

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC1
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Comment on gi-2021-21

Anonymous Referee #1

Referee comment on "Towards agricultural soil carbon monitoring, reporting, and verification through the Field Observatory Network (FiON)" by Olli Nevalainen et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-21-RC1>, 2021

The manuscript by Nevalainen et al. introduces the Field Observatory Network and its methodology which combines data from different sources (offline and near real time in situ data, satellite imagery and climatic data) with ecosystem modelling to support the monitoring and verification of soil carbon sequestration in agricultural soils. The network currently consists of 20 pilot farm sites in Finland with the involvement of different actors from researchers to farmers with the common goal of optimizing agricultural practices in order to preserve and possibly enhance soil carbon stocks. Both data and simulations results are disseminated publicly through a web graphical user interface. Such a system and intended as a decision support for the farmers who are able to monitor the effects of agricultural practices in relation to crop productivity and carbon sequestration is innovative, however the limits of the decision-making based on the information currently provided by the FiON are lacking in the discussion section. In addition, some aspects of CO₂ flux data processing have to be clarified to make the current methodology scalable in view of an expansion of the sites network.

Overall, the paper is well structured, written in a clear and concise style and definitely within the scope of the journal GI. I advise that the paper is published after minor review based on the following remarks:

P1 L29: **a** MRV tool

P8, L52 "unfavourable flow conditions according to the following validity criteria:..". CO₂ flux data are filtered according to validity ranges, which are site specific, except for those resulting from the stationarity tests and u-star filtering. However, in the perspective of expanding the EC flux observation network within the FiON, the same threshold values (eg. CO₂ mixing ratio mean and variance) might not be applicable to guarantee the quality of the processed datasets of other sites. Therefore, it would be important to explain how

these thresholds were determined, also referring to current methodological standards of other flux networks, when possible. Moreover, was a flux footprint analysis carried out in order to exclude flux data (partly) not targeting the monitored crops? If yes, the Authors should include the description of this processing step in section 3.3. Was the diurnal footprint always encompassed within the crop fields borders? Was the increase in the crop height accounted for in the displacement height used in the footprint model?

P11 L18 " ..by combining **the** observational uncertainty..

P20, L50 "One of our aims with this framework is to provide decision support for end users"

This sentence is key for the discussion section and for the message delivered by the paper. The Authors should discuss explicitly the limits of the provided decision support for farm management in terms of potential array of options given the current forecast window of 15 days. Consider that many factors of agricultural management are fixed within a production cycle (eg. crop type) and that many agricultural operations depend strictly on the crop growing stages and have limited margins to be temporally shifted. Also, underline in the discussion what can the FiON decision support system provide in addition to the traditional weather forecasting services upon which farmers usually rely.

P20, L73-76: "field activities". These activities are only related to the work of the farmers in the fields and should be better indicated with the tem "agricultural activities"