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Investigation of the spectroscopic features of clay-rich rocks in terms of geo-mechanical evaluations

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The main purpose of this study is to investigate the spectroscopic features of clay-rich rocks in terms of geo-mechanical evaluations. For the purpose, different types of sedimentary rocks including claystones and mudstones were used. Ultra sonic pulse velocity (Vp) measurements and Uniaxial Compressive Strength (UCS) tests were carried out by using the core samples of these clay-rich rocks, and moduli of elasticity (Ei) values of the samples were calculated. Spectroscopic measurements were also done by using the failed core samples. According to the spectral feature search analyses of the samples 7 spectral bands were differentiated depending on crystal filed effects and charge transfer absorptions of transition elements and water and OH vibrational features. Considering these 7 spectral bands, 8 different genetic rock types were defined. The regression equations of Vp-UCS and Vp-Ei were evaluated for the unclassified and genetic rock types, respectively. The coefficients of correlations of the equations became considerably higher when the genetic rock types were considered, and the equations were found to be statistically significant.