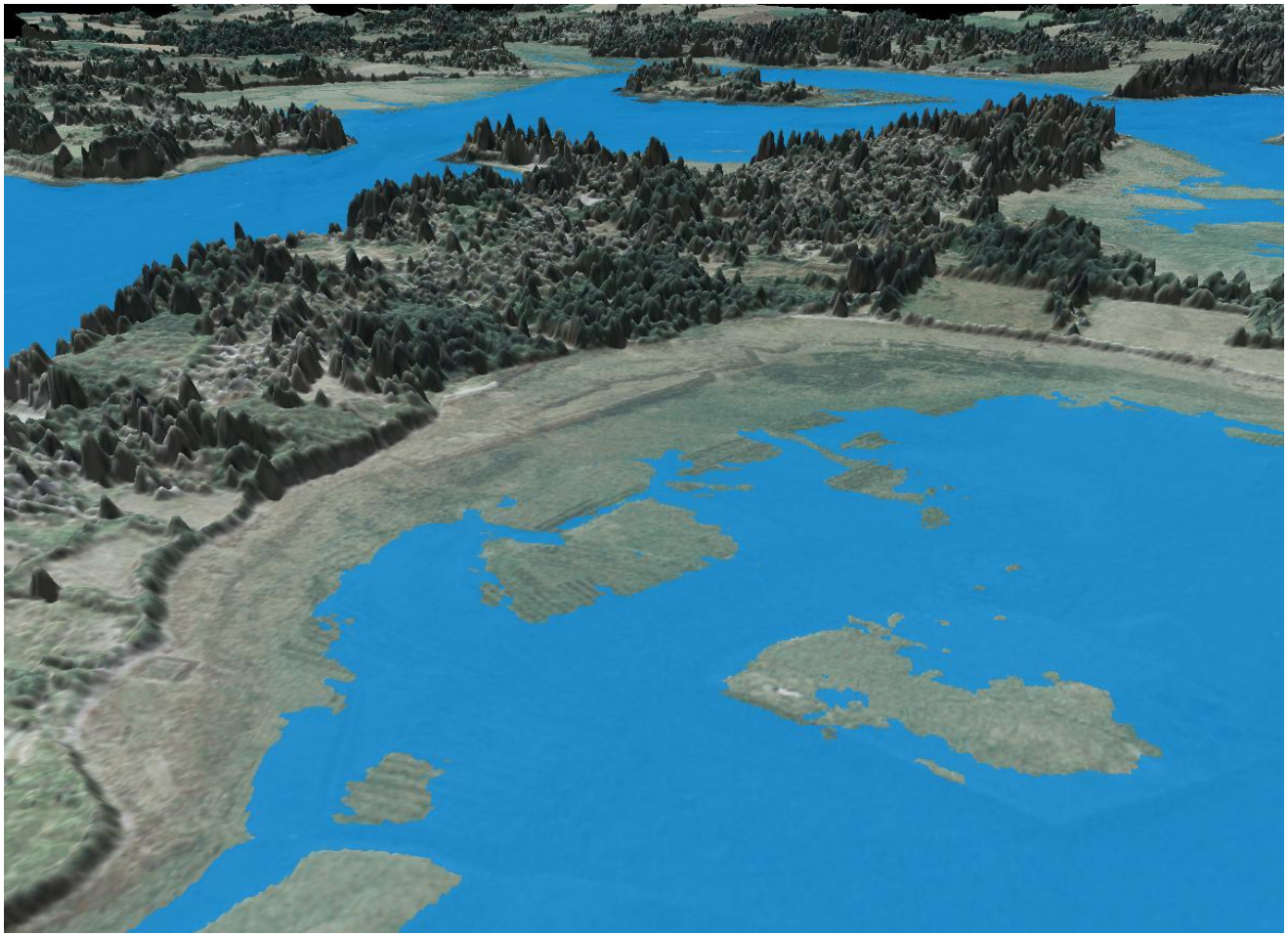
Step 2 – Modeling the coast



Golfe du Morbihan

Bayonne

Coupling the two models



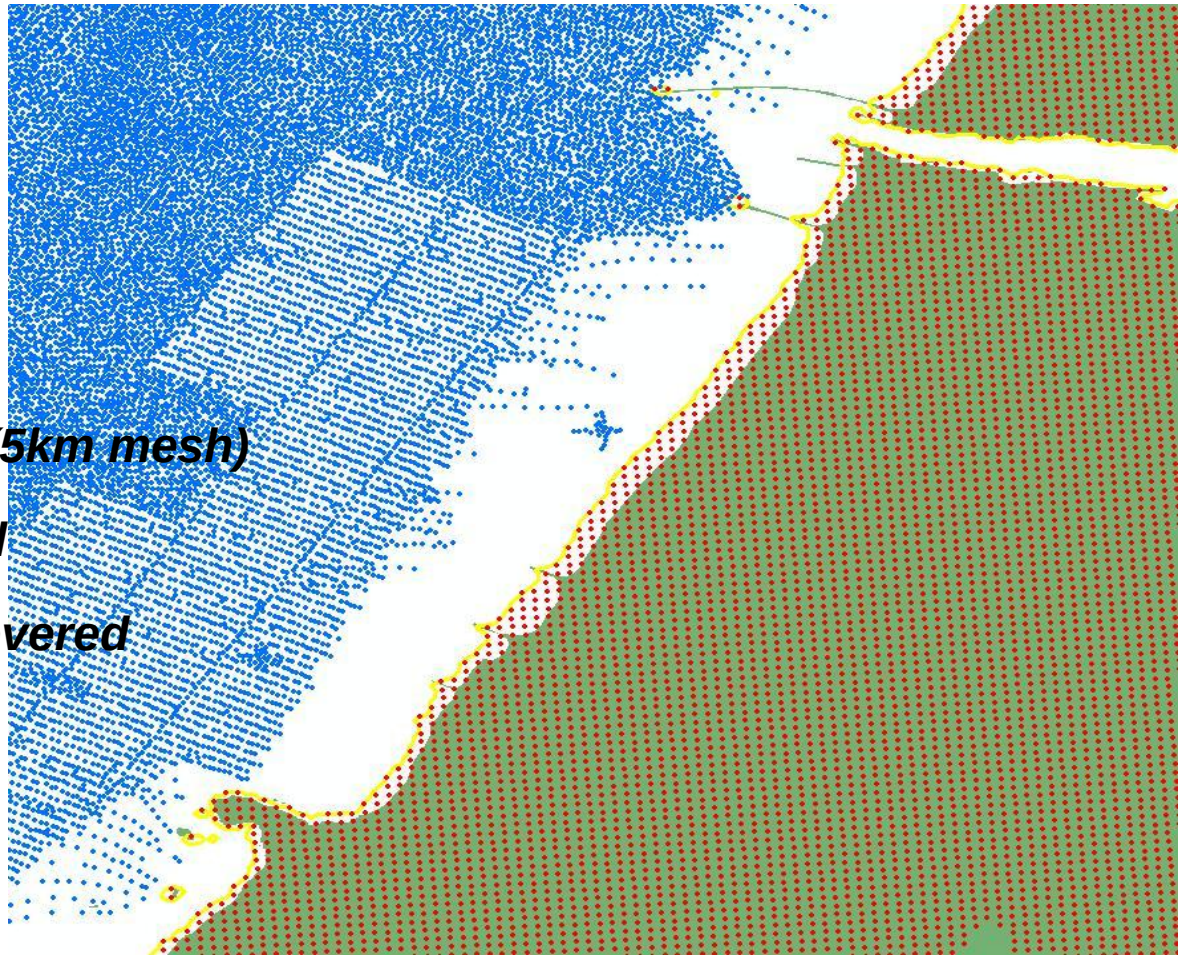
Coupling the two models

Demo

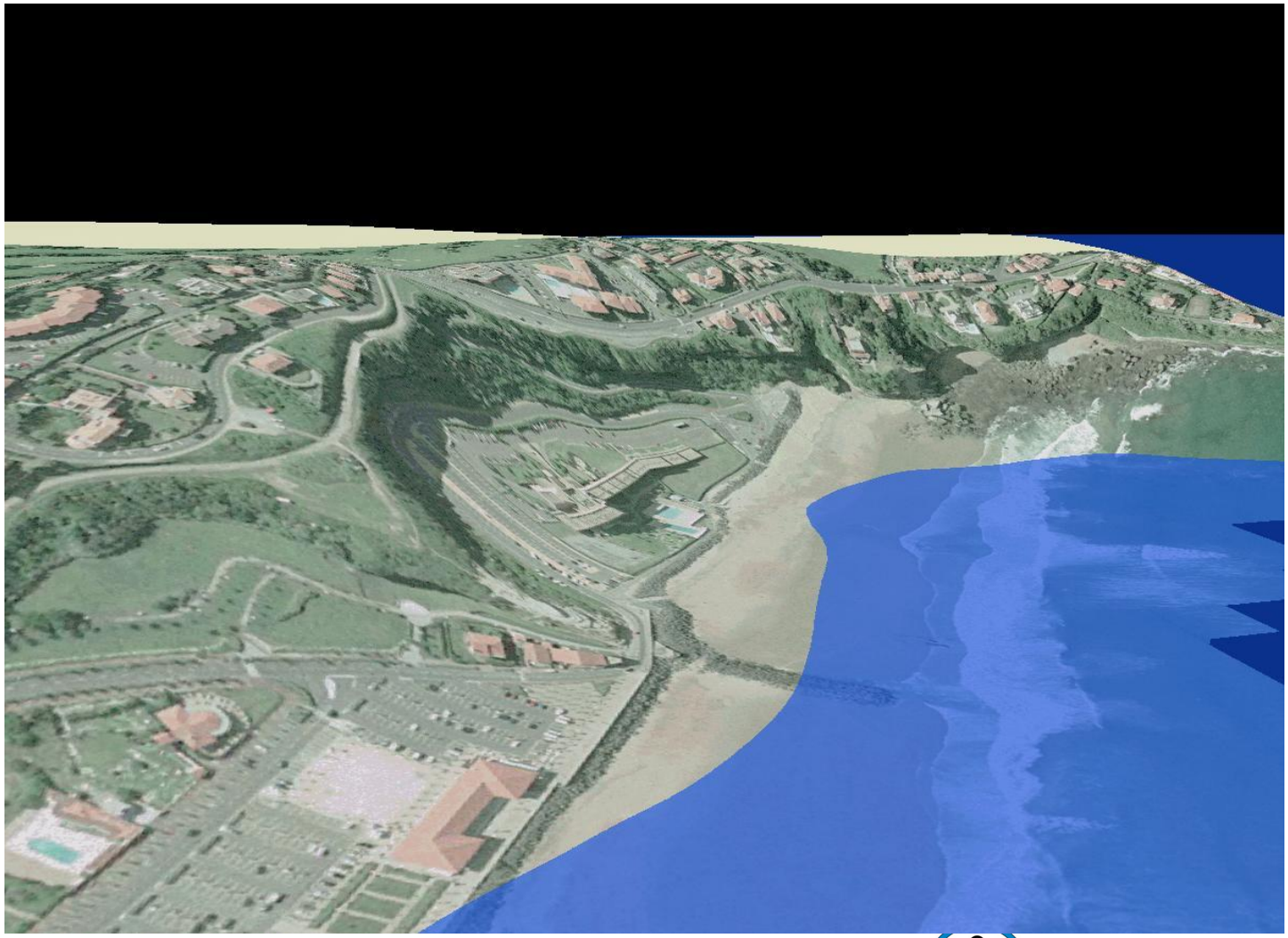
Cases Comparison

Anglet – Bayonne

- ***Sea : Historical Data***
- ***Land : BDAlti® 50m***
- ***Generic HDC model (5km mesh)***
- ***No Zero Hydro model***
- ***Intertidal zone not covered***



Results - Bayonne



Results - Bayonne

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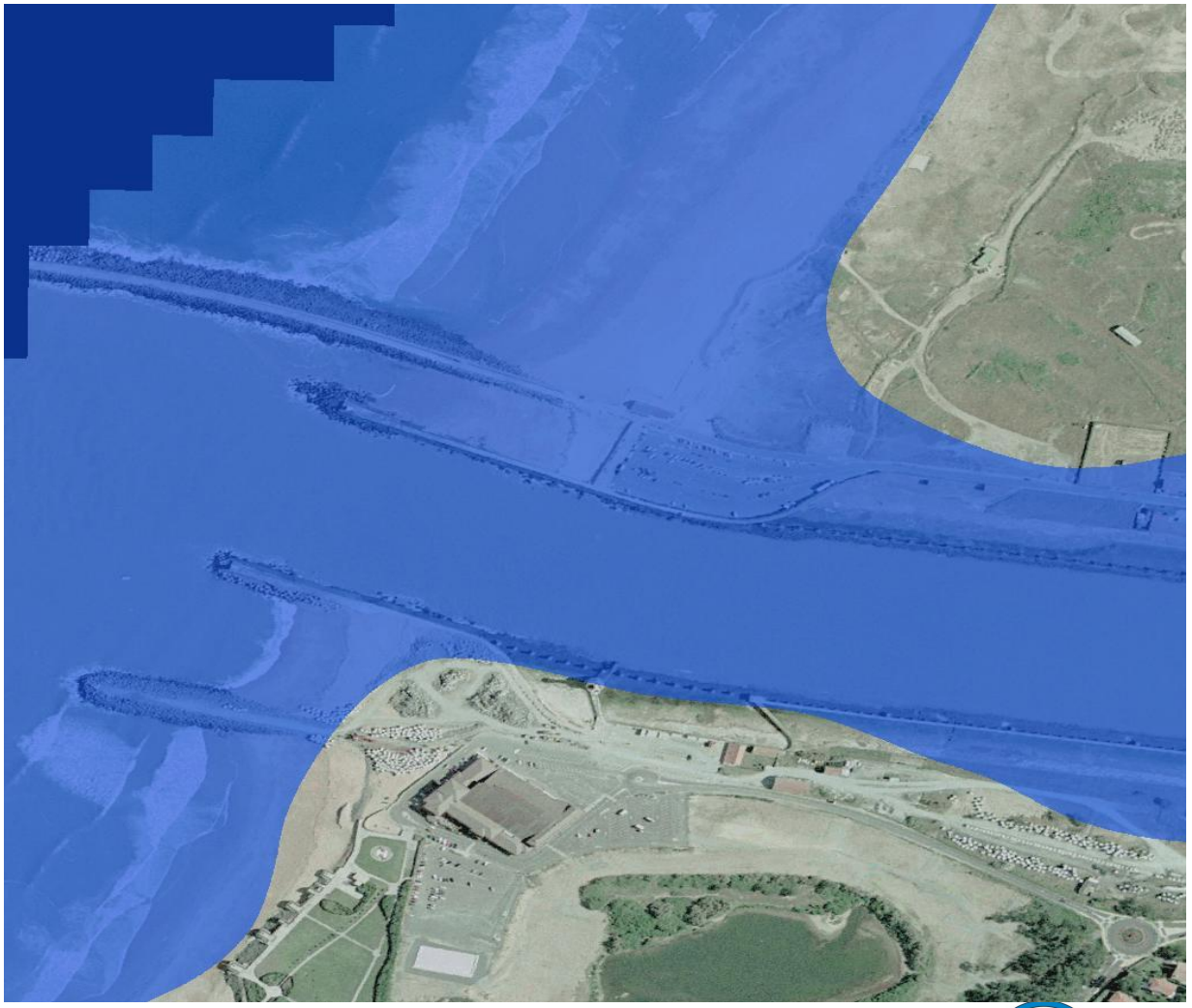


Results – Golfe du Morbihan

Results – Golfe du Morbihan

Results are not bad – but are they good ?

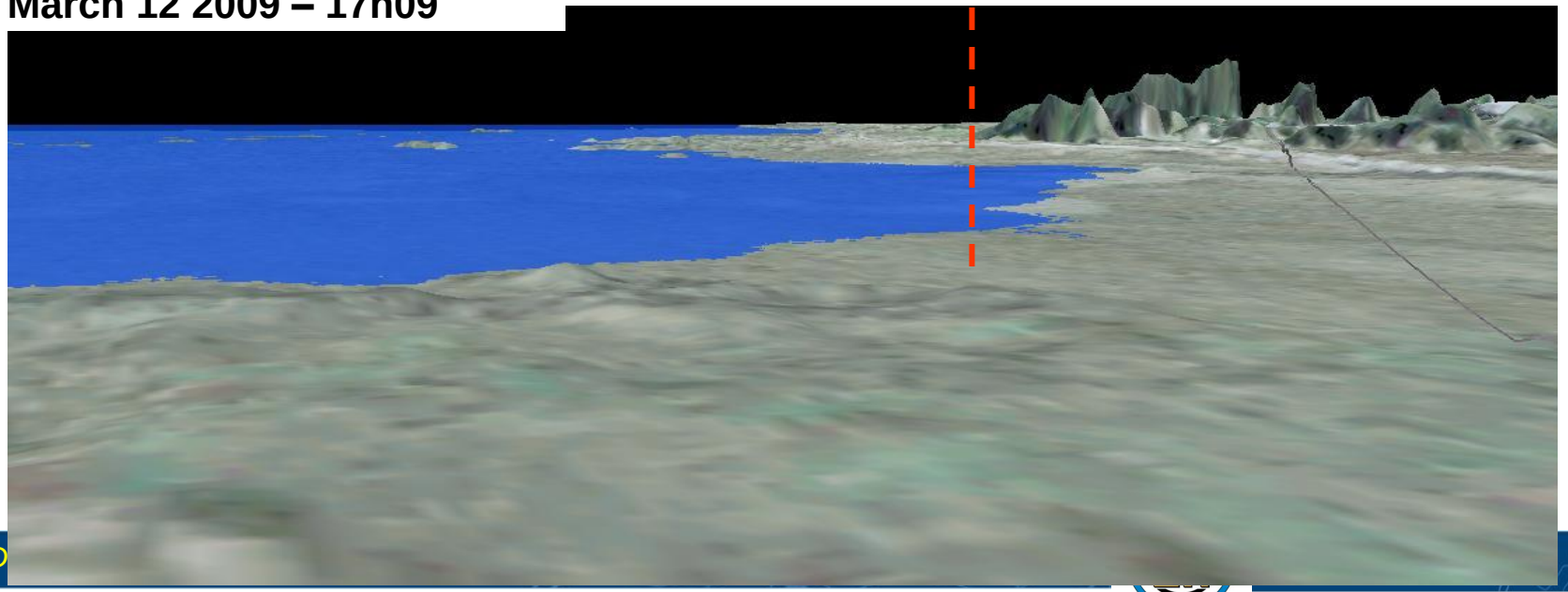
Need to qualify the result

- ***Correlation observation / Simulation***

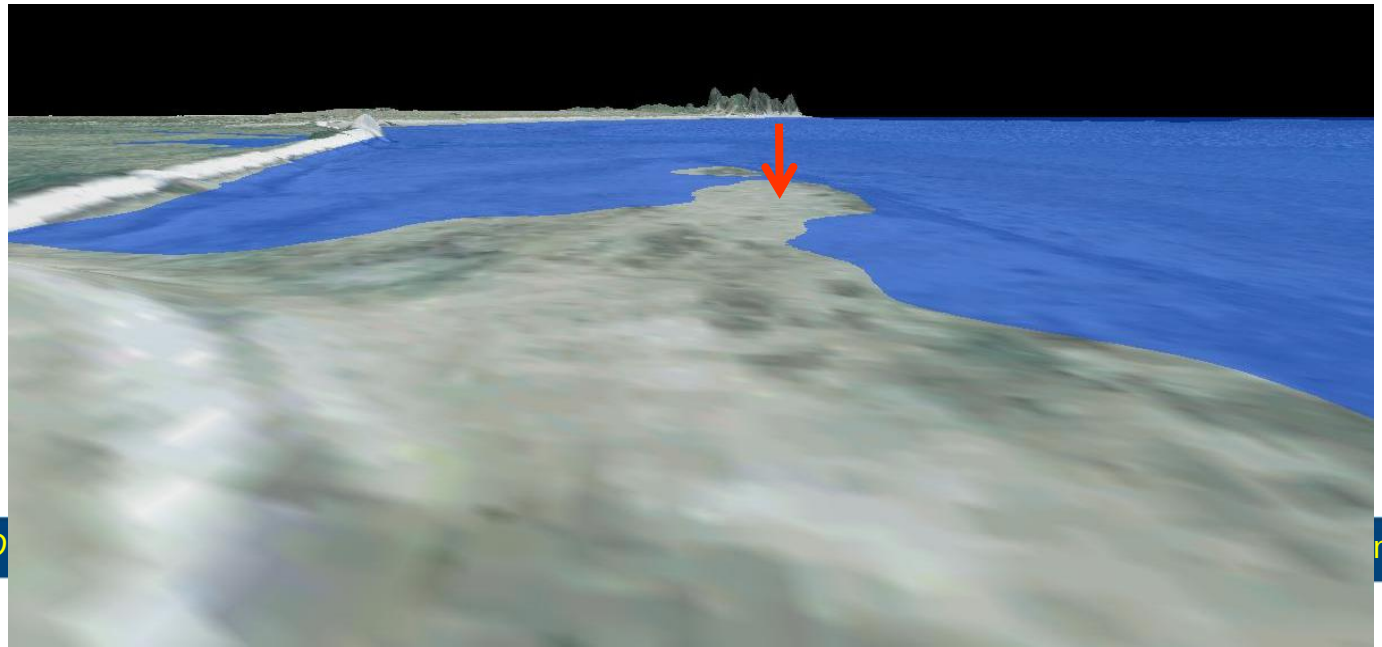
Use of time-stamped observations

- ***Aerial imagery***
- ***Ground observations***

March 12 2009 – 17h09



March 12 2009 – 17h25



Applications (Example and prospects)

Generalities

- ***The simulation itself is an application !***
- ***« What will the sea look like, D-Day H-hour ? »***
  - ***Potential interest of public (fishers, leasure, pedagogic, etc.)***

Applications – Littoral management

Under study :

- ***Impact of sea rise***
- ***Cadastral delineation***

Ocean rising

High tide

Coefficient 108

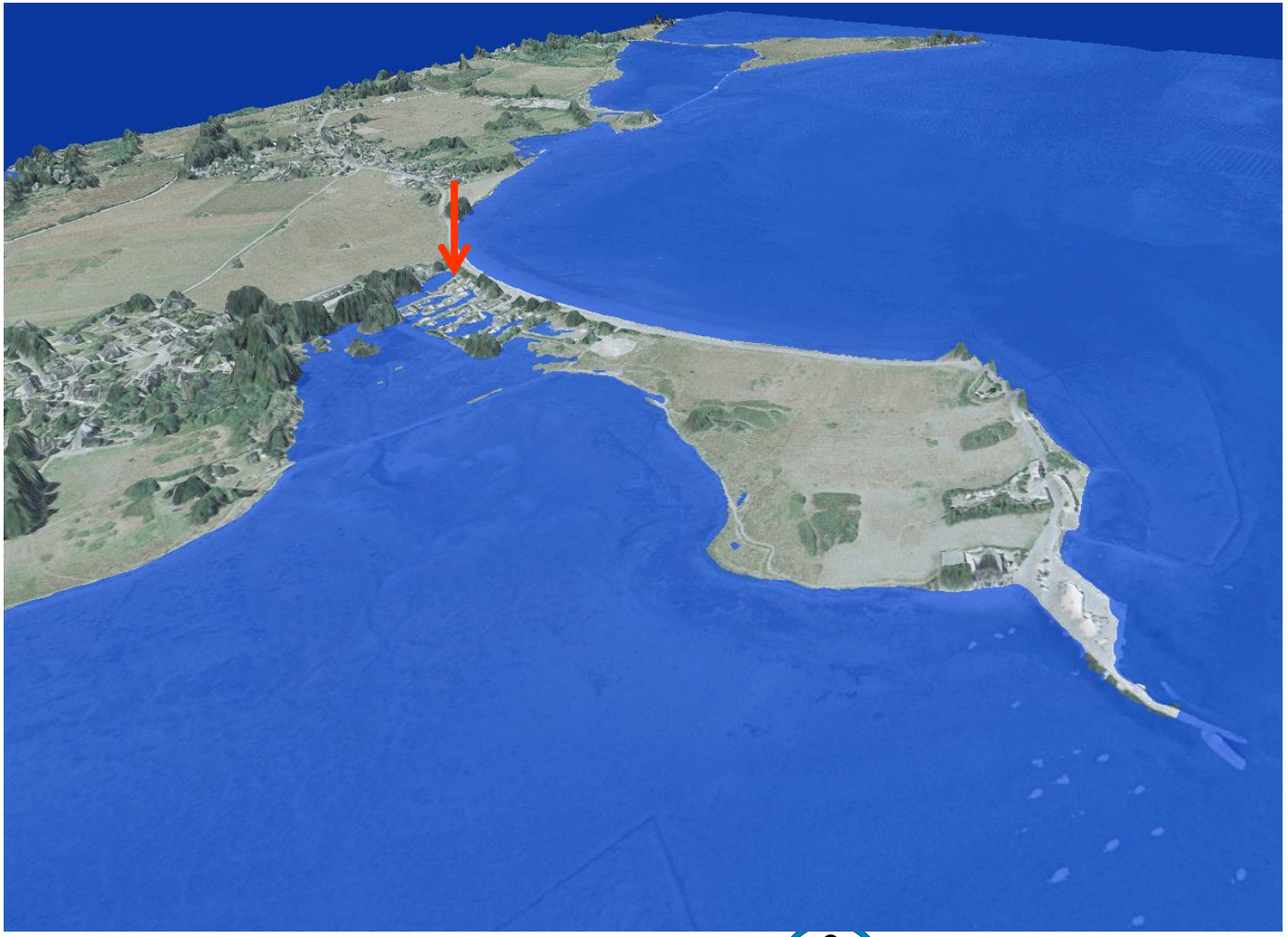
Elevation : 0 cm

Ocean rising

High tide

Coefficient 108

Elevation : 40 cm

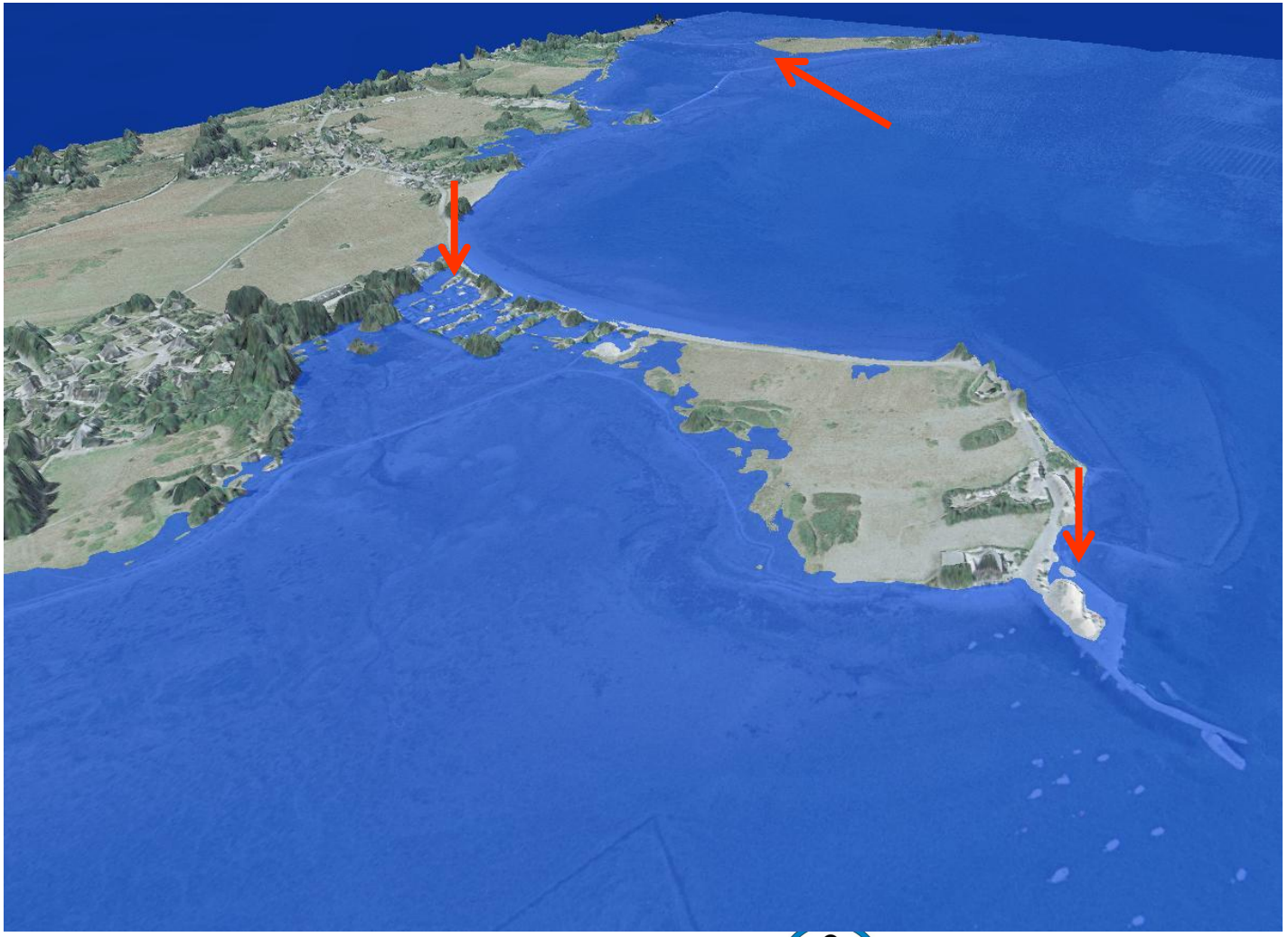


Ocean rising

High tide

Coefficient 108

Elevation : 100 cm

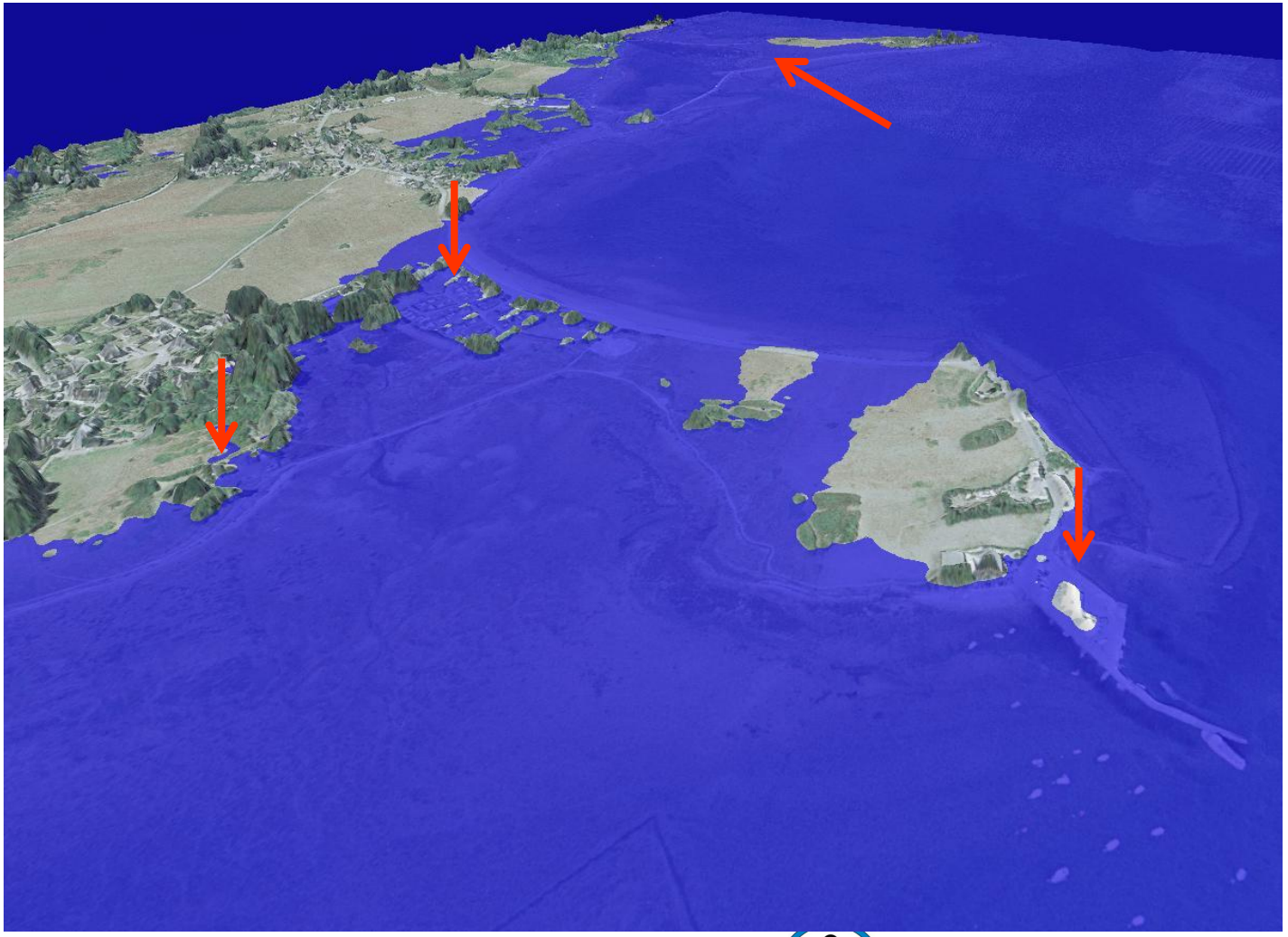


Ocean rising

High tide

Coefficient 108

Elevation : 190 cm

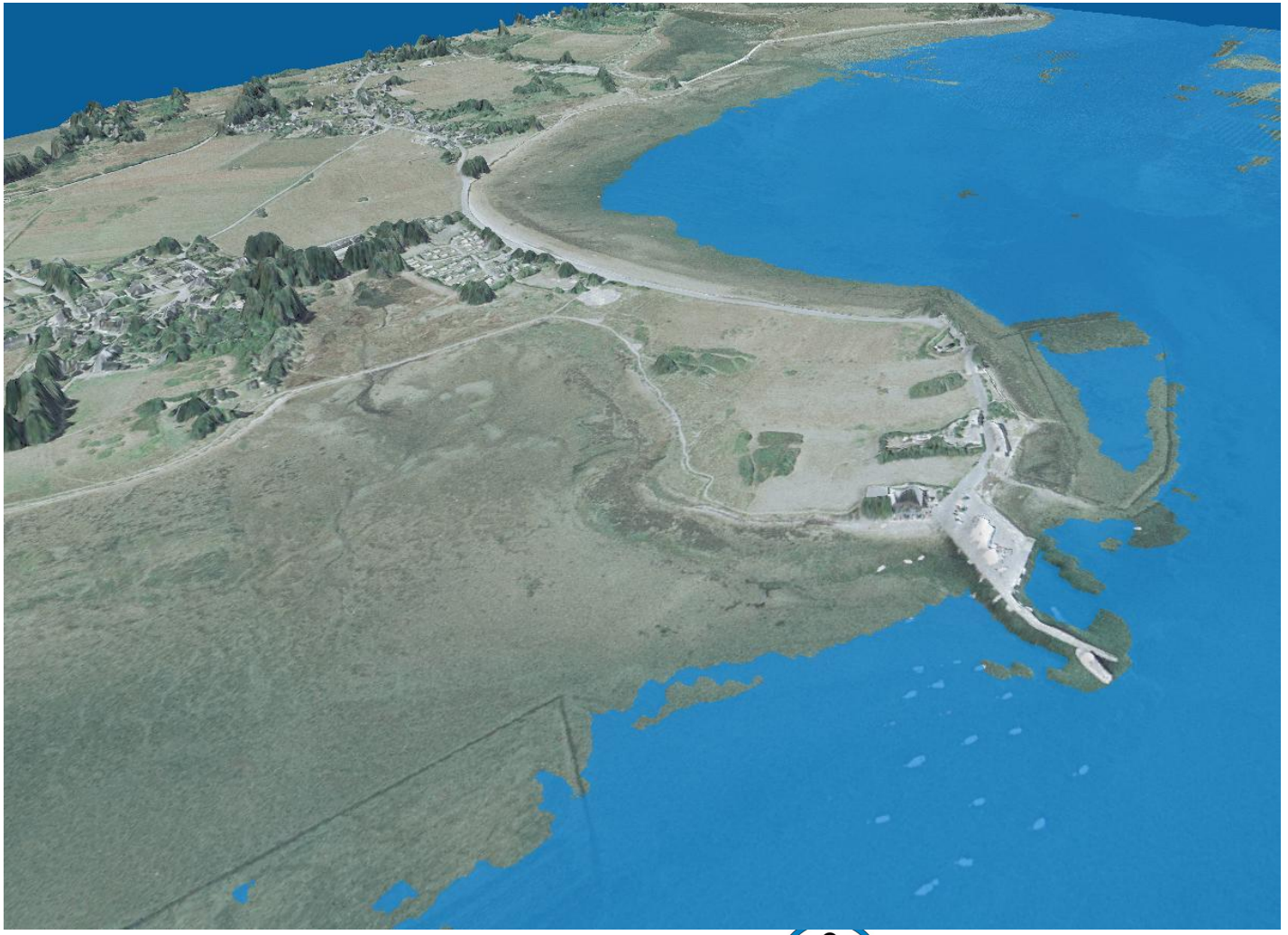


Ocean rising

Low tide

Coefficient 108

Elevation : 0 cm



Ocean rising

Low tide

Coefficient 108

Elevation : 190 cm

Littoral management

- **Delineation of Maritime Public Domain (*French DPM*)**
  - ***DPM is the level of highest astronomical tide (without atmospheric perturbation)***
- **Today : Delineated by terrain campaigns**

Intersection between Litto3D model and the highest level of a simulated astronomical tide.

Domaine Public Maritime

Domaine Public Maritime

CONCLUSIONS

Litto3D® gives new potential to existing data

New products and services

- ***Anticipation of sea-rise risk***
- ***Cadastral management – spatial planning***
- ***Simulation for the public***