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Abstract title : The Thau hydrosystem under surveillance: an observatory to prevent seawater intrusion in the submarine Vise spring (Balaruc-les-Bains, France)

Abstract body :

The Balaruc-les-Bains peninsula is subject to seawater intrusion phenomena by the sudden and prolonged inversion of the flow through the submarine Vise karst spring (the so-called "inversac" phenomenon). The inversion process spreads saltwater from the Thau lagoon downstream of the karst aquifer developed in Upper Jurassic limestones.

This process modifies the local field of hydraulic heads and groundwater quality. Nevertheless, the preservation of the quality of these groundwaters and their uses (drinking water, thermalism...) is crucial. Such preservation requires a better understanding and prevention of the inversion process which already occurred 7 times over the last 50 years.

For this purpose, an observatory has been installed over the territory since 2019. Offshore in the Thau lagoon, the submarine Vise spring was equipped with flow recording devices as well as electrical conductivity and temperature monitoring sensors. Onshore but close to the spring, three boreholes of 45 m, 168 m and 300 m deep each were drilled near an existing thermal borehole, and a new borehole including fiber-optic *distributed temperature sensing* (FO-DTS) is currently under completion.

Sub-hourly observations of pressure, electrical conductivity and temperature in these boreholes and in the lagoon, as well as synoptic measurement campaigns focused on groundwater chemistry, complete a monitoring network of about twenty boreholes and springs spread across the territory.

Thanks to this observatory, the last inversion process which started on November 28th could be characterized with a high temporal resolution on a dense monitoring network. This monitoring network allowed to follow : the sudden rise of the water level in the wells (more than 2 m locally) and changes of temperature and salinity associated with the transport of salt water in the karstic aquifer. Overall, this observatory provides valuable observations that helps better understand inversion processes drivers, which up till now remained overlooked.