



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

Anne Duperret (1), Sara Vandycke (2), Rory N. Mortimore (3), and Albert Genter (4)

(1) Université du Havre, FRE3102 CNRS LOMC, UFR Sciences et Techniques, Le Havre, France  
(anne.duperret@univ-lehavre.fr, 33 0235217198), (2) Université de Mons, Géologie fondamentale et appliquée, 20 place du Parc, 7000 Mons, Belgique, (3) University of Brighton and ChalkRock Ltd, 32 Prince Edwards road, Lewes, Sussex BN7 1BE, United Kingdom, (4) BRGM and GEIE Exploitation minière de la chaleur, route de Soultz, BP 40038, 67250 Kutzenhausen, France

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.