



Multi-scale X-ray tomography analysis of carbonate porosity

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We measured the porosity (from 0 to 52%, with a mean value of 37%) and permeability (from 0 to 20.4 D, with a mean value of 8 D) of thirty-eight plugs of 40 mm-diameter sampled almost every 1.5 m along a 100 m borehole core crossing different lithofacies of a reefal carbonate platform. None ubiquitous relation between porosity and permeability can be inferred. In parallel we evaluate the porosity from processing X-ray microtomography with resolution ranging from 0.42 to 190 μm and sampling volume ranging from less than 1 μm^3 to few cm^3 . We identified that the calculated porosity can be contingent by the resolution and the sampled volume depending on the structure of the pore network. While high resolution is required to tackle microporous material, large samples with lower resolution is necessary for identifying distributed vugs and mm-scale structures. This study shows that multi-resolution X-ray microtomography is effective for characterizing the pore structure and is a promising technique to better understand the pore structure control on the rock properties.