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Use CT images to assess the scale effect and variations of porosity and permeability in the rock sample in Kueichulin Formation in western Taiwan

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The technologies of X-ray CT have improved the understanding of geological microstructures, including micro fractures, tortuosity, porosity, permeability, and other important features in rocks. This study aims to quantify the scale effect involved in a relatively homogeneous sandstone rock sample in Kueichulin Formation Yutengping Sandstone in western Taiwan. The variations of sampling volumes are assessed based on 2 μm resolution CT images. To determine the representative elementary volume (REV) for the rock sample, the commercial software Avizo and the Kozeny-Carman equation are used to estimate porosity and permeability. Results of the imaging process, the observed porosity varies from 20% and 33%, while the values of permeability are between 2×10^{-14} and 2×10^{-12} m^2. These values are similar to those obtained by applying rock confining pressure test to the same region of the rock sample.