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INDICATOR-BASED SOIL MOISTURE MONITORING OF AGRICULTURAL RIPARIAN SITES IN NORTH-EAST GERMANY WITH A MULTI-SENSORAL TIME-SERIES

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ABSTRACT:

The estimation of soil moisture for agricultural areas is an urgently needed parameter for a variety of applications, e.g. for yield estimation or the monitoring of the requirements of the water framework directive (WFD). Therefore, within the presented approach, an indicator-based model is tested for implementing different sensors for predicting the water content in open and vegetation covered riparian soils. Since the soil moisture content is not stable over time, the estimations were repeated for several time-steps within the vegetation period of 2014. The presented study is focusing on the Peene area close to the city Demmin in North-East Germany.
A set of 15 RapidEye images and 12 Landsat 8 images was acquired throughout the vegetation period of 2014 (24/01/2014 - 01/11/2014). The images were co-registered and atmospherically corrected with ATCOR. As respective indicators the measurements of 20 agro-meteorological stations (e.g. soil temperature and soil moisture at different depths, precipitation, wind speed), the mapping of 50 vegetation plots (coverage and dominating species), as well as Leaf Area Index (LAI) data were available for three different time-steps throughout the vegetation period. These measurements were related to in-situ soil moisture measurements (TDR / FDR). Subsequently, a robust set of indicators and the sensor data can be applied to derive maps, which can be used independently from the time of the year and the utilized sensor. In a next step, the set of indicators can be applied to derive a map with soil moisture classes as well as indicator species. The method was tested for time-steps without calibration measurements. First results indicate that the method might be transferable to other phenological phases or weather conditions. In a next step, transferability to other riparian areas at the rivers Elbe, Havel, Rhein, and Lahn are planned.

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