

EGU21-14465

<https://doi.org/10.5194/egusphere-egu21-14465>

EGU General Assembly 2021

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## Characterisation of the Dogger and Trias deep resources in Orléans Métropolis, Centre-Val de Loire region, France : 3D geomodel and first geothermal potential assessment

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In Ile-de-France region, in the center of Paris Basin, geothermal energy contributes to a large extent to the supply of heating networks with about 50 of the 70 deep geothermal installations dedicated to district heating in France. Those installations mainly exploit the Dogger limestones between 1500-2000 m deep, which are present throughout the Paris Basin. In the case of Centre Val-de Loire region, south of Paris Basin, deep geothermal energy is very little developed, only one geothermal well is currently in operation and targeting the Triassic aquifer at Chateauroux on the southern edge of the basin. A former doublet had also targeted the Trias at Melleray (Orléans metropolis) in the 1980's but was shut down after one year due to reinjection problem.

In 2019, Orléans metropolis, in collaboration with BRGM, has launched a program in order to investigate its deep geothermal resources like the Dogger and Trias aquifers between 900 m and 1500 m deep. This action is in line with Orléans métropolis Territorial Climate Air Energy Plan (PCAET) and master plan for the heating networks adopted which foresee 65 000 additional dwellings to be connected using geothermal energy based heating networks.

In order to reduce the risks of failure of deep geothermal drilling, one of the prerequisites is a better knowledge of the subsurface. This requires the development of an accurate 3D subsurface geomodel as well as the most reliable possible hydrodynamic and thermal parameters to assess the geothermal potential. The purpose of this work was to produce a 3D geological model of the Dogger and Triassic units, on the scale of Orléans Métropolis, based on hydrocarbon and geothermal well data as well as interpretation of 2D seismic data. Seismic data acquired in the 1960s and the 1980s were processed and interpreted. A particular attention was paid to the Sennely fault and its geometry. It crosses the study area and was interpreted as a relay fault segmented in three parts. The horizon picking points were then converted from two-way time to depth and integrated in the GeoModeller software for the development of the 3D geomodel. It was then used for first hydrothermal simulations in order to assess the theoretical potential of the Dogger and Trias aquifers at Orléans metropolis.

The 3D geomodel and first geothermal potential assessment have allowed defining areas of interest for geothermal development into the Dogger or Trias. However an initial exploratory

drilling well or additional exploration techniques will be necessary to confirm/specify the reservoir properties (useful thickness, porosity, permeability) and the connectivity of the reservoir(s) and the flow rates that can actually be exploited, which cannot be predicted by the current geological model.