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3D structural modelling of a wrench rift basin: the Upper Rhine Graben of NW Europe as a case study - Contribution of the EU GeORG project.

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The Upper Rhine Graben (URG) of NW Europe is a Cenozoic wrench rift basin about 300 km long and 30 to 40 km wide, with an Eocene to Quaternary sedimentary fill up to 3 km thick. The EU GeORG project aims to give a detailed knowledge of its deep geological structure, in order to assist the safe and successful use of its great geological potential (e.g. geothermal energy, CO2 sequestration...).
Products are based on a Gocad 3D geological model of the URG, mostly based on the interpretation of about 5400 km of reprocessed seismic lines, and a database of more than 2500 wells, from oil, mining and thermal water exploration. It's the first time that such an amount of subsurface data is gathered, studied and modelled in the URG.
We first put the emphasis on the inventory of the various observed structural features (e.g., normal and strike-slip faults, salt domes), and their implication regarding the structural evolution the URG. We demonstrate the predominant role of the Miocene-to-present NNE-SSW strike-slip regime of the URG, which is characterized by the development of transtensional faults and flower structures, local transpression and inversion of older normal fault planes. A remarkable feature is also the offset of reactivated Paleozoic basement faults, known outside the basin. Thus, the Neogene strike-slip deformation tends to obliterate the initial rift structure as well as its basement structural heritage, giving a distorted view of pre-Miocene structural styles.