# How does silt fraction control mudstone compressibility and permeability?

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## ABSTRACT

I use uniaxial consolidation experiments on resedimented samples of mudstones from offshore Japan to analyze the permeability and compressibility evolution during consolidation for natural mudstones with varying grain size distribution. I prepare mixtures composed of varying proportions of silt-sized silica and marine mudstone from Site C0011 drilled during Integrated Ocean Drilling Program (IODP) Expedition 322. At a given porosity, vertical permeability increases by two orders of magnitude and compression index decreases from 0.36 to 0.24 for sediment mixtures with 59% to 34% clay (<2 μm). Backscattered electron microscope images show the difference in microstructure.

**CLICK ON IMAGE FOR LARGER VIEW**

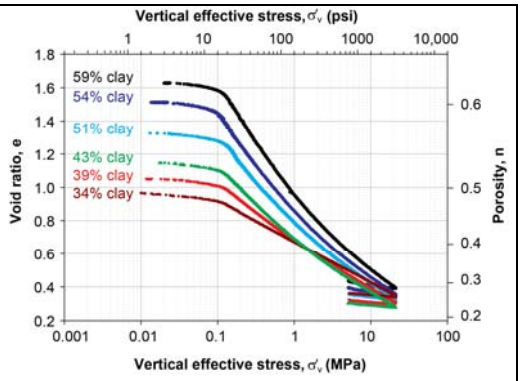


**Fig. 1**: Compression curves of six Nankai-silt mixtures with varying clay fractions from uniaxial constant-rate-of-strain consolidation tests.

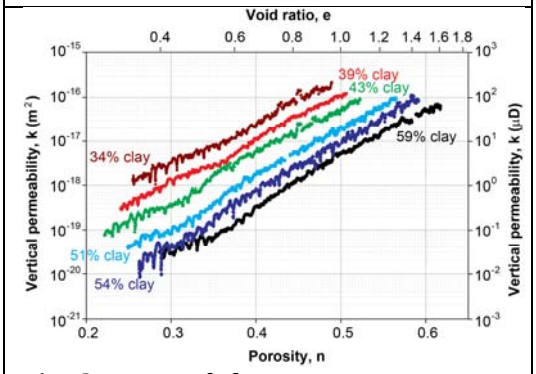


**Fig. 2**: Permeability – porosity relationships of six Nankai-silt mixtures with varying clay fractions derived from uniaxial, constant-rate-of-strain consolidation tests.

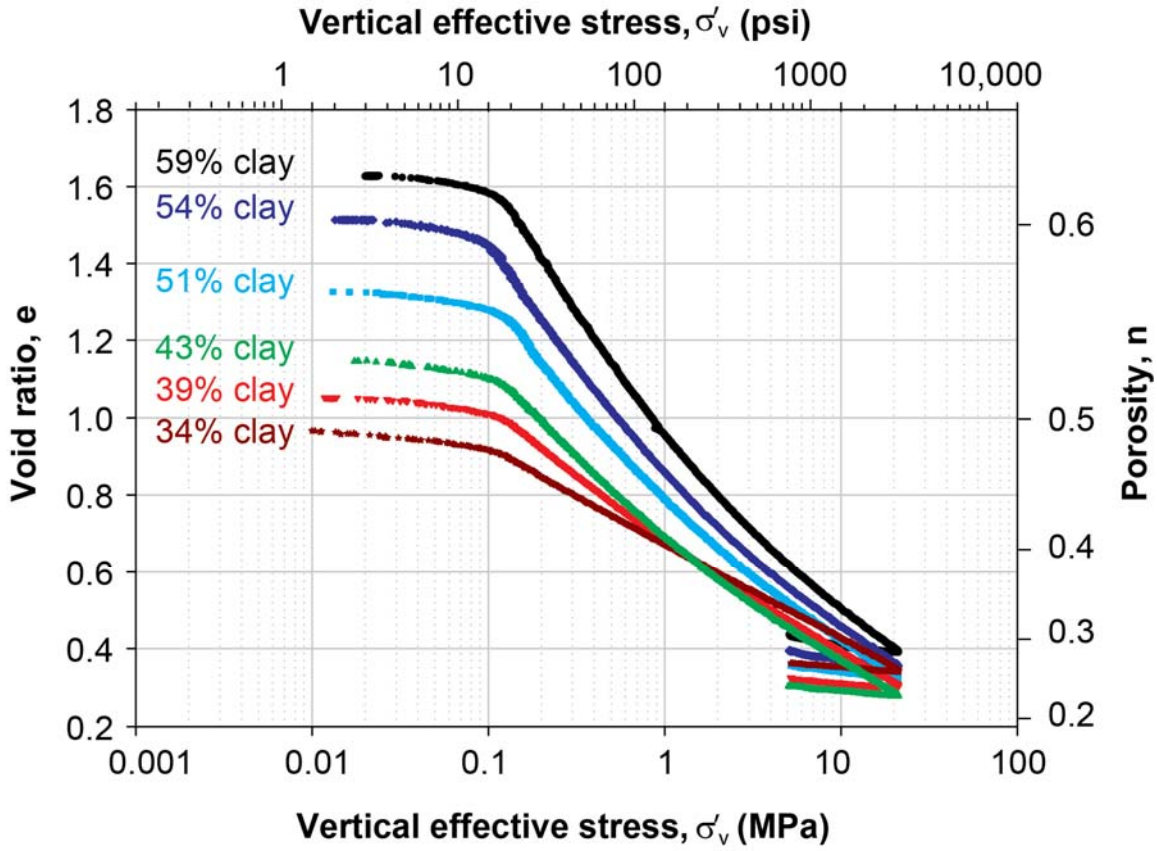


**Fig. 1**: Compression curves of six Nankai-silt mixtures from uniaxial, constant-rate-of-strain consolidation tests. All samples were consolidated to a maximum vertical effective stress of 20 MPa. Black circles = 59% clay (pure Nankai mudstone); dark blue diamonds = 54% clay; light blue squares = 51% clay; green triangles pointing upward = 43% clay; red triangles pointing downward = 39% clay; brown stars = 34% clay.

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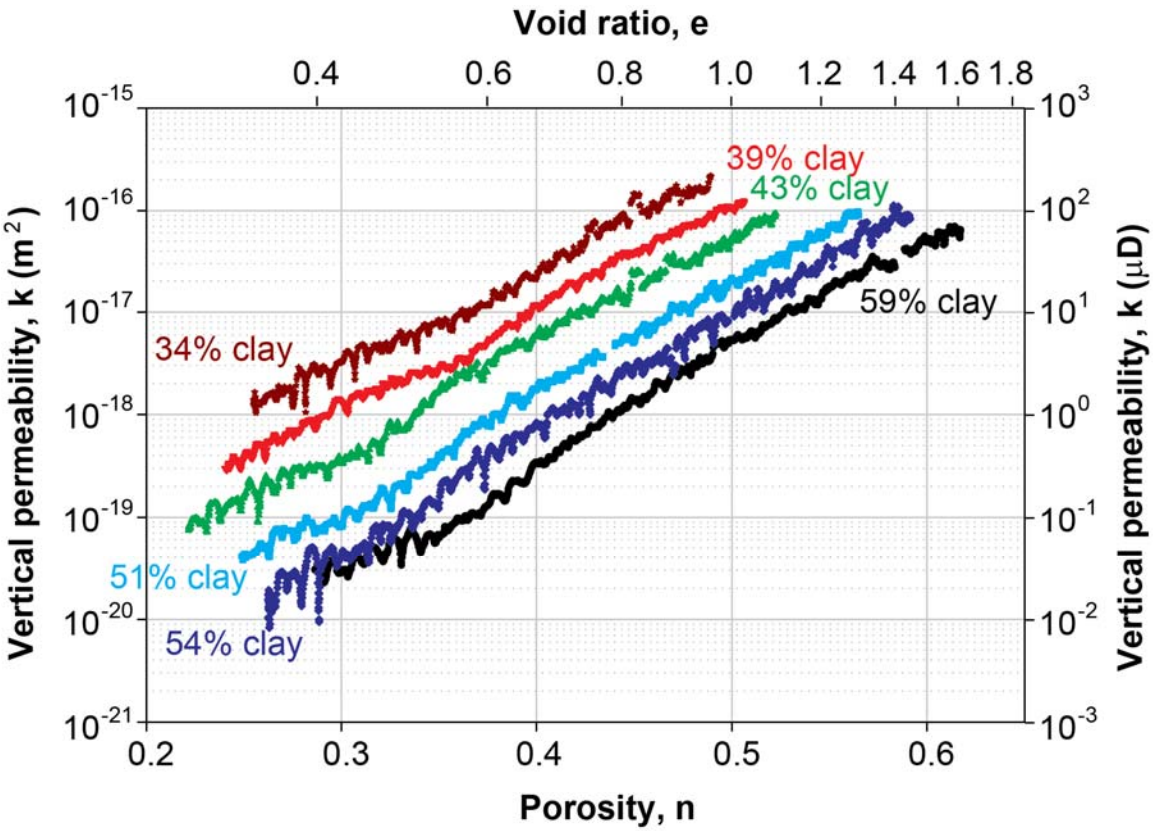


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