Sea level changes in the Paleocene-Eocene interval in NW France Evidence of two major drops encompassing the PETM

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Terrestrial and lagoonal to shallow marine paleoenvironments are preserved in the Lower Paleogene outliers scattered along the eastern English Channel coast (Dieppe-Hampshire Basin). Stratigraphic studies in this Paleocene-Eocene (P-E) interval reference area (Dupuis *et al.*, 1998; Aubry *et al.,* 2005) are especially useful in reconstructing sea level changes. Nine regional units can be delineated and traced along the coast transect. They are separated by eight hiatuses of diverse durations and variable lateral continuity and structured in three transgressive sets of units. The lower one belongs to the Thanetian (NP7 to NP9a). The two others encompass the "Sparnacian" and the Early Ypresian (*s.s*.) (NP10-NP11). The second set comprises the successive Mortemer Fm, Ailly Mb and Craquelins Mb.

The first Major Sea Level Drop (MSLD1) resulted in the erosion of large channels filled up by the fluviatile-palustrine Mortemer Fm. The upper bed of this later Fm bears the CIE onset pointing to the P-E boundary. The transgression continued with the lagoonal-shallow marine Ailly Mb yielding the *Apectodinium* acme. The overlying Craquelins Mb is a glauconitic clay only recognized along the Varengeville outlier and in the Sotteville-sur-Mer and Eu sections; it coincides with the end of the *Apectodinium* acme and marks a maximum flooding of the transgression. The third set starts after the MSLD2 which formed a regional erosional surface. On it lays a complex unit of very shallow marine sands often rich in "avelannes", very well rounded small flint pebbles, appearing for the first time in the stratigraphic record ("Sables Fauves", Blackheath Beds, Oldhaven Mb, etc.). Of variable thickness, this unit marks the base of the marine Ypresian (*s.s*) (Varangeville Fm, London Clay Fm, etc.).

The two MSLDs are of different natures. MSLD1 is widely reported in the studied area where the uppermost Paleocene fluvial channels can be observed (Cap d'Ailly, Newhaven, Dormaal, Erquelinnes, Flines-les-Râches, Therdonne, Le Quesnoy-Rivecourt, etc.). The regular size of the channels and their rather uniform distribution suggest that the incision of fluvial networks was dependent to a broad uplift due to the magmatic activity of the NAIP (North Atlantic Igneous Province). The subsequent cooling of the intrusion caused the thermal subsidence controlling the transgressive trend of the succession (Knox, 1996) later perturbed by the MSLD2. Of independent (?) origin, MSLD2 is related to a sea shore abrasion surface the effects of which vary from almost no erosion to large denudations resulting in unconformities over rejuvenated (?) tectonic structures (Bray anticline, etc.).

The MSLD1 context suggests a scenario for some global events around the P-E boundary. The NAIP driven uplift emerged a large area around the hot spot. This may have triggered both the organic matter oxidation of those regions and the destabilization of the sea slopes clathrates, adding a contribution to the release of thermogenic methane from the intrusions in the Norvegian Sea (Svensen et al, 2004). This interpretation may also explain the position of the CIE shortly after the incision of the channels and the beginning of the transgression.