

DESCRIPTION**3D structural and thermal modelling
of the Permian-Carboniferous basin of Sarr-Lorraine.**

We are seeking candidates with doctorate degree in geosciences, specialized in the reconstruction of tectonic and sedimentary filling history of sedimentary basins on the basis of the interpretation of seismic profiles and well data in the objective of a 3D structural reconstruction and dynamic interpretation.

Context and motivation of the post-doc project.

In France, the Carboniferous-Permian Sarr-Lorraine basin is located under a Mesozoic sedimentary cover of the east Paris Basin. Despite its significant dimensions (250x100x6km) its detailed tectono-sedimentation history is not well known. It has been intensively explored and exploited in its more eastern part, yet only in the localized area of the coal district (Bassin Houiller) until the end of the mining activities by the Houillères du Bassin de Lorraine. The lithostratigraphy of the remaining parts of the basin is known through dispersed drillings. The lateral and vertical extensions of the basin is known through diverse geophysical investigations. In particular, some seismic profiles allowed to characterize its general organization (Ecors-Dekorp campaign for instance); many petroleum exploration seismic profiles have been acquired over the basin during several decades but not necessarily in the objective of understanding the structure and the filling geometries of the Carboniferous. The consequence is that the basin is only partially known and no complete geological synthesis has yet been proposed for the Carboniferous-Permian. A detailed study of the structure and evolution on the basin is however necessary. It would allow to :

- Understand the development of the basin within the heart of the Hercynian mountain belt, in a key position between the Saxothuringian and Rheno-Hercynian domains, seated on the Rheno-Hercynian suture ;
- Propose a geodynamic context to the filling history in order to understand the organisation of the sedimentary deposits, perceived today as complex because not well known in its relationships to tectonics ;
- Bring a reasoned context to the deep geological exploration of Lorraine for divers resources like coal gas, geothermy, underground reservoirs for energy or greenhouse gases storage.

Objectives of the post-doc.

The scientific objective is to construct a dynamic 3D model of the complete Lorraine coal basin. This is an unprecedented objective.

- 1) The construction of a 3D model implies a study of the geometry of tectonic structures but also on their kinematics
- 2) The revision of the structural evolution of the basin will be conducted together with its filling history. Indeed, sedimentation is strongly tributary of the kinematic evolution of the basin at various scales, located in the heart of the mountain belt. Correlation between wells and understading of sedimentary architecture always posed problems in the Carboniferous basin of Lorraine because of absence of a synthetic vision. The 3D model will take into account relationships between tectonics and sedimentation in order to progress in our understanding

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of the sedimentary architecture. This approach will allow to evaluate with greater precision the thickness of eroded terrains during the uplift episodes within the basin, a relevant information for a better quantitative assessment of the thermal evolution analysis.

- 3) The dynamic spatio-temporal analysis of the structural evolution will lead to the reconstruction of burial curves using a basin modelling approach. This will be essential to the thermal reconstruction of the basin.

Key words : Hercynian, Carboniferous, intra-mountain basin, 3D geological and thermal modelling

Administration and logistics

- Financing : Post-doc stipend from the Lorraine University of Excellence (50% Deepsurf-50% BRGM) : about 1800euros/month depending on the experience of the candidate.
- The post-doc work will be conducted within the GeoRessources laboratory located at the University of Lorraine (Vandoeuvre-lès-Nancy) in close partnership with BRGM (Orléans). This research will be strongly connected with the work done within the REGALOR project framework <https://regalor.univ-lorraine.fr/>
- Scientific Direction :
 - *Direction* : R. Michels - GeoRessources (Université de Lorraine-CNRS)
 - *Co-Direction* : L. Beccaletto - Direction des Géorressources (BRGM Orléans)
 - *Collaborations* : O. Averbuch, LOG (Université de Lille) ; T. Blaise, GEOPS (Université Paris sud) ; A. Izart, independant expert independant, specialist of the Carboniferous.

SELECTION CRITERIA

- Doctor diploma in Earth sciences
- Mastering of concepts : structural geology (fault/folds deformation, kinematics), sedimentary basins dynamics (molasse/syn-rift), mountain belts dynamics (hercynian orogeny, syn vs post orogeny), basin thermicity.
- Mastering of softwares : GOCAD (3D modelling), Geographix (seismic interpretation, time-depth conversion), Petromod (burial modelling).
- Language : French is not required (foreing students will follow French lectures). Level in english must meet allow understanding and writing of scientific documents of professionnel standard level.

TERMS AND TENURE

This two-year position will be based at the **laboratory GEORESSOURCES (UMR7359)** The duration can not exceed 24 months.

The target start date for the position is **October 1st, 2020**, with some flexibility on the exact start date.

HOW TO APPLY

Applicants are requested to submit the following materials:

- A cover letter applying for the position
- Full CV and list of publications
- Academic transcripts (unofficial versions are fine)

Recommendation letter(s) will be appreciated



POSTDOCTORAL FELLOWSHIP

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Deadline for application is **June 15th, 2020**. Applicants will be interviewed by an Ad Hoc Commission by **July, 10th, 2020**].

Applications are only accepted through email. All document must be sent to **Raymond.michels@univ-lorraine.fr**

JOB LOCATION

GeoRessources, Vandoeuvre-lès -Nancy, Lorraine, France

REQUIREMENTS

DOCUMENTS

- Curriculum Vitae - Your most recently updated C.V. including list of publications
- Cover Letter
- Statement of Research
- Recommendation letter(s)