



How plate tectonics is recorded in Chalk deposits along the eastern English Channel in Normandy (France) and Sussex (UK)

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Intra-plate stresses occurred in the Anglo-Paris Basin and English Channel during Upper Cretaceous and Cenozoic times as a consequence of the convergence between Eurasia and Africa and the opening of the North Atlantic area. This geodynamic re-organisation is recorded each part of the English Channel, with the emergence of regional structures like the Weald-Artois anticline and the reactivation of large-scale strike-slip faults. We analyse the Anglo-Paris basin Chalk fracture system, on each part of the eastern English Channel, using a set of 1600 meso-scale fractures data collected on coastal chalk cliffs in Normandy (NW France) and Sussex (UK). Meso-scale fracture system is precisely dated using chalk lithostratigraphy correlations within the basin. Moreover, an inversion method is used on fault slip data to evidence a paleostress chronology in the Anglo-Paris basin. Three main older extensive events, characterized by normal faults and jointing are recorded in Normandy and two younger compressive and extensive events with strike-slip and normal faults appear in Sussex. Paleostress records vary on each part of the eastern English Channel. The meso-scale fracture system is thus used to better define the type of relationship between meso-scale and large-scale brittle deformation in the Chalk during Meso-Cenozoic. A first NE-SW extension is recorded in Normandy in relation with local anticlines structures and related to the Lower Rhine graben opening. A second event is a WNW-ESE extension of local origin in relation with the subsidence axis of the Paris basin. The third event is a NNE-SSW extension, well marked in Normandy and related to the activation of E-W normal faults in the western approaches of the English Channel. This event is also recorded in Sussex and reactivates locally older fractures in strike-slip. The Oligocene N-S compression / E-W extension related to the Pyrenean tectonics and the last E-W extension relative to the North Sea graben opening are well recorded in Sussex, but not in Normandy. Recent far-field stresses developed in the NW European platform are focused on deep crustal structures like the Artois hills and the Cotentin areas in France. These structures act as a stress barrier by protecting the Normandy Chalk from recent far-field stresses. On the contrary, recent far-field stresses are easily recorded by meso-scale brittle deformation on the folded Chalk in Sussex.