20 000 years ago, ice sheets covered NW Europe, Canada, Northern USA etc.

Sea level Rise

- ✓ The process whereby global mean sea level changes over time
- ✓ As global temperature rise and land based ice melts, ocean expands

Université Bretagne Sud

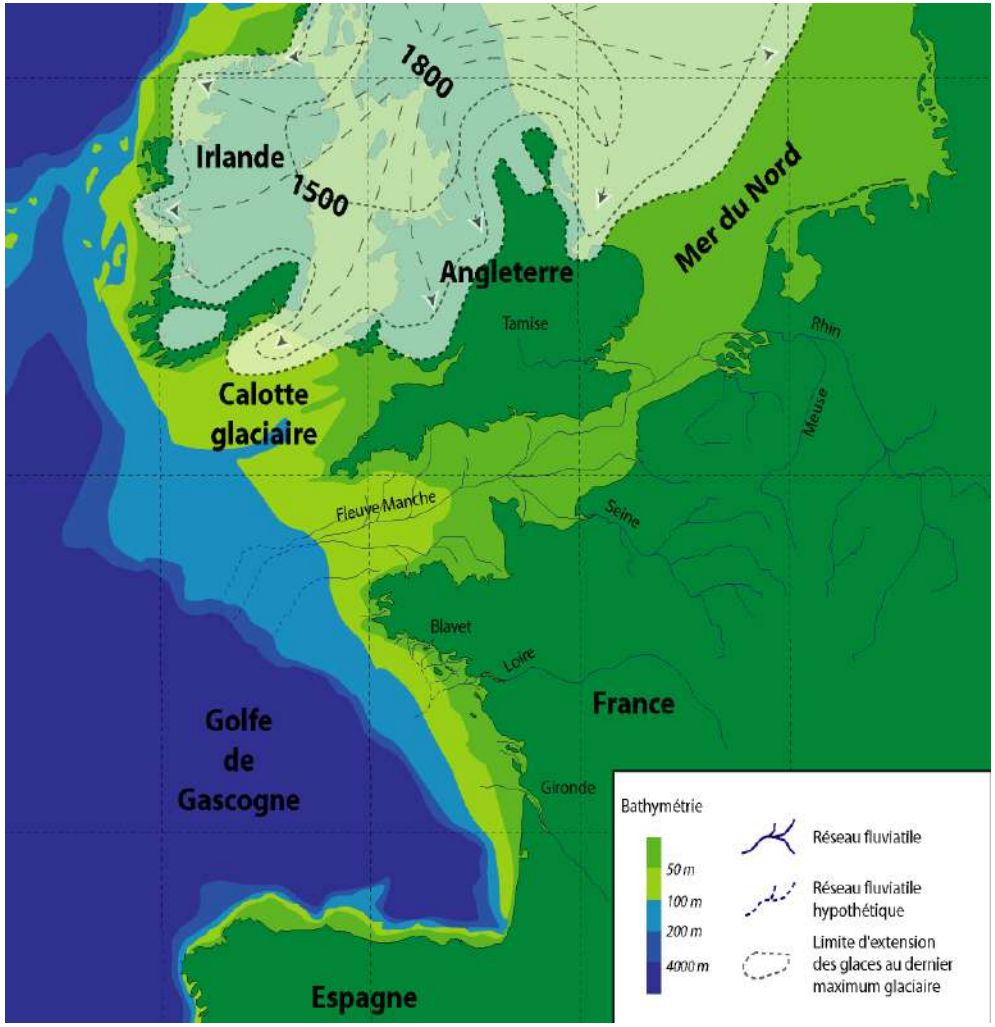
IUEM-OSU GEOSCIENCES OCEAN CNRS-UBO-UBS

David Menier & Manoj Mathew

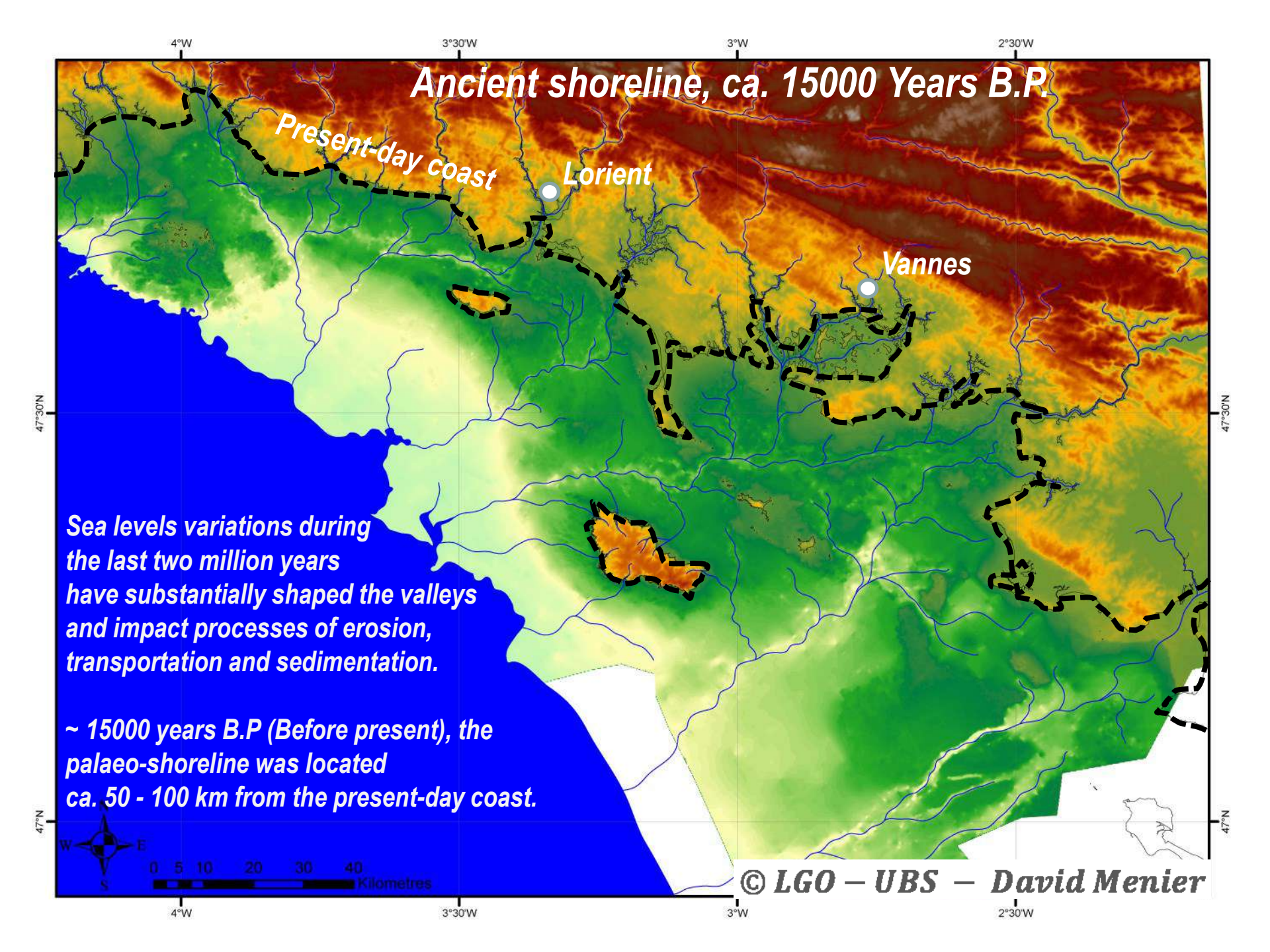
20 000 years ago, ice sheets covered United Kingdom and Ireland.

A palaeonetwork of paleovalleys crossing NW Europe

- ✓ The palaeosystem of English channel is the biggest one
- ✓ Present-day rivers as Tamise, Seine and Rhin were affluents of this English channel
- ✓ A network of palaeovalleys along the continental shelf of South Brittany were highlighted by examining approximately 18000 km of seismic profiles and 158 cores



Effect of Rising Sea-Level since 20 000 years B.P. on the palaeo-shorelines of South Brittany (Northern Bay of Biscay)


Ancient shoreline, ca. 15000 Years B.P.
Present-day coast
Lorient
Vannes
Sea levels variations during
the last two million years
have substantially shaped the valleys
and impact processes of erosion,
transportation and sedimentation.
~ 15000 years B.P (Before present), the
palaeo-shoreline was located
ca. 50 - 100 km from the present-day coast.
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
W
E
S
0 5 10 20 30 40
Kilometres
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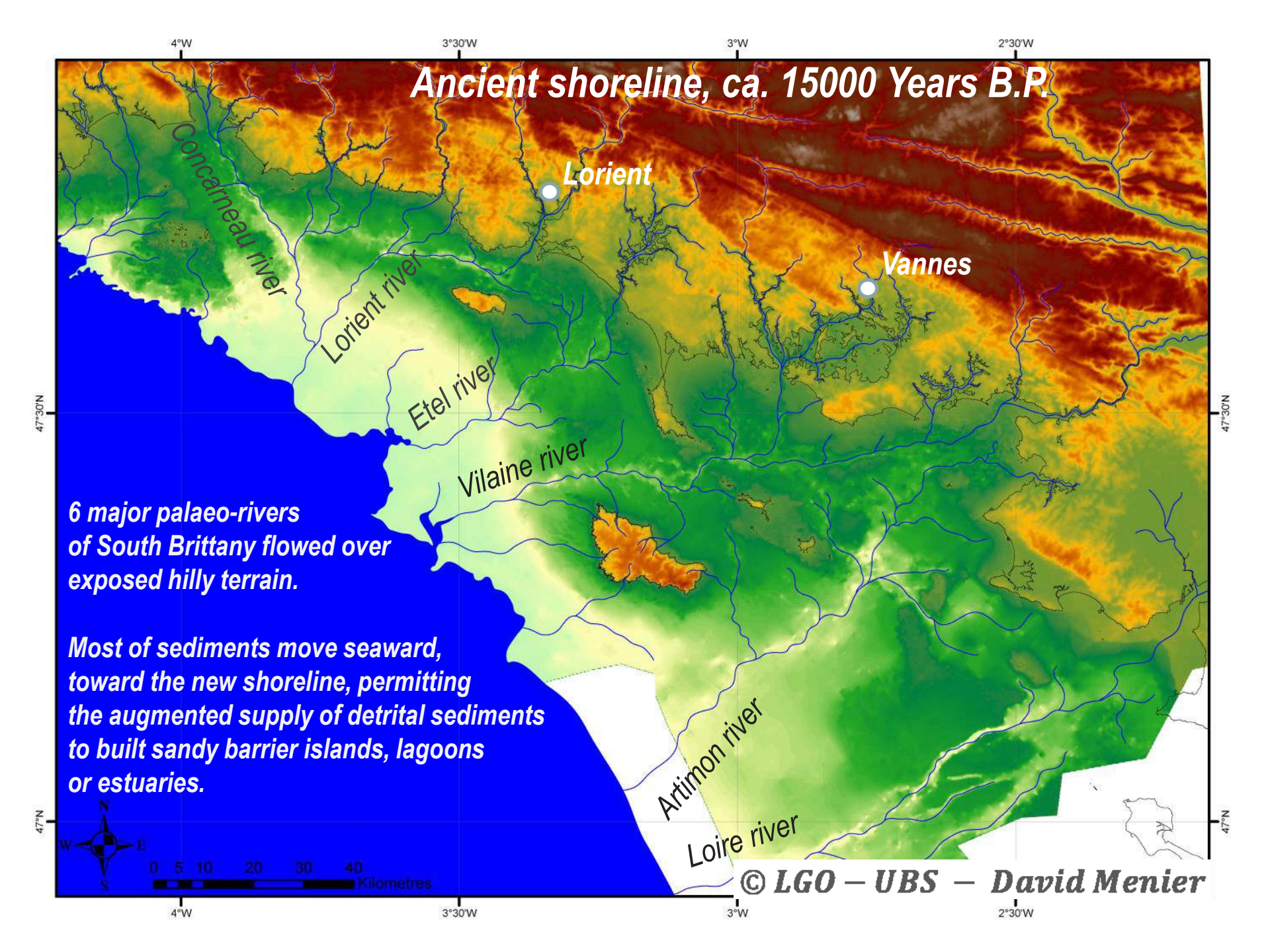
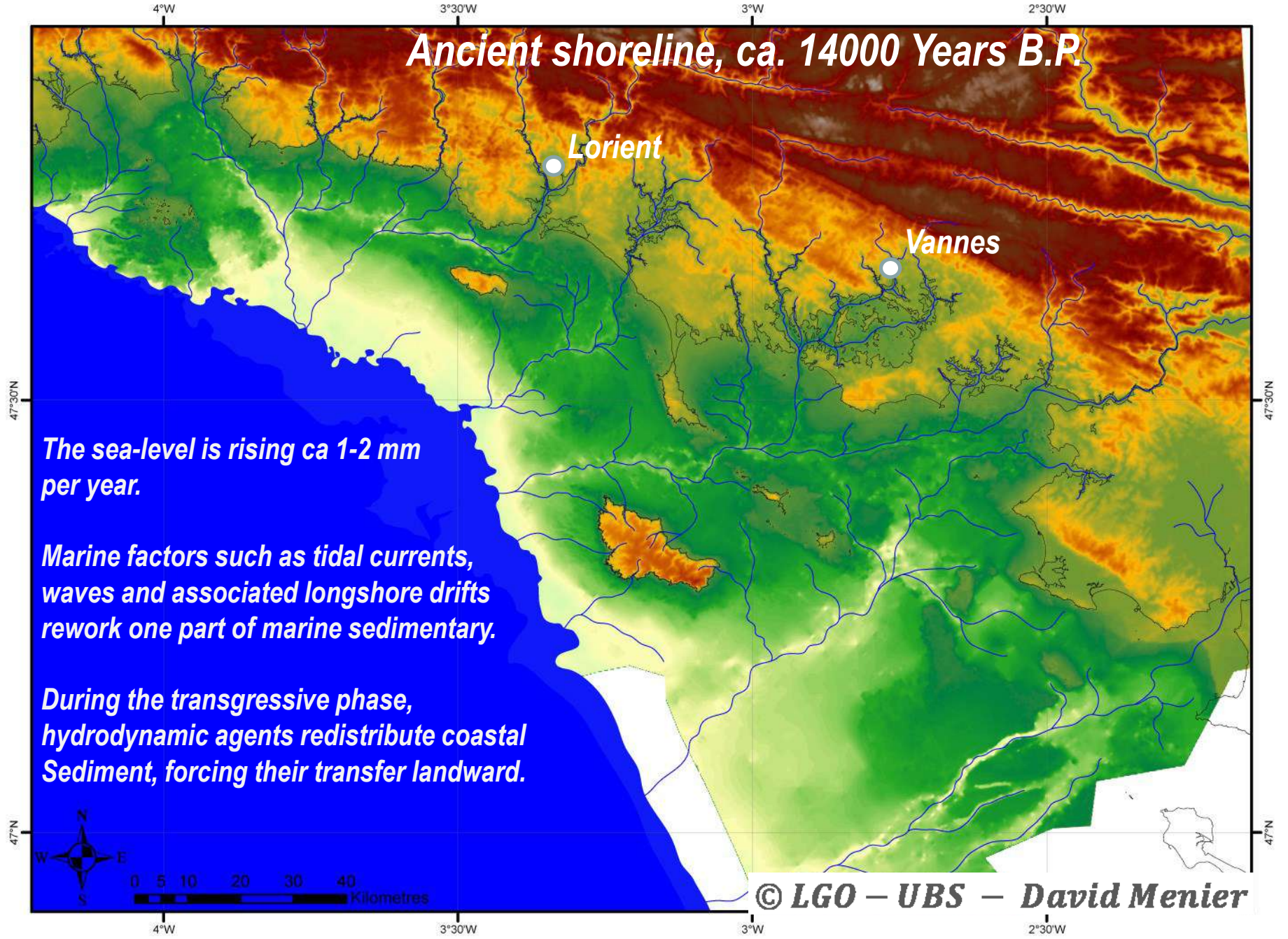
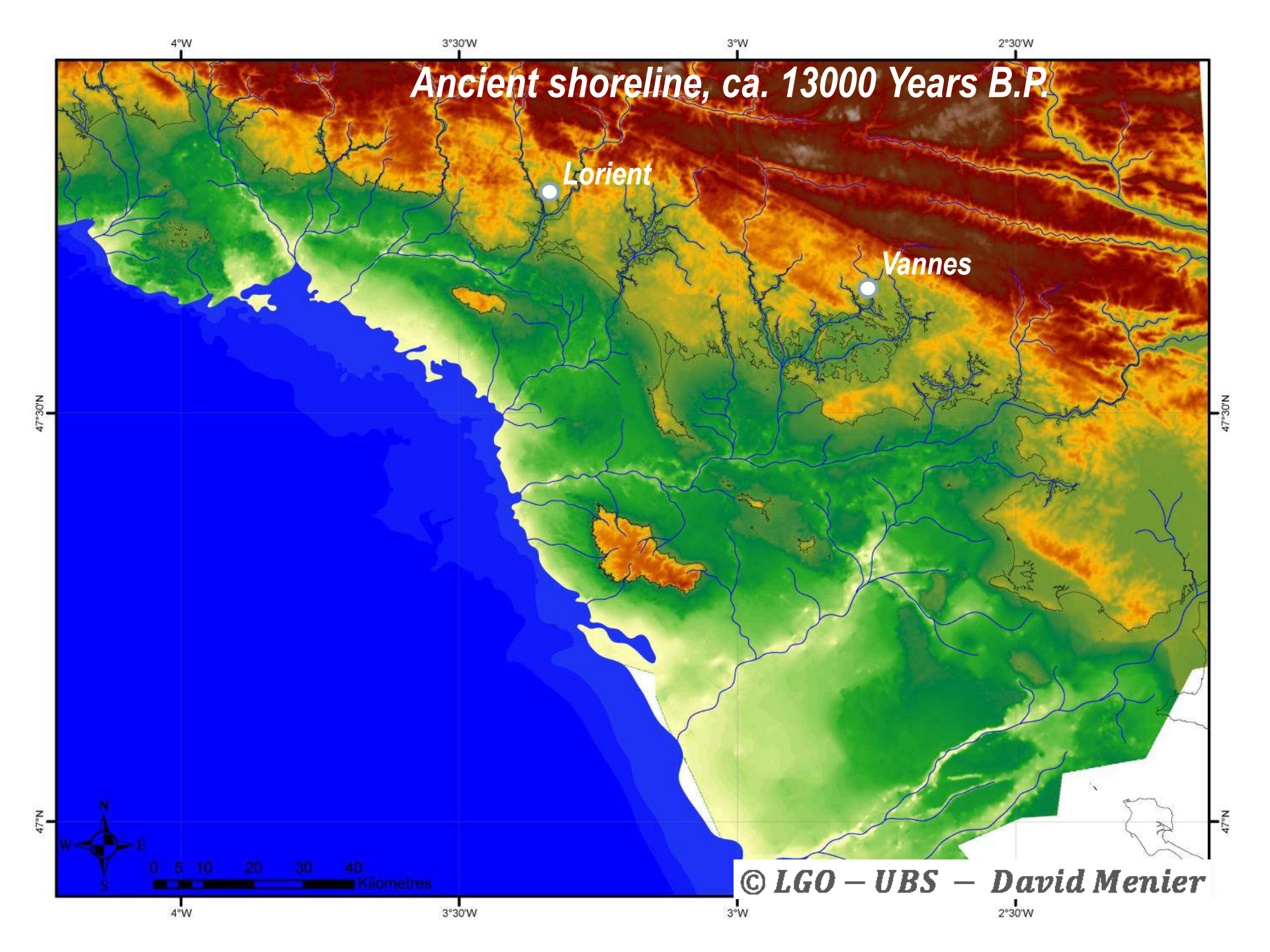
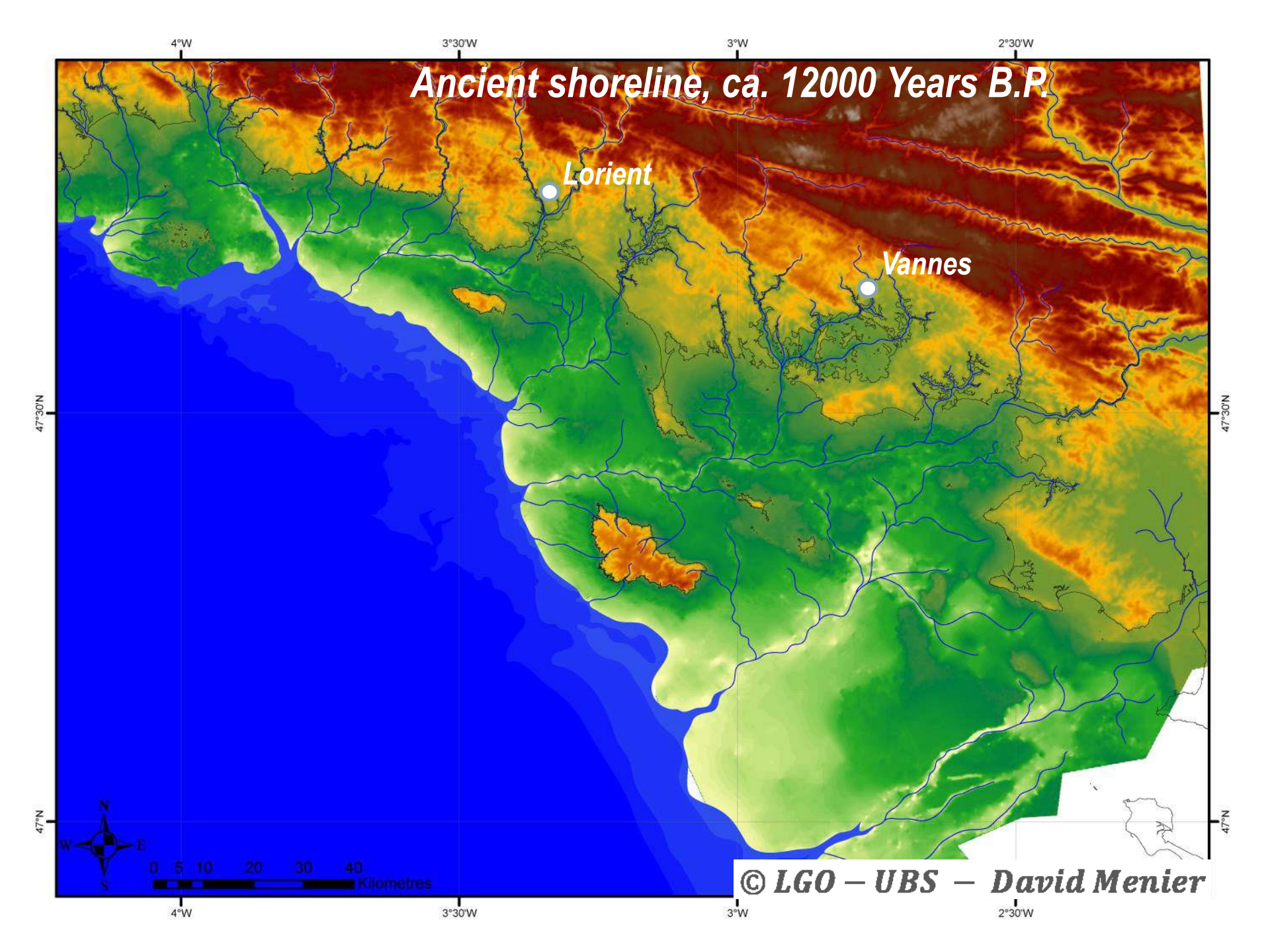
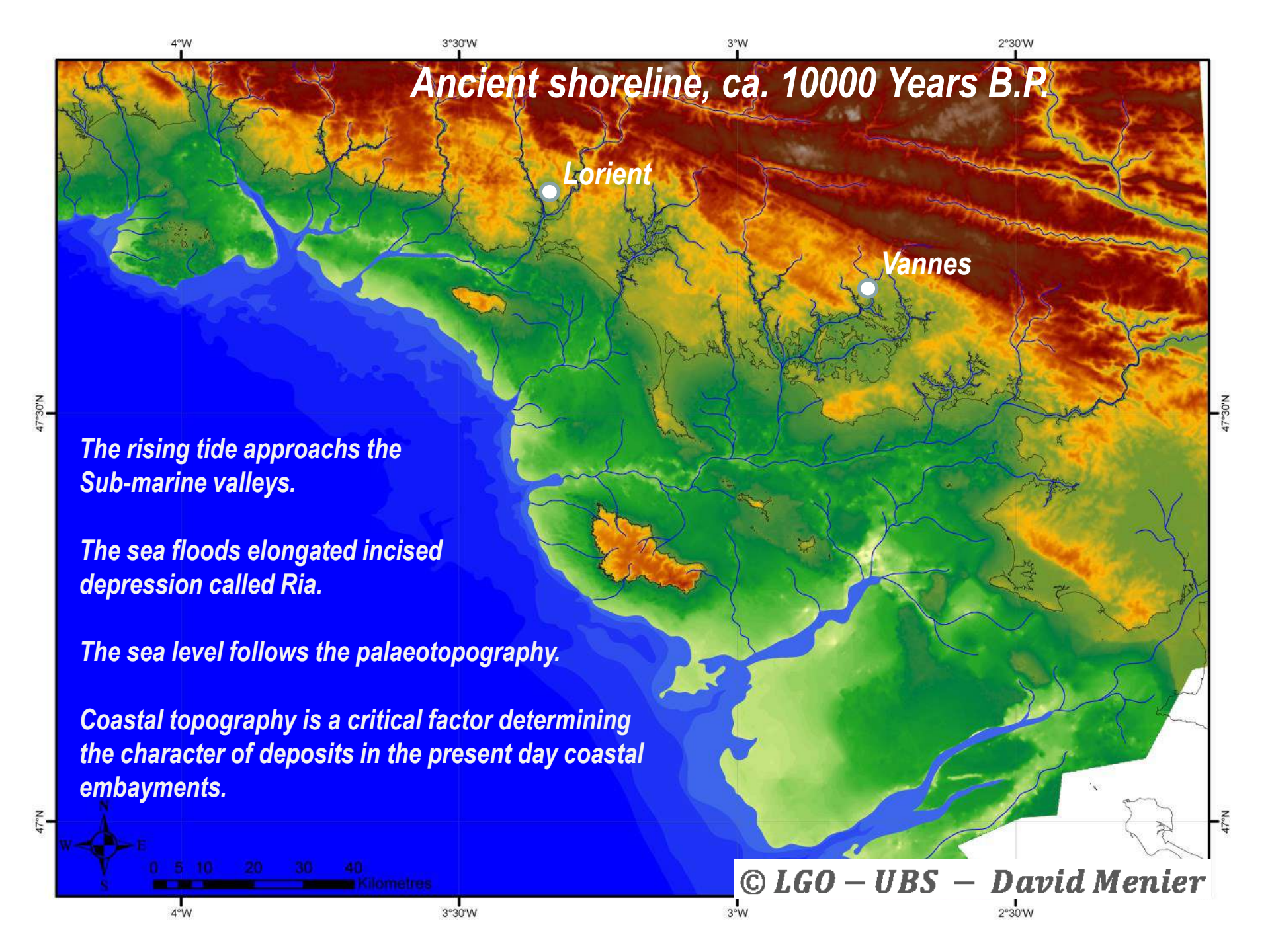
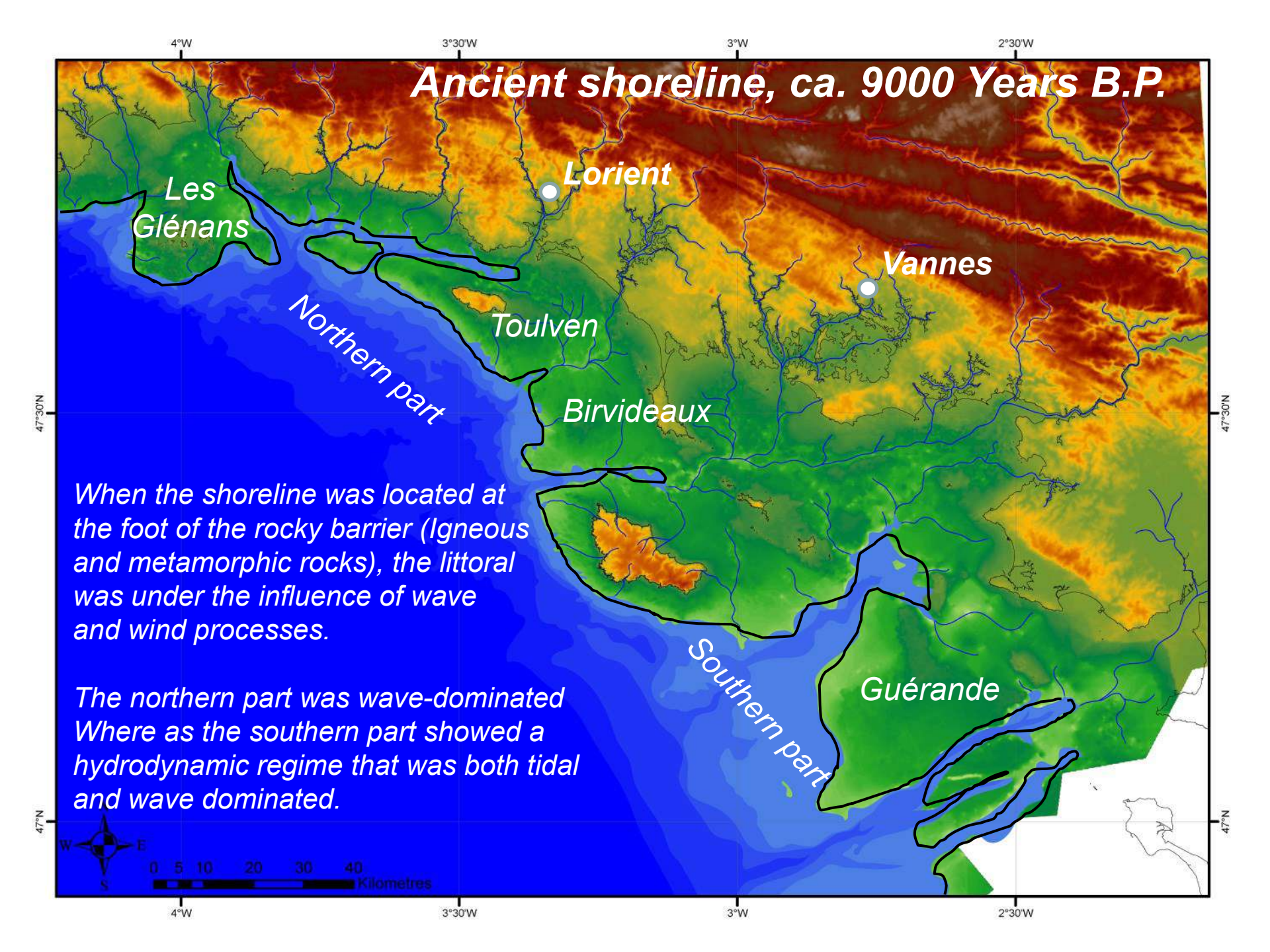

Ancient shoreline, ca. 15000 Years B.P.
Lorient
Vannes
Concarneau river
Lorient river
Etel river
Vilaine river
Artimon river
Loire river
6 major palaeo-rivers of South Brittany flowed over exposed hilly terrain.
Most of sediments move seaward, toward the new shoreline, permitting the augmented supply of detrital sediments to built sandy barrier islands, lagoons or estuaries.
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier

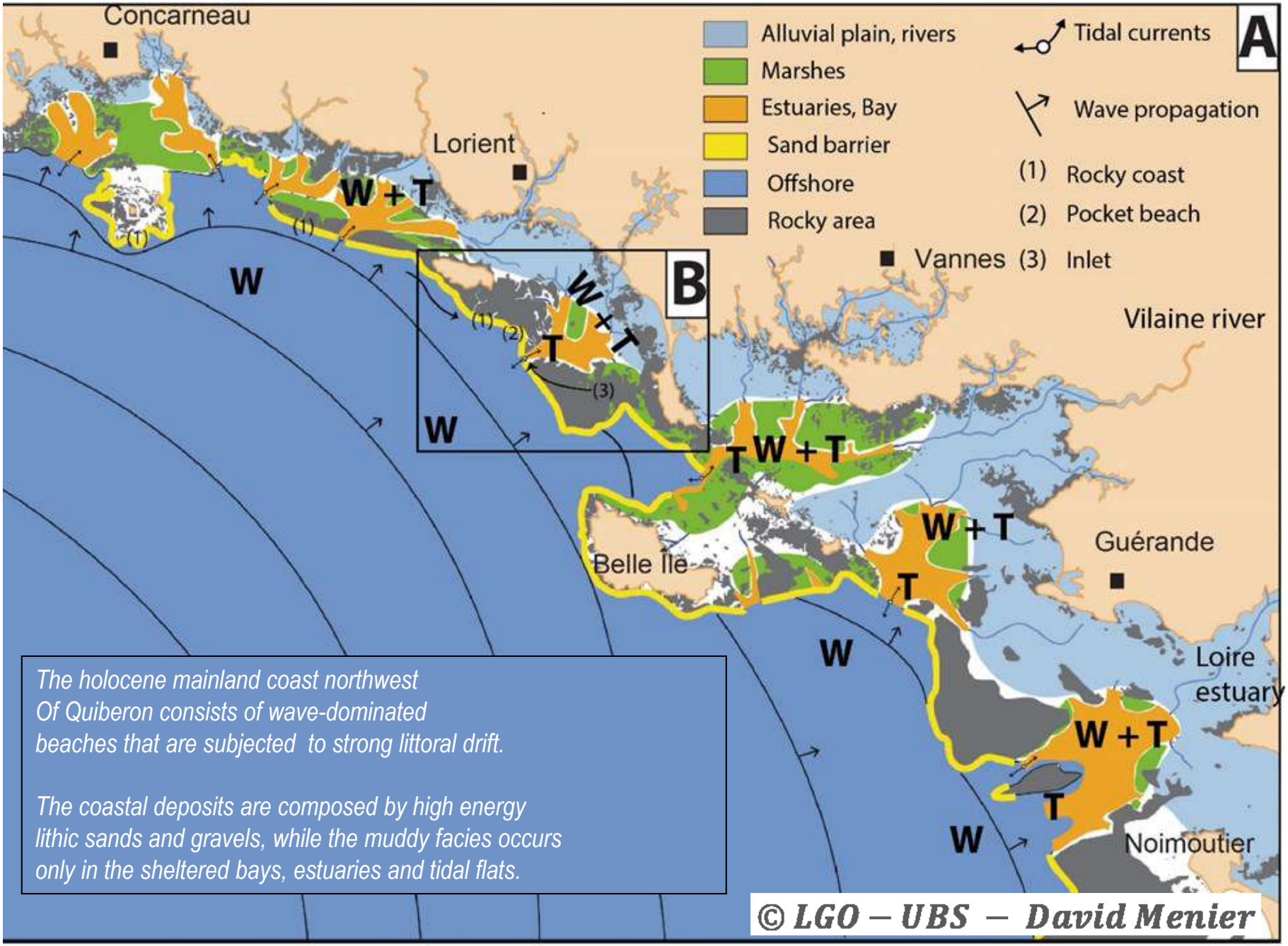

Ancient shoreline, ca. 14000 Years B.P.
Lorient
Vannes
The sea-level is rising ca 1-2 mm per year.
Marine factors such as tidal currents, waves and associated longshore drifts rework one part of marine sedimentary.
During the transgressive phase, hydrodynamic agents redistribute coastal Sediment, forcing their transfer landward.
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier


Ancient shoreline, ca. 13000 Years B.P.
Lorient
Vannes
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier


Ancient shoreline, ca. 12000 Years B.P.
Lorient
Vannes
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier


Ancient shoreline, ca. 10000 Years B.P.
Lorient
Vannes
The rising tide approachs the Sub-marine valleys.
The sea floods elongated incised depression called Ria.
The sea level follows the palaeotopography.
Coastal topography is a critical factor determining the character of deposits in the present day coastal embayments.
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier


Ancient shoreline, ca. 9000 Years B.P.
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
Lorient
Vannes
Les Glénans
Toulven
Birvideaux
Guérande
Northern part
Southern part
When the shoreline was located at the foot of the rocky barrier (Igneous and metamorphic rocks), the littoral was under the influence of wave and wind processes.
The northern part was wave-dominated Where as the southern part showed a hydrodynamic regime that was both tidal and wave dominated.
W
E
S
0 5 10 20 30 40
Kilometres


Concarneau
Lorient
Vannes
Vilaine river
Belle Ile
Guérande
Loire estuary
Noimoutier
Alluvial plain, rivers
Marshes
Estuaries, Bay
Sand barrier
Offshore
Rocky area
Tidal currents
Wave propagation
(1) Rocky coast
(2) Pocket beach
(3) Inlet
A
B
W
W + T
T
The holocene mainland coast northwest
Of Quiberon consists of wave-dominated
beaches that are subjected to strong littoral drift.
The coastal deposits are composed by high energy
lithic sands and gravels, while the muddy facies occurs
only in the sheltered bays, estuaries and tidal flats.
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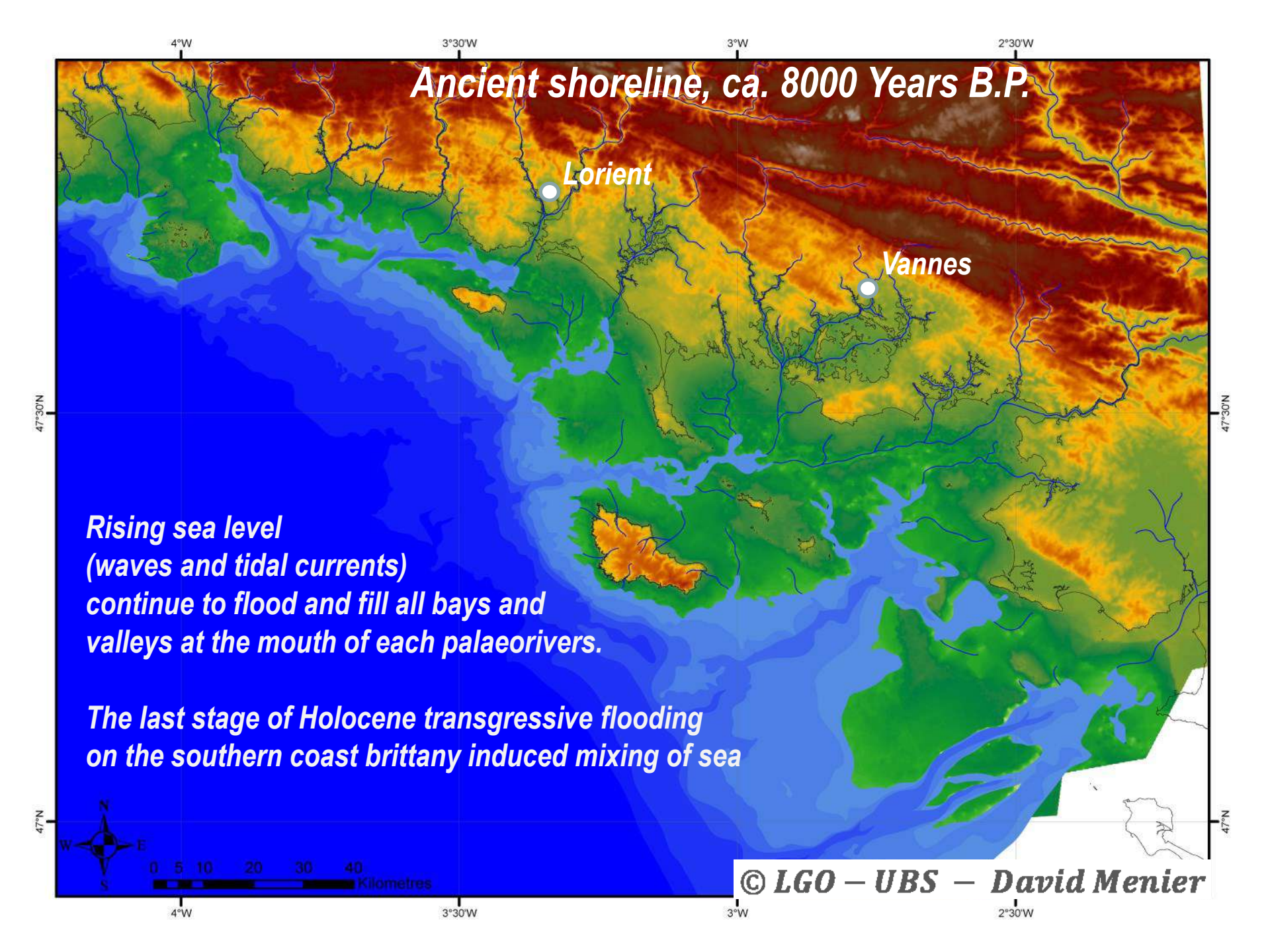
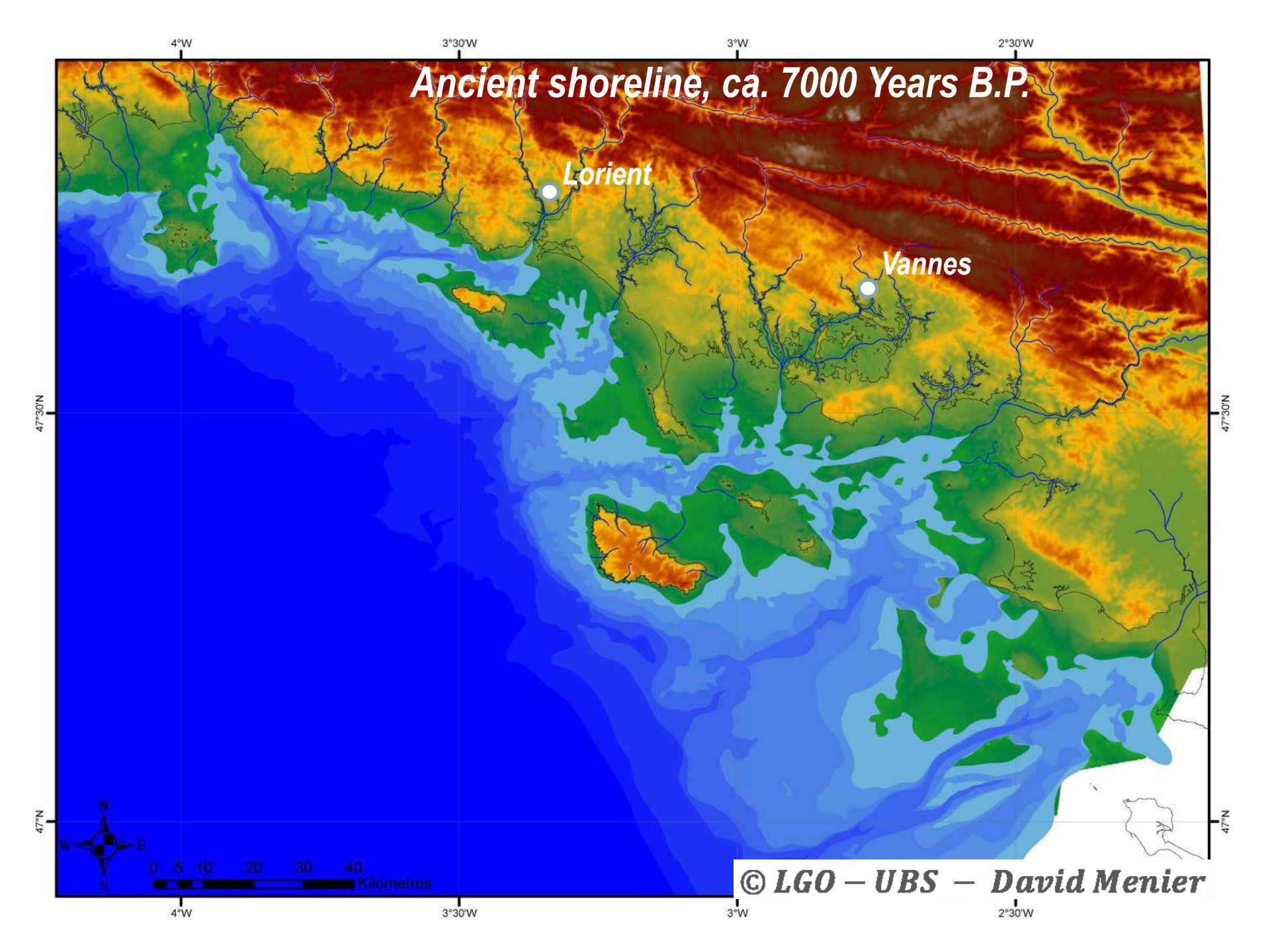

Ancient shoreline, ca. 8000 Years B.P.
Lorient
Vannes
Rising sea level
(waves and tidal currents)
continue to flood and fill all bays and
valleys at the mouth of each palaeorivers.
The last stage of Holocene transgressive flooding
on the southern coast brittany induced mixing of sea
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
© LGO – UBS – David Menier


Ancient shoreline, ca. 7000 Years B.P.
Lorient
Vannes
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
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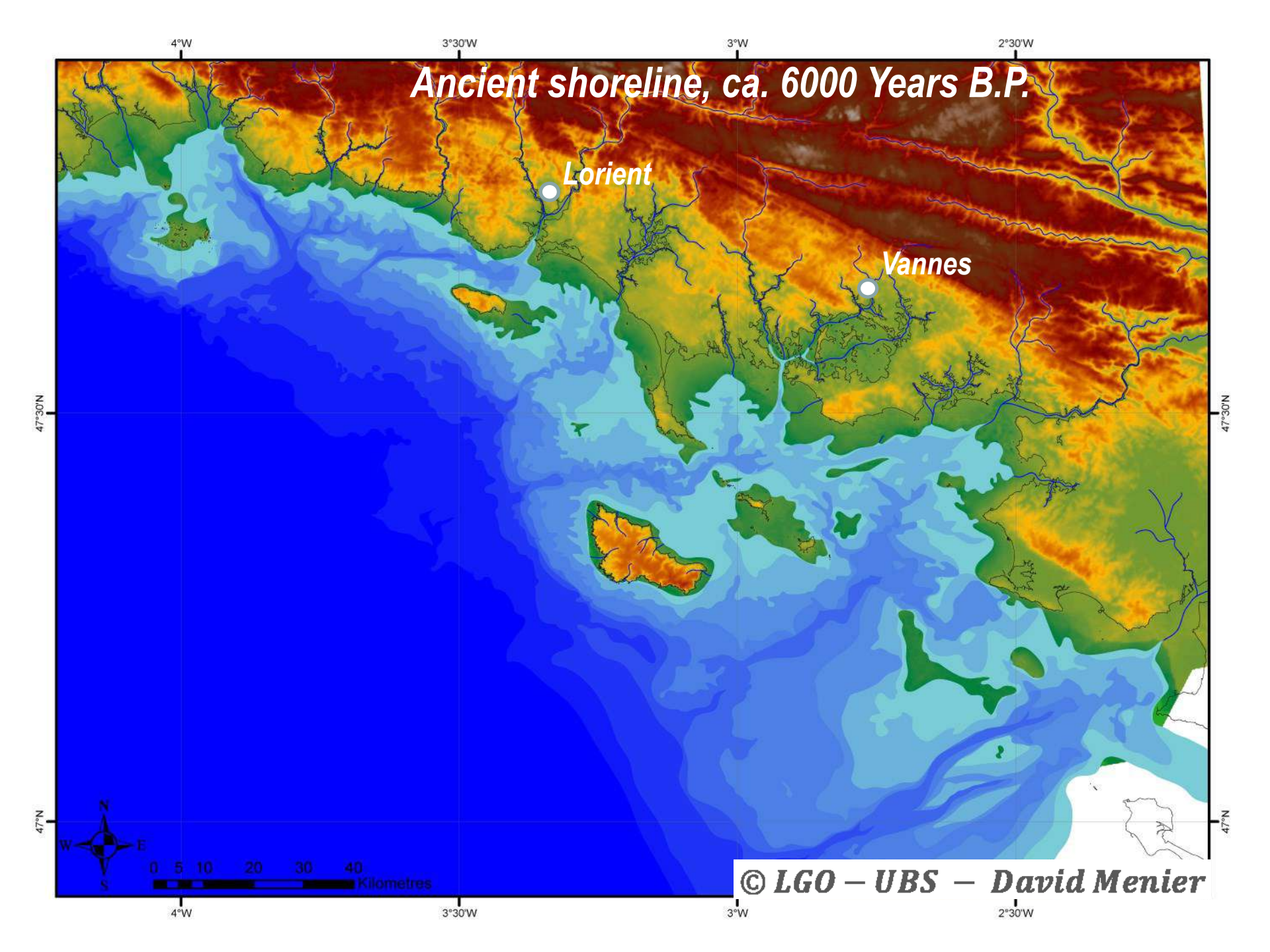
Ancient shoreline, ca. 6000 Years B.P.
Lorient
Vannes
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
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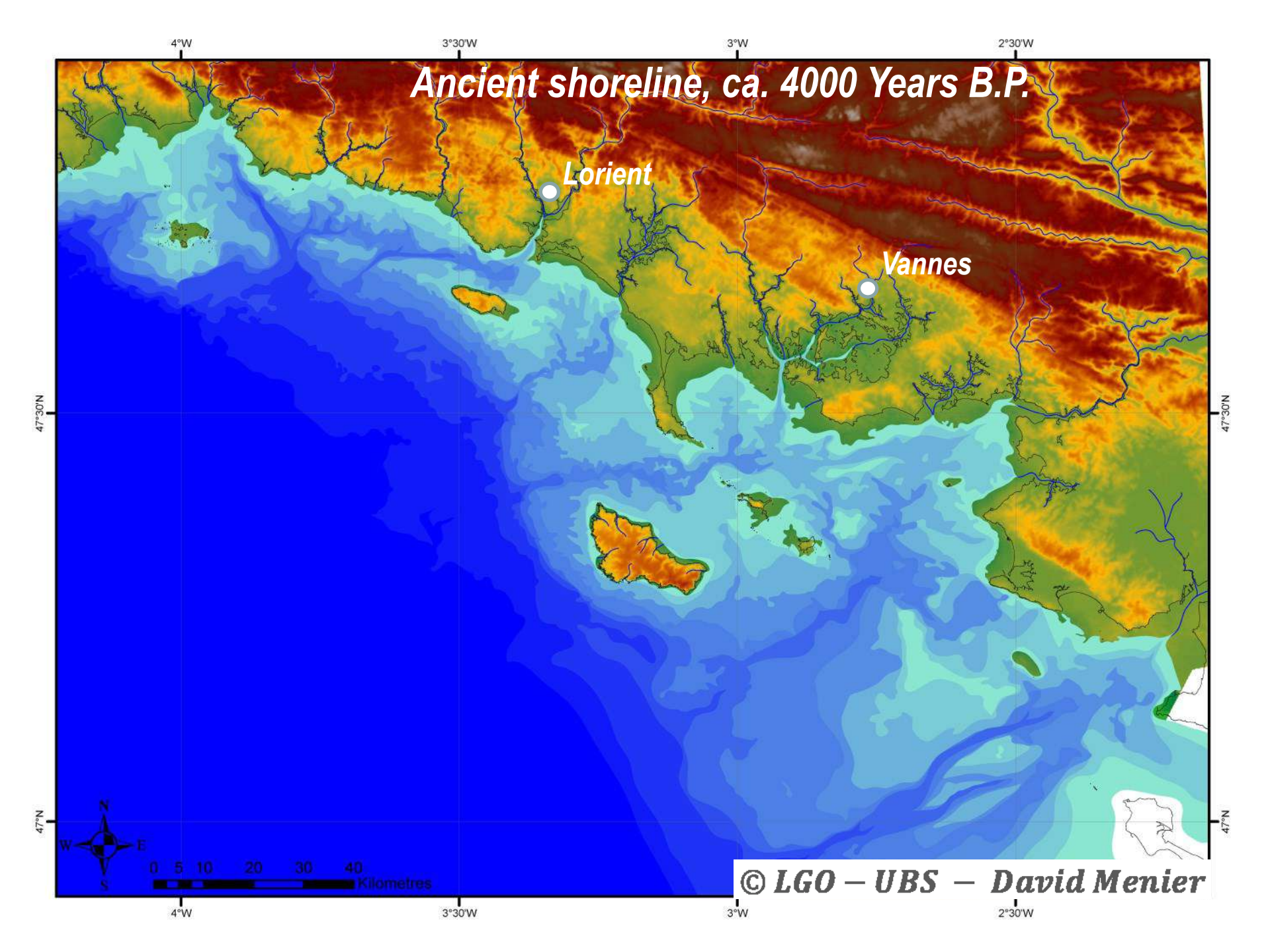
Ancient shoreline, ca. 4000 Years B.P.
Lorient
Vannes
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
W
E
S
0 5 10 20 30 40
Kilometres
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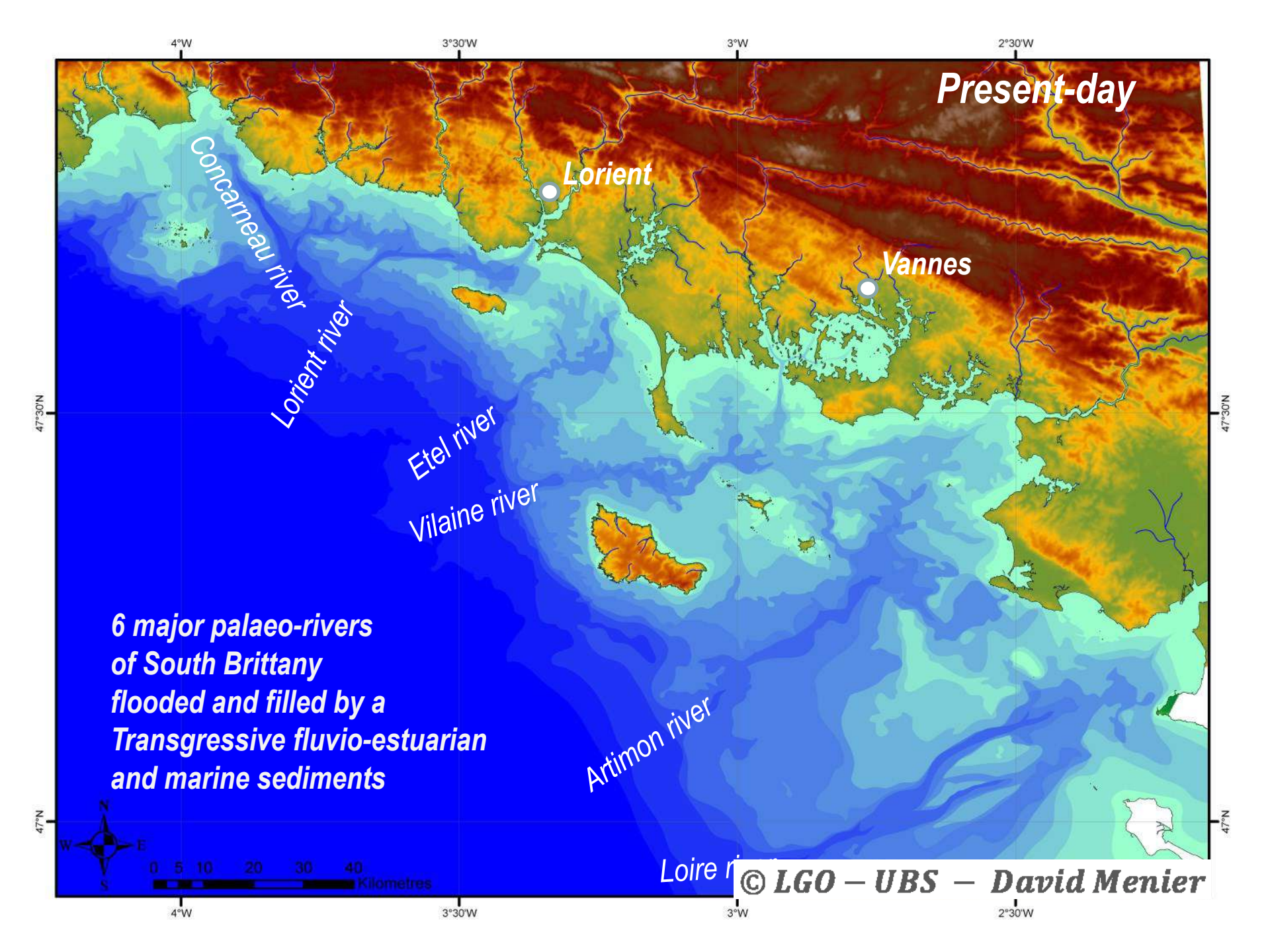
Present-day
Lorient
Vannes
Concarneau river
Lorient river
Etel river
Vilaine river
Artimon river
6 major palaeo-rivers
of South Brittany
flooded and filled by a
Transgressive fluvio-estuarian
and marine sediments
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
S
W
E
0 5 10 20 30 40
Kilometres
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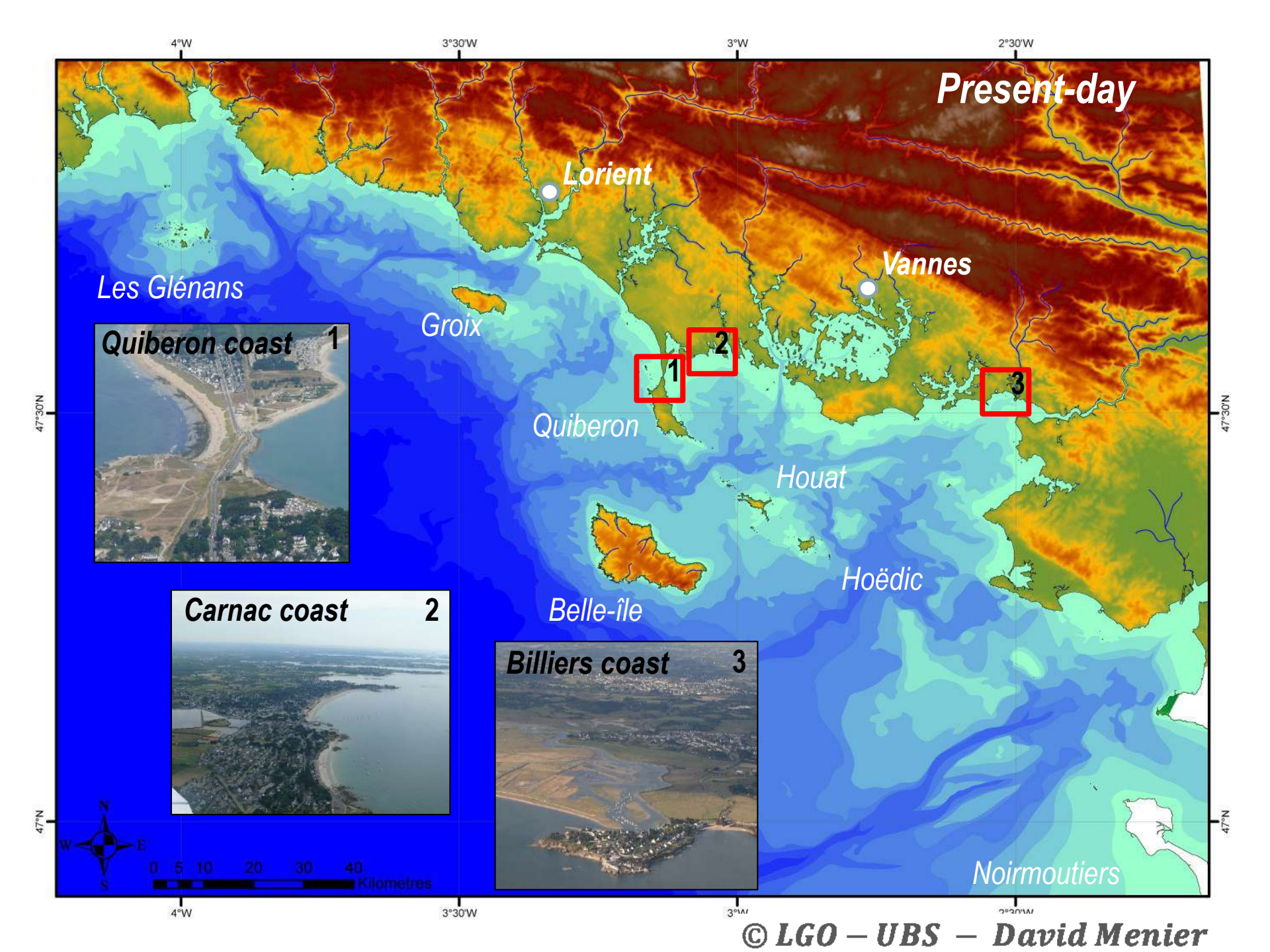
Present-day
Lorient
Vannes
Les Glénans
Groix
Quiberon coast
1
2
1
3
Quiberon
Houat
Hoëdic
Belle-île
Carnac coast
2
Billiers coast
3
Noirmoutiers
4°W
3°30'W
3°W
2°30'W
47°30'N
47°N
N
S
W
E
0 5 10 20 30 40
Kilometres
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