

Mudrock Velocity Measurements up to 100MPa

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ABSTRACT

Compressional (V_P) and shear (V_S) wave velocities were measured on Resedimented Boston Blue Clay (RBBC) over a stress range of 0.1 MPa to almost 100 MPa using modified triaxial cells with different stress capacities. The low stress results are obtained using bender elements, while the medium and high stress results are obtained from piezoelectric elements imbedded inside the triaxial endcaps (high stress courtesy of Shell). Despite the differences in experimental setup, the void ratio, P-wave, and S-wave velocity results are extremely consistent. S-wave velocity results are presented in **Fig. 1**. The frequency response for each test was monitored, indicating a lack of trend in the P-wave frequency results, while the S-wave frequency results increased with stress and decreased with plasticity. When comparing two different experimental setups, the S-wave frequency response for RBBC does not agree, as shown in **Fig. 2**.

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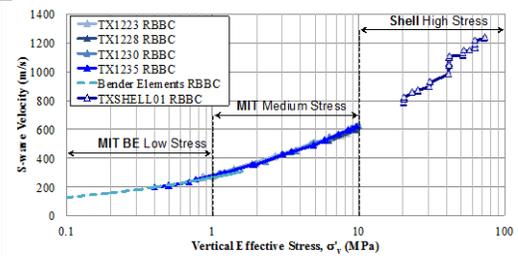


Fig. 1: The S-wave velocity for RBBC is shown over a wide stress range using three different experimental setups. Despite the differences in technology and setup, the S-wave velocity agrees remarkably well, following a consistent trend line.

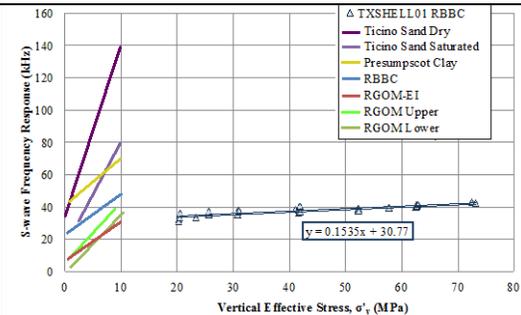


Fig. 2: The frequency response obtained by measuring the period of the first peak in the response is shown in this graph with a solid colored line. The line is an average of all the data points for each material. The S-wave frequency response increases as a function of stress but decreases with increasing plasticity (highest plasticity clay is RGOM-EI, lowest plasticity clay is Presumpscot Clay). The experiments conducted at Shell showed a much lower frequency response than the medium stress frequency results obtained at MIT.

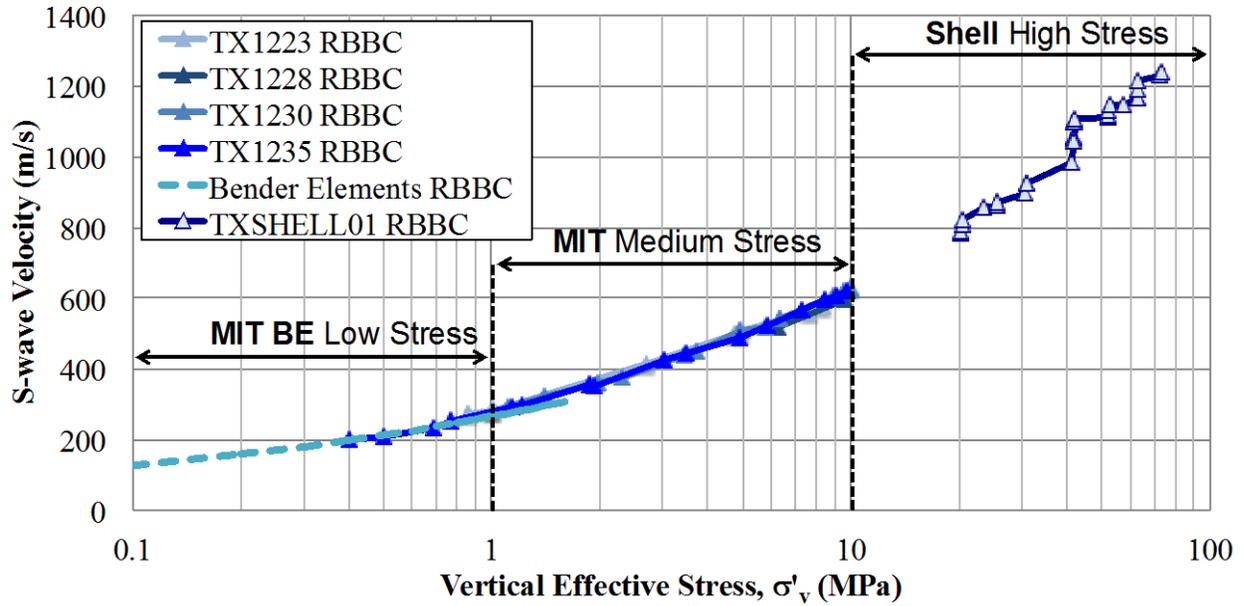


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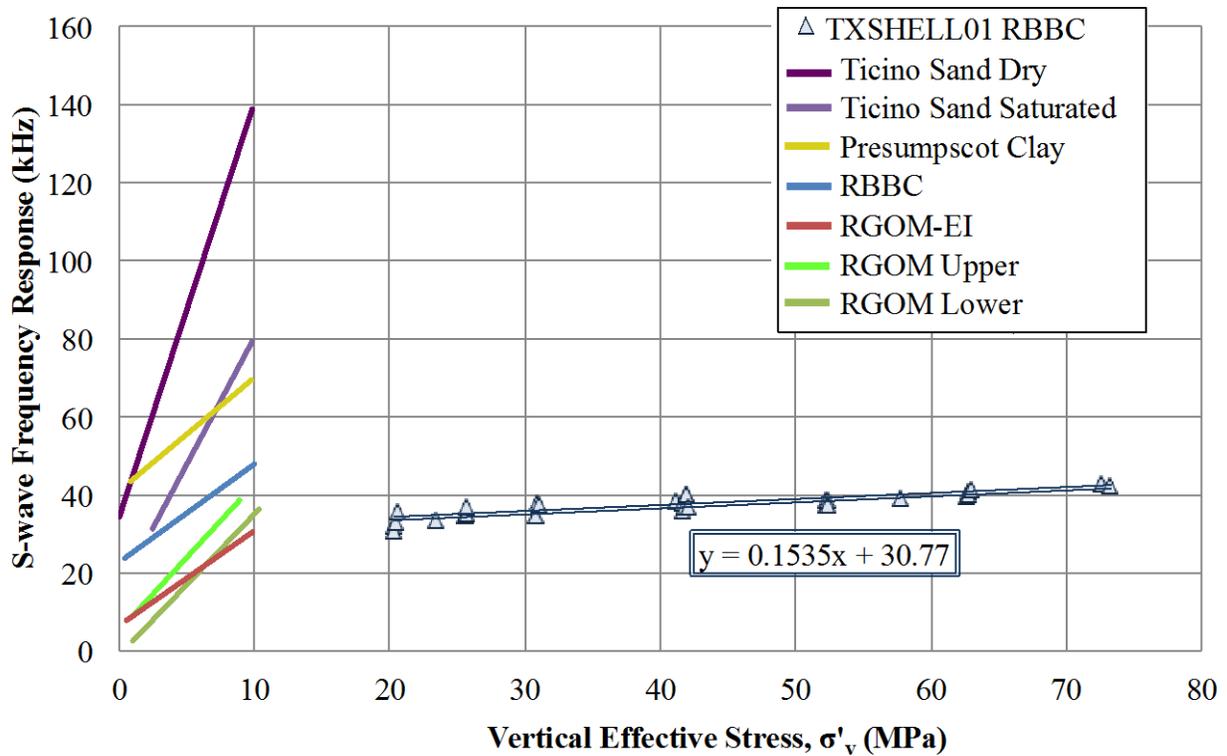


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