



## **Estimation of aggregate stability in Mediterranean soils by diffuse reflectance spectroscopy**

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The percentage of water stable aggregates larger than 0.25 mm (WSA) and the mean weighted aggregate diameter (MWD) are good indicators of the risk of soil erosion by water and, at the same time, well correlated with the contents in clay, iron oxides, calcium carbonate and organic matter in soil. These components have specific spectral characteristics which can be used to estimate aggregation indices from reflectance ( $R$ ) measurements. Samples of 50 topsoils developed on granodiorites, quartzites, sandstones, shales and marls were collected in southwestern Spain, which ranged widely in total clay content ( $50\text{--}634\text{ g Kg}^{-1}$ ), free iron oxides ( $0.5\text{--}31.6\text{ g Kg}^{-1}$ ), calcium carbonate equivalent ( $0\text{--}567\text{ g kg}^{-1}$ ), organic matter ( $6\text{--}39\text{ g Kg}^{-1}$ ), WSA ( $0.2\text{--}49\%$ ), and MWD ( $0.1\text{--}2.8\text{ mm}$ ). Spectra in the visible to near infrared range ( $350\text{--}2500\text{ nm}$ ) of ground ( $<0.1\text{ mm}$ ) soil samples were recorded in  $0.5\text{-nm}$  steps using a spectrophotometer equipped with a diffuse reflectance attachment. Partial least squares regression analysis based on  $\log(1/R)$  for this spectral range resulted in good estimates of the contents in clay ( $R=0.93$ ), free iron oxides ( $R=0.91$ ), calcium carbonate ( $R=0.96$ ), and acceptable estimates of the content in organic matter ( $R=0.62$ ), WSA ( $R=0.88$ ), and MWD ( $R=0.88$ ). These results suggest that diffuse reflectance spectroscopy is a potentially useful technique for rapid determination of different soil physical and chemical properties, including aggregate stability indices.