

12.24: Vertical Velocity Measurements as a Function of Clay Fraction and Stress of Mudrocks

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ABSTRACT

Wave velocities through mudrock are dependent on stress and composition. The effects of stress level on compression and shear wave velocity are determined through a laboratory program of combined Constant Rate of Strain compression testing with velocity measurements (Fig 1). Test specimens consisting of Resedimented Gulf of Mexico Eugene Island clay admixed with controlled mass quantities of a crushed quartz silt, provide lithology control to quantify the effects of lithology on wave velocities.

The results of the laboratory program are used to create a new predictive model for wave velocity as a function of stress and lithology, which is verified through the comparison of predicted values to in situ velocities from International Ocean Drilling Program (IODP) site 308 (Fig 2). The effects of overpressure on wave velocities are studied through a comparison of predicted wave velocities, calculated assuming hydrostatic conditions and calculated using pore pressure measurements at IODP site 308 .

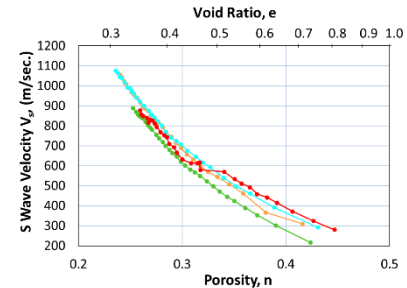


Fig 1: Shear wave Velocity by Porosity for Resedimented Gulf of Mexico Eugene Island – Silt Mixtures.

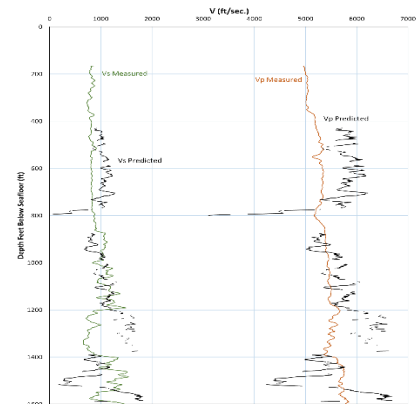


Fig 2: Predicted wave velocities compared to measured wave velocities for IODP site 308 hole 1324.

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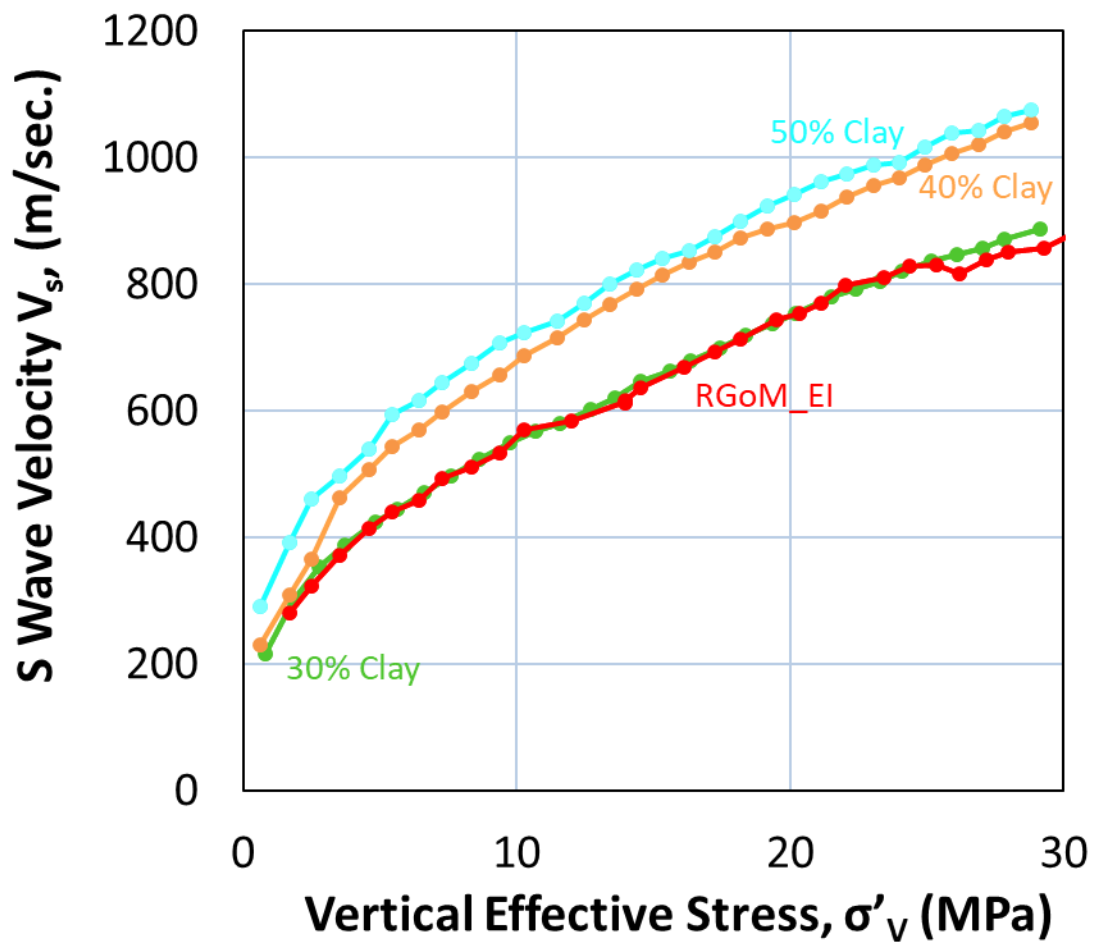


Figure 1: Shear wave Velocity by Porosity for Resedimented Gulf of Mexico Eugene Island – Silt Mixtures with clay content between 30% and 65%.

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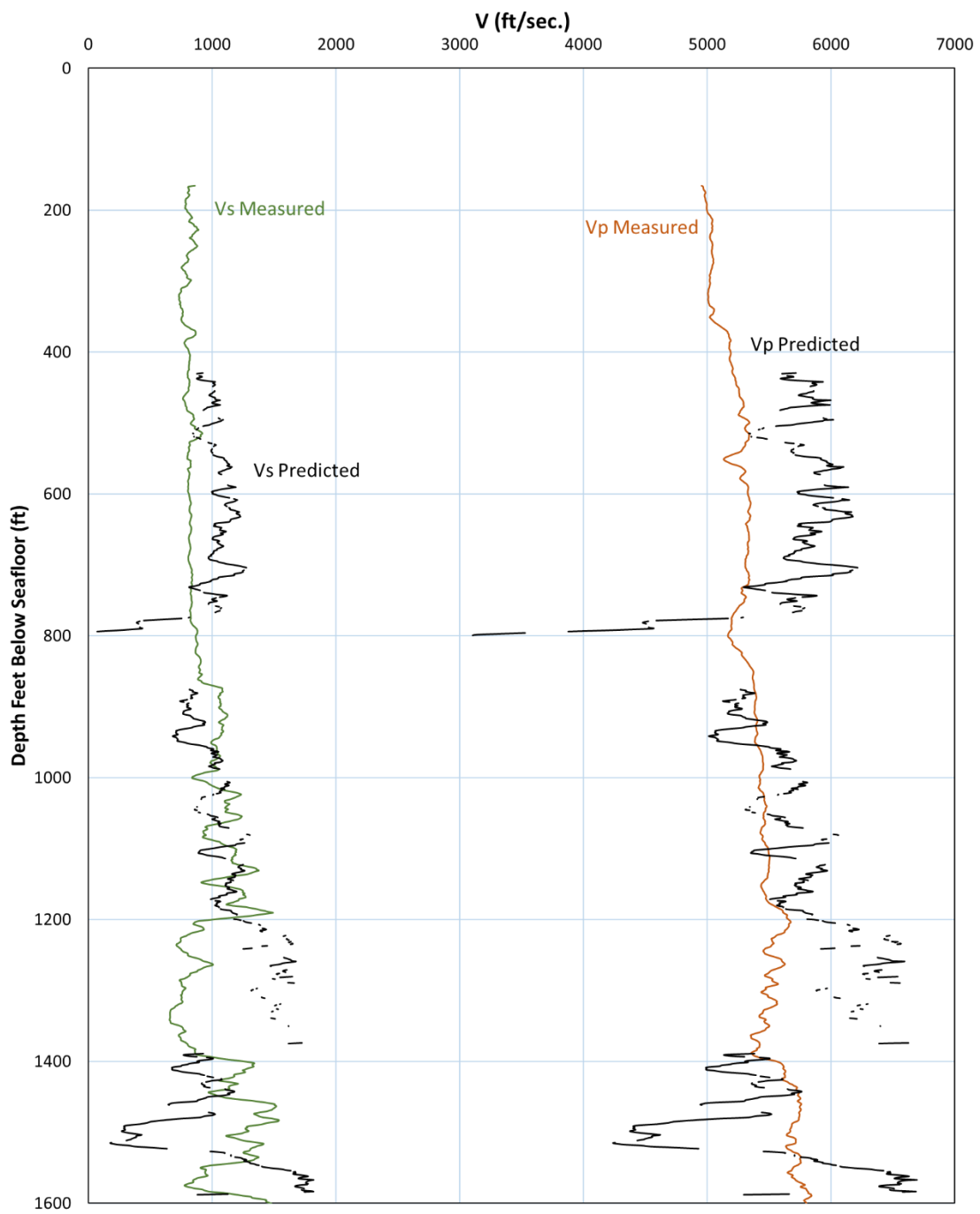


Figure 2: Predicted wave velocities compared to measured wave velocities for IODP site 308 hole 1324.

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