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Review of the late-Holocene storm events along the European Atlantic coasts

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Introduction

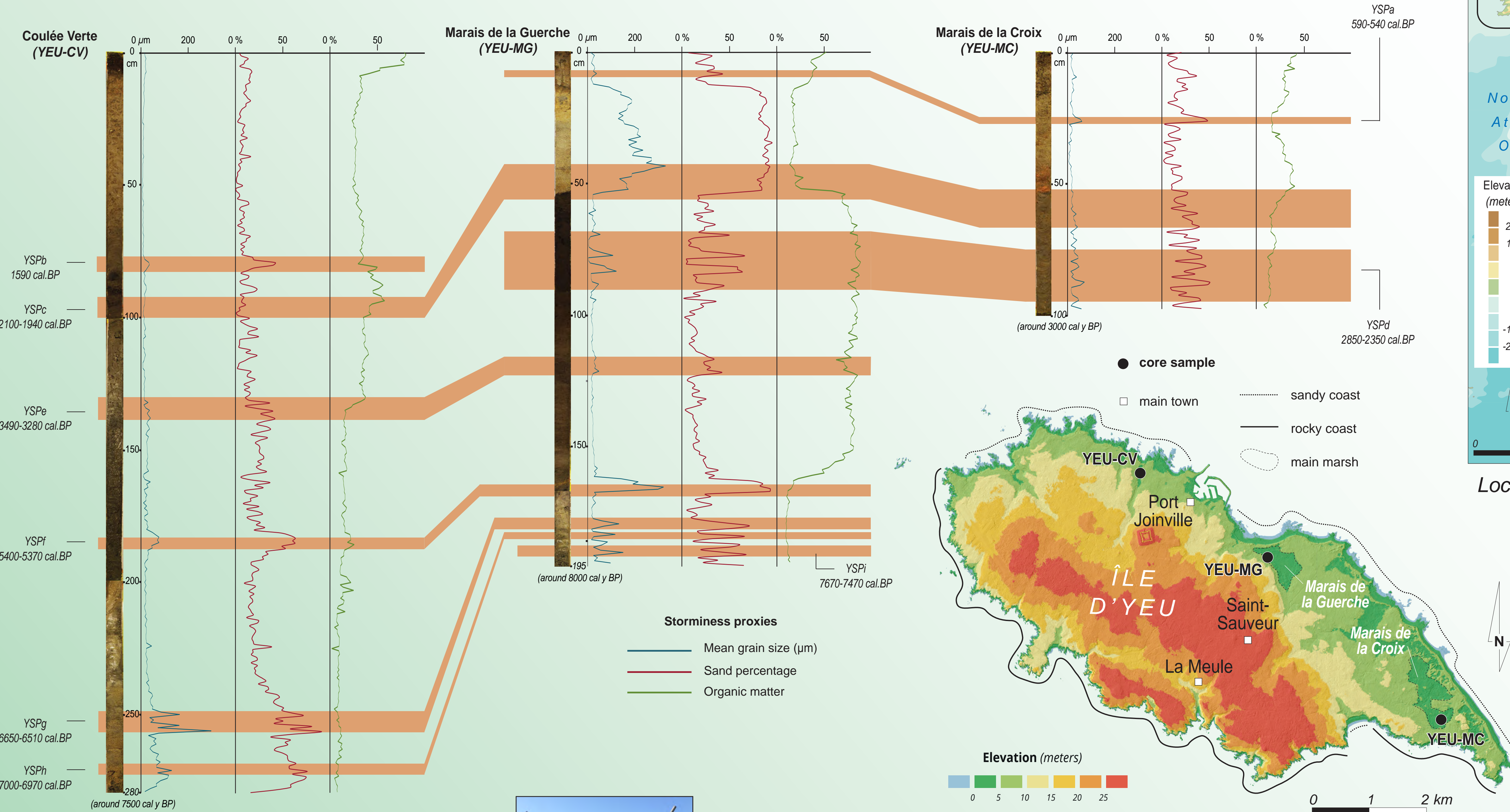
In Europe, a few Holocene paleostorm chronologies have already been conducted. The Mediterranean coast remains the main basin studied, with a good correlation shown between southern stormy events and cooling climatic periods. We focus here on the European Atlantic region, with two main objectives aimed :

→ The first high resolution reconstruction of Western Central France mid to late Holocene stormy periods. We determine Yeu Stormy Period (YSP) by comparison of three stormy proxies measured in three different cores presented below : mean grain size, organic matter content and sandy proportions.

→ The review of late Holocene European Atlantic disturbances from previous projects found in bibliography, correlated with global climatic datas. We propose European Atlantic Stormy Events (EASE) : general periods of increasing storminess, extracted from the comparison of existing European Atlantic sedimentary studies.

Coring campaign into the isle of Yeu

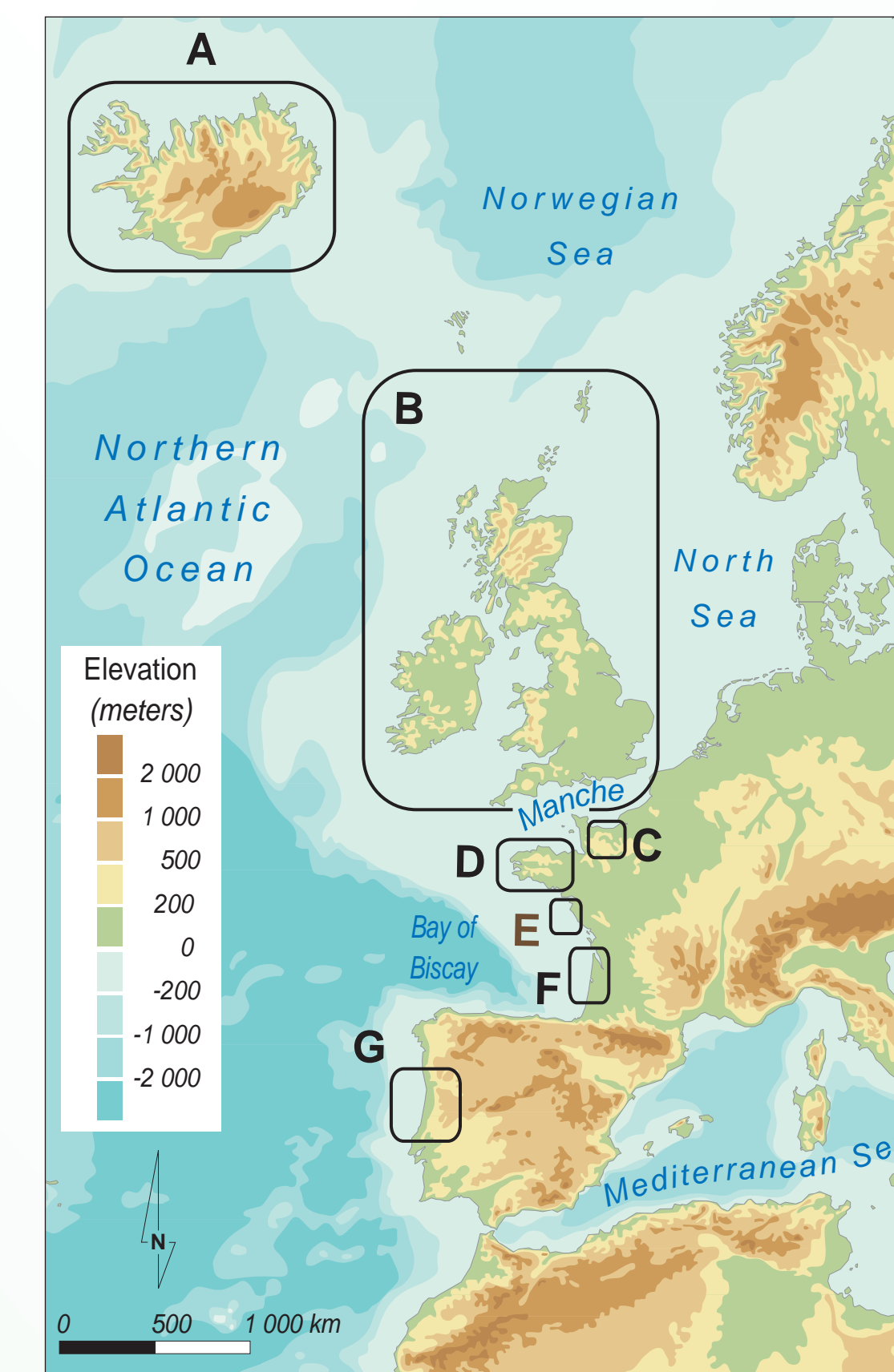
The figure shows YSP detected in each core, and possible correlation between different marshes. YSP periods are assessed with radiocarbon dating. From eleven dated samples, we built an age depth model for each core to estimate datations for every centimeters of the three cores.



- Methods**
- Vibracore drilling (April 2015)
 - High Resolution centimeter scale core sampling for sedimentology :
 - Loss on ignition
 - Grain size analysis
 - ¹⁴C Dating of eleven samples



- Study site**
- The isle of Yeu, Vendée, France :
 - A high coastal flooding exposed area
 - A semi-diurnal tidal regime, with 5.5 to 6m tidal ranges
 - A NE tilting with an W/SW incised shelf and a E/NE lower area
 - A NE coast dominated by sandy beaches
 - Three marshes with low human impact



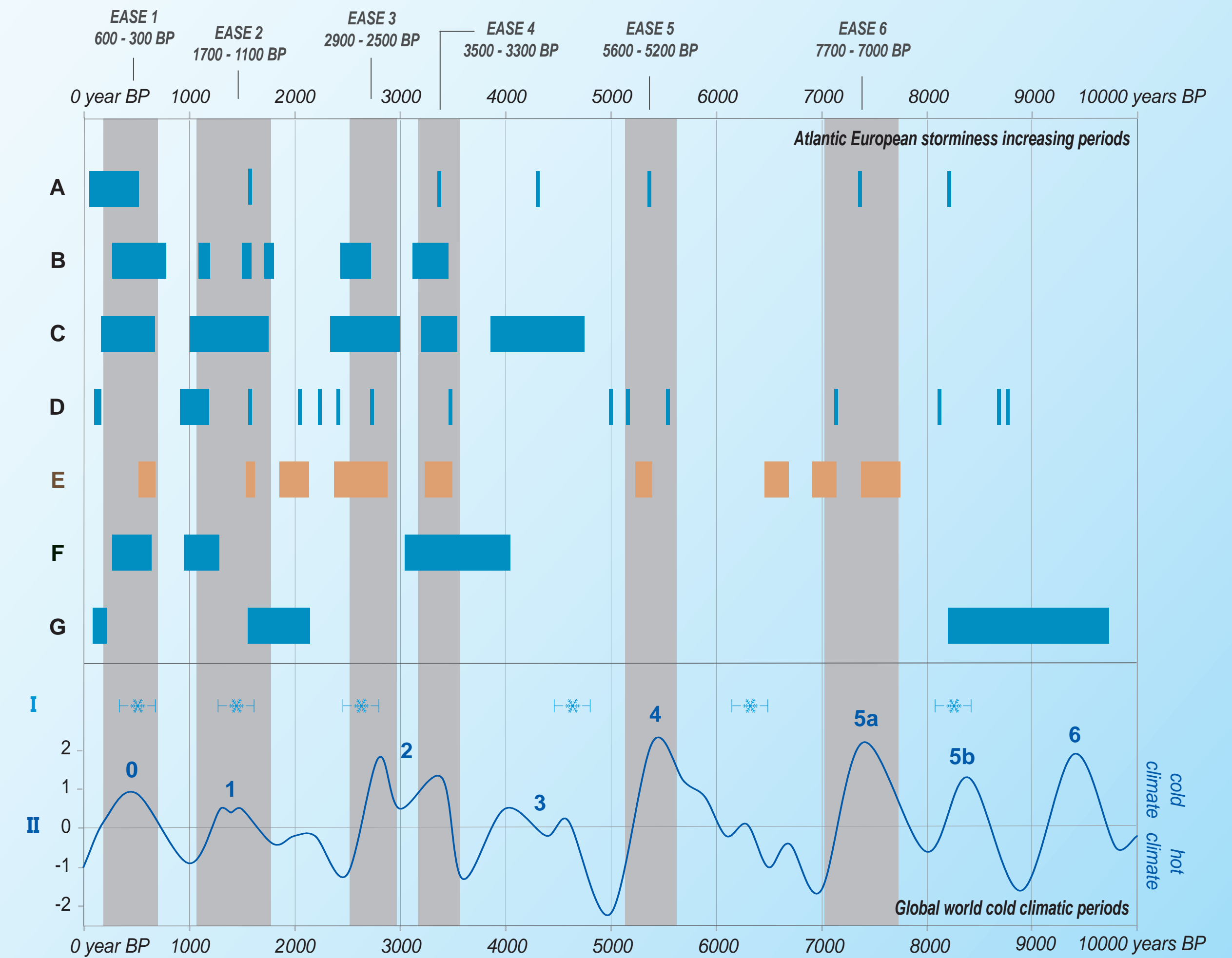
Localisation of mentioned European Atlantic paleostorm studies

- Methods**
- Bibliographic review :
 - Extraction of storminess increasing periods from other European Atlantic coastal projects.
 - Comparison with global cooling periods.

General European Atlantic Review

Storminess increased periods (SIP) from sedimentary stormy studies have been sorted on a chronological scale into the figure presented below. We visually crossed SIP extracted from litterature to identify gray shaded periods where notable storminess increase concordance (EASE) can be observed between these projects.

- Storminess increased periods of mentioned paleostorm studies :**
- A :** Iceland (Jackson et al., 2005);
 - B :** Brittany islands (Orme et al., 2016);
 - C :** Normandie (Sorrel et al., 2009);
 - D :** Bretagne (Baltzer et al., 2014 & Van Vliet Lanoe et al., 2014);
 - E :** West-central France (this work);
 - F :** Aquitaine (Clarke et al., 2002);
 - G :** Central-Portugal (Clarke and Rendell, 2006).



We compare EASEs extracted with I* : global high cold climatic periods (Wanner et al., 2011). These periods are determined by II : standardized ocean stacked Ice Rafted Debris records, with Bond's events also numbered above (Bond et al., 2001, 1997; Wanner et al., 2011). Cooling periods seem to be linked to storminess increases in European Atlantic coasts.

Conclusions

→ Nine paleo-storm events identified into three Yeu Island deposition environments, including a 2100-1950 calBP deeply stormy-disturbed period and five others major impacted times : 600-500 calBP, 2850-2350 calBP, 3500-3270 calBP, 5400-5370 calBP and 6650-6510 calBP.

→ Six European Atlantic stormy periods stand out from the last 8000 years : 600-300 BP, 1700-1100 BP, 2900-2500 BP, and 3500-3300 BP, 5500-5100 BP and 7700-7100 BP globally corresponding to worldwide Holocene cold events.