



Deriving rootable depth and plant-available water holding capacity from SoilGrids as input for soil water models to inform crop yield forecasting in Pan-Europe

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Crop yield forecasts and crop production estimates are necessary to provide timely information for rapid decision-making during the growing season and are also useful in relation to trade, policies and cooperation linked to food security. Near real-time crop growth monitoring and yield forecasting information is provided for the EU, its neighborhood and the main producing regions of the world as well as assessments of climate change impacts on agriculture. Daily collected weather data and forecasts are combined with historical yield data and crop growth models, for various crops, and soil information. All necessary data and information is processed and managed through the Crop Growth Monitoring System (CGMS) database which includes the soil information required to calculate the impact of weather on crop growth. This soil information consists of soil hydraulic properties and rootable depth and is currently derived from a compilation of national soil type maps. These maps are of heterogeneous nature and the current study aims to update the associated soil schema (data model) in the CGMS database to that of SoilGrids which is a coherent collection of gridded maps that provide soil property values estimated at 6 depth intervals and a spatial resolution of 250 m under a single standard worldwide. Concretely, SoilGrids derived maps are produced for pan-Europe (including Turkey, Maghreb and West Russia) of soil hydraulic properties and rootable depth. The soil hydraulic properties are derived using an ensemble of pedotransfer functions (PTFs) which are developed based on the EU-HYDI database and include 1) the volumetric moisture content at saturation, 2) at field capacity and 3) at wilting point and 4) the hydraulic conductivity at saturation. The soil rootable depth is derived from SoilGrids in line with the pedotransfer rules (PTR) recently developed and applied for sub-Saharan Africa. The parameterisation of these rules is, where possible, further improved according to pan-European conditions. For those soil properties which are available from the Africa SoilGrids but unavailable from the SoilGrids for Europe, data from the WISE30sec database are used. The accuracy of the derived products is limited by the accuracy of the pan-European extent of SoilGrids, and WISE30sec, which is limited by the production using soil profiles data from only 2,060 point observations located in pan-Europe, included in WoSIS, plus topsoil data from the LUCAS 2009 survey. From the profiles included in WoSIS a number of 890 profiles includes data on bulk density and 380 on soil hydraulic properties.