CETE
Méditerranée

MobiTC, automatic calculation of the historical shoreline changes: examples on three different coastal morphologies

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RÉPUBLIQUE FRANÇAISE

MINISTÈRE
DE L'ÉGALITÉ
DES TERRITOIRES
ET DU LOGEMENT

MINISTÈRE
DE L'ÉCOLOGIE,
DU DÉVELOPPEMENT
DURABLE
ET DE L'ÉNERGIE

Ressources, territoires, habitats et logement
Énergies et climat
Prévention des risques
Développement durable
Infrastructures, transports et mer

Présent pour l'avenir

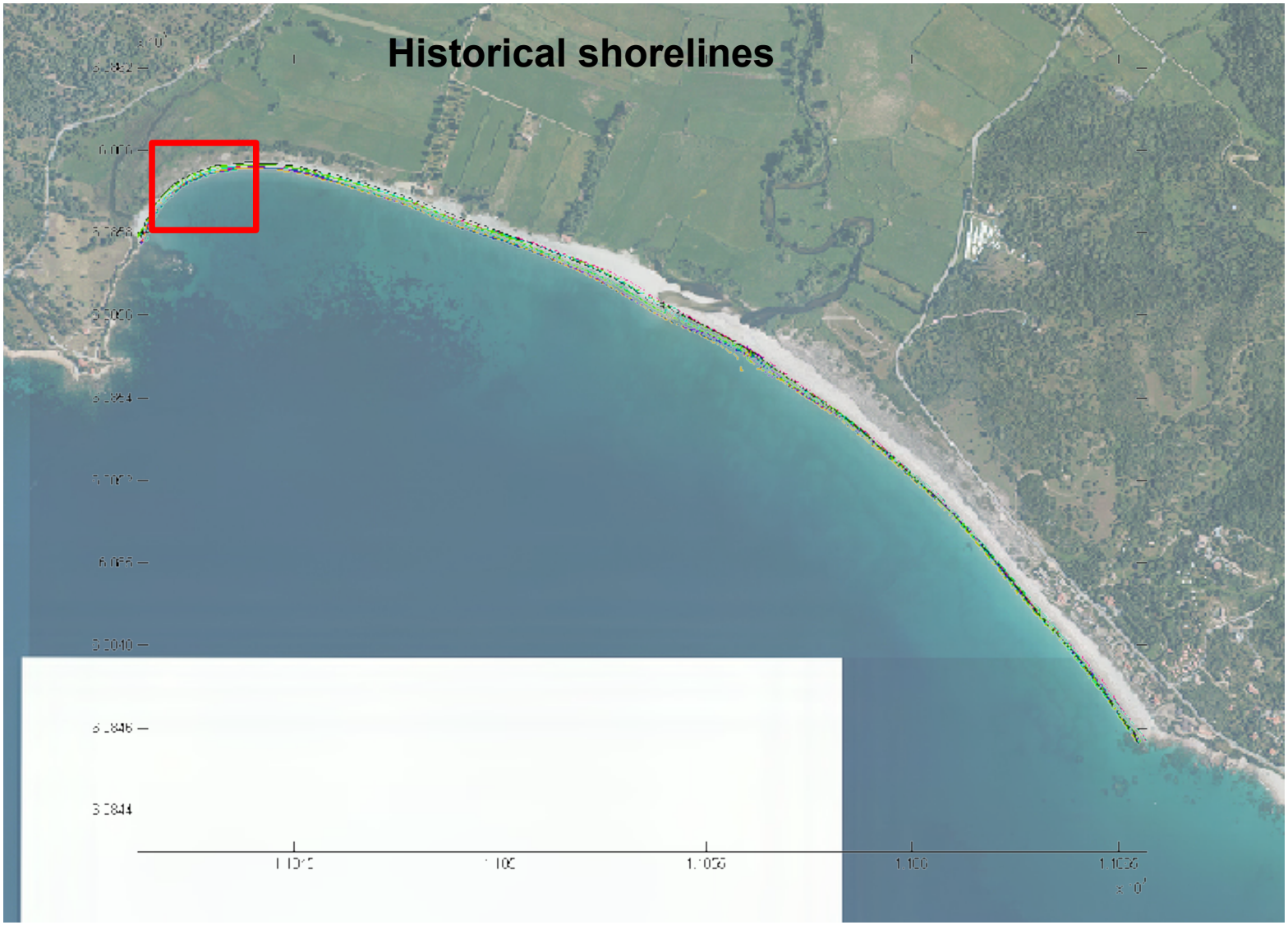
Scope of the talk

- Why to develop a new software? Originalities of MobiTC
- Principe of MobiTC
- Added statistics
- Results and GIS visualisations
- 3 examples :
  - On a pocket beach
  - On a long sandy beach
  - On a sand spit
- Future shoreline
- Conclusions and prospects

Why to develop a new software?

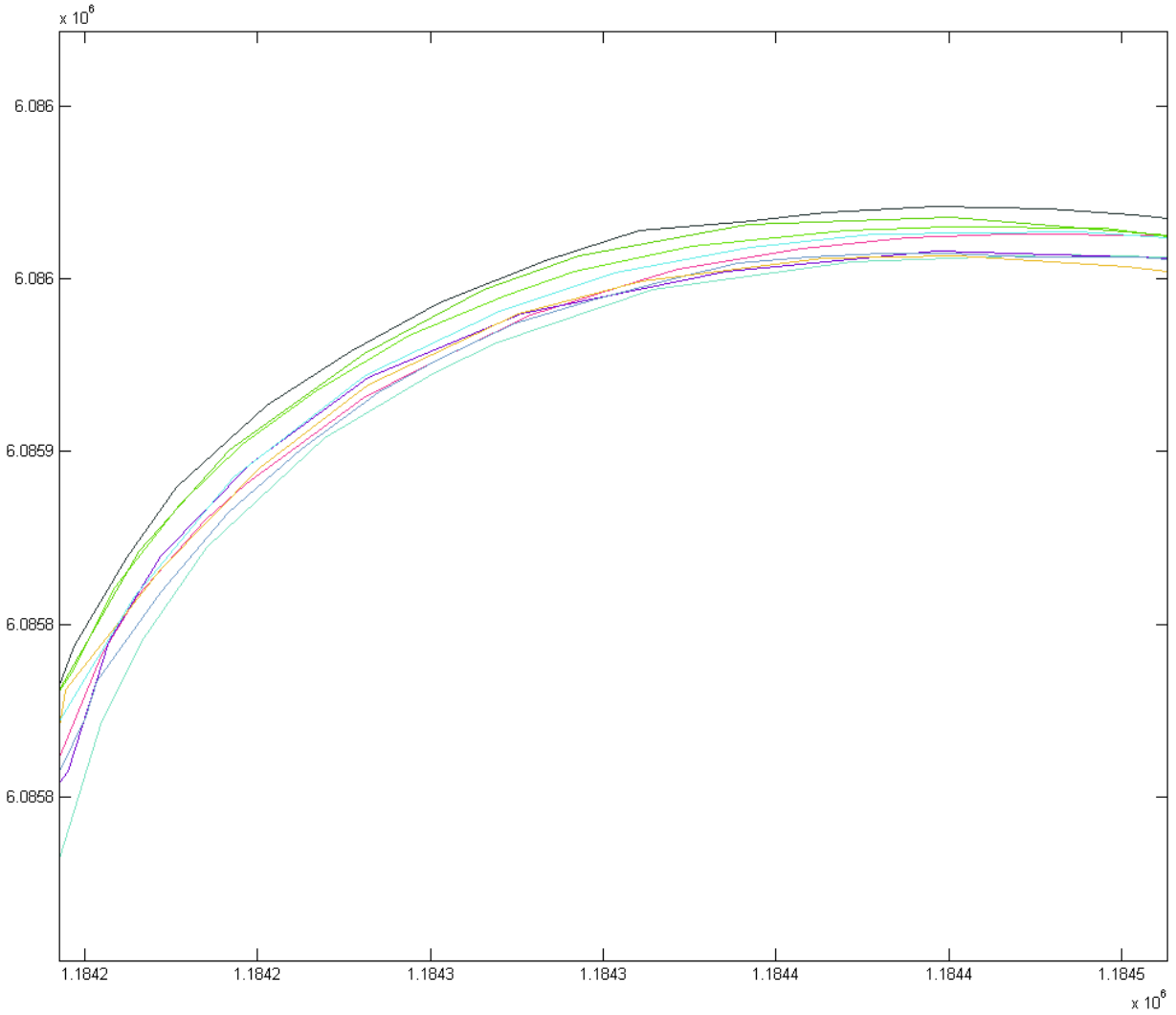
- **The Aim : Calculate the shoreline evolution of the entire French coast**
  - **A significant willing of automation of all calculations to process long sectors in one shot**
  - **A need of fitting on all types of coastal morphologies**
    => Use of the skeleton algorithm
  - **A need of simple tools for analysing the numerous results**
    => Comprehensive statistic calculation with different methods
    => Homogeneous and automatic GIS representation

Principle of MobiTC

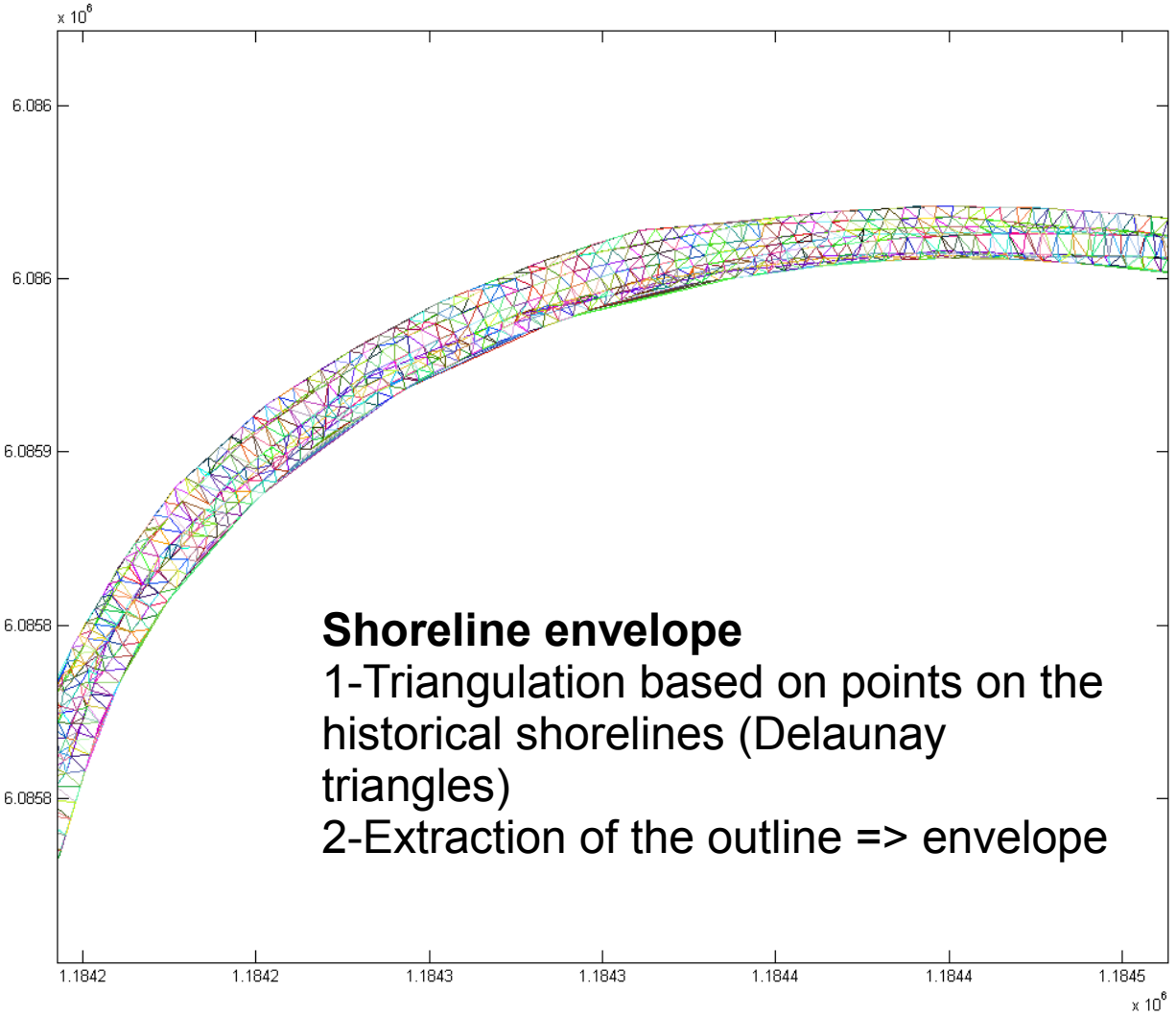


Principle of MobiTC

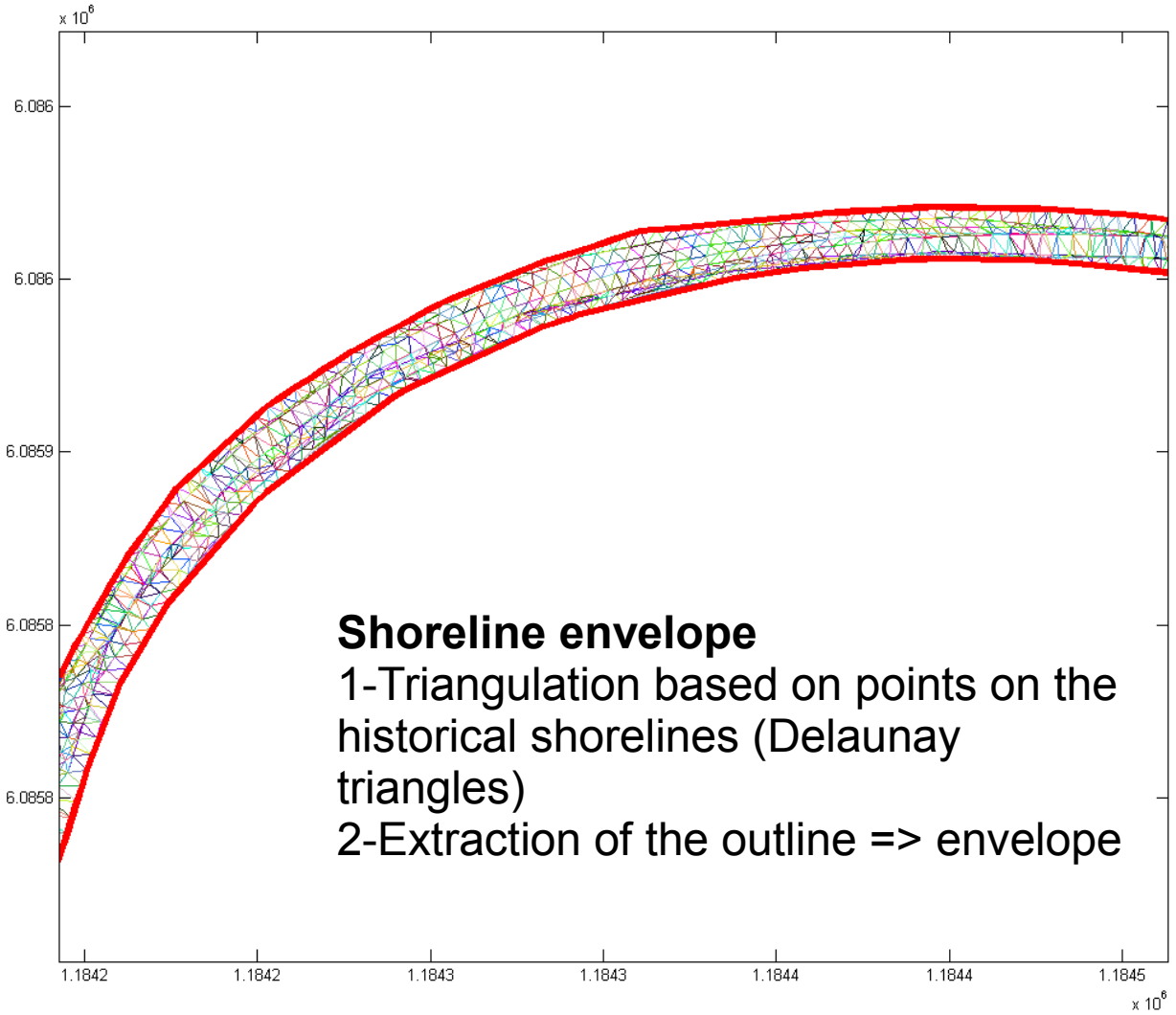
Historical shorelines



Principle of MobiTC



Principle of MobiTC



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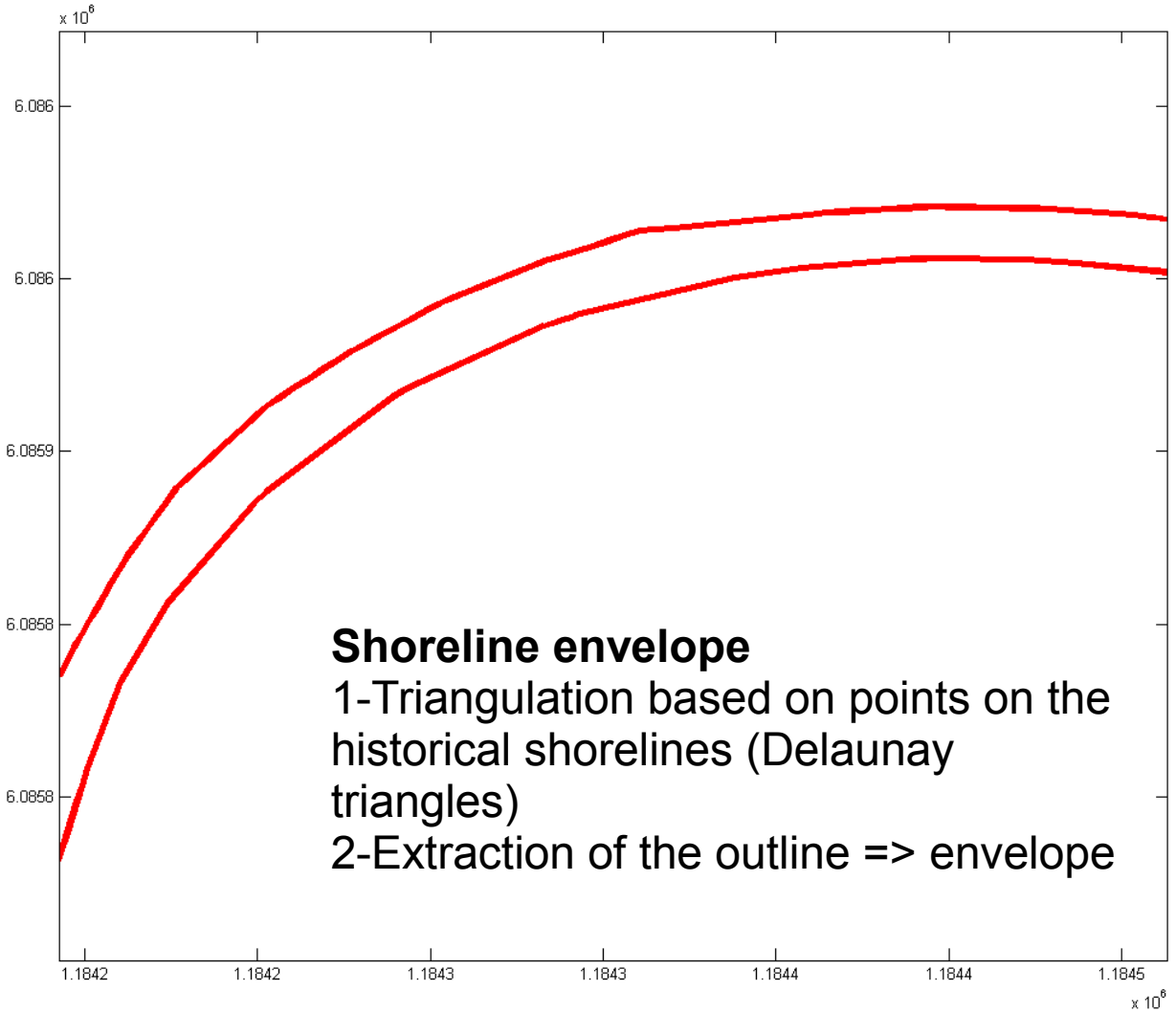
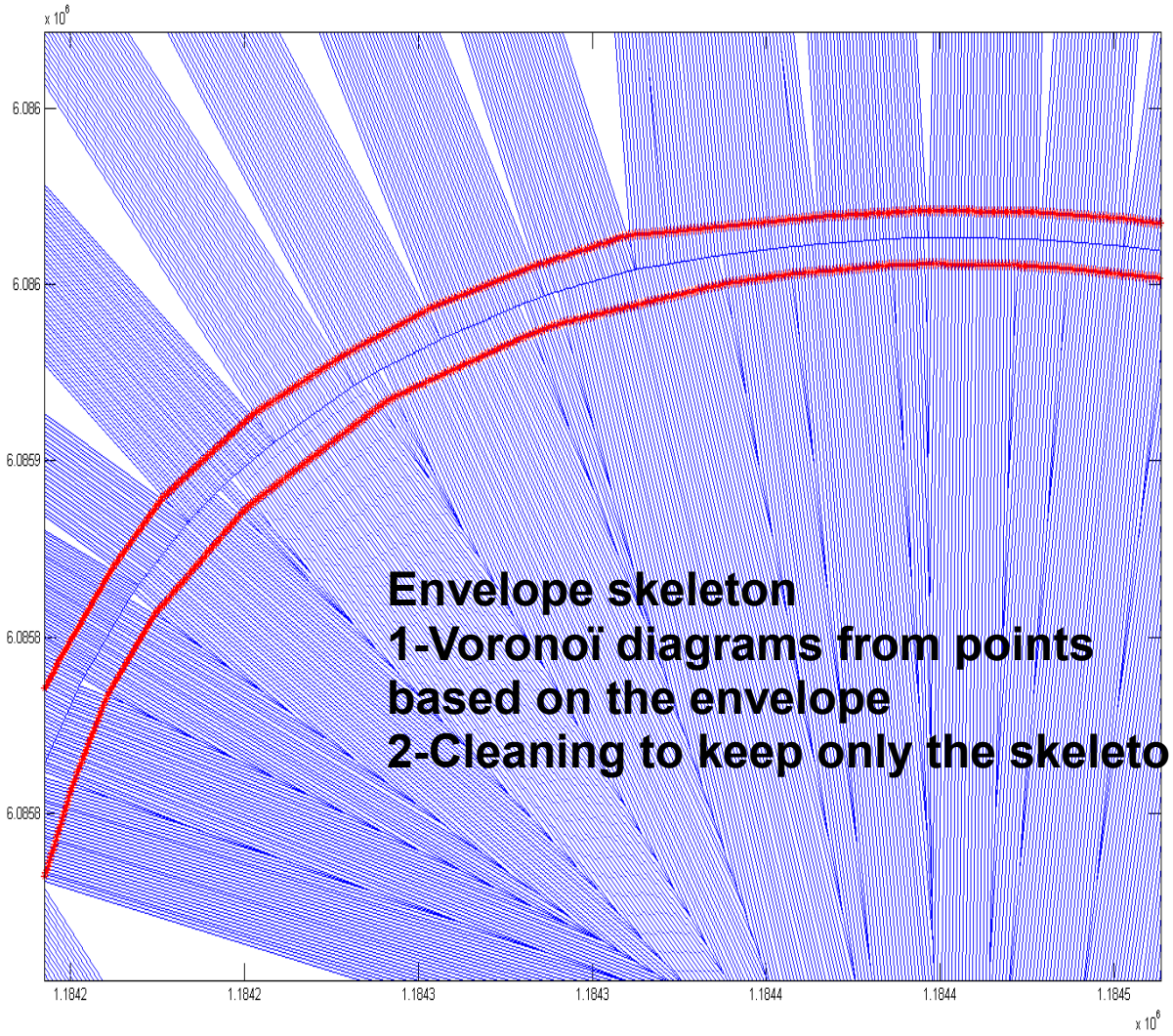
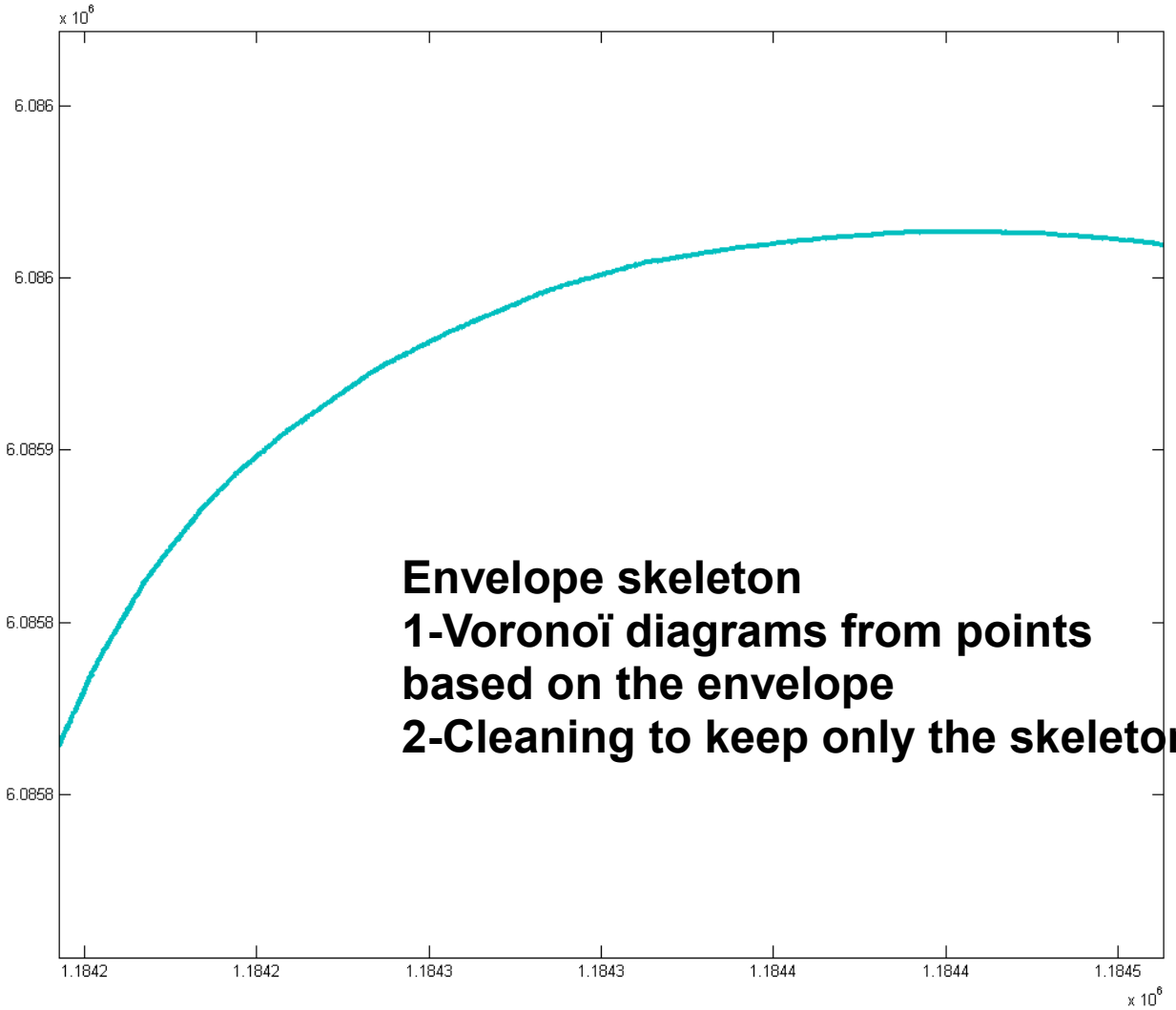


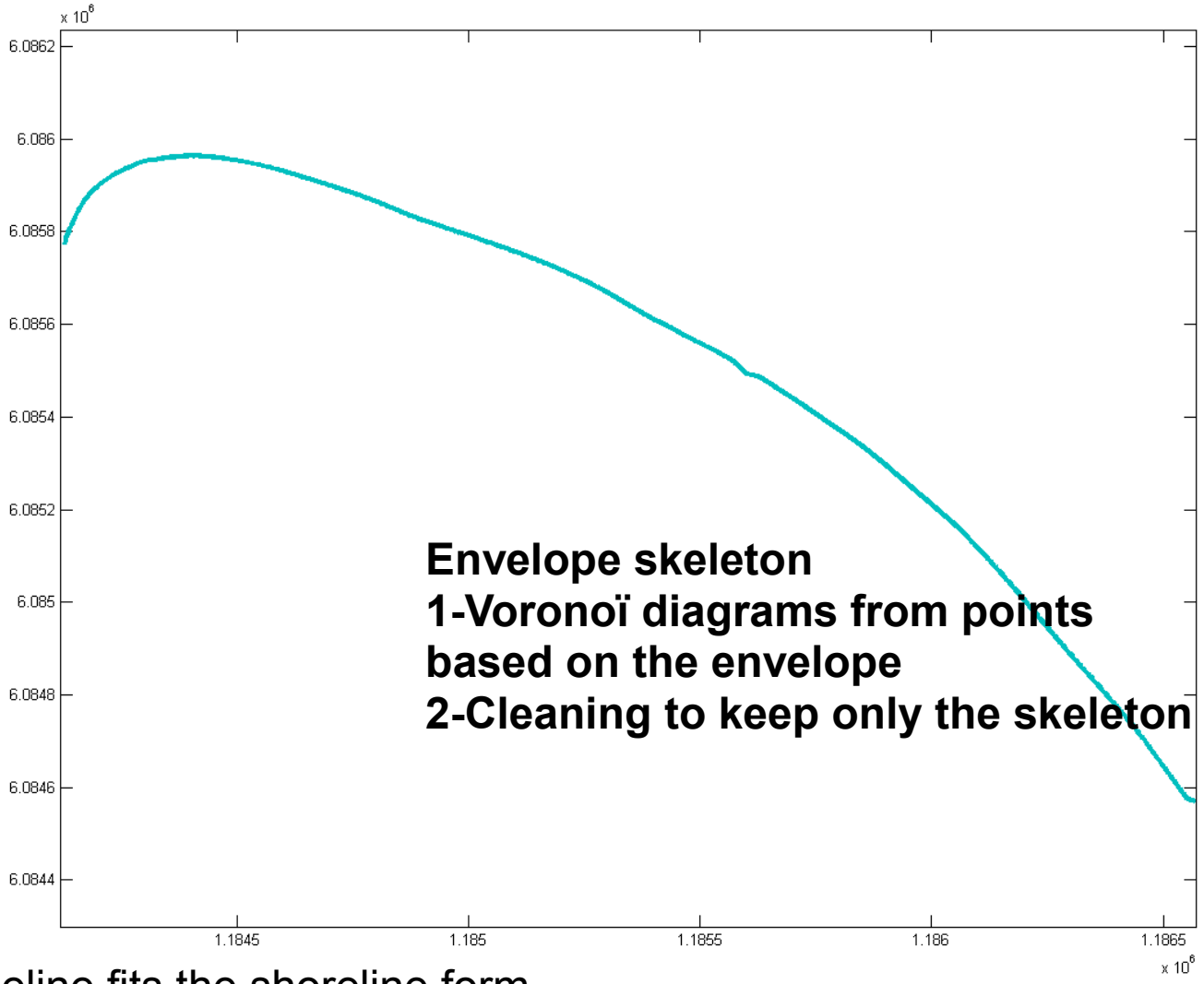
Principle of MobiTC



Principle of MobiTC

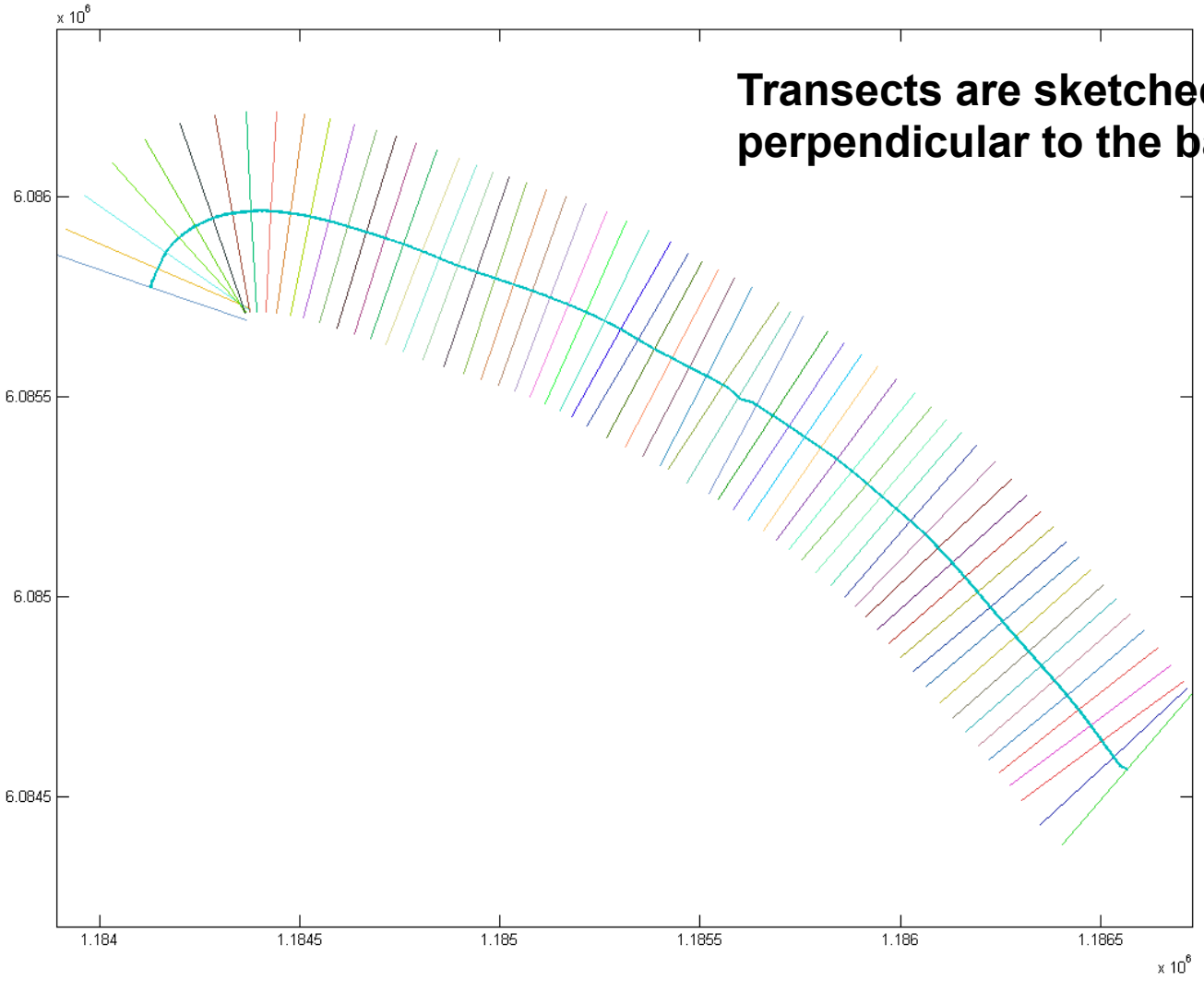


Principle of MobiTC



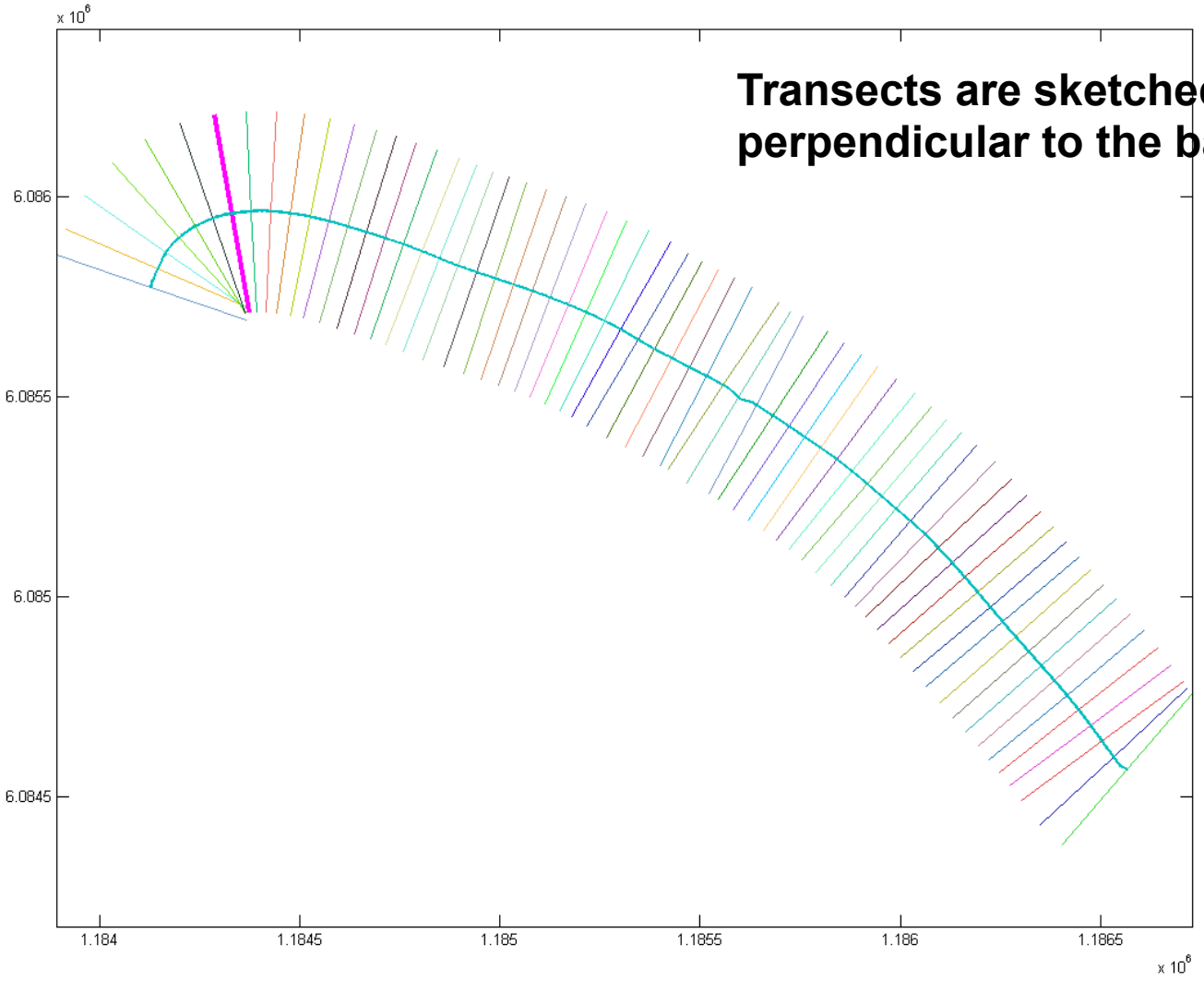
The baseline fits the shoreline form.
It goes through the middle of the historical shorelines

Principle of MobiTC



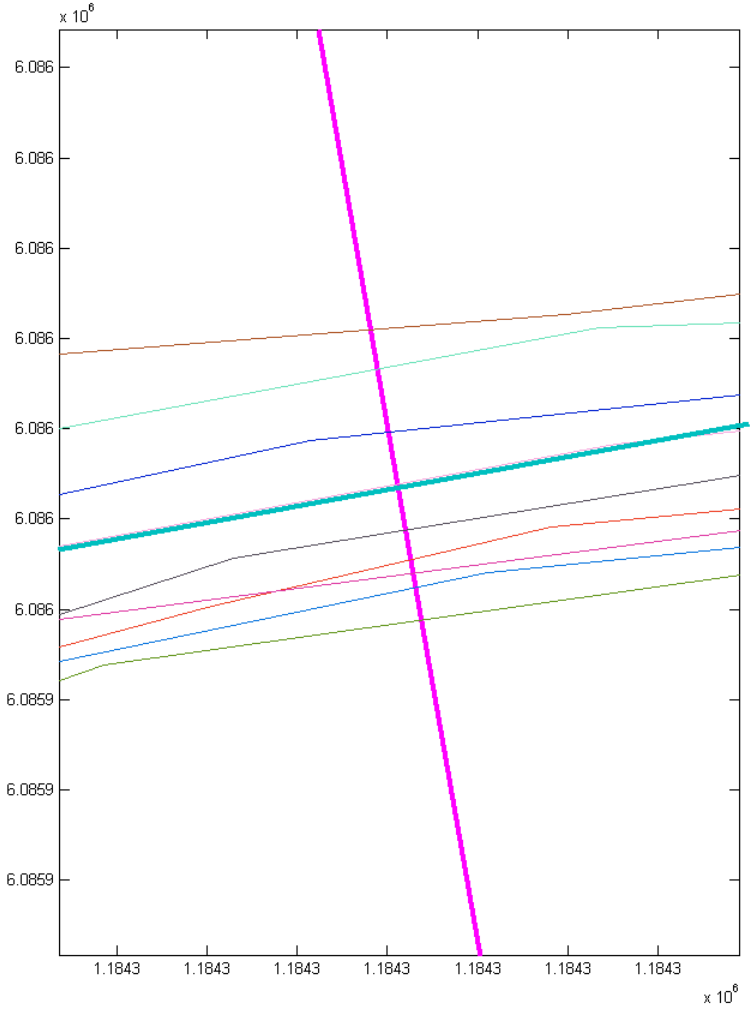
Transects are sketched perpendicular to the baseline

Principle of MobiTC



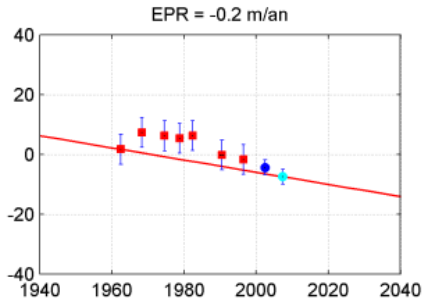
Transects are sketched perpendicular to the baseline

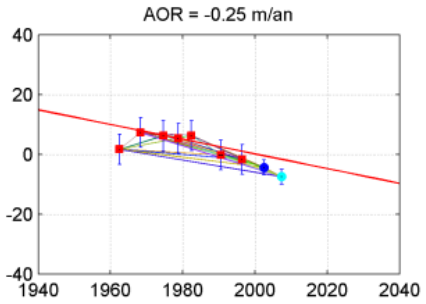
Princip

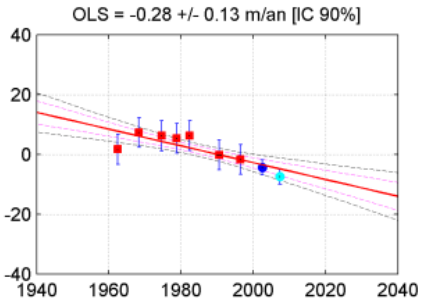


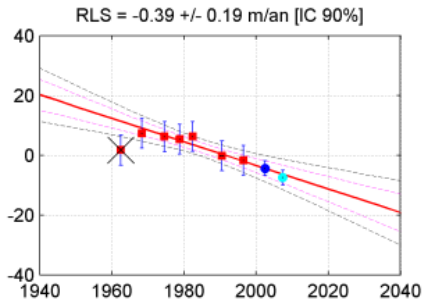
Axe nb	Transect nb	X middle	Y middle	U	V	Distance	Year 1	Month 1	Day 1	Year 2	Month 1	Day 2	Limit	Error	lev1num2	Owner
1	7	1184379.22	6085962.6	0.06	-1	1.66	1962	6	20	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	7.29	1968	4	23	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	6.18	1974	8	7	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	5.37	1978	10	10	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	6.28	1982	5	21	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	-0.21	1990	-9	-9	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	-1.71	1996	6	10	-9	-9	-9	2	10	2	1
1	7	1184379.22	6085962.6	0.06	-1	-4.39	2002	6	12	-9	-9	-9	4	5	1	2
1	7	1184379.22	6085962.6	0.06	-1	-7.48	2007	5	11	-9	-9	-9	6	5	1	2

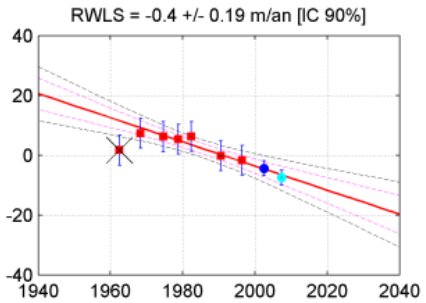
Graphics transect by transect

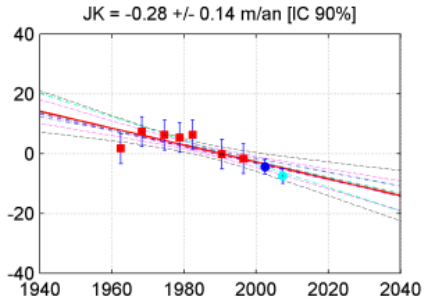


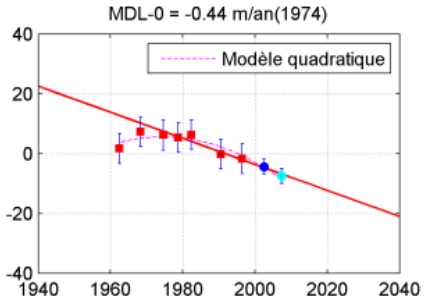


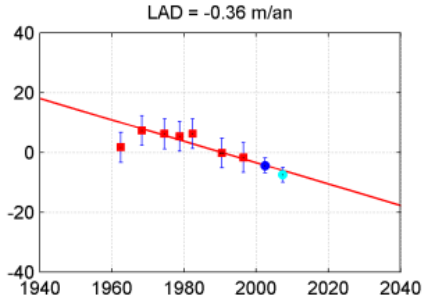


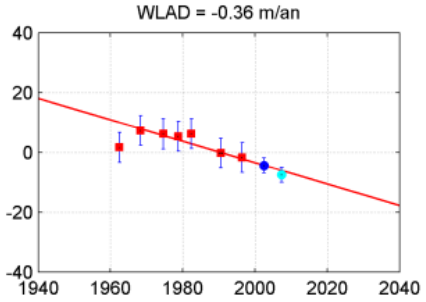


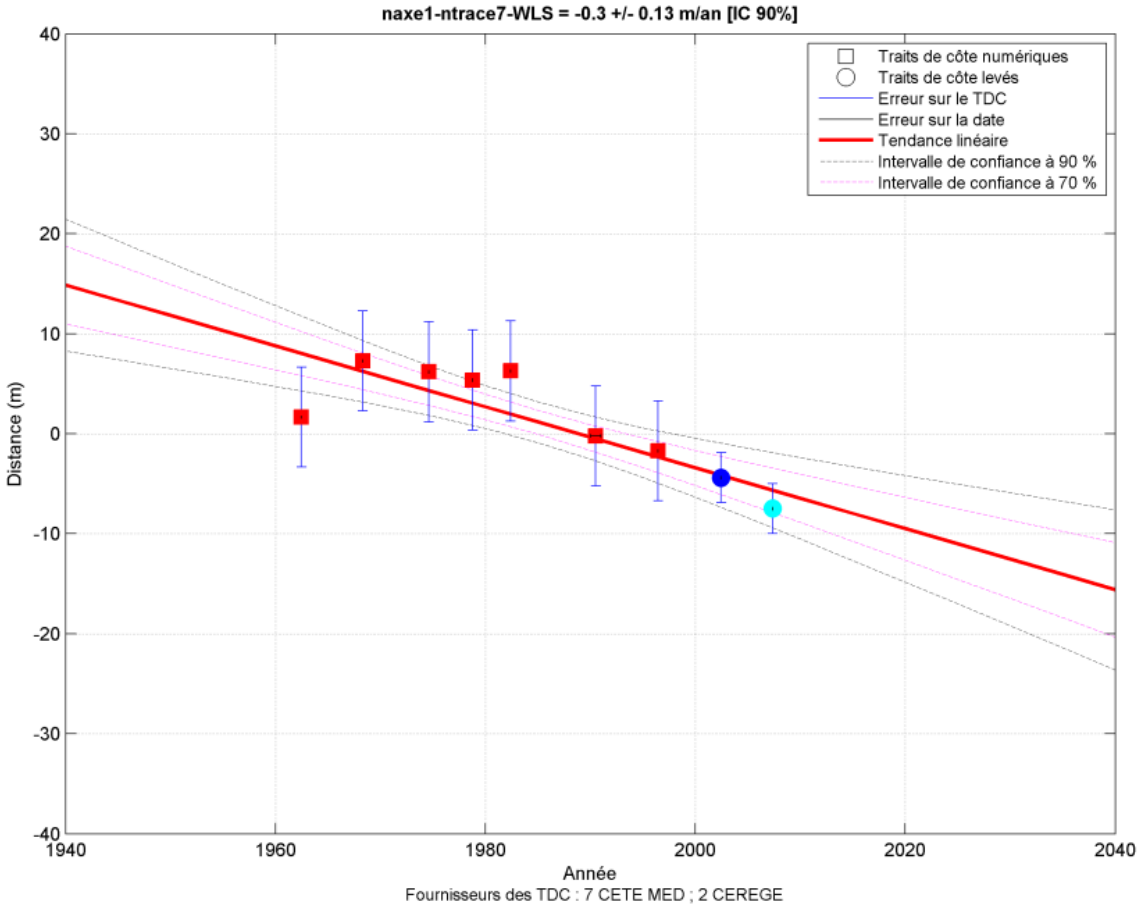




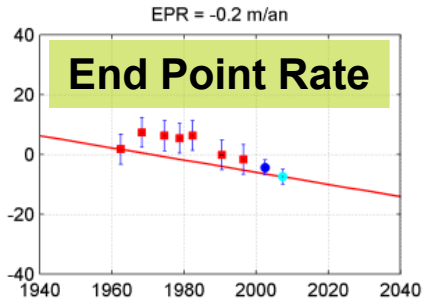




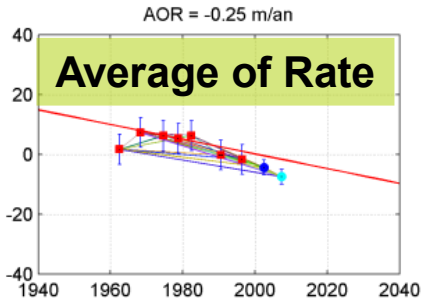




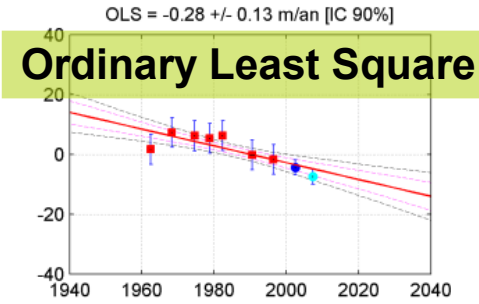
Graphics transect by transect



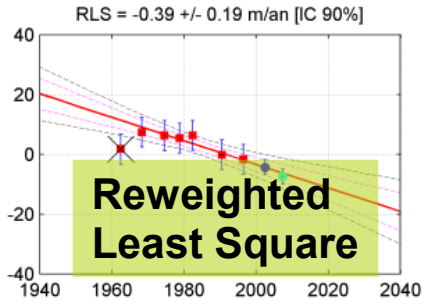
End Point Rate



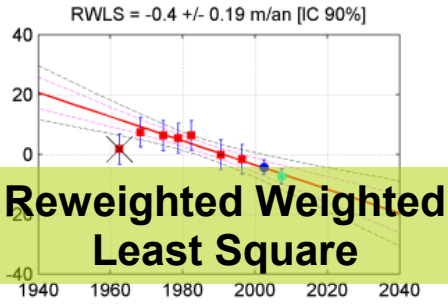
Average of Rate



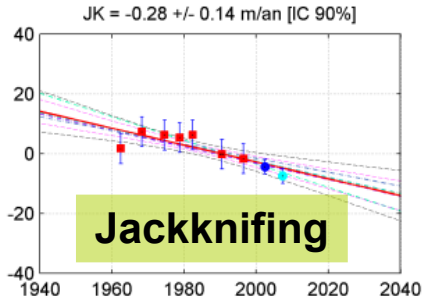
Ordinary Least Square



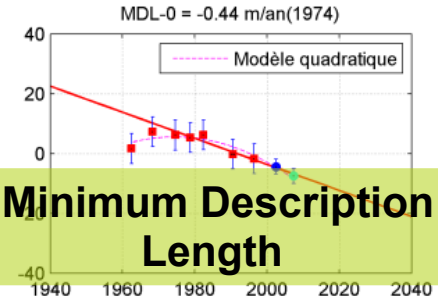
Reweighted Least Square



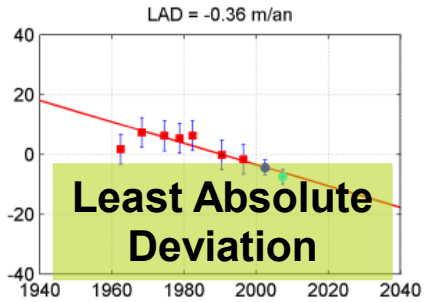
Reweighted Weighted Least Square



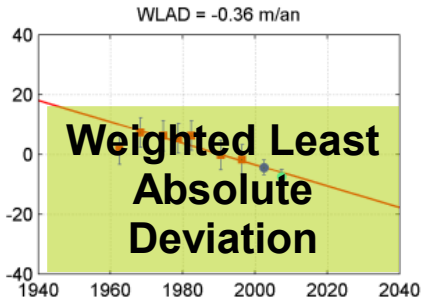
Jackknifing



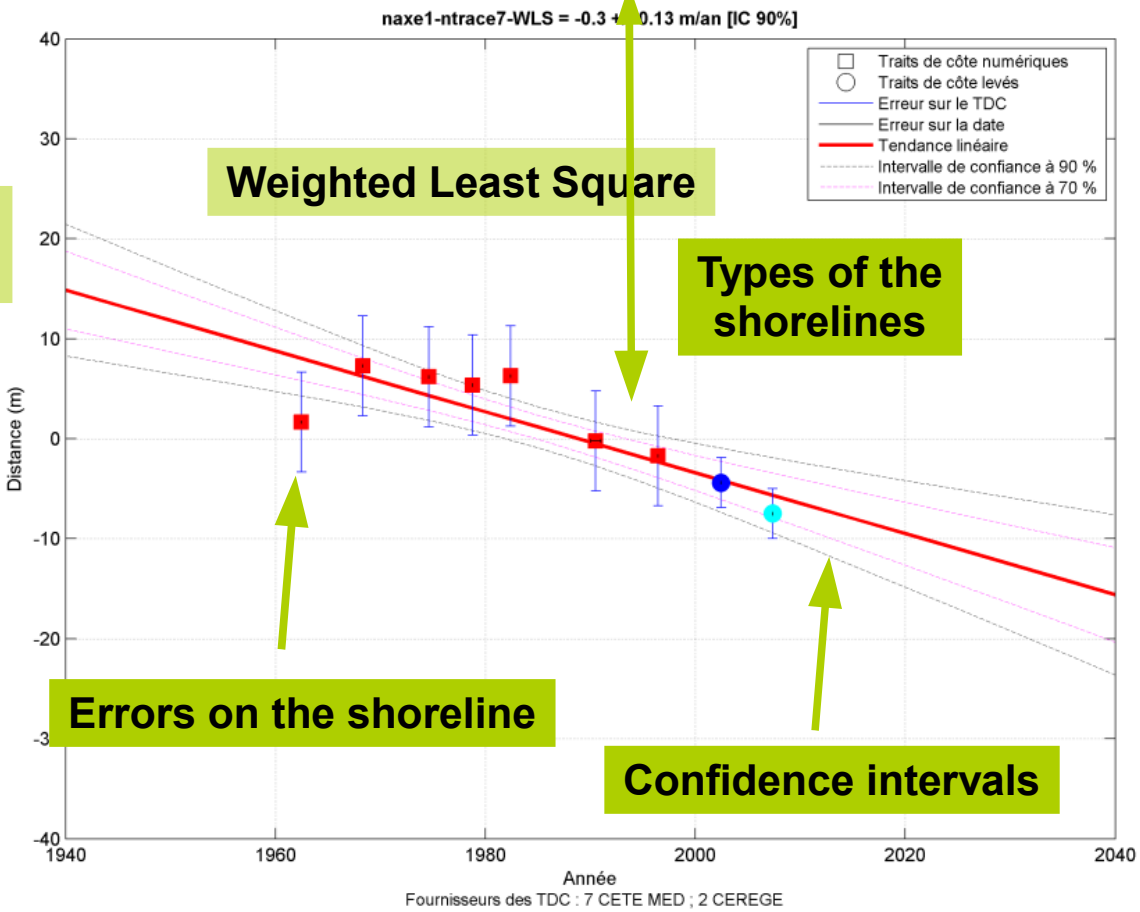
Minimum Description Length



Least Absolute Deviation



Weighted Least Absolute Deviation



Weighted Least Square

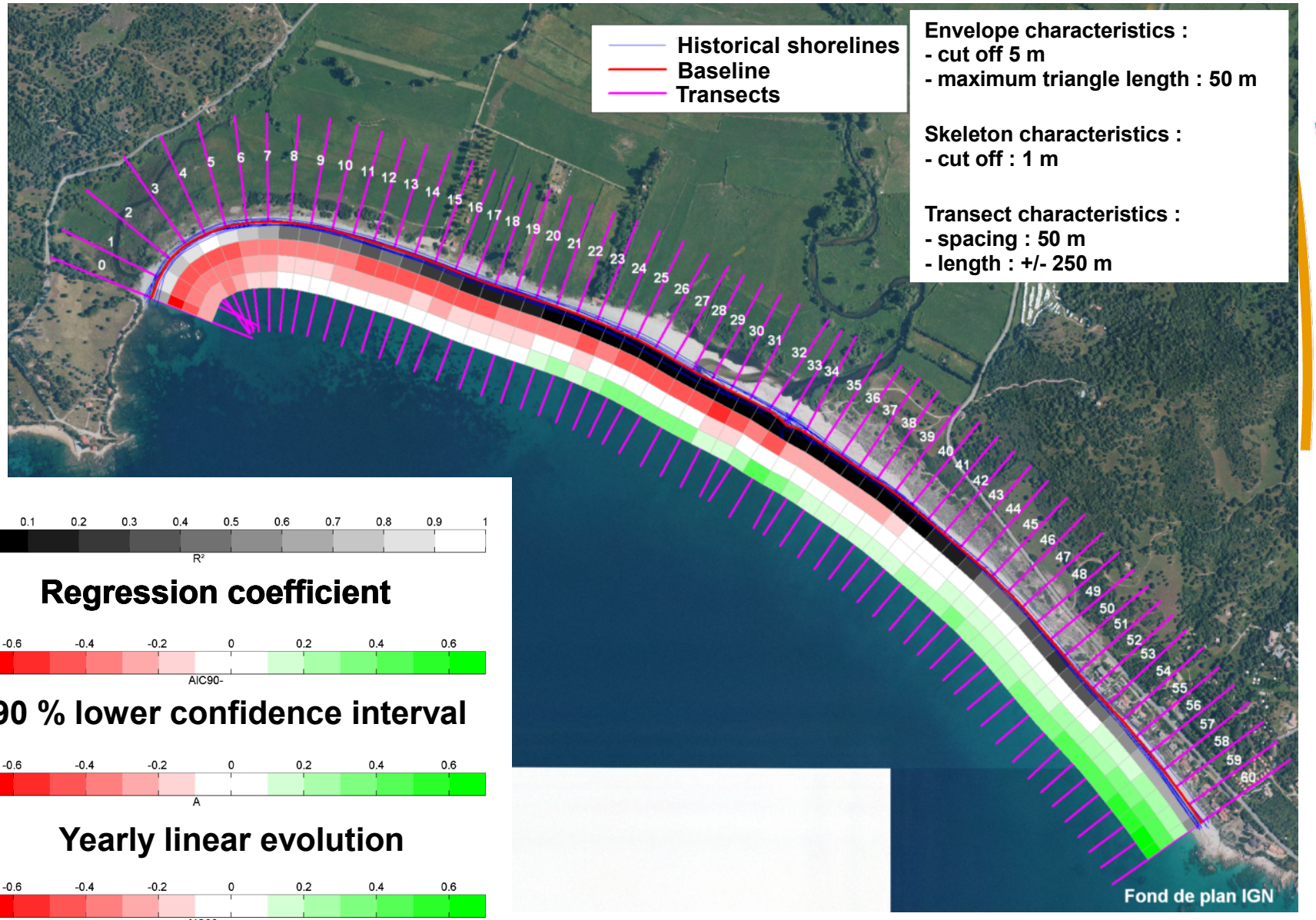
Types of the shorelines

Errors on the shoreline

Confidence intervals

Réalisé avec MobiTC : http://www.wikhydro.org/index.php/MobiTC

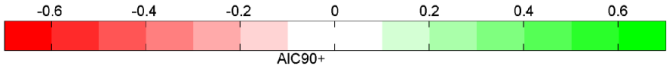
Pocket beach



Regression coefficient

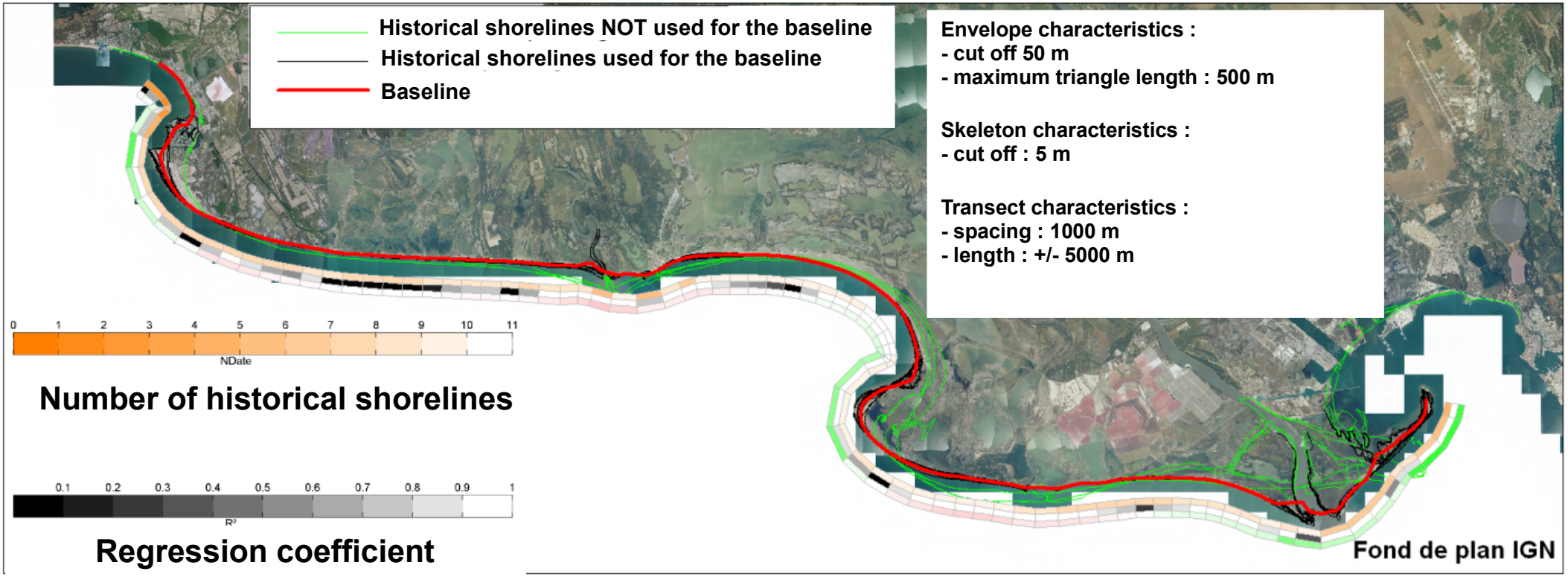
90 % lower confidence interval

Yearly linear evolution

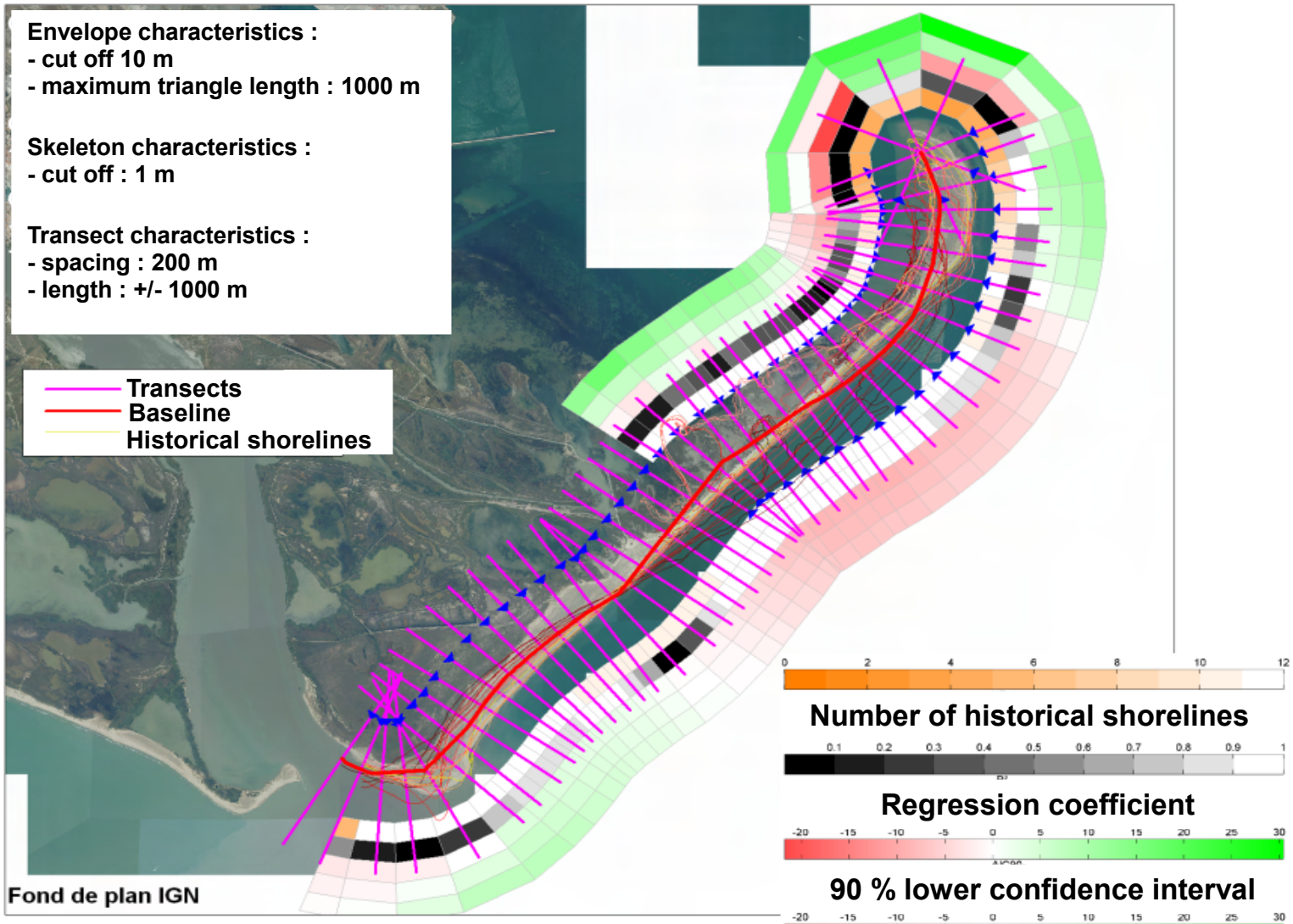


90 % upper confidence interval

Long sandy beach



Sand spit


Envelope characteristics :
- cut off 10 m
- maximum triangle length : 1000 m
Skeleton characteristics :
- cut off : 1 m
Transect characteristics :
- spacing : 200 m
- length : +/- 1000 m
Transects
Baseline
Historical shorelines
Fond de plan IGN
0 2 4 6 8 10 12
Number of historical shorelines
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Regression coefficient
-20 -15 -10 -5 0 5 10 15 20 25 30
90 % lower confidence interval
-20 -15 -10 -5 0 5 10 15 20 25 30
Yearly linear evolution
-20 -15 -10 -5 0 5 10 15 20 25 30
90 % upper confidence interval

Future shorelines

Next developments

- Validation of the statistical modules
- Smoothing of transects to avoid intersection (Gauss filter)
- Work on secondary closed transects and synthetize the calculation on principal transects
- Take in account of coastal structures
- Junction with other data base like the geological one

Prospects et conclusion

- Implement at the National Scale in the National Strategy of Shoreline Management to find the Erosion Risk Area
- Implement at local scale for the Coastal Risk Prevention Plan
- Version 1 (without all statistics) available (free)
- Manual and presentation at : http://www.wikhydro.org/index.php/MobiTC
- Version 2 available soon
- Acknowledgements : CETMEF, DGPR, DGALN