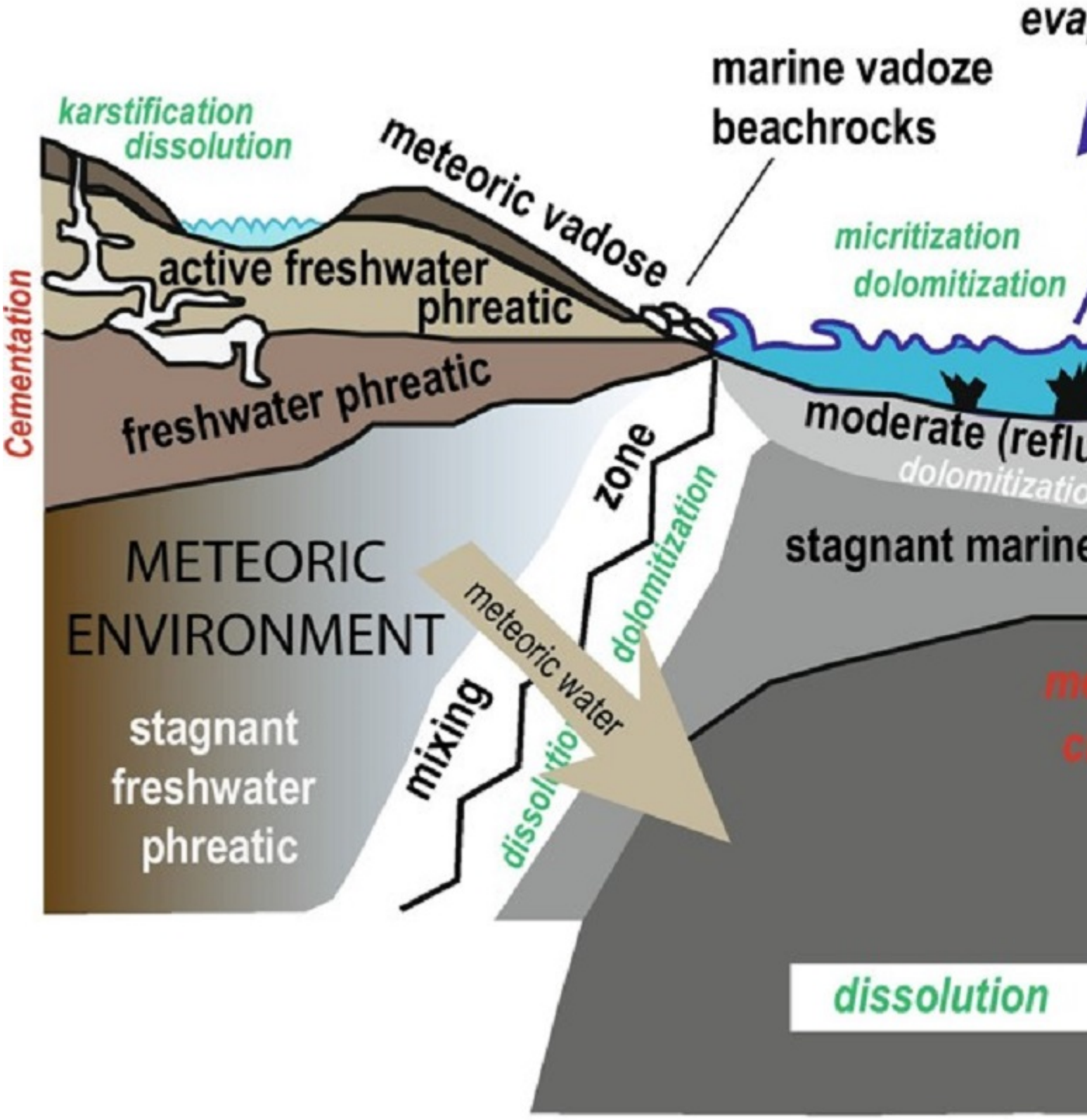

Written on 13 March 2025 3 minutes of reading
News

- Fundamental Research
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Understanding and predicting fluid-rock interactions to optimize energy resources and underground storage
A new review article in the Earth-Sciences Reviews journal

A new review article has just been published decomplexifying the mechanisms governing fluid-rock interactions and providing keys to better understanding how to manage energy resources and underground storage. The study was published in Earth-Sciences Reviews, a scientific journal covering the evolution of the Earth and its environment.

Research conducted within the framework of a chair dedicated to muti-scale fluid-rock interactions

Led by Fadi H. Nader (IFPEN), in collaboration with Liviu Matenco (Utrecht University, Netherlands and Bucharest University, Romania) and Bilal U. Haq (Utrecht University, Netherlands; Sorbonne University, Paris, France; Smithsonian Institution, Washington DC, USA), this study [1] was conducted within the framework of the chair he holds. This chair, initiated within the context of a partnership between IFPEN and Utrecht University, is dedicated to fluid-rock interactions on various scales, and has just been renewed for a period of five years on the back of its success.

A simplified model that takes into account tectonic structures to qualify fluids and the way they circulate in the underground environment

It proposes a simplified model to better understand the mechanisms involved and how these fluid-rock interactions are influenced by tectonic movements. These processes play a key role in rock porosity and deep fluid flows, with major implications for underground energy use. Researchers have identified four types of fluids associated with the principal tectonic structures. They show that fractured structures where rain water infiltrates promote better circulation, something that is essential in the field of geothermal energy. Conversely, in more stable, less fractured contexts, fluids evolve by precipitating minerals that tend to obstruct pores, thereby limiting flow.

This new model makes it possible to better anticipate the evolution of reservoir rocks as a function of tectonic and hydraulic conditions. It will be invaluable for improving geothermal resource management and optimizing underground CO? storage, by identifying the most favorable environments for these applications.

Reference :
[1] Fadi H. Nader, Liviu C. Matenco, Bilal U. Haq, Conceptualizing fluid-rock interaction diagenetic models with focus on tectonic settings, Earth-Science Reviews, Volume 258, November 2024, 104951
>> https://doi.org/10.1016/j.earscirev.2024.104951

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A new study of the effects of tectonics on fluid/rock interactions
13 March 2025

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