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# The influence mechanism of pore structural properties on gas hydrate saturation and permeability via micro-CT technology

*Tuesday, 31 May 2022 14:20 (15 minutes)*

Gas hydrate, as an alternate hydrocarbon source, has attracted significant attention in past decades. A precise estimation of permeability of the gas hydrate-bearing formation is essential for predicting the flow behaviors and the associated gas production performance. In this research, the influence of gas hydrate saturation on pore structural properties and then affect permeability was investigated using a three-dimensional micro-CT dataset that records an experiment of xenon hydrate formation in a sand pack at selected times during the experiment. Unlike the previous work, the goal of this work is to characterize pore space evolution, during gas hydrate formation, using a set of key microscopic pore characteristics, i.e. pore and throat radii, pore throat ratio, coordination number and tortuosity, by applying pore network analysis, on larger and therefore more representative sub-volumes. The same segmented volume of that dataset was used in this work to estimate gas hydrate saturation and permeability, recalculated by the lattice Boltzmann method, on those larger sub-volumes at selected snapshots. Besides, the analysis provides further insights into the links of gas hydrate localities and local pore characteristics and therefore their controls on the permeability. New evidence of semi-quantitative nature emerges that grain-coating gas hydrate formed at low gas hydrate saturations play a crucial role on reducing permeability, while pore-filling and/or cementing gas hydrate become dominating at high gas hydrate saturations, and these can be explained by gas hydrate formation mechanisms.

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China

## References

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## Time Block Preference

Time Block B (14:00-17:00 CET)

## Participation

Unsure

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