

The Mapping of Swelling Clays with Remote Sensing: Potential of High Spectral Resolution Sensors.

¹van Dijk, P.M., ¹van der Meer, F.D., ¹Kariuki, P. ¹¹Geological Survey Division, International Institute for Aerospace Survey and Earth Sciences (ITC), P.O.Box 6, 7500AA Enschede, The Netherlands. vandijk@itc.nl, vdmeer@itc.nl, kariuki@itc.nl

Swelling soils are soils containing clay minerals that change volume with water content. Natural soils may change up to 150% in their original volume with increasing water content, which yields major geologic hazards and extensive damage world-wide. The yearly destruction caused by soil expansion in the U.S. has been estimated to rate second place in terms of economic loss. Many examples of damage due to expansive soils can be given for developing countries. The three most important groups of clay minerals involved in swelling are smectite, illite and kaolinite, here listed from high to low swelling potential. Currently used engineering practice in quantifying soil swelling potential is time consuming and expensive because of the large extent of laboratory measurements needed. Results from spectral analysis of clay mineral spectra presented in this paper show that careful examination of absorption bands allows the characterisation and mapping clay mineralogy of the soil which, in conjunction with spectral unmixing, may lead to surface fractions of the various clay minerals. Spectroscopy (laboratory, field or imaging) provides a rapid and in-expensive alternative to mapping swelling potential of soils.