



Assessment of improved root growth representation in a 1-D, field scale crop model

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Many 1-D, field scale crop models over-simplify root growth. The over-simplification of this “hidden half” of the crop may have significant consequences on simulated root water and nutrient uptake with a corresponding reflection on the simulated crop yields. Poor representation of root growth in crop models may therefore constitute a major source of uncertainty propagation. In this study we assess the effect of an improved representation of root growth in a model solution of the model framework SIMPLACE (Scientific Impact assessment and Modeling PLatform for Advanced Crop and Ecosystem management) compared to conventional 1-D approaches. The LINTUL5 crop growth model is coupled to the Hillflow soil water balance model within the SIMPLACE modeling framework (Gaiser et al, 2013). Root water uptake scenarios in the soil hydrological simulator Hillflow (Bronstert, 1995) together with an improved representation of root growth is compared to scenarios for which root growth is simplified. The improvement of root growth is achieved by integrating root growth solutions from R-SWMS (Javaux et al., 2008) into the SIMPLACE model solution. R-SWMS is a three dimensional model for simultaneous modeling of root growth, soil water fluxes and solute transport and uptake. These scenarios are tested by comparing how well the simulated water contents match with the observed soil water dynamics. The impacts of the scenarios on above ground biomass and wheat grain are assessed