

A synthetic structural map of Tertiary formations in the Paris Basin

Stephen Brown^{*1}, Laurent Beccaletto³, Agathe Jullien-Sicre¹, Yves Missenard¹, Philippe Robion², Cécile Allanic³,

¹Université Paris-Saclay, UMR GEOPS - France

²Géosciences et Environnement Cergy, CY Cergy Paris Université (GEC) - France

³BRGM - France

Sedimentary basins are subject to tectonic stresses that propagate from continental plate boundaries. The resulting strain can vary: the lithosphere can buckle and fold, brittle deformation can occur, often reactivating basement faults, and microstructure networks of faults, joints and veins can develop on a local scale. These intraplate deformations, either attributed to the Pyrenean Orogeny or to the Alpine Orogeny, are present in Tertiary formations of the Paris Basin. Tectonic structures directly affect the stratigraphic architecture and facies of sedimentary deposits. However, when compared with the well-documented architecture of sedimentary deposits and tectonic structures of the Paris Basin, relatively little is known about the relationship between the two. Preliminary results of this PhD revisit the tectonic structures of Tertiary formations using new and existing data.

Since 2000, the BRGM reprocessed thousands of kilometers of industrial seismic lines covering the entire Paris Basin. We propose an interpretation of the base of Tertiary formations in the Paris Basin, calibrated by hundreds of wells with velocity surveys. Strategically placed geological cross sections made with well data containing the top depth of different Tertiary stages, combined with information from geological maps (1/50 000 scale edited by the BRGM), reveal the Cenozoic tectonic structure of the Paris Basin.

Interpreted seismic lines and geological cross sections make up the initial results of this PhD, illustrated by a synthetic structural map of Tertiary deformations in the Paris Basin. This map shows long wavelength and low amplitude post-Mesozoic undulations along with faults traversing the Tertiary base.

The continuation of this PhD will involve fieldwork with structural observations (deformation directions, geometry, density, distribution) and sample collecting as well as laboratory work (magnetic and wave velocity anisotropy and in-situ U-Pb calcite dating) in order to constrain the temporal and spatial evolution of paleo stresses propagating from tectonic plate limits.

Keywords: Paris Basin, Cenozoic deformations, tectonic, faults, folds, inherited structures