



Tuesday 23 August, University of Uppsala
16:30 – 16:50



Transformations of maritime and island landscapes in the western France over the last 8,000 years : a long story of the links between Human and Environment

Pierre STEPHAN, Yvan PAILLER

and Serge SUANEZ, Aurélie PENAUD, Clément LAMBERT, Muriel VIDAL, Yves-Marie PAULET, Stéphane BLANCHET, Clément NICOLAS, Gwendoline GREGOIRE, Axel EHRHOLD, Gwen JOUET, Pascal LE ROY, Thierry GARLAN, Henri GANDOIS



Background & Topics

Compilation of several works

PhD students and researchers

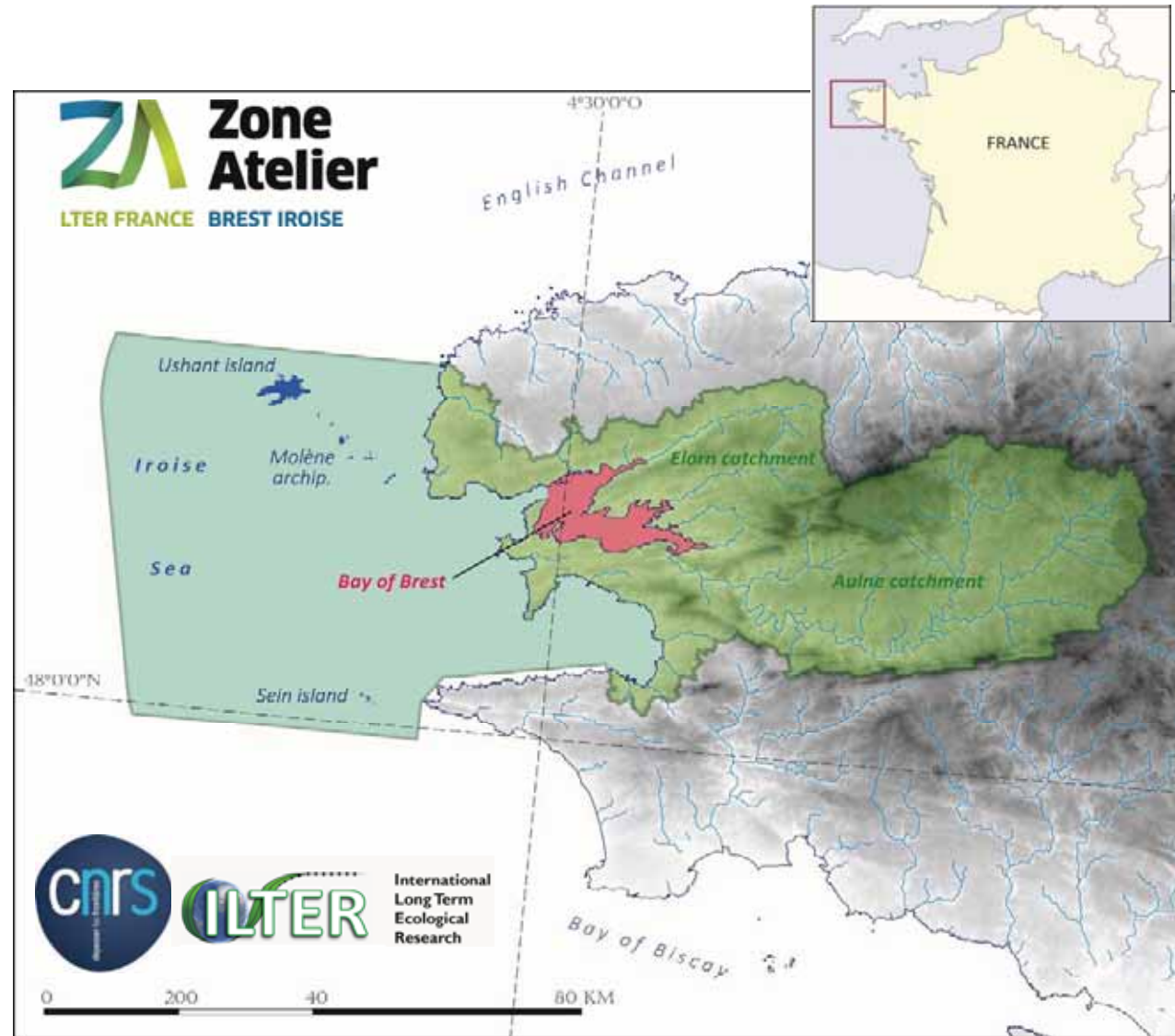
Interdisciplinary research team (10 lab.) :

- Archaeology
- History
- Geography
- Geology
- Biology
- Chemistry

Interdisciplinary research device : Zones Ateliers

The central question :

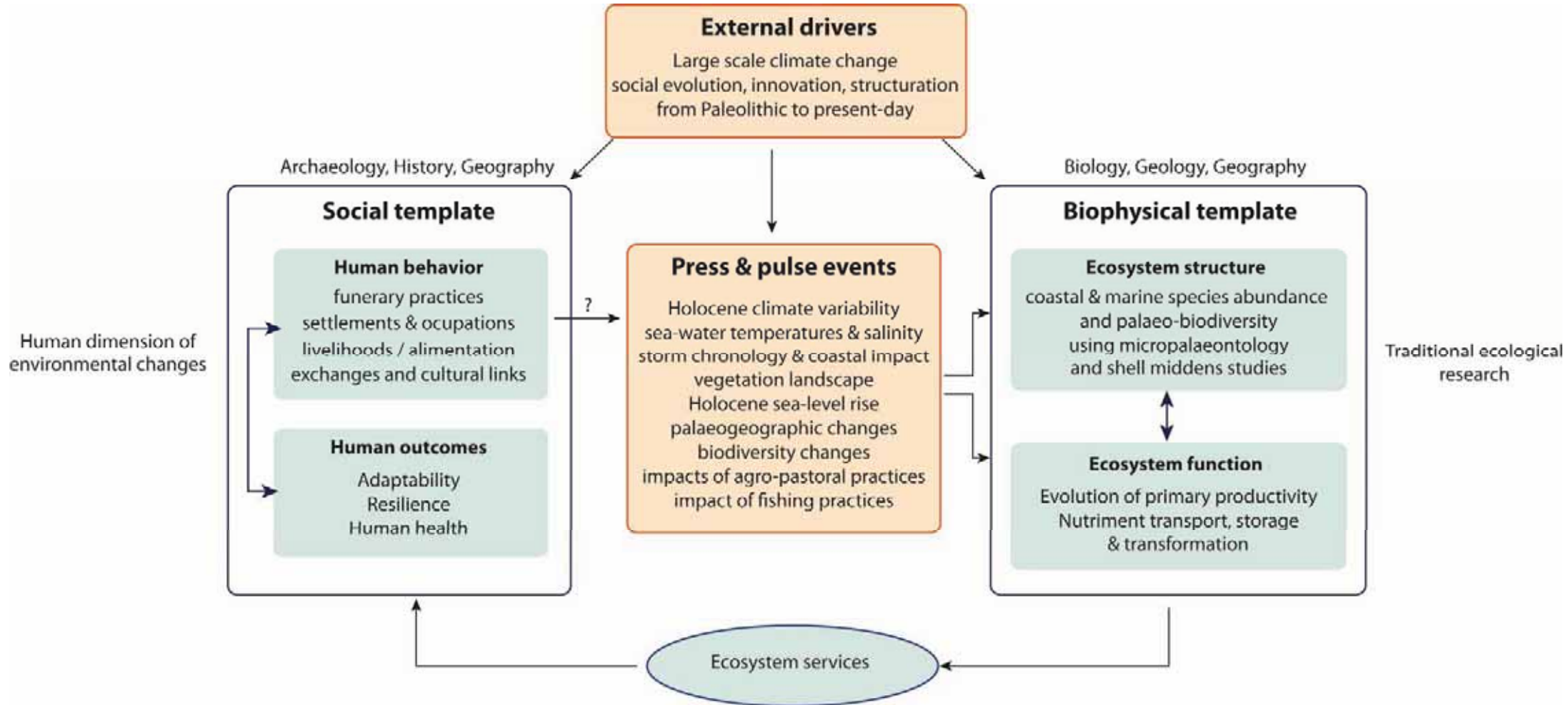
What are the socio-ecological processes that play out at Holocene time scale ?



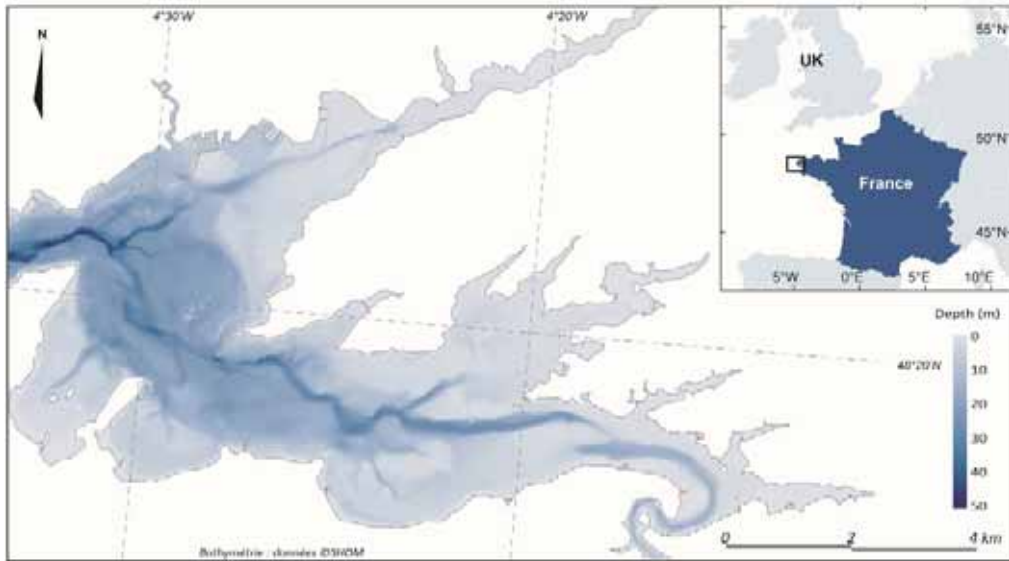
Background & Topics

Numerous questions summarized in this conceptual framework

(adapted from Collins et al., 2010 for the Holocene period)



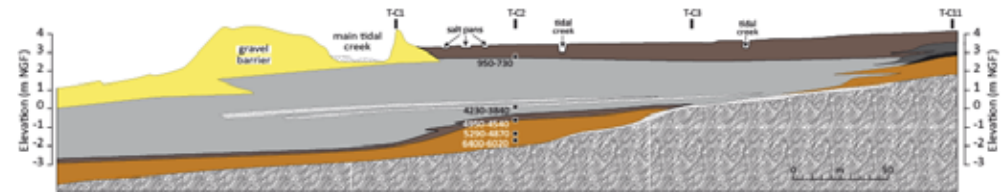
The Bay of Brest : presentation



The Bay of Brest : reconstruction of the Relative Sea-Level rise

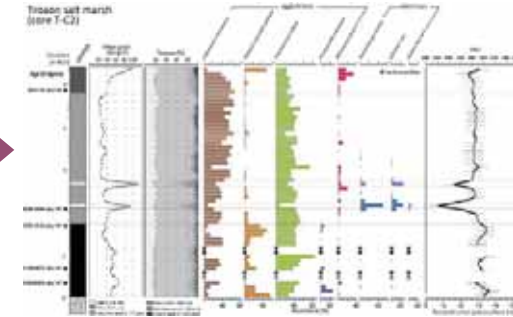
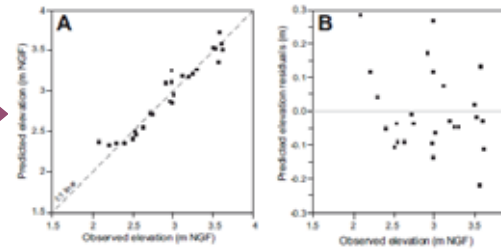
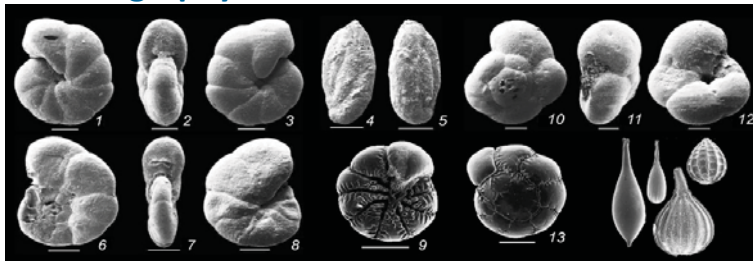
Back-barrier lithostratigraphy

Four sediment sequences studied : hand-augerings, vibracores, sedimentology, AMS ¹⁴C datings

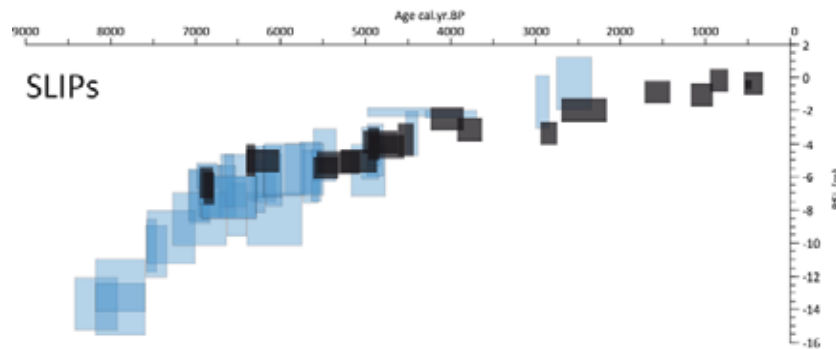


Back-barrier biostratigraphy

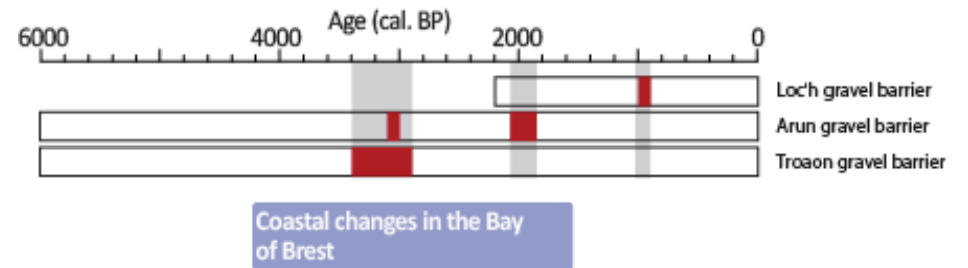
Salt-marsh foraminiferal assemblages, transfer functions development



History of the Relative Sea-Level rise

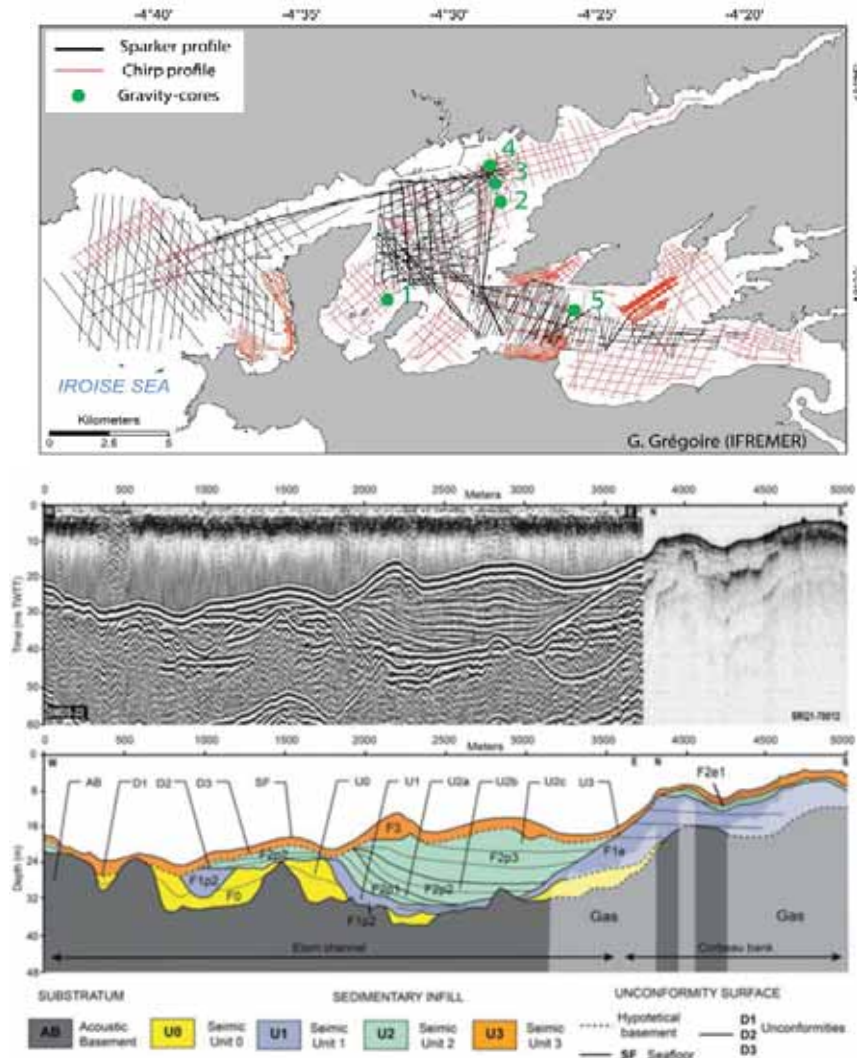


Periods of enhanced-storminess

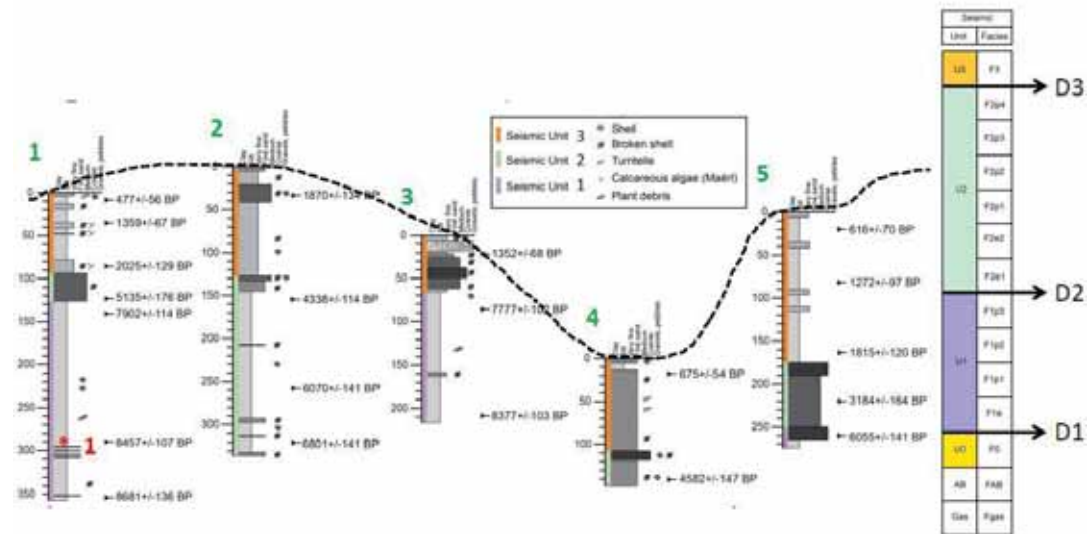


The Bay of Brest : Palaeogeographic changes (G. Grégoire PhD work)

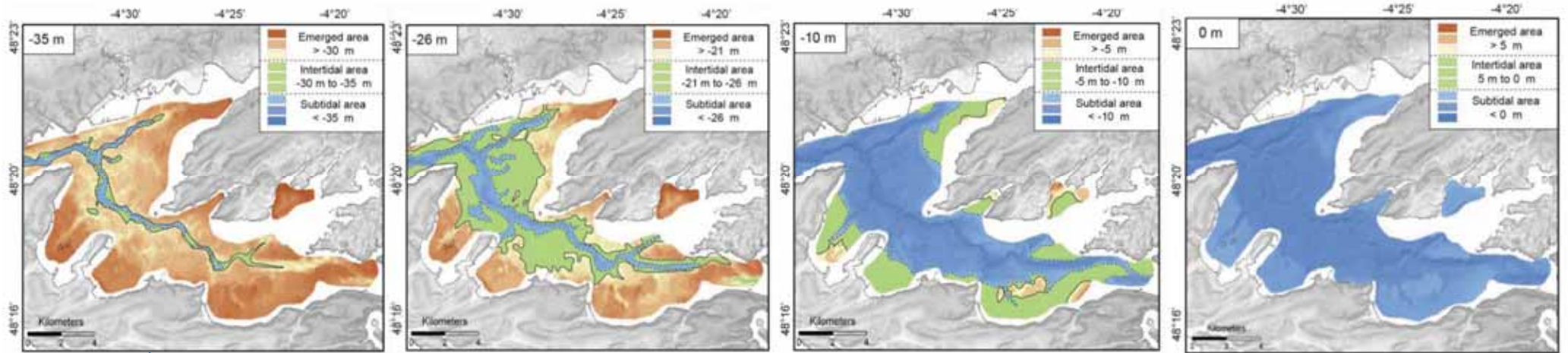
Geometry of sediment bodies from 1200 km of seismic profiles



Nature and chronology of sediment infilling from 70 marine cores analysed



The Bay of Brest : Palaeogeographic changes (G. Grégoire PhD work)



Fluvial

Before 8500 cal BP

Estuarine

8500-6500 cal BP

Intertidal

6800-3000 cal BP

**Sedim.
hiatus**

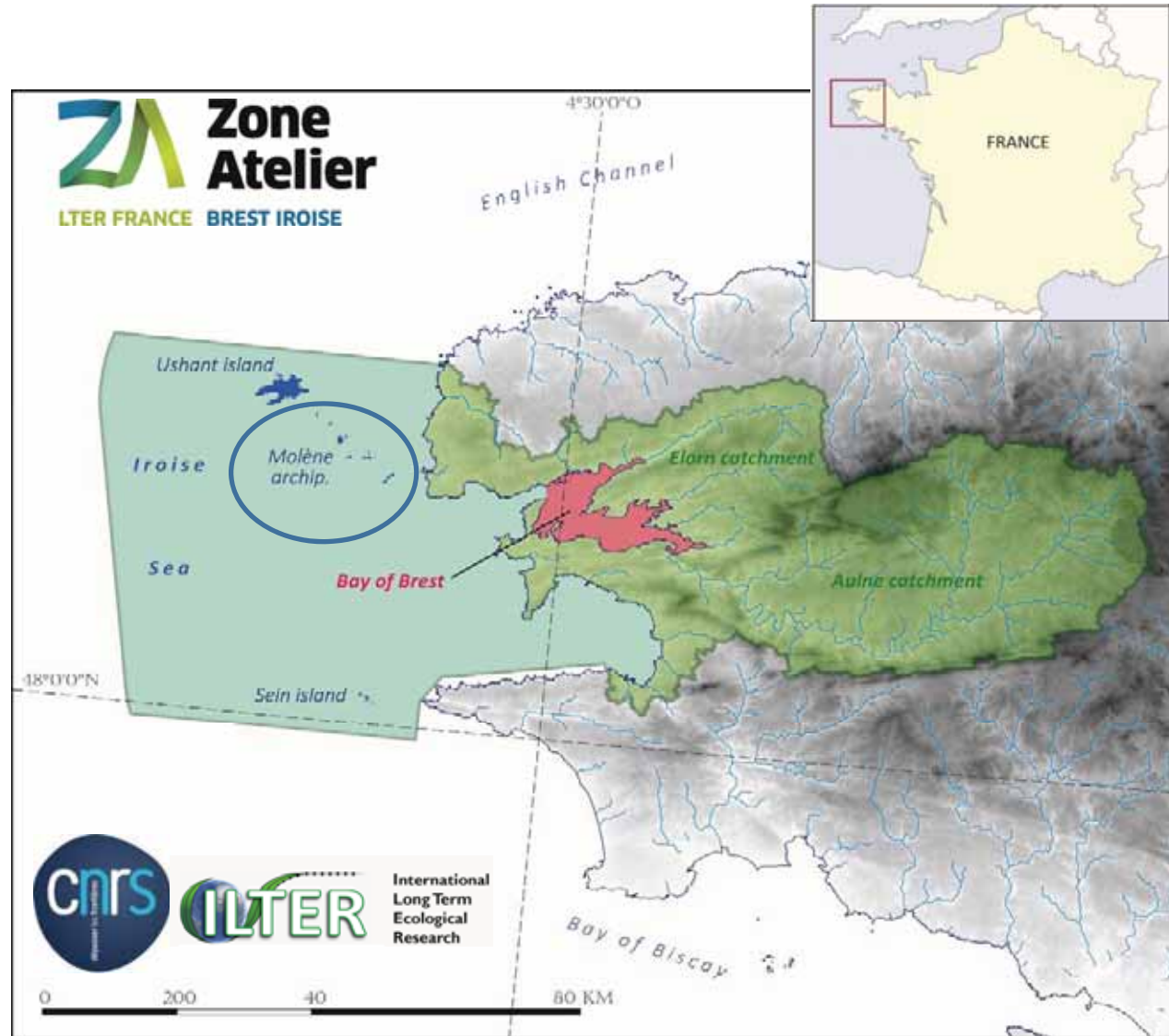
Subtidal

From 2000 cal BP

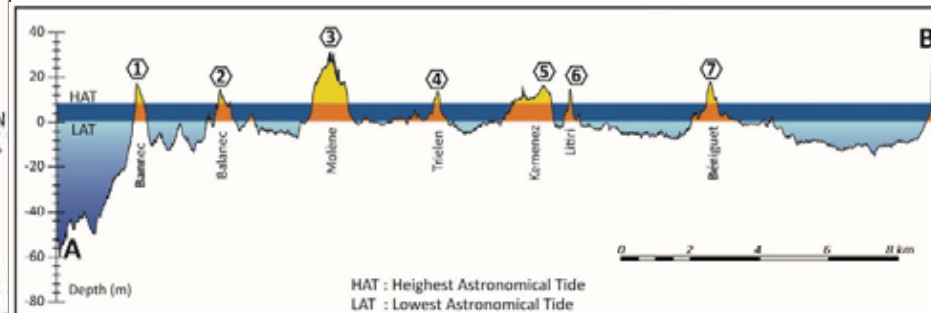
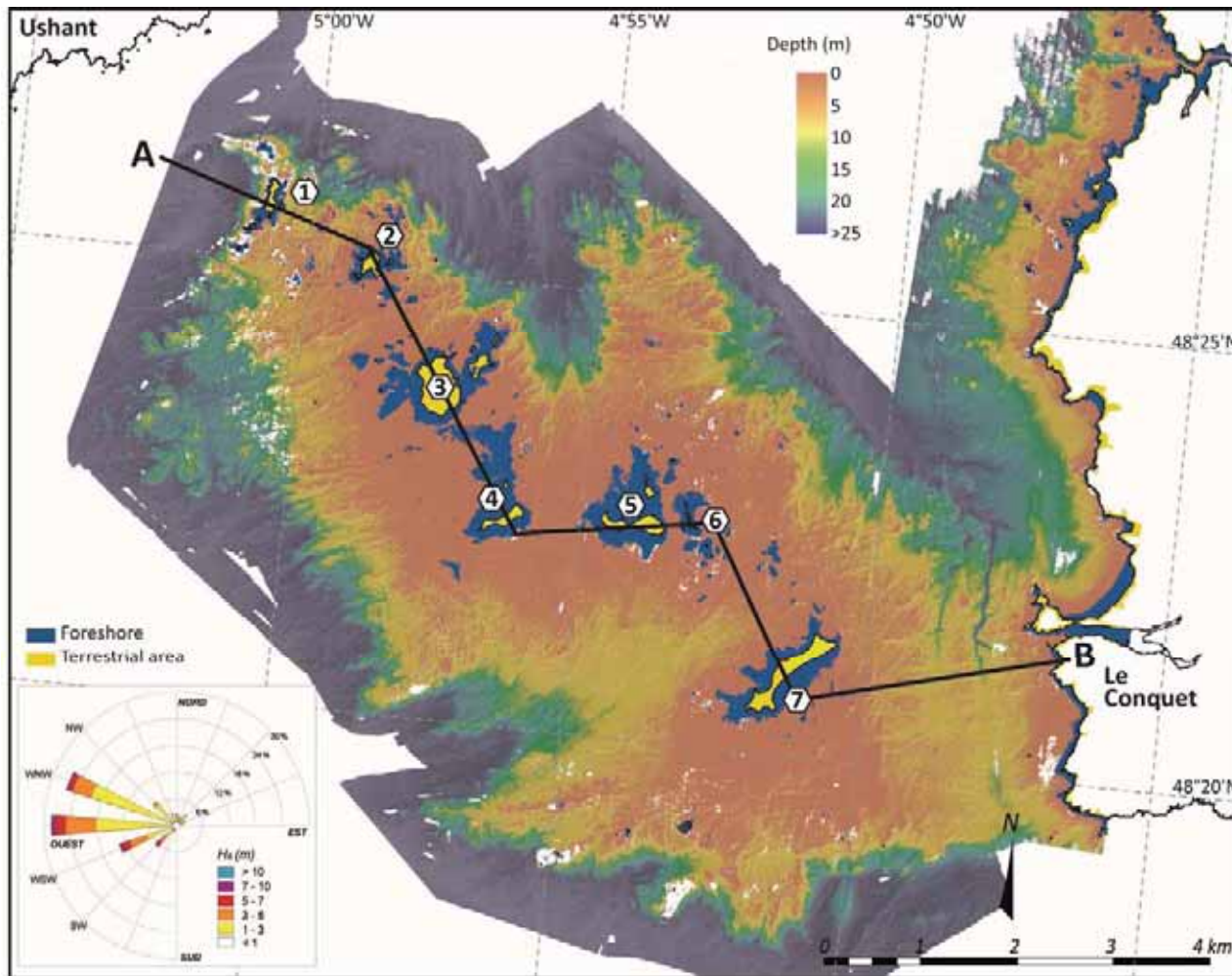


Major flooding of the coastal plain occurred between the Late Mesolithic and the Bronze Age
A possible explanation of the absence of coastal remains in the bay of Brest

The Iroise Sea and the Molène archipelago : presentation

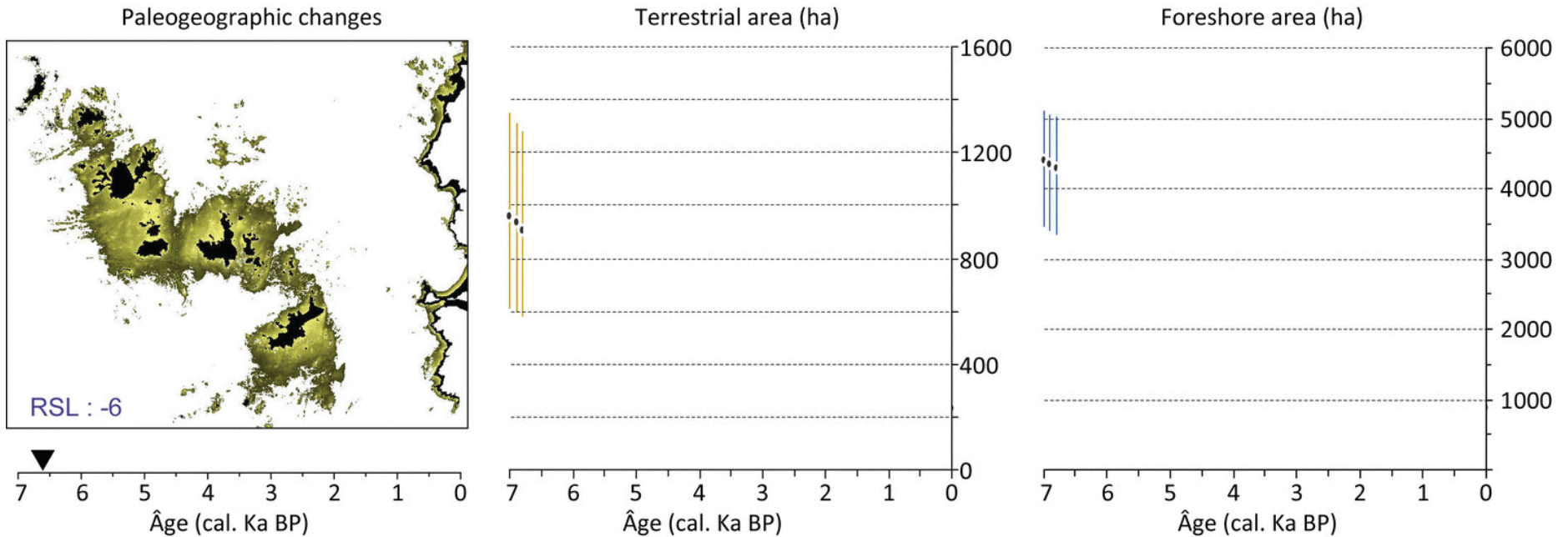


The Iroise Sea and the Molène archipelago : presentation

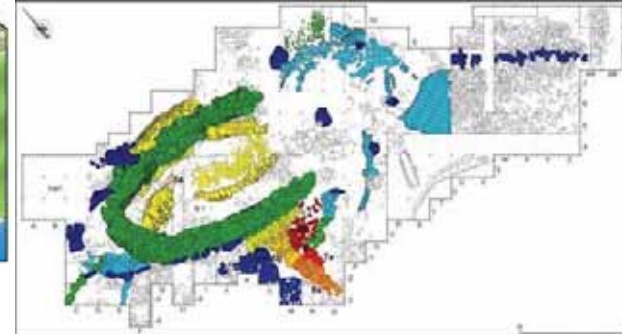
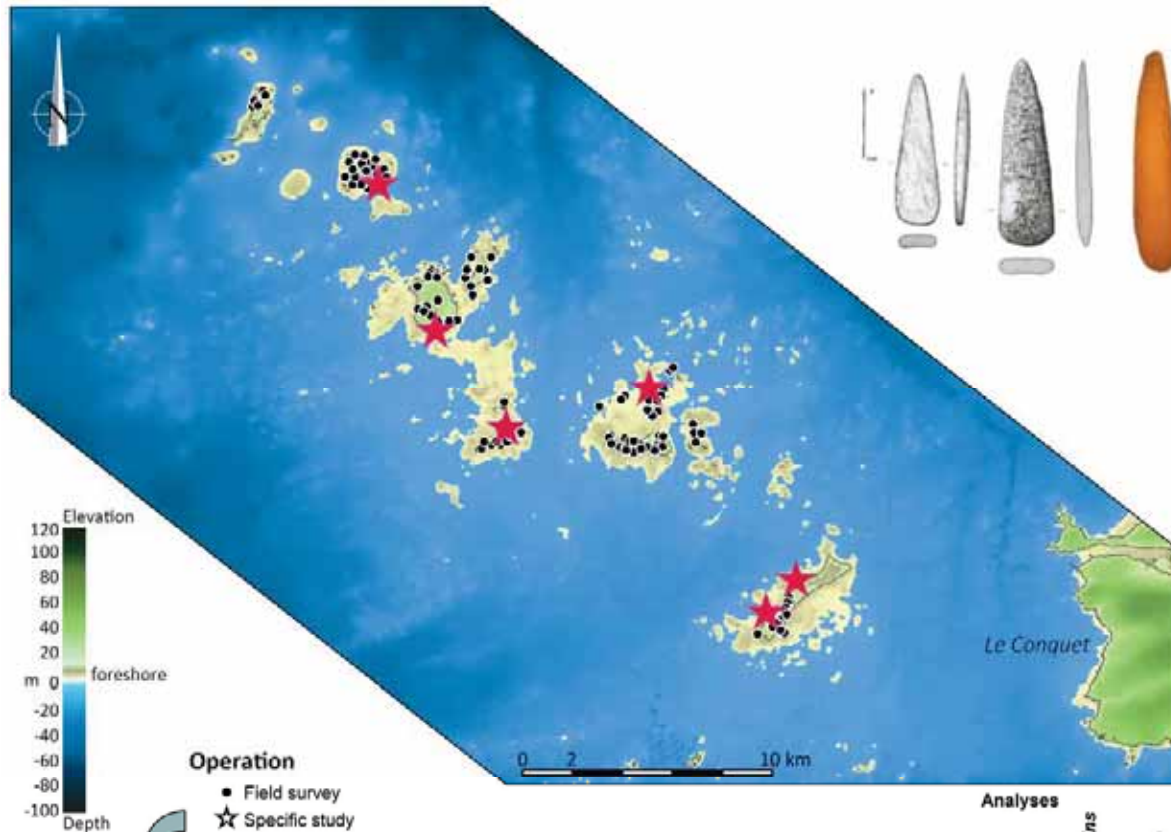


The palaeogeographic changes of the Molène archipelago

Great paleogeographic changes, reduction of terrestrial and foreshore area, fragmentation of insular territories

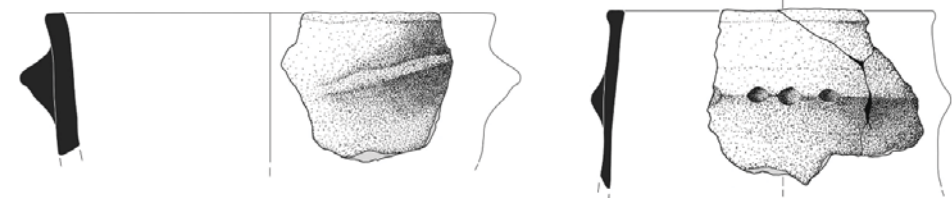


Archaeological background on the Molène archipelago



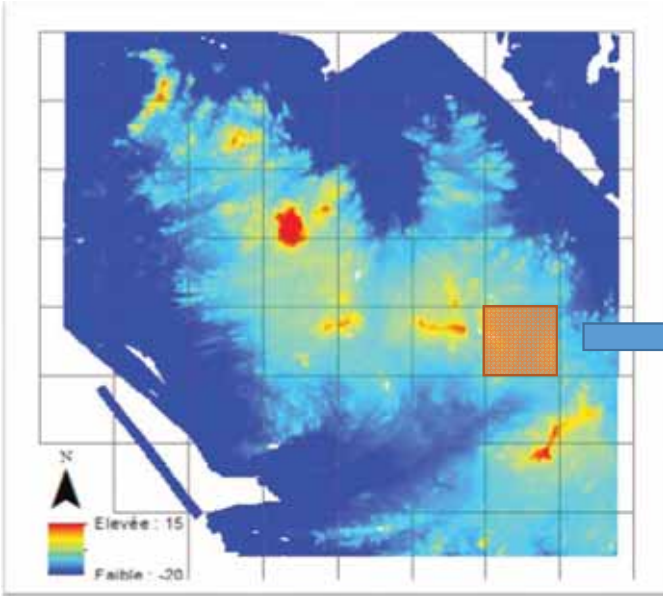
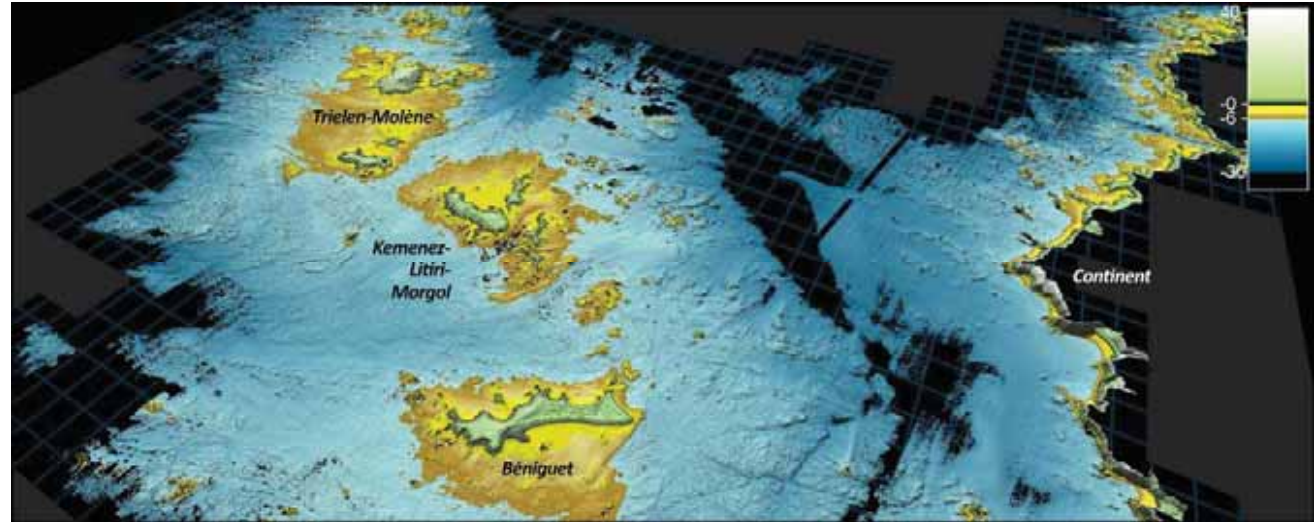
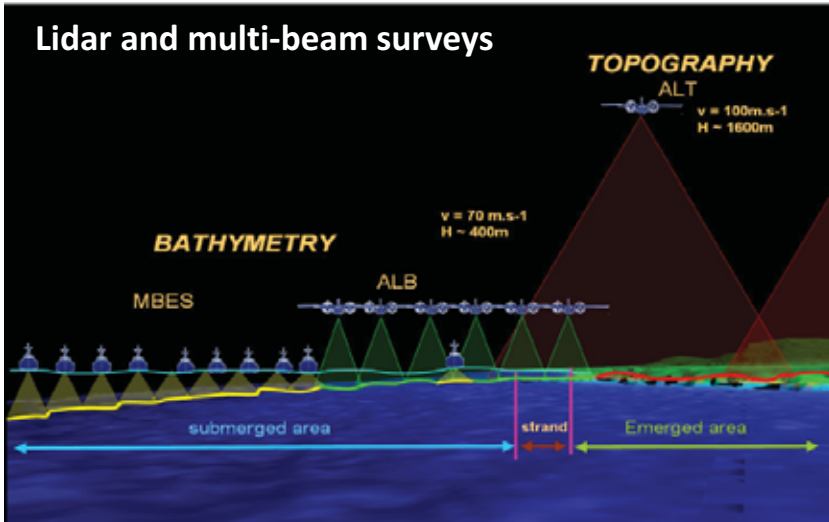
Synthesis of analyses conducted on the main archaeological sites investigated

Archaeological site	Island	Type	Period	Operation	Analyses								
					Radiocarbon data	lithic material	ceramic material	metallic material	carpology (seeds)	anthracology	macro-faunal remains	ichthyology (fish)	malacology (shells)
Balanec south	Balanec	Midden pocket	Late Bronze Age	Sampling	x	x					x	x	x
Trielen north	Trielen	Midden pits	Late Iron Age	Archaeological survey		x	x				x	x	x
Beniguet-3	Beniguet	Shell midden	Recent Neolithic	Archaeological survey	x	x	x		x		x	x	x
Beniguet-104	Beniguet	Midden pit	Recent Neolithic	Sampling	x	x	x				x	x	x
Beg ar Loued 1	Molène	Shell midden	Late Neolithic	Rescue excavation	x	x	x		x	x	x	x	x
Beg ar Loued 2	Molène	Midden pits	Early Bronze Age	Excavation	x	x	x	x	x	x	x	x	x
LVK	Quéménès	Midden pits	Recent Neolithic	Excavation	x	x	x			x	x	x	x

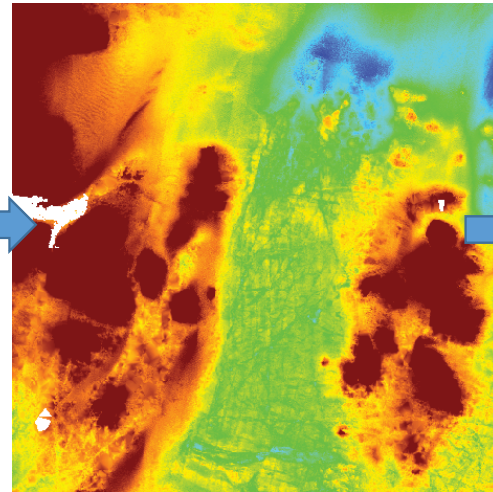


Fishweirs discoveries

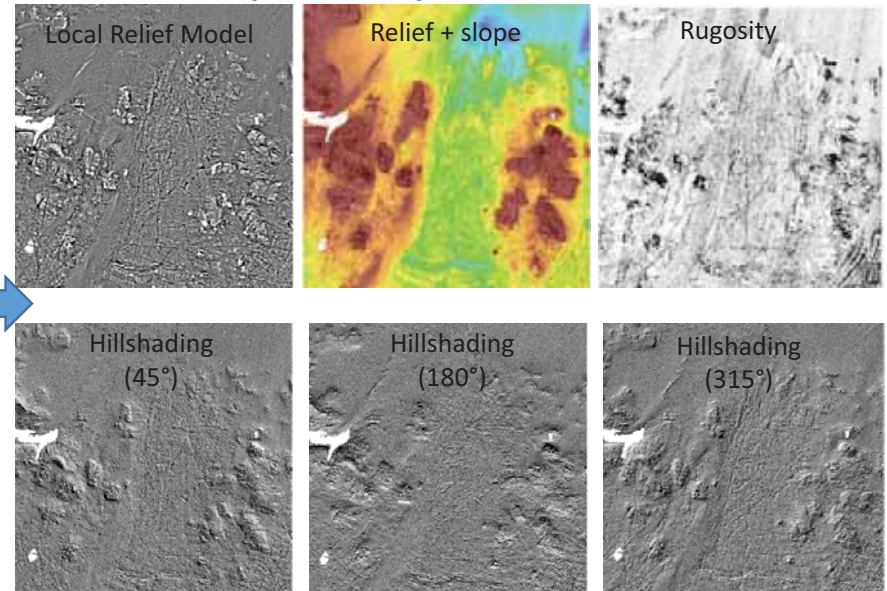
Lidar and multi-beam surveys



Digital Elevation Model
(0.7 x 0.7 m)

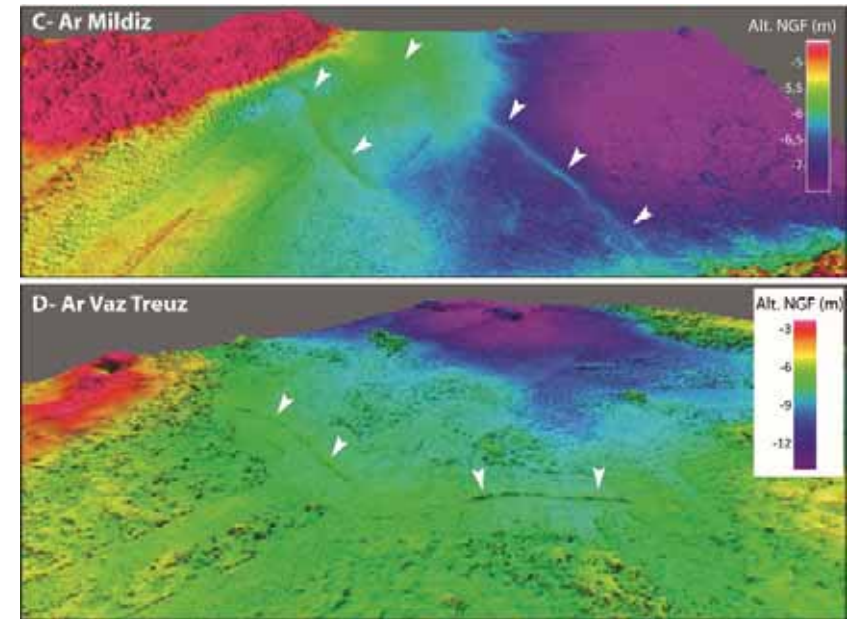
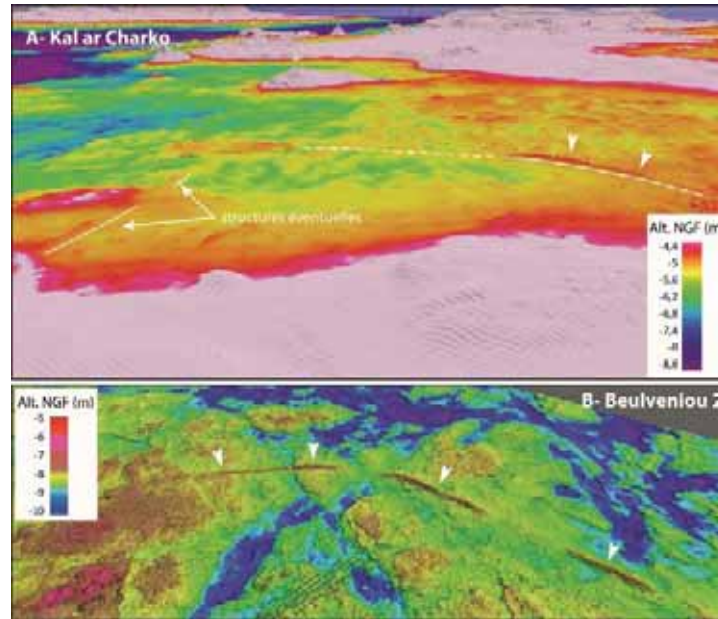


Geospatial analysis and treatments



Fishweirs discoveries

3D views of the underwater stone walls

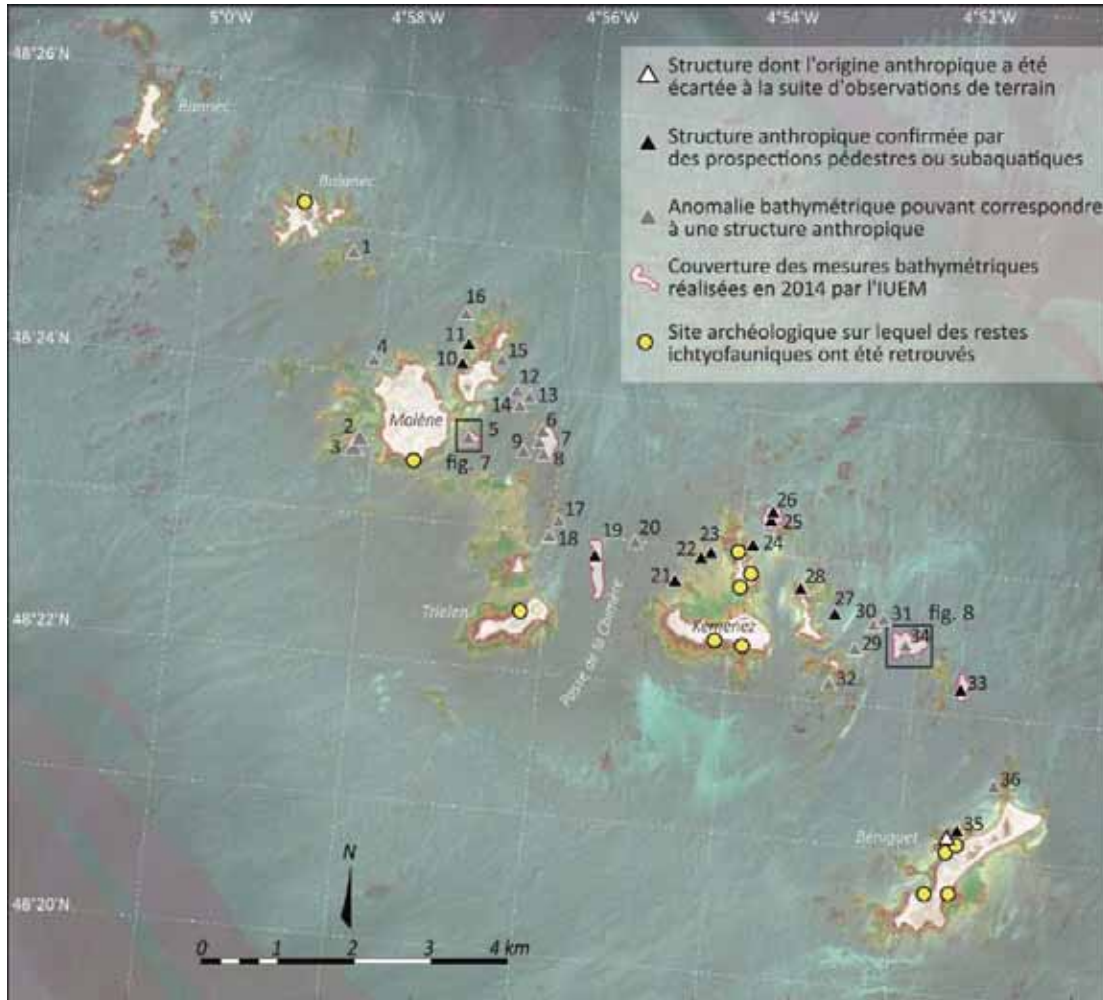


Direct observations from dives

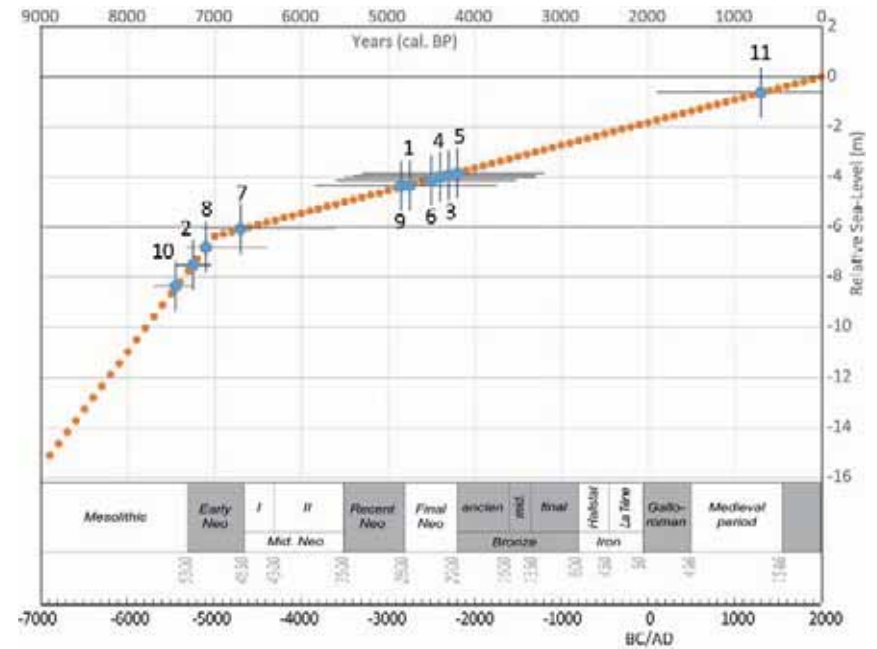
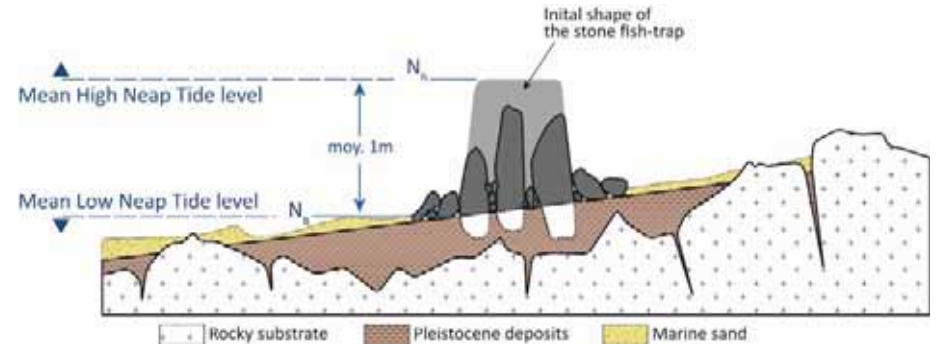


Fishweirs discoveries

Location of suspected underwater structures



Principles used to date the stone fish-traps



Archaeological results and questions

Limited human impact on the insular environment

Fishing practices appear from the very beginning of the Neolithic using megalithic structures

The livelihood of populations insured with a strong association between agro-pastoral and fishing practices

Management of the forest despite the reduction of the terrestrial areas

Human settlements

High frequentation of the islands during the Neolithic and Bronze Age periods

Cultural links maintained with the mainland

Perennial or seasonal settlements ?

Chronology of settlements

Disparition of archaeological remains during the Bronze Age

Rapid or gradual ?

Linked to climatic factors ?

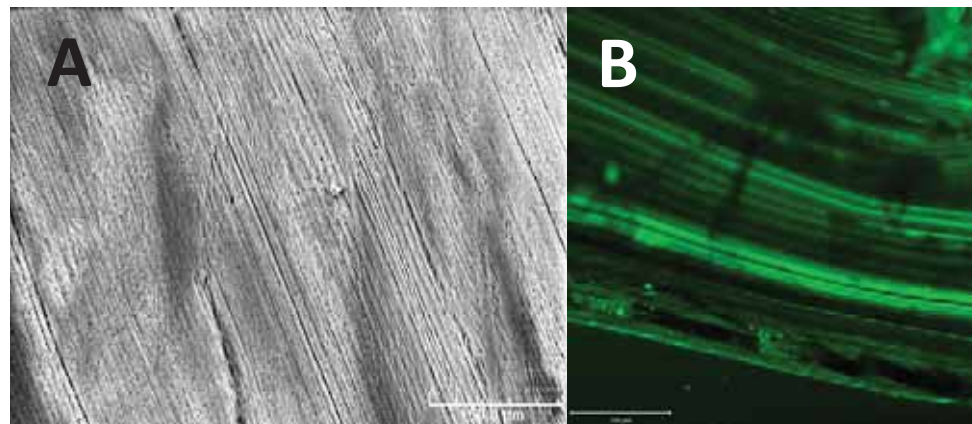
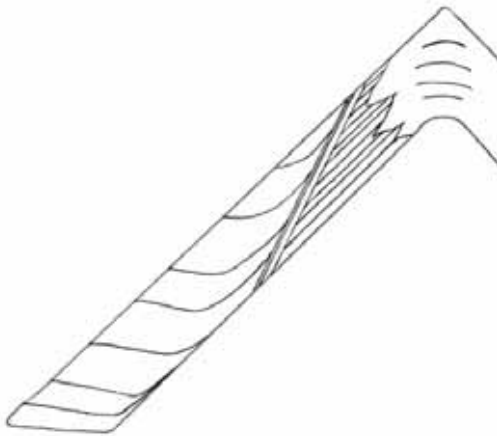


Sclerochronological approach

Limpet shells within shell-middens were used to estimate the timing of human settlements

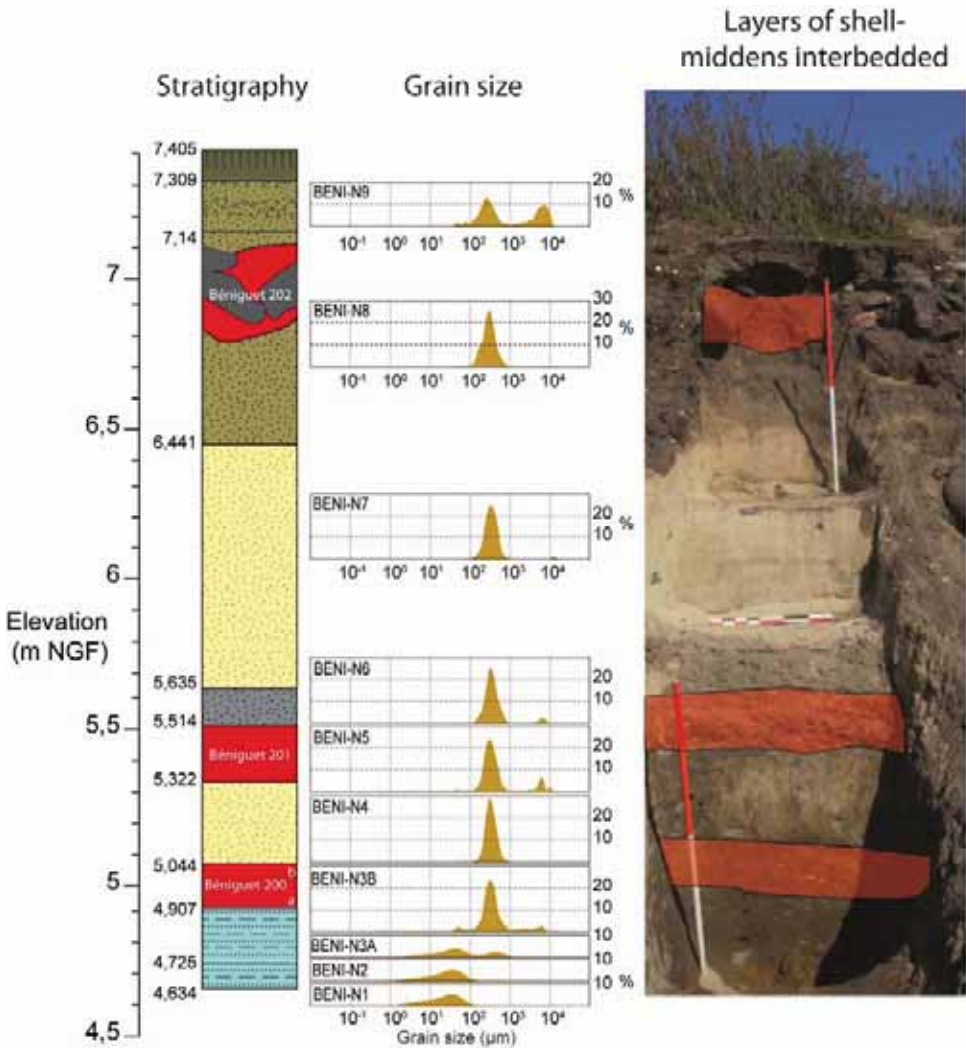


Study of growth rings



Sclerochronological approach

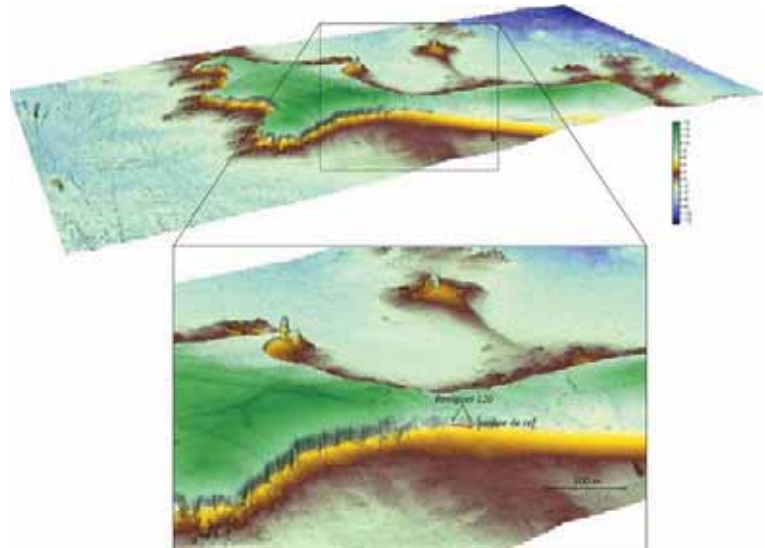
Limpet (*Patella vulgata*) shells within shell-middens were used to estimate the timing of human settlements



Medieval
640-675 AD

Bronze Age
2187-1960 BC

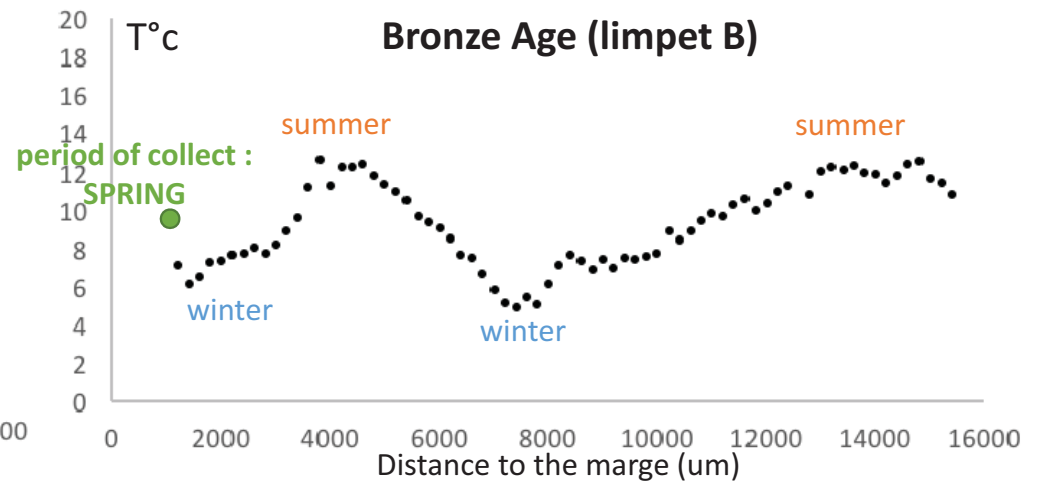
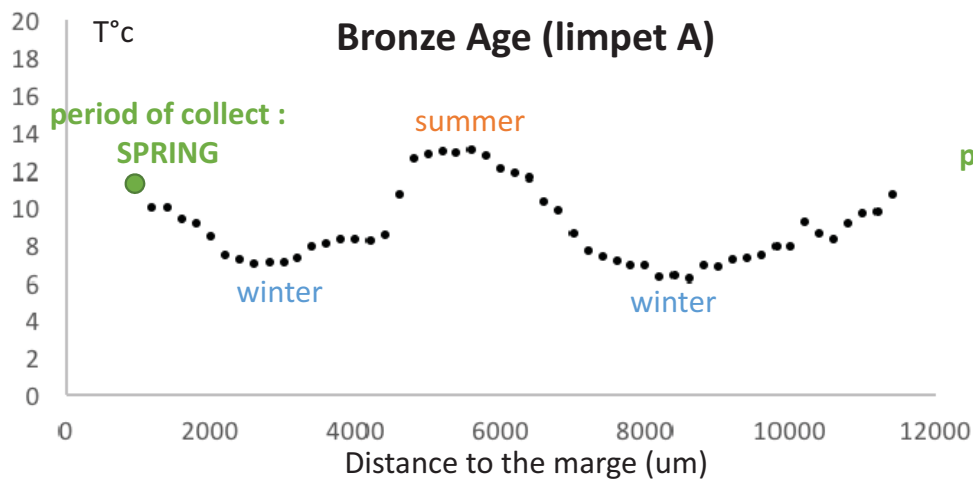
Basal shell midden
Final Neolithic
2455-2200 BC



Sclerochronological approach

First results can be used to estimate the period of shell collecting

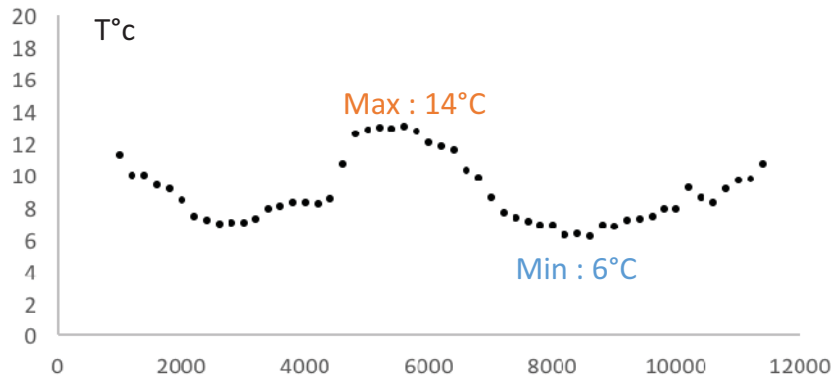
Ex : Temperature reconstructed from the isotopic signature of the two limpets sampled in the Bronze Age shell-midden



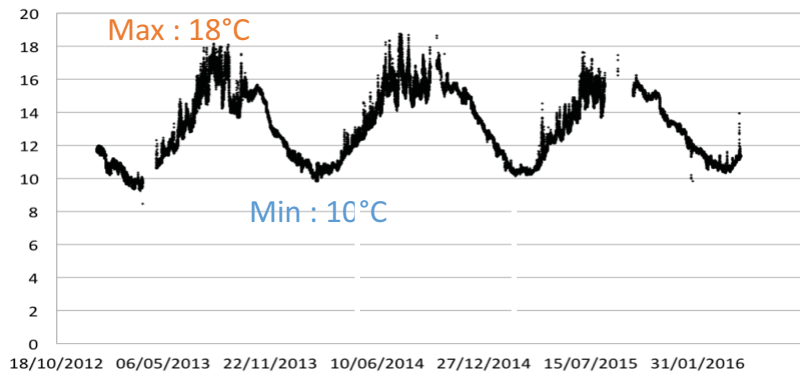
Sclerochronological approach

First results also raises questions about the climate conditions at the Early Bronze Age.

Sea Surface temperature at the early Bronze Age reconstructed from the limpet A



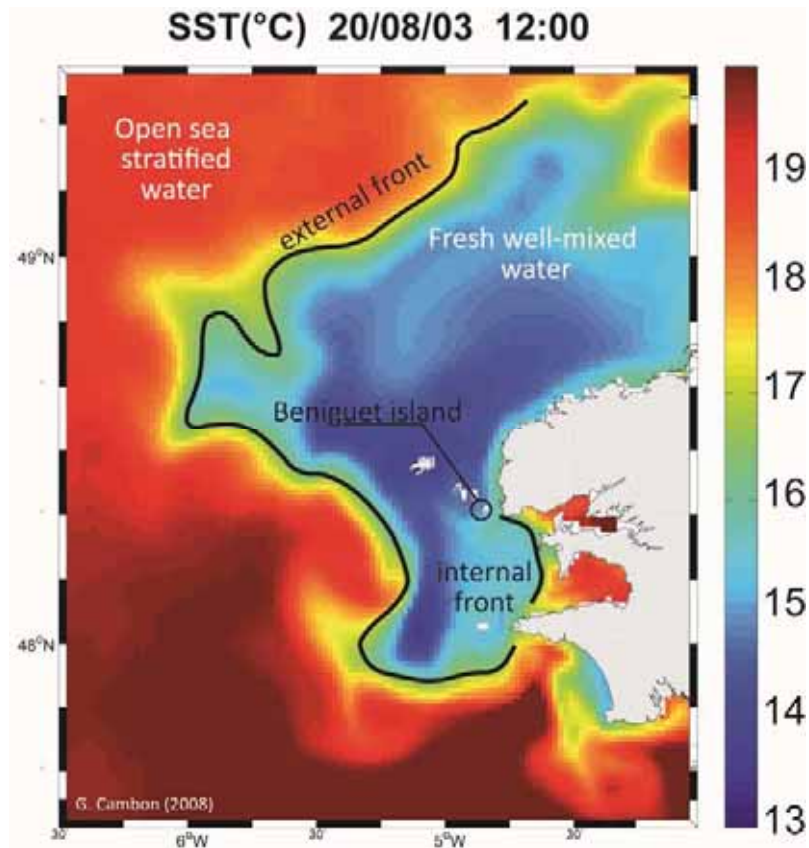
Sea Surface Temperature measured in the Iroise Sea (2013-2016)



SST was 4°C cooler at the Early Bronze Age ?

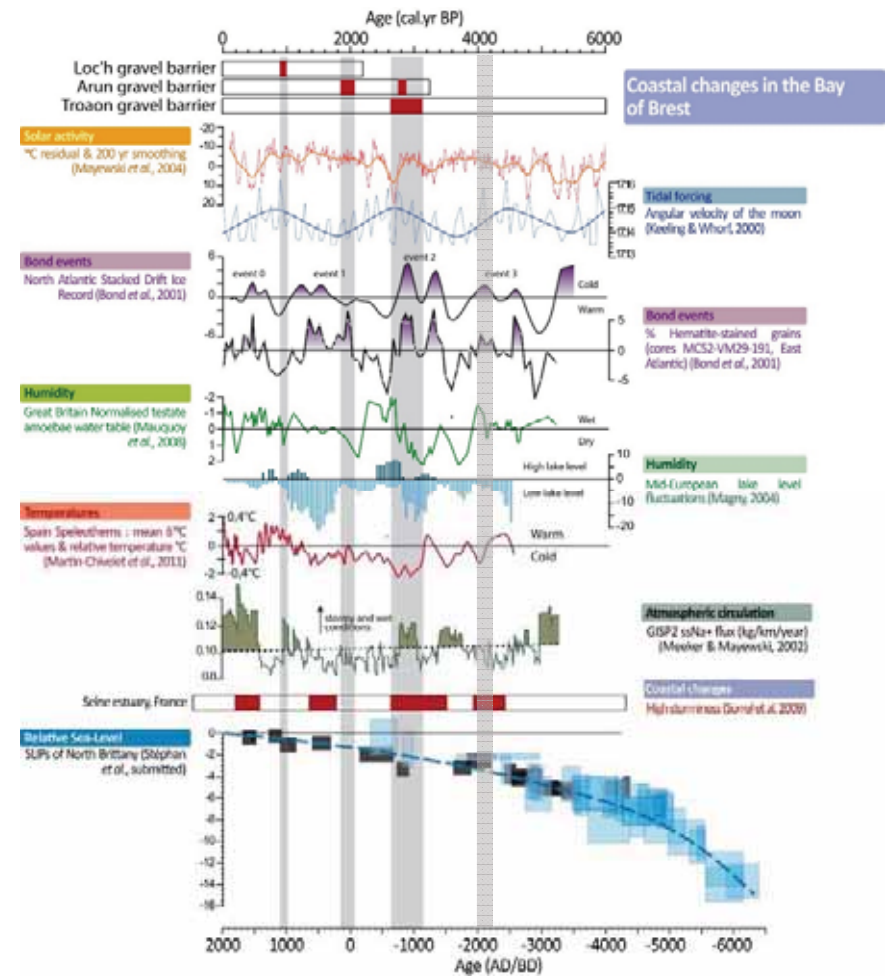
Questions about climate conditions

Modification of the coastal marine currents ?



Intense thermal front : the Ushant front

Cooler climate conditions ?



Conclusion

Summaries

Bay of Brest : Despite an attractive environment (ressources, biodiversity), the low density of coastal archaeological sites was explained by the major coastal floodings from the Late Mesolithic to the Bronze Age.

Iroise Sea : high density of archaeological remains despite a relative repulsive environment. Numerous information about the livelihood of the human communities, relation with the mainland. A question about the apparent desertion of the islands at the Late Bronze Age.

Perspectives

- > Develop the sclerochronology to estimate the duration of human settlements on the islands
- > Integrate Ushant and Sein islands to the study
- > Systematic post-storm archaeological surveys

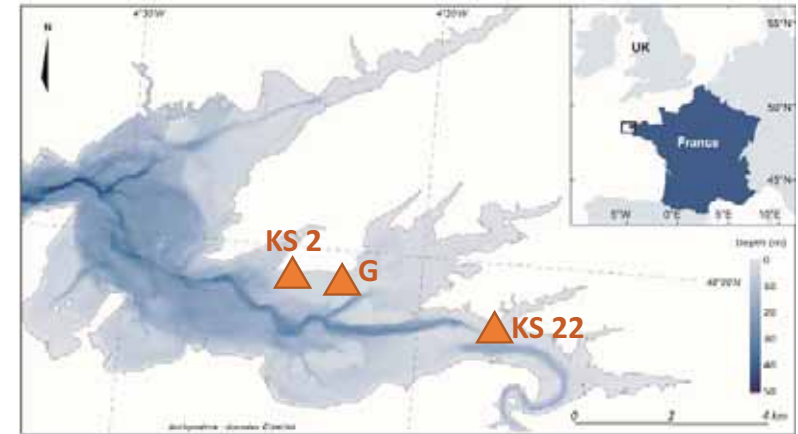
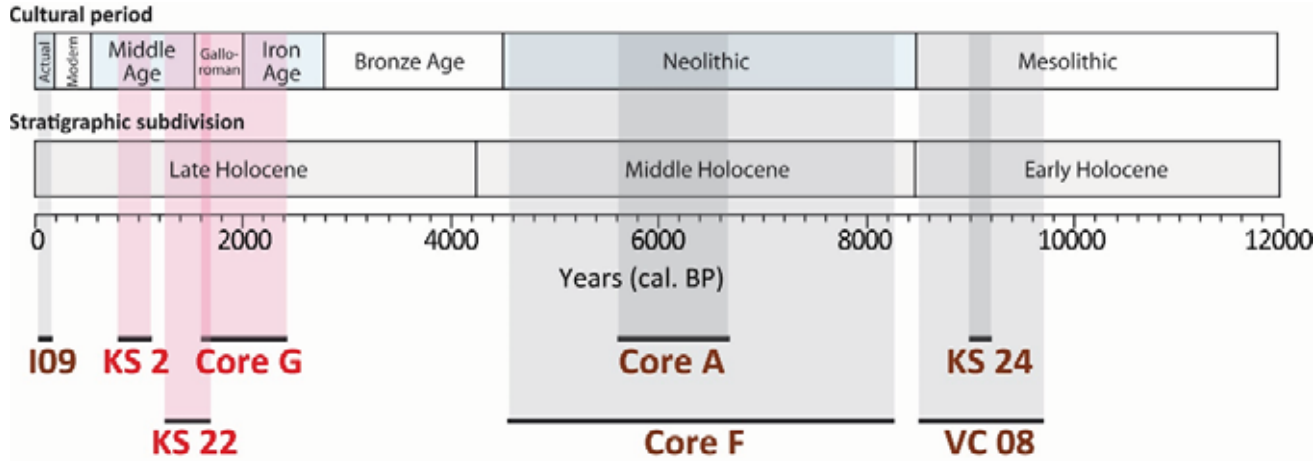
Compare these results to other coastal and marine environments



Thank you for your attention

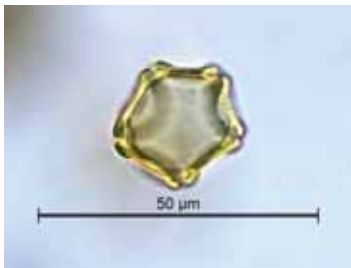
The Bay of Brest : vegetation landscape (C. Lambert PhD work)

8 marine cores located in the Bay of Brest and the Iroise Sea covering the last 8000 yr cal.BP



↓
Vegetation signal

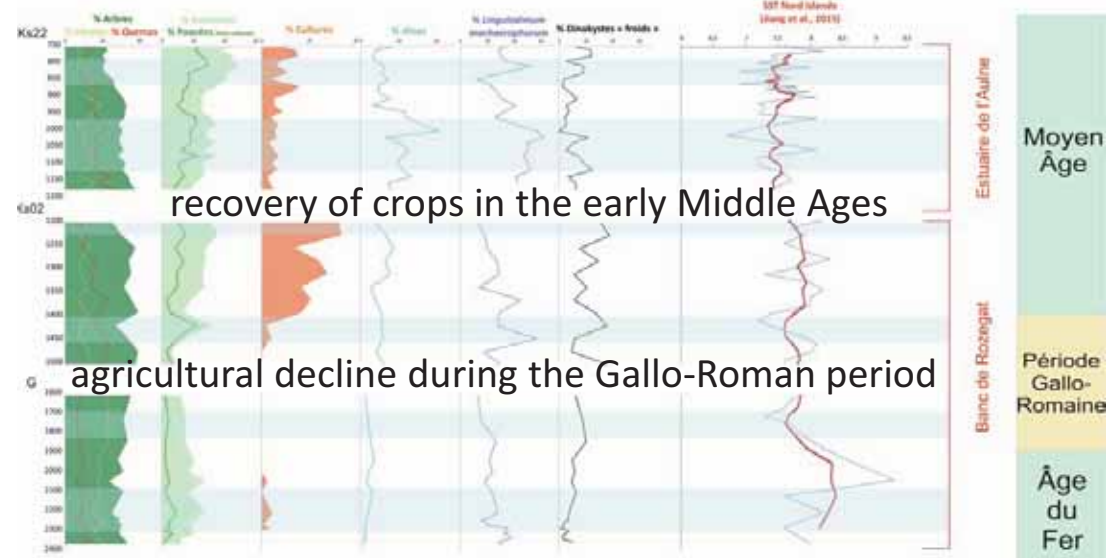
Pollen



Dinokystes

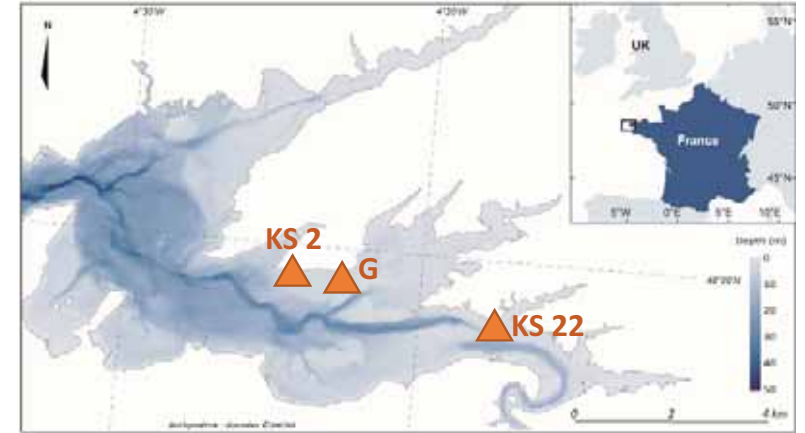
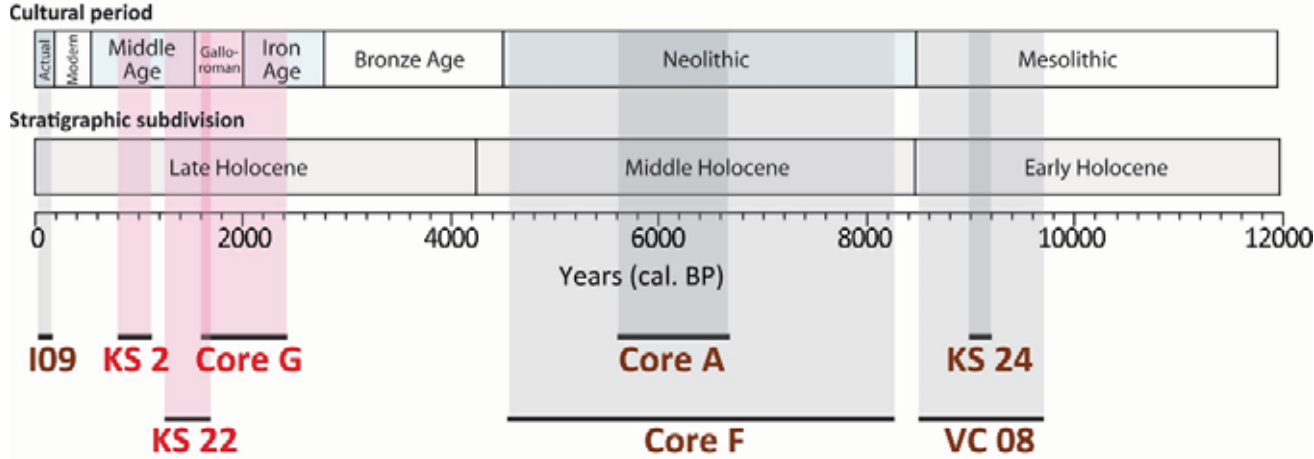


First results



The Bay of Brest : vegetation landscape (C. Lambert PhD work)

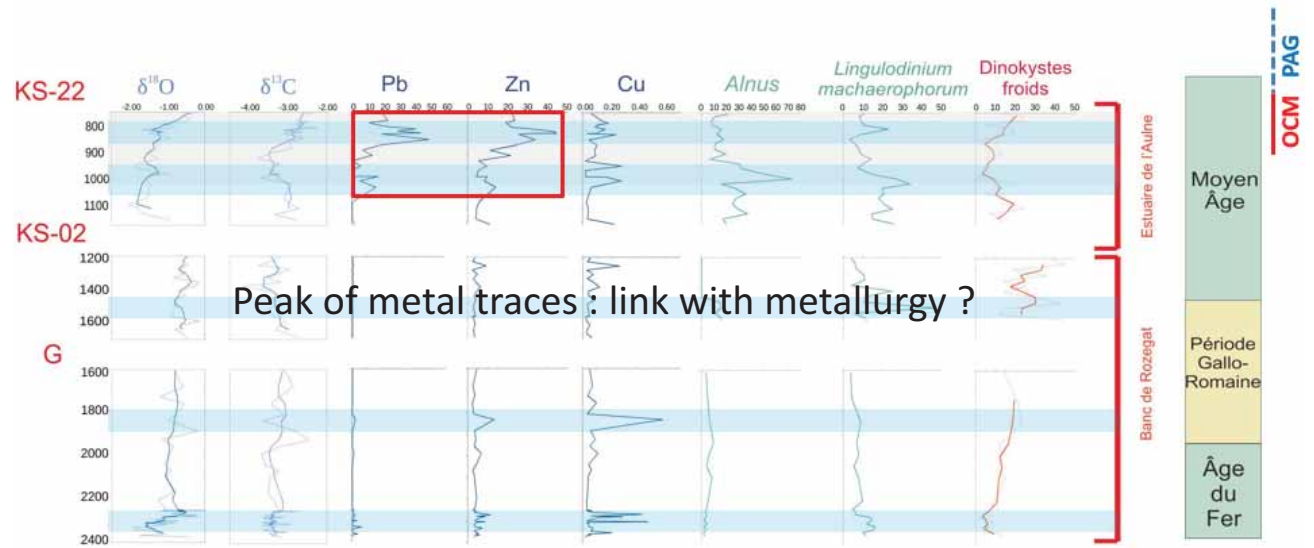
8 marine cores located in the Bay of Brest and the Iroise Sea covering the last 8000 yr cal.BP



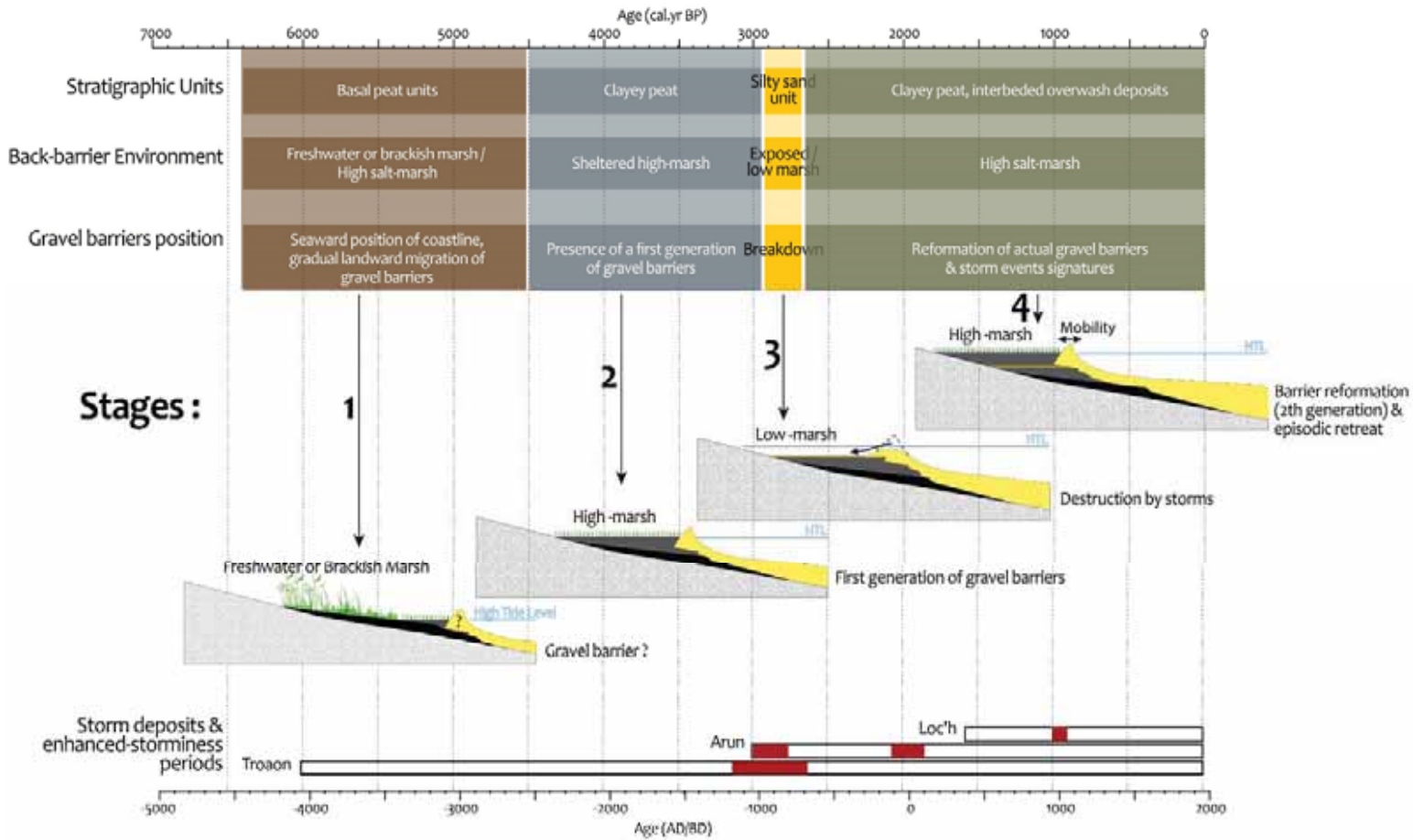
Carbonate concretion (maërl)



First results



The Bay of Brest : reconstruction of the coastal changes



A gradual retreat of coastal barriers by rollover since 6000 yrs and several phases of intense erosion during periods of enhanced-storminess