



Estimating Soil Water Holding Capacity using Sentinel2 images and yield map

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The Sentinel 2 satellite mission offers the possibility of having a frequent global coverage with high spatial resolution. This is an unprecedented opportunity to follow the dynamics of plant canopies (NDVI, fapar, LAI, chlorophyll) and to observe spatio-temporal variations that can be related to the interactions of plant covers with the environment. In addition, recent advances in technologies have offered the possibility to accurately map crop yield. This paper presents and evaluates a modelling approach for estimating soil water holding capacity parameters at 10 meters spatial resolution. The method is based on an inverse use of the STICS crop model and easily accessible input data including yield maps, time series of Leaf Area Index derived from Sentinel 2 observations, farming practices and a priori knowledge on soils. In order to have a good representation of the interactions between yield and foliar development, parameters describing crop variety in STICS crop model have first been calibrated. The main parameters describing the crop stand establishment have also been calibrated. Finally, the soil water holding capacity has been estimated. This method was applied on different wheat fields located in the South of France and on the plateau of Castilla La Mancha in Spain. The results were compared to the measurements of soil water holding capacity. The comparisons showed that simulated maps accurately fit the measurements in high water stress areas. The model was able to reproduce the critical water stress that seriously hindered the wheat growth and the final yields. These results demonstrate the benefit of using time series of Sentinel 2 data. The proposed approach can be applied in different agronomical, pedologic and climatic conditions to support farmer's decisions in a precision farming approach.

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