Contribution ID: **705** Type: **Oral Presentation**

Use of 4D tomography to track the evolving geometry and flow patterns in dissolving rocks

Thursday, 25 May 2023 10:15 (15 minutes)

Dissolution of porous media introduces positive feedback between fluid transport and chemical reactions at mineral surfaces leading to the formation of pronounced wormhole-like channels. While the impact of flow rate and reaction rate on the shapes of the wormholes is now well understood, much less is known about the dynamics of their propagation. In this communication, we show how the evolution of wormholes and their effects on flow patterns can be captured by in-situ X-ray microCT imaging of dissolving limestone cores. 4D tomography allows us in particular to correlate the permeability changes in a dissolving core with the advancement of the tip position of the wormhole. The analysis of such correlations allows one to detect the highly cemented regions in the core which act as permeability barriers, which the wormhole tries to bypass. Finally, we show how to supplement this information with the analysis of the flow patterns. The latter can be obtained by injecting a contrast solution while scanning the sample in the tomograph. This data allows us to quantify the competition between the wormhole branches, which drives the evolution of the wormholing pattern.

Participation

In-Person

References

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

Poland

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary authors: SZYMCZAK, Piotr (Faculty of Physics, University of Warsaw, Warsaw, Poland); Dr COOPER, Max P. (Faculty of Physics, University of Warsaw, Warsaw, Poland); SHARMA, Rishabh P. (Faculty of Physics, University of Warsaw, Warsaw, Poland); Dr RADLIŃSKI, Andrzej (University of New South Wales, Sydney, Australia); BLACH, Tomasz P. (University of New South Wales, Sydney, Australia); Dr DRABIK, Katarzyna (Oil And Gas Institute - National Research Institute, Krakow, Poland); Dr TENGATTINI, Alessandro (University Grenoble Alpes, Grenoble, France)

Presenter: SZYMCZAK, Piotr (Faculty of Physics, University of Warsaw, Warsaw, Poland)

Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies