

## General comments

Concerning the content and the structure, the manuscript is improved, its structure is more concise and objectives are more comprehensive now. The connection between soil organic carbon stocks and the components of the carbon budget is now clearer to see. The authors addressed my previous comments and e.g. added an improved justification of the study area for applying the presented approach.

However, there are still minor points to improve. Some sections are still very lengthy, e.g. the first part of the discussion is too descriptive and repeats the findings from the previous section instead of placing them in the wider research context. E.g., the finding that the number of image acquisitions leads to reduced accuracy, but specific sensors increase the accuracy, needs to be discussed more clearly. What are the limitations and also steps forward to improve the approach? Shall users focus on careful image pre-processing (cloud filtering) or sensor selection, what advices could you give based on your findings? Further, the abstract lacks the most important research findings.

Unfortunately, the manuscript still needs to be linguistically revised. It is not so much the spelling mistakes, but often sentence structure and transitions as well as few grammatical errors that make it difficult to read. Please check the references and short citations in the next, as they are numerous redundant brackets and inconsistent formatting!

## Specific comments

### Abstract

#### Lines 15ff

What are the main findings here? You rather describe what was done but I am missing an interpretation/discussion of what we can learn from the findings. Please add some insights from the discussion (on data comparison, the difference between pixel- and field-scale and the impact of remote sensing images). How are your results, e.g. the accuracy values, the bias or the affected percentage of uncertainty, to be evaluated? Are the values high, surprising, low - what is new? What are the ways forward?

#### Line 25 – “soil organic carbon (SOC) storage has the potential to remove 0.6 to 9.3 Gt CO<sub>2</sub> yr<sup>-1</sup>”

At which scale – global, Europe-wide or regional? Please specify.

#### Line 34ff – “..shows the importance”

The equation rather shows the linkage between those components and, as a consequences, it is important to quantify them in order to better understand the effect of changing farming practices on the carbon budget. Please rephrase that accordingly and provide more information on the overall objective of the quantification.

### Discussion

**Section 4.1** Instead of an almost 1-page descriptive text about the results from other studies, a figure or table with an overview of the selected studies their results in  $R^2$ , RMSE, site characteristics etc. compared against the metrics of this study would be useful here.

In addition, please highlight more clearly what we can learn from that. You write that performances “are close to or better than existing state-of-the-art evaluations” but what does that mean? How high is the agreement or the improvement? Does that mean with less input variables you can yield better results? Please provide more information on what we can learn from the experiment!

**Line 548ff: “The same approaches may be penalized when applied to areas with high spatial variability, such as the hilly countryside in southwestern France”**

How about your approach applied to an area with low spatial variability? Please provide information on the scalability of your approach to other regions!

**Technical corrections (please check again! This is just a selection)**

- Line 26: remove “)”
- Line 28: remove “ )” and redundant spaces and brackets in the references
- Line 30: remove brackets in the references
- Line 46: insert space in “theregional”
- Line 47: change references into readable format
- Line 47ff: insert hyphenation and commas where needed
- Line 58/59: remove brackets in reference
- Line 561ff: wrong sentence structure! please change to “our approach will benefit from improvements...”
- Figure 5: typo in the axis labels
- Figure 6A: Please use different colour scaling for the different maps, as the spatial differences in the middle plot are not visible at all.