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Using remote sensing data for mapping clay content and hydrodynamics soil parameters in semi-arid region

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Clay content is an important parameter governing the hydrodynamics soil parameters which play an essential role for multi-domain applications such as hydrology, pedology and agronomy.
The aim of this study is to map the clay content over the bare soil based on the topsoil samples taken from the Haouz plain (Tensift in the center of Morocco) and the middle infrared index (MID-infrared) derived from Landsat-8 Operational Land Images (OLI). Then, clay content was predicted over gaps covered by green vegetation and vegetation residues using the Ordinary Cokriging approach.The obtained clay content map were thereafter derived by means of suitable pedotransfer functions to map field capacity (θfc), wilting point (θwp) and total available water (TAW).
A correlation analysis showed that clay content was significantly correlated with MID infrared index. The Cokriging improves the map of clay content which records a reasonable accuracy (R2 = 0.70, RMSE = 3.5%) compared to independent soil samples. The resulting maps of field capacity (θfc), wilting point (θwp) were validated by using the in situ measurements taken from experiment sites of the Haouz plain (R2 = 0.8, RMSE = 0.0046 mm3/mm3).

Keywords: Remote sensing; MID infrared index; Ordinary cokriging; field capacity; wilting point; total available water