

Comparison of Resedimented Mudrocks

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The physical characteristics, compression and permeability behavior, and the undrained shear strength and friction angle of 11 resedimented mudrocks studied in the GeoFluids Consortium are reviewed. We focus on the behavior of resedimented Boston Blue Clay (RBBC), resedimented Eugene Island Gulf of Mexico Mudstone (RGoM_EI) and Resedimented Nankai Mudstone (RNankai). These materials have similar particle size distributions (55-60% clay-sized particles). However, the clay sized fraction of the RBBC is dominated by illite, whereas the RNankai and the RGoM_EI are dominated by smectite. The liquid limit (W_L) is lower for the RBBC (~38%) than for the RNankai (~68%) or RGoM_EI (~88%). Compressibility as measured by the Compression Index (C_c) is generally proportional to the liquid limit: the RNankai and the RGoM_EI have much greater loss of porosity with increasing effective stress than the RBBC. The RNankai and the RGoM also have a much higher initial void ratio (or porosity). At similar porosities, the RBBC has a permeability that is at least one order of magnitude higher than the RGoM or the RNankai, which have similar behavior. Undrained strength and friction angle are found to vary with the effective stress state. For example, the normalized undrained strength of RBBC varies from .33 at an effective stress of 0.1 MPa to 0.28 at 10 MPa. Materials with a higher liquid limit (more smectite) lose more strength with increasing effective stress. The GeoFluids consortium is building a database on resedimented material and a quantitative model to predict constitutive behavior from composition and texture.