# Attenuation of seismic waves in sediments containing pore-filling gas hydrates

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**Context**
*Gas hydrates are icelike structures forming in required pressure-temperature conditions found in deep sea marine environments and in subpermafrost sediments. Global warming may trigger hydrate dissociation and destabilization. Therefore, it is important to find a way to detect, not only large hydrate reservoirs, but also hydrate that is dispersedly distributed in the sediments.*

**Objectives and Methods**
*In this project we will study the attenuation of seismic/acoustic waves in sediments hosting pore-filling gas hydrates and water. The student will use idealized models as well as Synchrotron-based micro-CT images of a published study to create models representing the volumes containing sediment grains, hydrates and water. Then, using COMSOL Multiphysics, the student will run numerical simulations to calculate attenuation associated with fluid flow in those volumes. The results of this study might be incorporated and published together with a more general research by the supervisor or collaborator.*

**Literature**

- *Chaouachi et al. (2015), Microstructural evolution of gas hydrates in sedimentary matrices observed with synchrotron X-ray computed tomographic microscopy, Geochem. Geophys. Geosyst., 16, 1711–1722.*
- *Sell et al. (2016), On the path to the digital rock physics of gas hydrate-bearing sediments – processing of in situ synchrotron-tomography data, Solid Earth, 7, 1243–1258.*


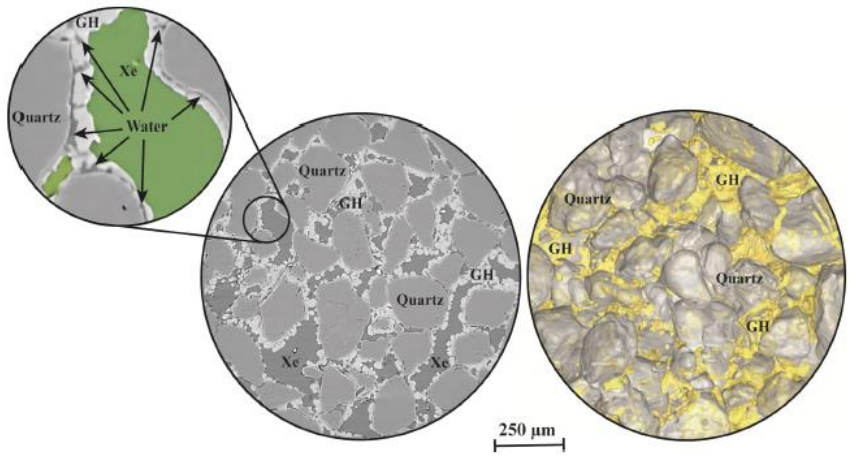


Figure adapted from Sell et al. (2016, Solid Earth). Overview of a 2D slice and the equivalent 3D volume. The presented sample contains 17 vol% hydrate. The 3D volume image depicts the quartz grains in grey and the hydrate in yellow. The zoom-in depicts all the phases present in the samples: xenon (Xe, green), quartz grains, gas hydrate (GH) and water.

**WEB sites**

**Choice of orientation**
1) Sedimentary, Environmental and Reservoir Geology