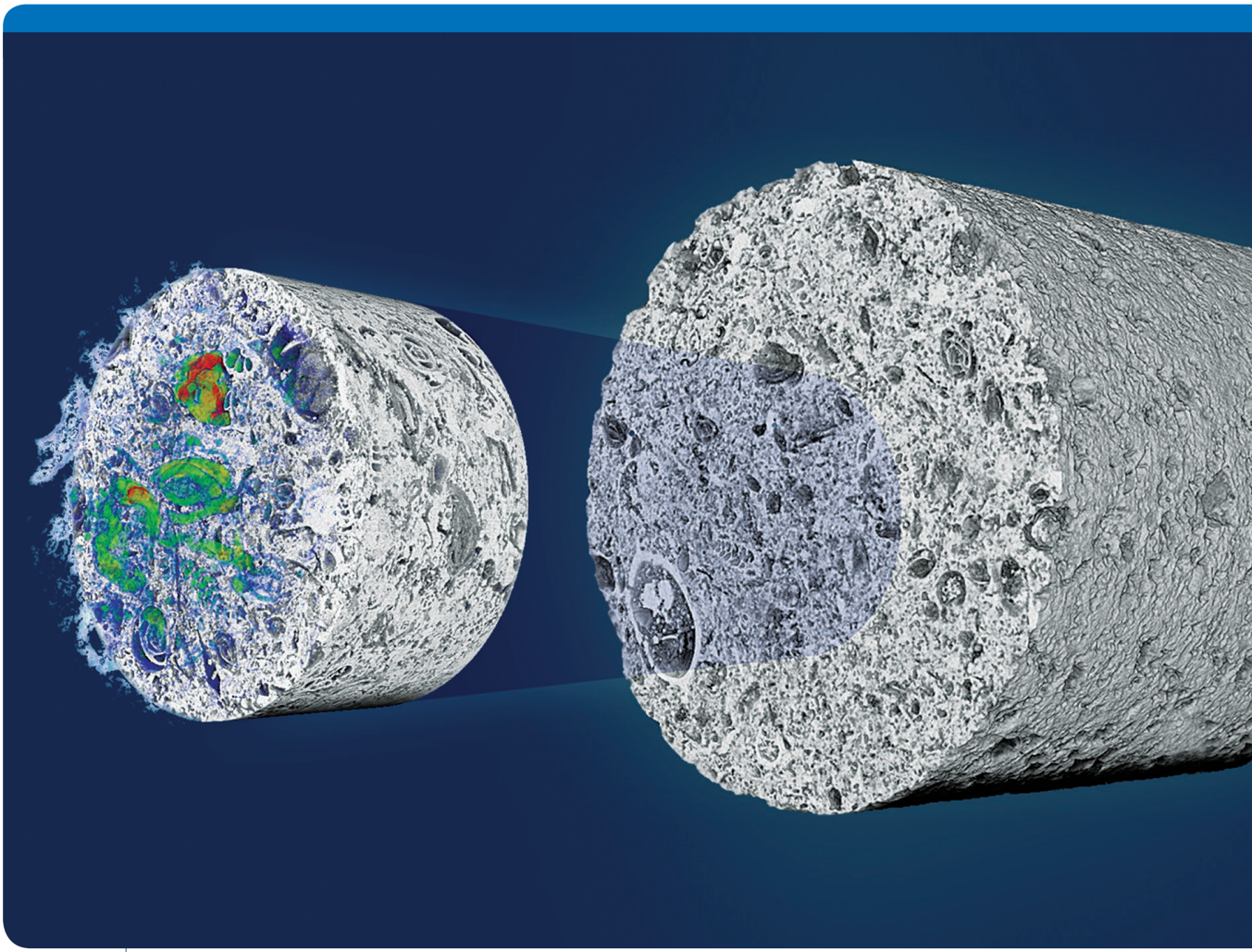


Imaging and Analysis of Geomaterials

- Using Desktop and Laboratory µCT Scanners

Innovation with Integrity

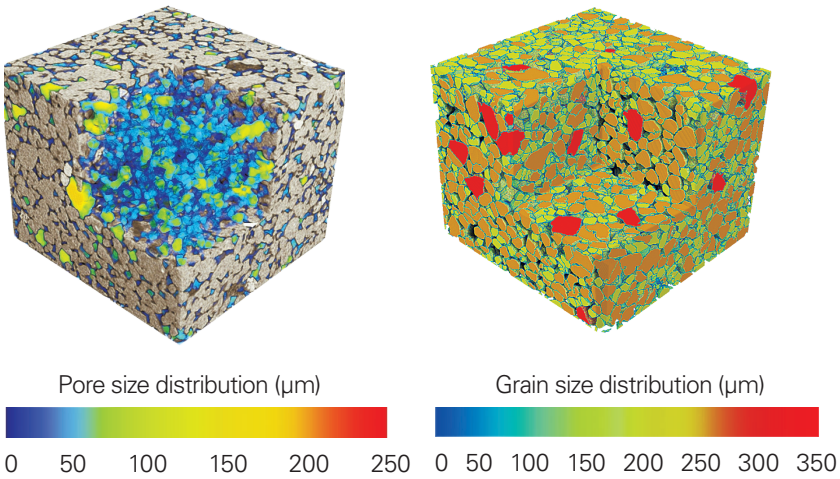
Microtomography

In-situ loading of Noyant limestone using compression stage MTS 3.
SKYSCAN 1275 – 10 µm voxel size

In-situ mechanical testing

Using in-situ compression, tensile and temperature stages, mechanical experiments can be performed inside the scanner. This way, the correlation between a sample's structure and mechanical properties can be investigated in high detail.

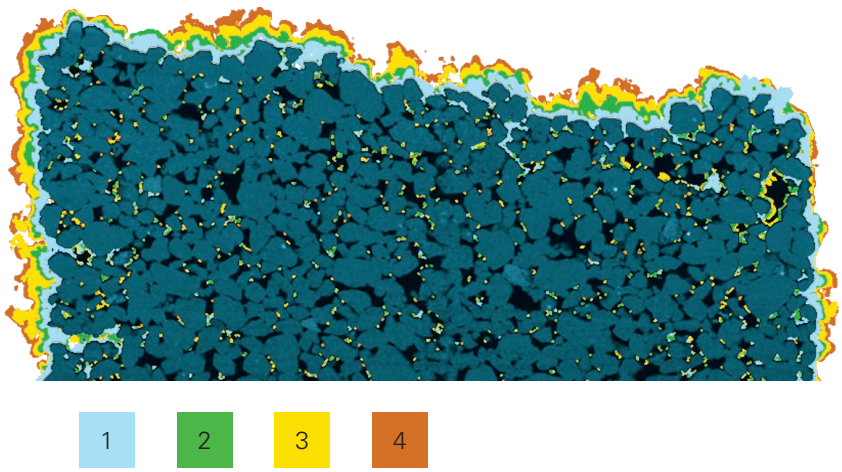
Bruker microCT offers mechanical testing stages up to 4.4 kN and in-situ temperature control from 40 °C below ambient up to +85 °C.



Pore (left) and grain (right) size distribution of Bentheim sandstone.
SKYSCAN 1275 - 5 µm voxel size

Quantitative analysis of structural properties of geological materials

µCT allows quantitative 3D analysis of structural parameters such as porosity, grain size, feature orientation and local thickness. All of these parameters can be calculated and visualized with Bruker microCT's in-house developed software tools.



Formation of a salt crust on and in Bentheim sandstone visualized during 4 wetting / evaporation cycles.
SKYSCAN 1275 – 5 µm voxel size

Imaging and analysis of dynamic processes

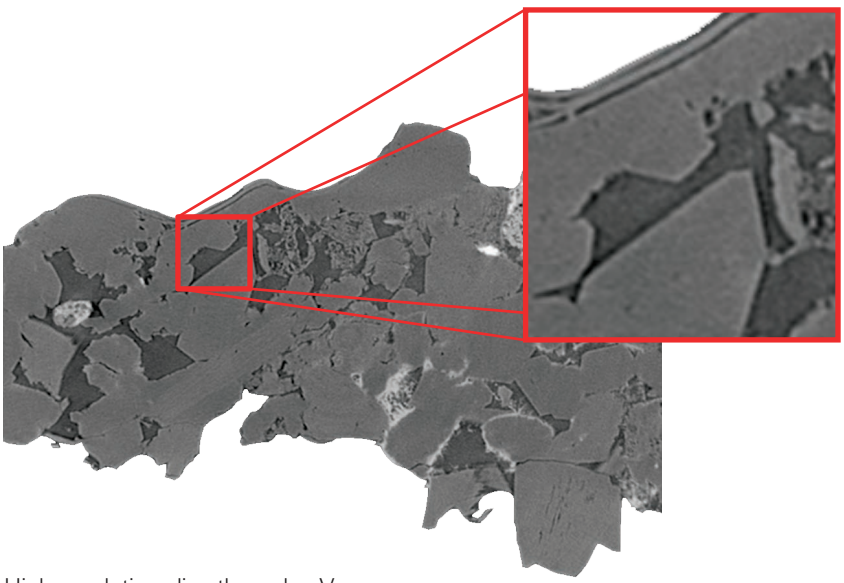
µCT can be used to follow up dynamic processes. Slow processes can be monitored by scanning a sample at different steady states (time-lapse CT) whilst fast processes can be studied by using fast scans at acquisition times down to 65 seconds (4D CT).

If needed, datasets of the same sample acquired at different times can be exactly aligned by using 3D image registration in the DataViewer software tool.

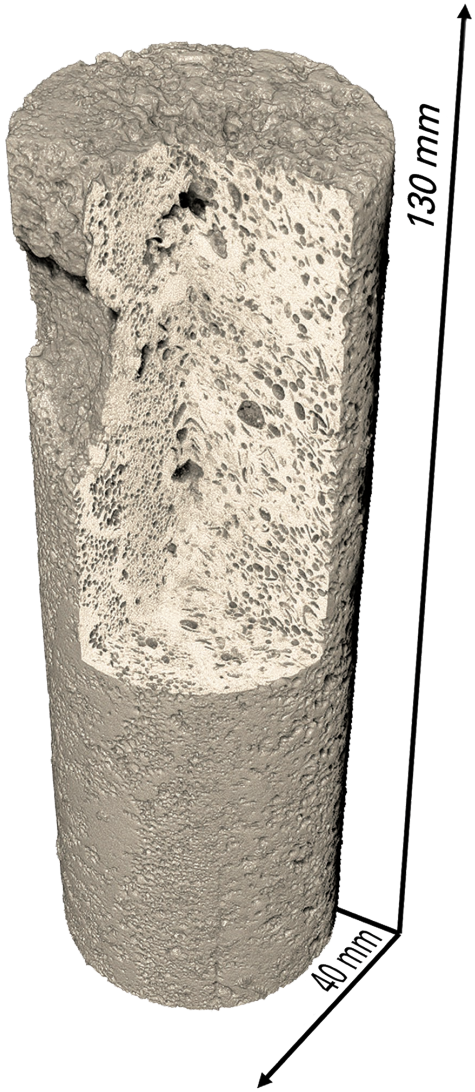
Imaging and analysis across multiple length-scales

Using Bruker microCT scanners, true spatial resolution down to 500 nm can be obtained on small samples, allowing pore-scale characterization of rocks and sediment samples in smallest details.

Using the same devices, larger samples up to 20 cm in diameter can be analyzed at lower resolutions. Scanning of long objects can be done by automatically stitched multiple scans with round trajectory or by single spiral (helical) scan.



High-resolution slice through a Vosges sandstone sample at 0.3 µm voxel size.

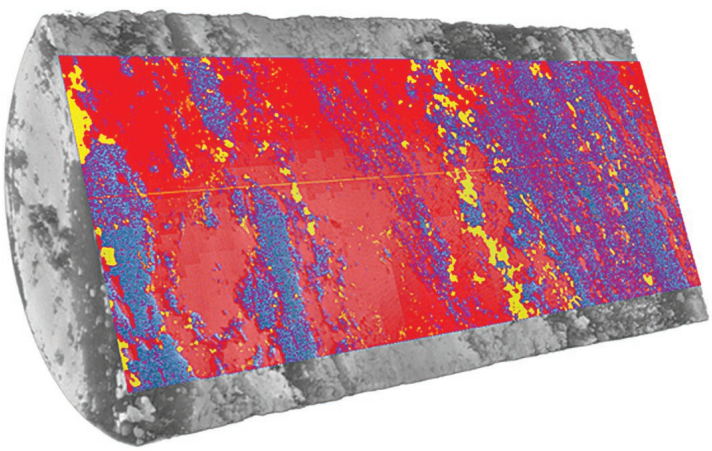


Large limestone core scanned.
SKYSCAN 2211 – 0.3 µm voxel size.

Ultimate compatibility

µCT data can be combined with Bruker imaging techniques such as micro-XRF or SEM-EDS. Furthermore, other methods such as mercury porosimetry and X-ray diffraction can be used to achieve a full structural and chemical characterization.

Using Bruker microCT's DataViewer, images acquired using different modalities can be aligned in 3D. The resulting data can be visualized simultaneously using the volume rendering package CTVox.



µCT - micro-XRF data fusion of a 40 mm diameter drill core.
µCT: SKYSCAN 2211 - 25 µm voxel size, µ-XRF: Bruker M4 TORNADO

Specifications

SKYSCAN 1272
High-resolution desktop µCT

- 11 or 16 Mpx large area CCD camera
- Down to 0.35 µm pixel size
- Up to 200 Mpx in every slice
- InstaRecon© – the world's fastest reconstruction algorithm
- 16 position sample changer

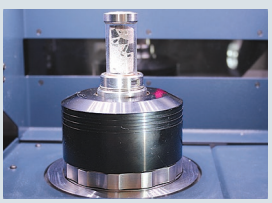
SKYSCAN 1275
Fast, automated desktop µCT

- Down to 4 µm pixel size
- Automated operation with Push-Button-CT™
- 96 mm (diameter) x 200 mm (height) sample size
- Licensed exact spiral reconstruction
- 16 position sample changer

SKYSCAN 2211
Multi-scale cabinet nanoCT

- 11 Mpx CCD and 3 Mpx flat panel dual detector setup
- Down to 0.1 µm pixel size – 500 nm spatial resolution
- Peak X-ray energy up to 190 keV
- Up to 200 mm scanning diameter – 25 kg sample weight
- Licensed exact spiral reconstruction
- World's fastest InstaRecon© hierarchical reconstruction

In-situ testing stages



- Compression up to 4400 N
- Tensile up to 440 N
- Cooling down to 40 °C below ambient
- Heating up to 85 °C

Bruker microCT is continually improving its products and reserves the right to change specifications without notice.
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