

08.07: Soil Properties of Resedimented Nile Silty Clays

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ABSTRACT

I am performing a comprehensive laboratory testing program on Resedimented Nile Silty Clay (RNSC); a mudrock from the Nile River floodplain in Egypt. The testing program will determine engineering parameters of RNSC for use in modeling, as well as determining the effectiveness of the empirical GeoFluids liquid limit correlations in predicting the behavior of a highly Smectitic mudrock with an appreciable sand content.

RNSC is different than the mudrocks in the GeoFluids database. Figure 1 shows that RNSC contains about 20% sand, 35% silt, and 45% clay. The clay fraction of RNSC is predominantly Smectite 93%. The liquid limit is 62%, the plastic limit is 23% and the plasticity index is 39%.

Mechanical trends observed in uniaxial compression and triaxial shear tests indicate that RNSC is in agreement with behavior observed in other mudrocks. The lateral stress ratio and friction angle are very sensitive to the compressive stress level. Figure 2 is an illustration of the extreme sensitivity of the Lateral stress ratio of RNSC. The GeoFluids correlations are poor at predicting the behavior of RNSC at low effective stresses but may be accurate at effective stresses above 1 MPa.

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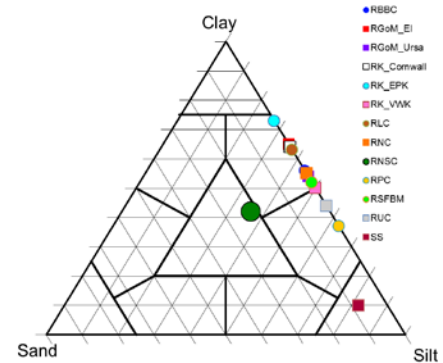


Fig 1: GeoFluid's Materials Clay, Silt & Sand Content Ternary Diagram.

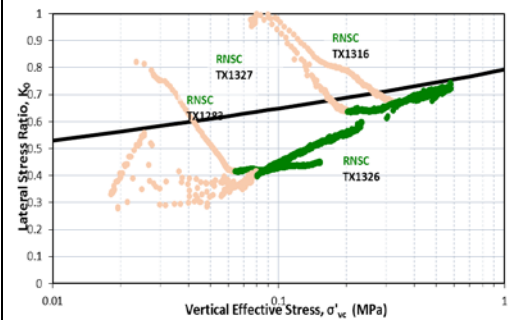


Fig 2: Lateral Stress Ratio by Vertical Effective Stress

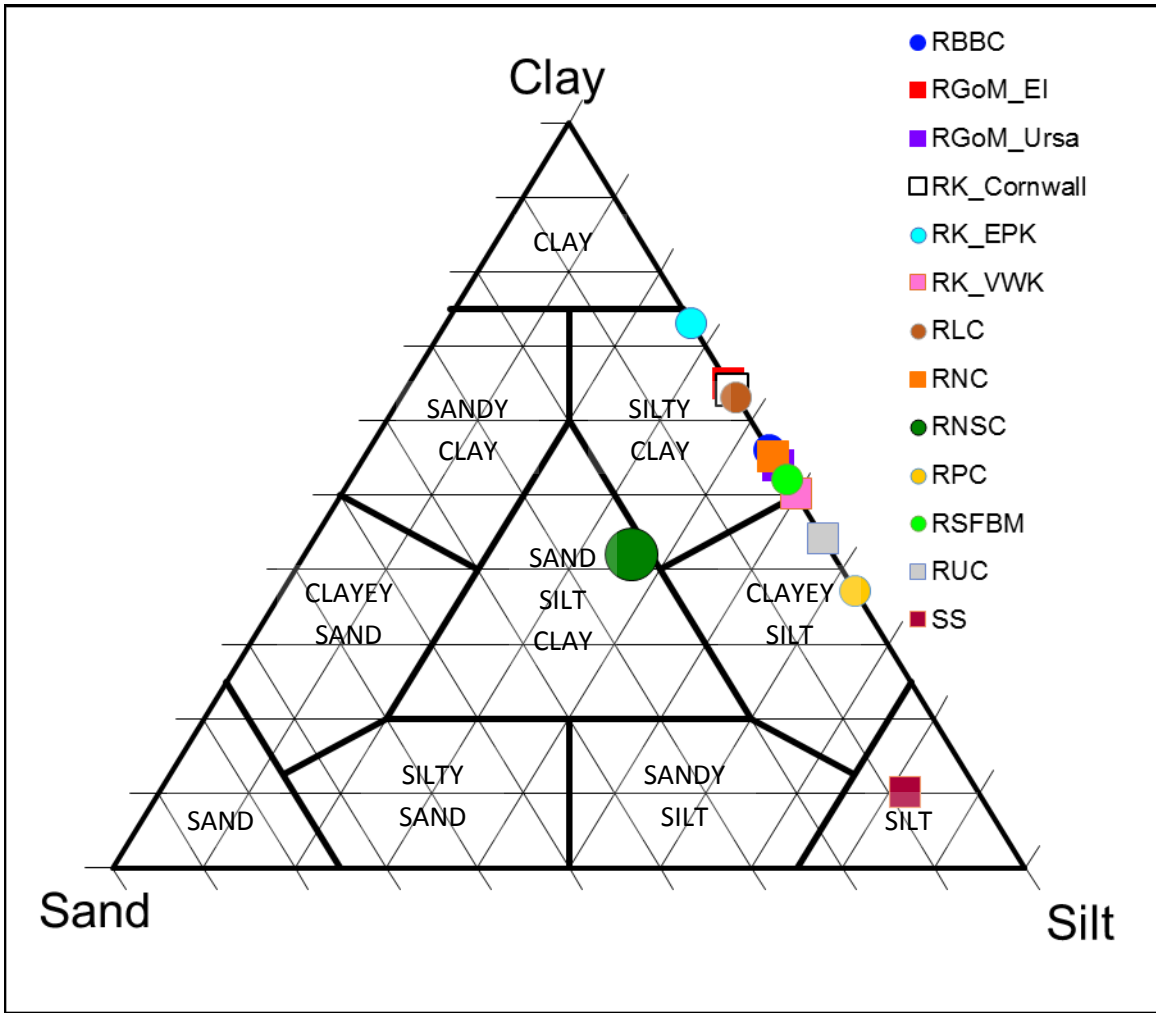


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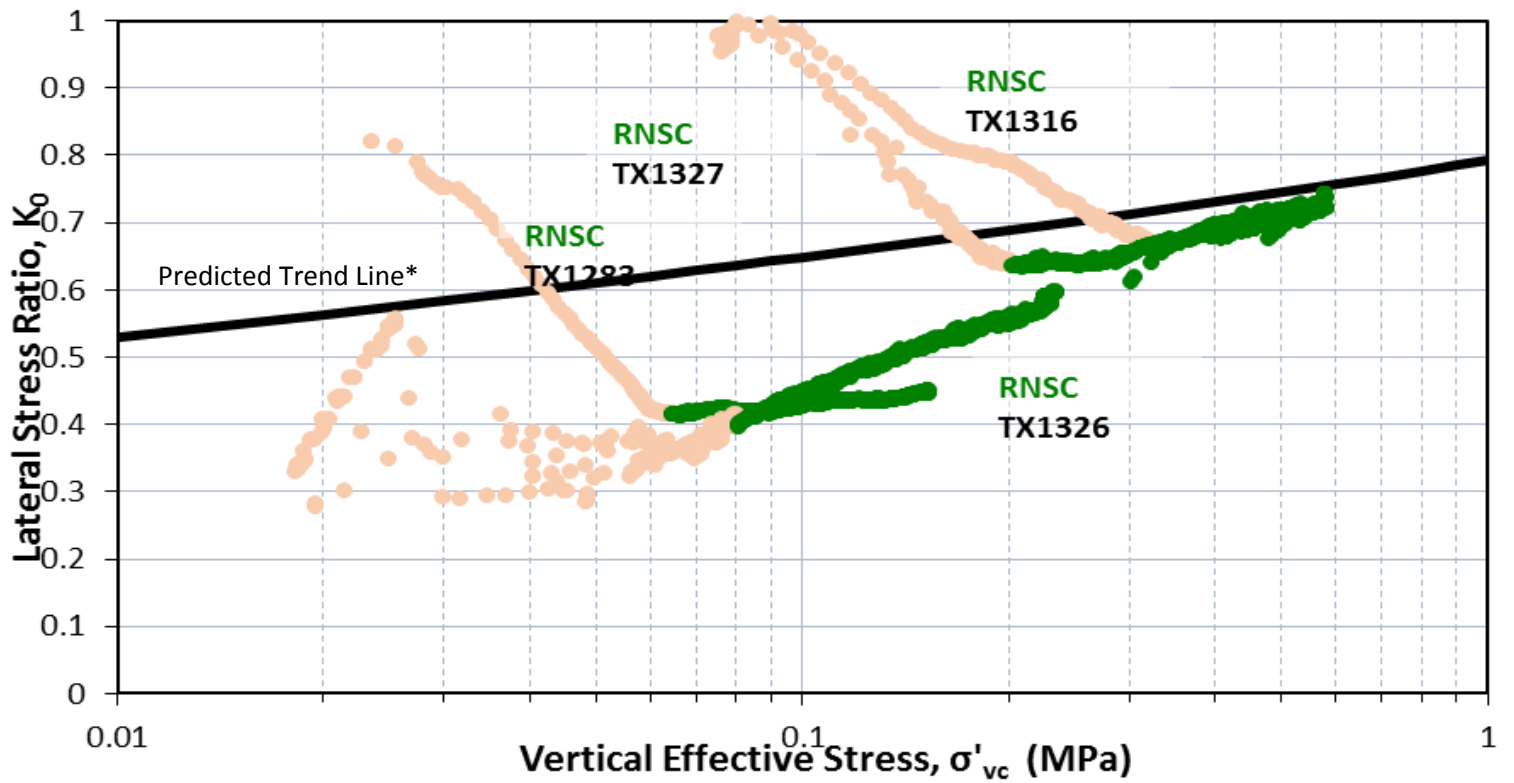


Fig. 2: Lateral Stress Ratio by Vertical Effective Stress

*Predicted Trend Line from - Casey, Brendan. "The Consolidation and Strength Behavior of Mechanically Compressed Fine-Grained Sediments." Thesis. Massachusetts Institute of Technology, 2014. Print.

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