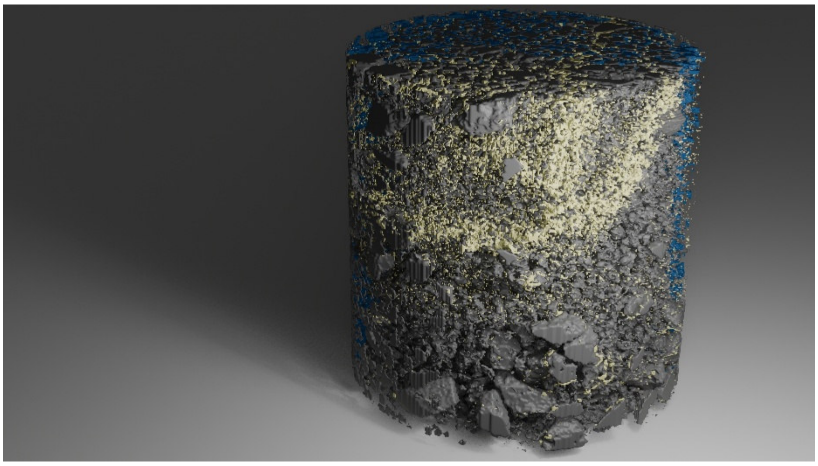

Title of Image

Path of Precipitation

Image description: The image description is a core element for the evaluation of the images by the jury. Please provide information about the following topics:

How was the image captured and (if applicable) colored?

The image is based on a 3D micro-computed tomography recorded using a Xradia 410 Versa system from Zeiss (Carl Zeiss AG). To balance high resolution and representativeness of the sample, a subvolume of the sample (Ø 4.2 mm × 4.2 mm) was imaged at a voxel size of 4.2 µm. The originating greyscale image was processed in Dragonfly 3D World, where the different phases were segmented. The final rendering and coloring were performed with the software Blender. In the image, grey represents quartz sand constituting the porous medium, blue indicates water within the pore space, yellow highlights the mineral precipitates and the gas is shown as transparent.

For what application was the image taken?

This image was taken to understand how mineral growth clogs pores and alter fluid movement in partially saturated porous materials, where gas and liquid coexist within the same space. The results are used to test and improve models that predict subsurface behavior, supporting safer and more reliable applications such as carbon dioxide storage, hydrogen storage, geothermal energy, and nuclear waste disposal.

What makes this particular image special?

This image captures a process that is usually invisible: how minerals grow inside a porous material and reshape the pathways through which fluids move, driven by chemical gradients. Unlike idealized systems, the image shows these processes under partially saturated conditions, where gas and liquid coexist and responds under chemical gradients. In this environment, mineral growth does not simply clog pores, it dynamically reorganizes the entire flow network. By revealing how chemical gradients trigger and control these transformations in three dimensions, the image provides a rare glimpse into how fluid flow in the subsurface in real-world conditions.

What scientific insights does one (hope to) gain from such images?

We rely on models to predict how subsurface energy systems behave, but these models are rarely tested under the conditions where they are most likely to fail. This image provides that missing reality check. It captures how mineral growth alters fluid pathways in partially saturated porous media, where chemical and thermal gradients drive complex changes that are typically simplified or neglected in simulations. By benchmarking models against these observations, we can identify their limitations and make them more physically realistic. This is a crucial step toward improving the reliability of predictions for energy applications such as CO_2 sequestration, hydrogen storage, and geothermal systems.

Modality used to take the image

The image was recorded using a Xradia 410 Versa X-ray computer tomograph from Zeiss (Carl Zeiss AG) at 4x magnification.

Please describe the scientific impact of the image and the method used in plain language. On the basis of this text, a decision will be made as to whether the image will progress to the next round *(max. 200 characters including spaces, no acronyms)*

This image shows how mineral growth reshapes fluid pathways when gas and liquid coexist, helping test and improve models that ensure the safety of underground energy systems.

Short image description *(max. 200 characters including spaces, no acronyms)*

The yellow mineral precipitates meander through the pore space, condensed around trapped gas clogging pathways and reshaping how fluids move through the material.