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Testing the Slake mobile app at the local scale to explore the spatial variability of soil structural stability

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The Slake mobile app measures the aggregate stability by rapid immersion in water. It is a particularly interesting tool to allow a cost-efficient determination of soil structural stability. The Slake app has proven its efficiency at large scale (New South Wales state, Australia). Its application at a more local level (e.g. small watersheds) could be of particular interest to farmers and local stakeholders to identify areas of sensitivity to soil slaking, in order to implement mitigation strategies in the most appropriate areas to prevent from soil erosion. The aim of this study was to test the Slake app at the plot and the watershed scales to test its applicability and robustness. The studied watershed is the 25 km² Louroux catchment, located in central France. This catchment is typical of intensively cultivated lowland catchments. Despite a very low slope (<0.4%), erosion processes have been shown as significant, either through soil surface erosion or tile drainage exports. Slaking values have been measured in the laboratory on undisturbed soil surface aggregates collected at 52 locations within the catchment, using a balanced sampling. The same methodology has been applied within a 5 ha plot on 52 sampling points. The aggregate stability was measured with the app simultaneously on three aggregates. This measurement was repeated 3 times for each sampling location. Therefore, 9 slaking indices can be extracted for each soil sampling location, allowing for a computation of the index variability at each sampling location. Besides, 13 samples for the plot and the catchment have been selected to measure soil structural stability by a normalized method (Mean Weight Diameter of soil aggregates after wet sieving, ISO 10930). Preliminary results show a variable heterogeneity of the slaking index measured at a single location. The origin of this heterogeneity (measurement errors, sample variability...) is discussed. The correlation with the normalized method is explored and the spatial structure of the slaking index over the two studied scales is presented.