

Tectono-stratigraphic evolution of the Permo-Carboniferous Lorraine-Saar basin constrained by 3D geological modeling (France, Germany)

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The Permo-Carboniferous Lorraine-Saar Basin (LSB) was formed during the late Variscan orogeny as part of the Saxo-Thuringian retrowedge. The Permo-Carboniferous series in Lorraine buried below the Paris Basin corresponds to the southwestern continuation of the exposed Saar-Nahe Basin in Germany. In Lorraine, this basin consists of thick continental series (up to 8 km) deposited from Late Mississippian to Early Permian, over about 70 Myr. Despite the investigations dedicated to coal and petroleum explorations over the last century, there is no coherent regional stratigraphy and tectonic history between both Lorraine and Saar regions. In Saar this basin is considered as an inverted half-graben with a strike-slip component, whereas the Lorraine part displays a stronger compressive imprint, with a fold and thrust belt developing during the Pennsylvanian (i.e. Asturian) and Early Permian (i.e. Saalian phase). Moreover, 2D seismic lines in the Lorraine show evidences of inverted thrusts, allowing the accumulation of the Stephanian (Late Pennsylvanian) series in some half graben structures. These tectonic phases are characterised by rapid subsidence, migration of depocentres (towards the NE along the Metz-South Hunsrück fault system), significant erosion and changing sediment sources. To date there is no 3D representation and coherency between the buried structures and established stratigraphy. In the frame of the DEEPSURF project, existing structural cross-sections, interpretation of newly reprocessed 2D seismic lines, borehole data and geophysical logs are used to build a GOCAD 3D model of the Permo-Carboniferous series and controlling faults. The resulting 3D geometry of the series will enable to analyse spatial variations of subsidence and uplift across the intramountain, thereby providing new constraints on the slab dynamics along the bounding Rheno-Hercynian suture zone.

Mots-Clés : Late Variscan orogeny, Saar-Nahe Basin, Permo-Carboniferous, intramountain basin, tectonic inversion, Rhenohercynian subduction.