Molecular Characterization of Natural Organic Matter in the Ouysse Karst System (Lot, France): A New Hydrogeological Indicator

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Résumé

Covering an area of 650 km^2, the Ouysse karst system ranks as the second in France. It is characterized by a mixed recharge, combining diffuse infiltration of rainwater and discrete inputs from three surface rivers (1). This system represents a strategic water resource, providing the sole source of drinking water for approximately 80,000 inhabitants. Recent studies have highlighted its complex hydrogeological functioning, marked by spatially and temporally variable mixing processes, heterogeneous chemical signatures at spring outlets, and a rapid decline in water quality following rainfall events (2).
This research project aims to characterize the nature and molecular composition of the natural organic matter (NOM) within this karst system and to assess its vulnerability to contaminant transport. The methodology is based on a series of sampling campaigns conducted at various locations within the Causses du Quercy Regional Natural Park, during contrasting hydrological conditions (floods and low-flow periods). Each sample will undergo physico-chemical (pH, temperature, conductivity), ionic, and microbiological analyses. The dissolved organic fraction will be extracted using solid-phase extraction (SPE) cartridges and analyzed by ultrahigh-resolution mass spectrometry (FTICR-MS). A second analytical phase using liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) will allow for detailed identification of functional groups and compound annotation through specialized molecular databases (3).

The ultimate goal is to develop a model describing the evolution of NOM within the Ouysse karst system, and to evaluate its potential as a novel hydrogeological indicator based on the

*Intervenant

molecular fingerprint of dissolved organic matter.

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(2) G. Lorette *et al.*, *J. Hydrol,* 2021, doi: 10.1016/j.jhydrol.2020.125859.
(3) M. C. Bridoux *et al.*, *Water Res.*, 2023.

Mots-Clés: Natural organic matter, FTICR, MS, karst system