

Can Resedimentation Reproduce In-situ Porosity and Permeability in Gulf of Mexico Mudrocks?

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Porosity in mudrocks of the EI-330 field declines from 39% to 20% over a depth range of 2.2 kilometers. Permeability of these mudrocks has been found to be $1.15 \times 10^{-19} \text{ m}^2$ when the mudrock has a porosity of 38%. We have taken material from mudrock at a depth of 2.51-2.64 km from this field and then uniaxially consolidated this material using resedimentation, a process which creates homogeneous mudrock specimens from disturbed sediments. Constant rate of strain consolidation tests on the resedimented material show experimental porosity-effective stress behavior that is fundamentally similar to that observed in the field. Furthermore, we show that the permeability measured on intact cores is reproduced during consolidation of resedimented specimens. These results suggest that resedimentation is a very useful tool to interpret in-situ material behavior for mudrocks.

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