06.12: CRS Measurement of Permeability Anisotropy in Resedimented Mudrocks

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ABSTRACT

New permeability anisotropy data show the anisotropy of resedimented Boston Blue Clay (RBBC) increasing from 1.5 to 3 as stress increases from 0.1 to 40 MPa (roughly corresponding to burial depths up to 3 km). For resedimented Gulf of Mexico – Eugene Island mudrock (RGOM_EI), the data show a startling anisotropy of much less than 1 at 0.1 MPa, increasing at an increasing rate to 4 at 40 MPa (see Figure 1). Stress has a much greater effect on smectitic RGOM_EI than it does on illitic RBBC.

These data are captured by combining horizontal permeability data from a new radially-draining constant rate of strain consolidation (CRS) device developed at MIT (see Figure 2) to vertical permeability data collected from a traditional vertically-draining CRS device. The test results are somewhat offset from cubic specimen constant head results, however.

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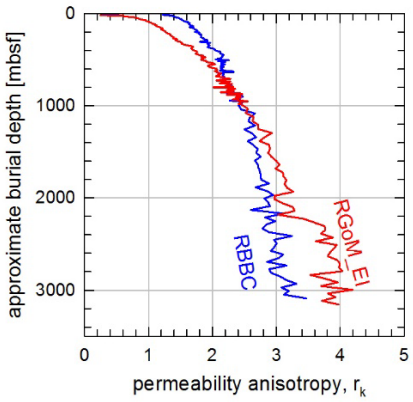

Fig 1: Permeability anisotropy of Resedimented Boston Blue Clay (RBBC) and Resedimented Gulf of Mexico – Eugene Island Clay (RGoM_EI) measured from constant rate of strain consolidation tests (CRS).

Fig 2: New radially-draining constant rate of strain (CRS) consolidometer with loading capacity up to 40 MPa developed at MIT.

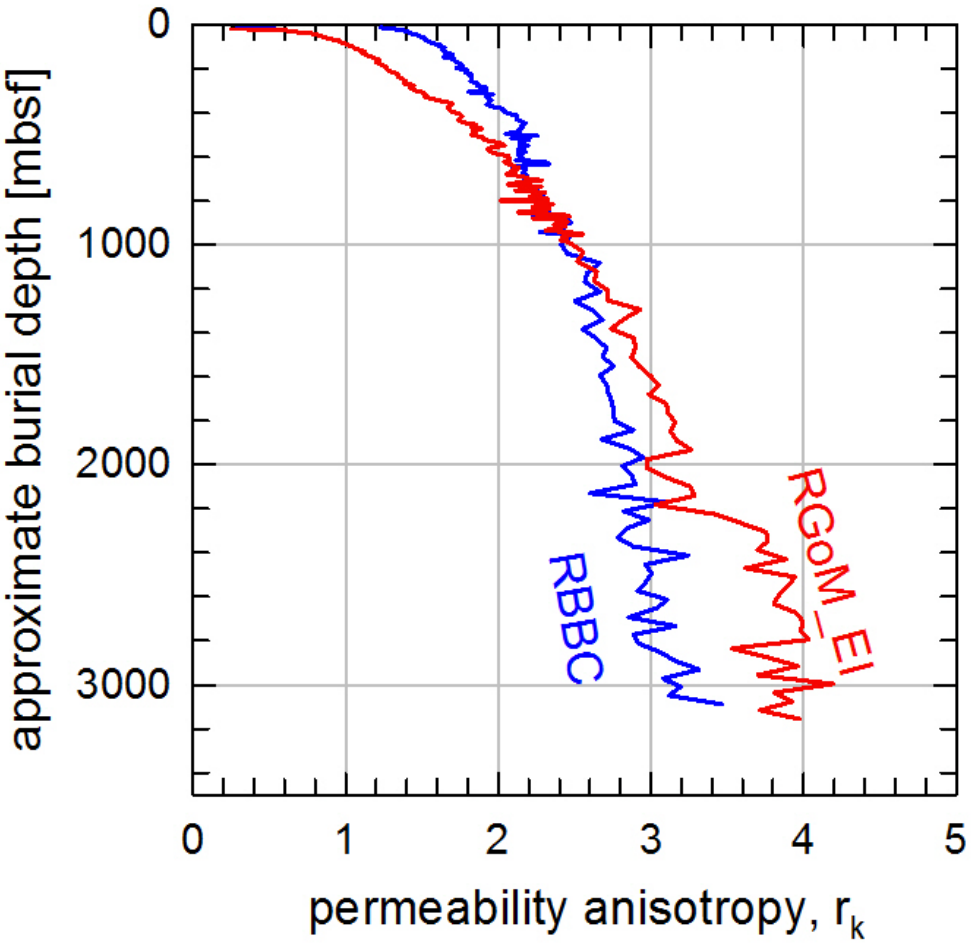

Fig. 1: Permeability anisotropy of Resedimented Boston Blue Clay (RBBC) and Resedimented Gulf of Mexico – Eugene Island Clay (RGoM_EI) measured in cubic specimen constant head tests (cubic) and constant rate of strain consolidation tests (CRS). Dotted lines represent standard deviations.

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Fig. 2: New radially-draining constant rate of strain (CRS) consolidometer with loading capacity up to 40 MPa developed at MIT.

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