

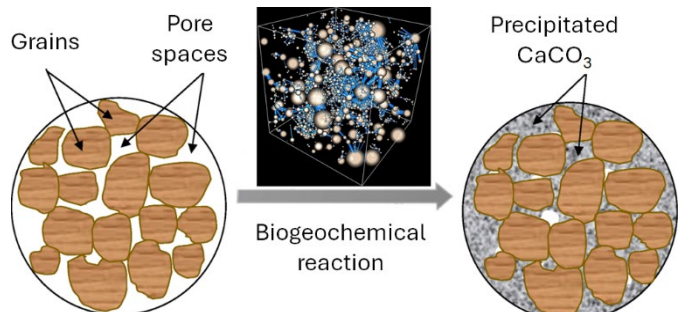
Development of a pore-network model for simulating biomineralization and biogas formation in porous media using denitrifying bacteria

Department: Earth Sciences
Research group: Environmental Hydrogeology
Supervisor: Dr. Jafar Qajar
Email address: j.qajar@uu.nl

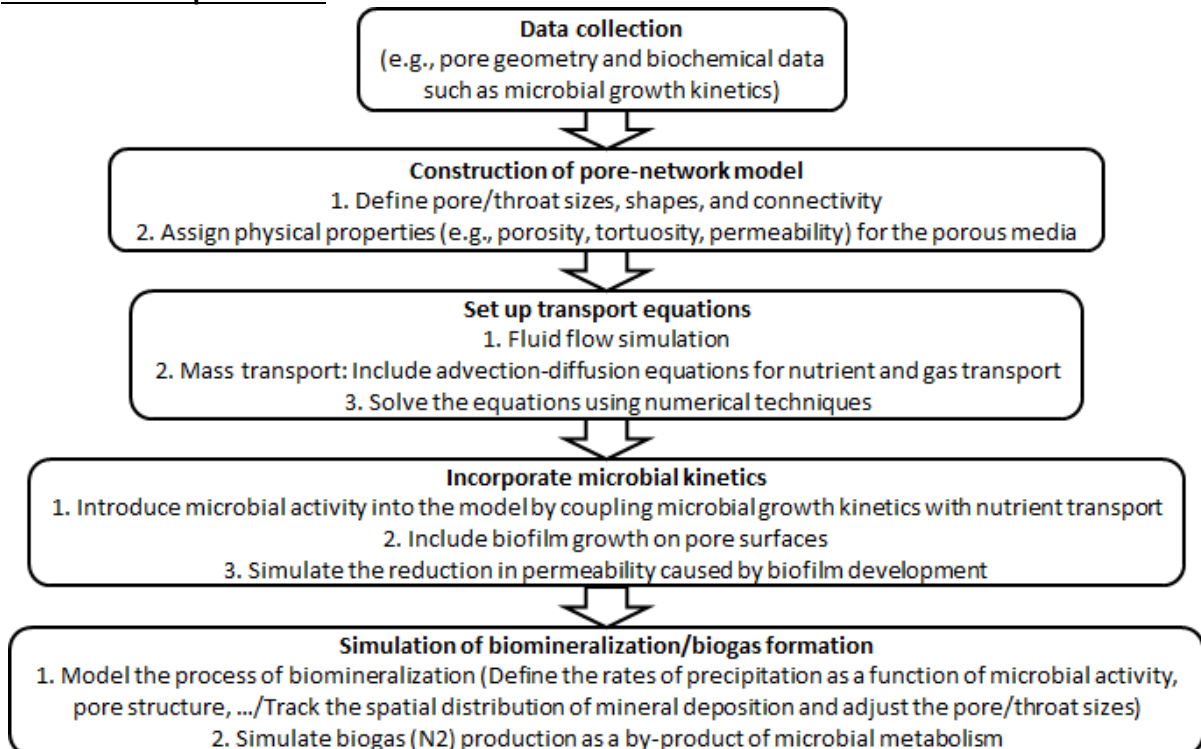
Project description

The conservation of masonry structures is a multidisciplinary field that combines engineering, material science, geology, architecture, and cultural heritage. Developing effective preservation techniques that protect the cultural, architectural, and functional value of these structures is an ongoing research field. Microbial organisms have shown to be an effective technique to positively modify rock microstructure for preservation purposes, primarily through the production of bio-cement and biogases. In this context, it is crucial to investigate how these organisms affect fluid flow at the pore scale.

This project aims to develop a pore network model (PNM) to simulate the biomineralization and biogas formation in porous media using *Paracoccus denitrificans* bacteria. The key parameters include (1) pore structure and connectivity, (2) transport properties (e.g., permeability), (3) microbial growth, and (4) mineral precipitation, biogas formation, and phase changes.



Recommended procedure:



Job requirements

Applicants for this project should have

- basic understanding of flow in porous media and biosciences
- knowledge of fundamental mathematics and numerical methods
- programming experience in MATLAB or Python