

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

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ABSTRACT

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. We find that the experimental porosity-effective stress behavior is fundamentally similar to that observed in the field (fig 1). Furthermore, we show that the permeability measured on intact cores is reproduced during consolidation of resedimented specimens (fig 2). These results suggest that resedimentation is a very useful tool to interpret in-situ material behavior for mudrocks.

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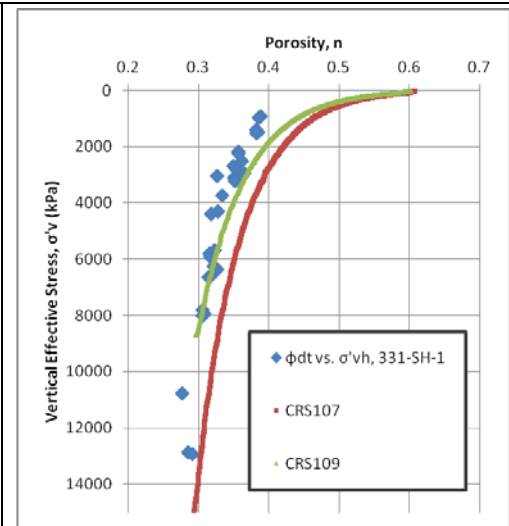


Fig. 1: Porosity, from CRS tests of resedimented GoM, and for hydrostatically pressured section of well 331-SH-1 estimated from sonic velocity log, plotted against effective stress. Note that CRS109 closely tracks the in-situ estimates.

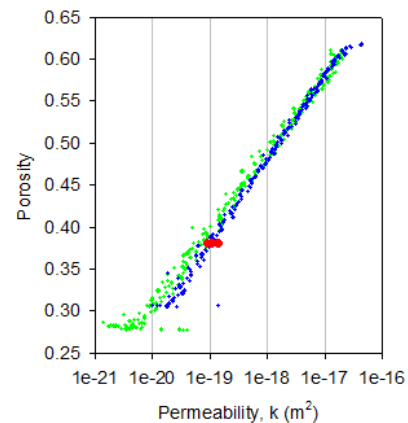


Fig. 2: Comparison of permeability from CRS tests of resedimented core material (CRS107 and 109) with that obtained by Stump (1998) in constant-head tests of Eugene Island intact core.

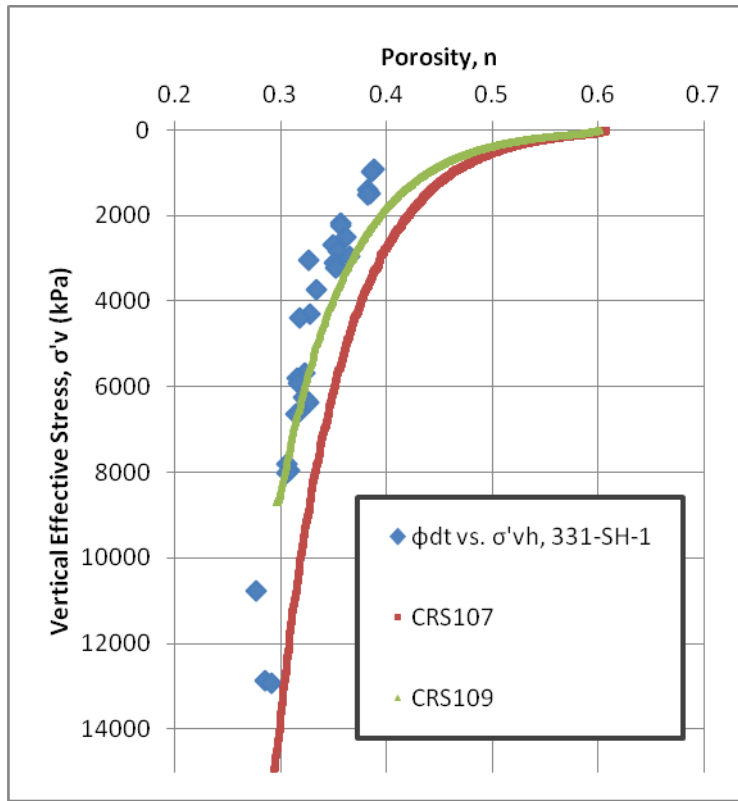


Fig. 1: Porosity from CRS tests of resedimented GoM (CRS107 and CRS109) and porosity for hydrostatically pressured section of well 331-SH-1 as estimated from sonic velocity log, plotted against effective stress. Note that CRS109 closely tracks the in-situ estimates.

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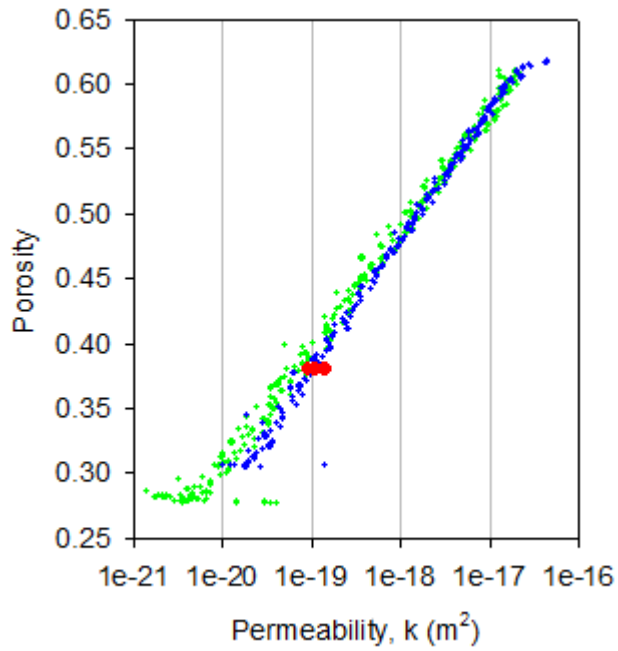


Fig. 2: Comparison of permeability from CRS tests of resedimented core material (CRS107 and 109) with that obtained by Stump (1998) in constant-head tests of Eugene Island intact core.

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