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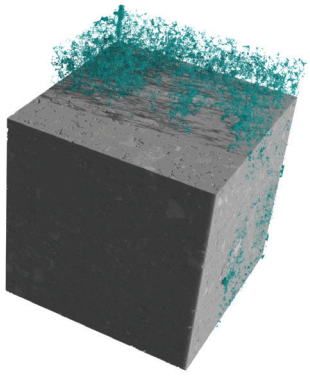
Digital dissection of reservoir samples - CT scanning reveals cracks in rocks

Ghent University have teamed up with the UNIS CO_2 Lab to use their expertise to extract more information from the six kilometers of drill cores collected since drilling began in 2007.

Digital core analysis was performed, using high resolution X-ray tomography imaging, on samples from the Dh4 borehole. Twenty-four samples from the Wilmeøya Subgroup target reservoir were taken, in both the Dh2 and Dh4 borehole as well as correlating outcrop exposures in Konusdalen and Criocerasdalen



Figures By: Ghent University

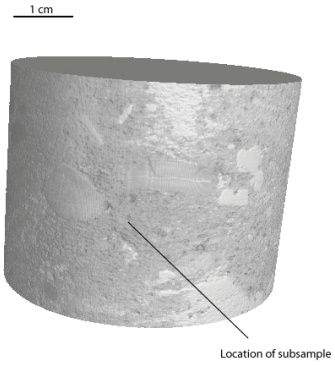


Figure captions

The first image, ("Dh4-C7-Subsample with porosity") is a 3D image of this subsample. This was scanned with a resolution of 4 micron and it was possible to extract the microporosity from it.

The second image, Dh4 - C7 - with location of subsample" is a 3D image of a scan from a conglomerate section in Dh4 at a depth of 677.12m to 677.20m. This scan has a resolution of about 60 micron. From this sample a subsample was taken.

Both outcrop samples of the Wilhelmøya section and core samples were used in order to be able to compare the fractures in the drill cores and the exhumed outcrops. Special attention was given to sampling different facies for maximum variety in the samples. The samples were scanned with a high resolution laboratory X-ray CT system at the UGCT facility of Ghent University (www.ugct.ugent.be). Through this technique a 3D image can be obtained of the internal structure of the samples. The 3D images were used to characterize the distribution of the general structure within the cores. Layering, fractures, down to the pore scale level using selective downscaling can be seen.

Image analysis on the 3D images gives quantitative information about the structures under investigation, like the width and orientation of fractures and the distribution of the pore space. 3D images of the pore space will be used as a basis for fluid flow modeling and will help determine parameters such as the permeability of the pore system.

At the UNIS CO_2 lab and Uni CIPR where the simulation work is done, the data will be directly used for a better understanding of the aquifer. High-resolution studies of the fractures provide the only "hard data" on fracture aperture distribution, a critical parameter for simulating the natural fracture network. With shifting focus on simulating CO_2 injection rather than water, the inclusion of relative permeability effects requires a detailed understanding of the pore throat characteristics, provided by the X-ray tomography imaging at Ghent.

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