

## **GEOPHYSICAL IMAGING OF SALTWATER BODIES IN LORRAINE (FRANCE)**

Philippe Elsass and Francis Mathieu

GEODERIS, Metz and BRGM, Orléans, France

### **Abstract**

The Lorraine region in France is rich in salt deposits of Triassic age, which have been mined both by underground mining and solution mining. Natural dissolution also occurs where the salt beds are less than 100 m deep, and gives rise to a system of brine-filled channels at the top of the salt formation, which is referred to as the saltwater body ("*nappe salée*").

Wild brining has been carried out in the 19th century in the vicinity of the underground Einville salt mine, which is still open but not active anymore. Concern has arisen that the continuation of solution mining activity in the area could reactivate dissolution at the fringe of the salt water body, which could eventually reach the underground mine.

This concern has led GEODERIS to commission a geophysical survey to delineate the extent of the salt water body in this area. Two resistivity methods have been applied, the electrical rectangle and the electrical panel method. The electrical rectangle method provides a resistivity map integrated over a depth of several hundred meters, but does not distinguish between the saltwater body and conductive clay formations.

The electrical panels provide 2D vertical sections which, after adequate modeling, can be interpreted as geological sections: clay formations and the salt water body are imaged as conductive layers, and zones of wild brining appear as extremely conductive structures, due to the invasion of brine into the overlying disorganized marls.

The interpretation from the electrical panels is then applied to the results of the electrical rectangle: The effect of the clay formation is modeled and subtracted from the map. In the end a map of the extent of the saltwater body and of the zones affected by wild brining is obtained, showing that they do not reach the hanging wall of the underground mine.

**Key words:** Bedded salt deposits, Underground mine/mining, Solution Mining and Salt History, Geophysics, France