Litto\textsubscript{3D}$^\text{®}$

and applications
Contents

- Litto3D project
- Applications: modeling sea-land interaction
  - Simulating the tide
  - Cadastral management
  - Sea-rising risk management
Continuous, high resolution altimetric model on the littoral
The coastal area is economically important
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
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 ®

Merged data
HistoLitt®

Merged data
HistoLitt®

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

- LIDAR, MBES, DGPS
- Sub-metric resolution
- Better coverage of low-water areas
Litto³D®
Landward: better resolution

Pixel: 30 cm
Precision Z: 15 cm
Litto$_3$D $^\text{®}$

- Seaward: better coverage

100% coverage
Mesh: 3 m
Precision: 30 cm
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*
  - ...

Vincent Donato

Litto$_3$D $®$ - GEBCO 09/29/09
**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)
Harbors infrastructure: Toulon’s jetty
Harbors infrastructure: Toulon’s jetty
Litto$_3$D $^\text{®}$ - Applications

Harbors infrastructure: Toulon’s jetty
Litto$_3$D $^\text{®}$ - Applications

Sedimentology
**Litto₃D® - 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
Results - Bayonne
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
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, leisure, 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
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