General comments

The study **"A comprehensive assessment of in situ and remote sensing soil moisture data assimilation in the APSIM model for improving agricultural forecasting across the U.S. Midwest"**, M.Kivi, N.Vergopolan, H.Dokoohaki comprises of a set of new approaches and techniques of data assimilation for improving agricultural forecasting. In this study authors integrated in situ and remote sensing soil moisture observations with APSIM model through sequential data assimilation and assessed the extent to which soil moisture data assimilation can improve APSIM model forecasts. Therefore, paper addresses relevant scientific questions within the scope of HESS. The scientific methods and assumptions present are valid. The title clearly reflects the contents of the paper and abstract provides a complete summary of the research.

The work showed that assimilation of in situ surface soil moisture is not as powerful as the assimilation of in situ root-zone soil moisture in terms of model constraint. It is shown that high temporal resolution due to multisensor satellite availability and accurately estimated observation uncertainty are critical components for optimal system performance. More frequent assimilation helps mitigate the impact of such model errors and improve overall crop model predictions by correcting errors more often. Assimilating in situ observations, the accuracy of soil moisture forecasts in the assimilation layers was improved by an average of 17% for 10 cm and ~28% for 20 cm depth soil layer across all site-years and the crop yield was improved by an average of 23%.

Specific comments

There are a number of questions:

- In this study, APSIM's daily forecasts of agricultural variables were transformed and used as inputs into the PROSAIL model to compute the spectral reflectance. Would it be the source of errors in future predictions?
- There are a number of crops used in the study, which have different spectral signatures, biomass, stages of development, nutrient uptake, water use and water stress effect etc. Therefore, in order to reduce errors of agricultural forecasting would it be better to use different optimized variables for each crop?

Some references should be revised in text and in the list of References