Geophysical Research Abstracts
Vol. 20, EGU2018-7813-1, 2018
EGU General Assembly 2018

Structural development of the southern Dieppe-Hampshire Basin and its borders (Eastern English Channel)

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The Eastern English Channel has been shaped since Mesozoic times by distant tectonic events along European plate boundaries (opening of the North Atlantic Ocean, Pyrenean and Alpine orogeneses). Currently, the Dieppe-Hampshire Basin corresponds regionally to a NW-SE oriented syncline crossing the English Channel with the terminations of the basin outcropping on both sides: on the southern English and the northern French coasts. Extensional and subsequent compressional states of stress in this region involve the reactivation of older major regional structures, even inherited from the Variscan orogeny. Although the general framework is accepted, the precise structural development of the basin during Cenozoic times and the way it affects the sedimentary cover in time and in space still remain poorly documented.

The contribution of new very high resolution seismic data acquired with a Sparker equipment during oceanographic cruises "TREMOR" (2014) and "TREMOR 2" (2017), and of new coring data ("TREMOR 2", 2017) allow to propose a stratigraphic model for the Paleogene of the Dieppe-Hampshire Basin and to highlight deformation episodes affecting the eastern English Channel during the Cenozoic. The high density of the seismic coverage provides clear tectonic geometries within the southern Dieppe-Hampshire Basin and adjacent areas. The interpretation of these seismic profiles resulted in a detailed mapping of numerous tectonic features (faults and flexures) and their respective spatial connections. We especially image the high intensity of the deformation offshore the Boulonnais coast (Weald-Artois anticline) and along the Nord-Baie de Seine Basin, with an unprecedented resolution. Some diffuse deformation is observed within the Upper Cretaceous chalk off the coast of Dieppe and Le Tréport. Within the Cenozoic Dieppe-Hampshire syncline, the deformation pattern reveals two major tectonic directions, E-W and NW-SE oriented, both affecting syn-to post-Bartonian sediments. Although lacking kinematic clues, our observations highlight the synchronous functioning of these two major faults/folds directions, consistent in age and orientation with a late Pyrenean or early Alpine deformation phase. We suggest that the major inherited heterogeneities of crustal blocks underlying the basin had an important control on the development and orientations of these late structures.