REVIEW - Earth System Science Data

Title: SPAMS10: InSAR-derived soil motion parameters to model relative peat surface elevation changes

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MS No.: essd-2026-143, MS type: Data description article

General comments

Overall, the paper presents a useful data set and the methods by which the data are generated are well described. This is well structured and laid out in a logical fashion. There are, however, several general areas where the paper could be improved:

1. The overall purpose of generating this data (justification) could be made much clear and a clear statement of how this improves on previous estimates / methods included.

2. Although I have said the structure of the paper of clear, the methodology could be better illustrated by included in a schematic diagram (Figure) of the structure of the method showing the significant stages (steps in generating the data.

3. The structure of the dataset could be better explained and justified. For example, on L134-135 - You say " We group parcels by soil type and water table zone and include only grassland parcels. The contextual grouping reduces the number of segments, thereby aiming to reduce segment shift noise. The group is formed if there are at least 15 and no more than 50 parcels. " This fundamentally affects the dataset but the background to this is not really explained in detail or justified. By how much are the segments are reduced? Why are only grassland parcels included? How are the group limits (15-50) determined?

4. The field area is poorly described. Given that the main deliverable of this paper is a 'dataset' it is important that the context of the data are well explained. Some additional information on the following should be included:
   - Type of soils, peat types and peat depths
   - Basic description of hydrology – annual precipitation, ET rates, water table variability (and how this varies over the 7-year period)
   - Type of agricultural practices in areas with % landcover types, average field size, etc.
   - Basic description of how these properties vary across the field area e.g. any gradients E to W or N to S.

5. Evaluation / illustration of the results could be more thorough to show the utility of the dataset in more detail. I understand the purpose of the paper is the

description of the dataset, but the accompanying Figures do not show the value or main characteristics (structure) of the data very well. The spatial maps are very small, and the time series plot is quite simple. Some additional Figures showing the distributions of the data (histograms) and box and whiskers plots of the data by parcel group would be much more helpful.

6. Subsidence is described at one point in the large field area (Figure) some more context is needed here. How does the 7-year record here fit with longer term trends and patterns?

7. The abstract is very descriptive and could usefully be rewritten to include much richer detail (results) that better describe the dataset (see specific comments).

Specific comments

Title – I would recommend including the word 'dataset' alongside SPAMS10, so it is clear this is the data and not the SPAMS model. This is the practice throughout the majority of the paper so I would also do it here. I was initially confused whether this was the data or the model.

L1 – What is meant by 'environmental stability' this is a very vague term please say something more specific.

L5 – Make it clear why it is 'SPAMS10' – 10 parameters.

L6 – please state clear what you mean by physical and statistical parameters and contextual information. This is too descriptive and does not tell us anything.

L6 – What is meant by 'parcel' – this is not clear at this stage in the paper so should be given context (adda few words in brackets?).

L8 – You state 'These parameters enable detailed and reproducible analyses of peat subsidence.' You need to give some statistics of the actual data and some error estimates (reproducibility) to support this statement. Inclusion of quantitative results would better illustrate the utility of the dataset.

L16 – Conclude this sentence with some suitable references.

L16-18 - Link the specific references to the particular challenges don't just list at the end of the sentence.

L33-35 - Add references to support this statement.

L37 – You define SPAMS10 in terms of 10 parameters yet on L5 you say there were “a limited set of parameters”. Ten parameters do not appear to be a limited set – can you word this better. Or do you really mean there are three main parameters and one constant (integration time). I think this could be better explained and worded.

L41-42 – It is unclear how you arrived at an integration time of 69 days and why it is so ‘constant’. Some physical explanation of this is needed.

L47 – 49 - How realistic is the “ assumption that conditions such as soil stratigraphy, groundwater management, and land use remain constant over time”. Do you mean over the 7 years of the data? If you described the field area better (see earlier comments) then you would be in a stronger position to justify this assumption.

L51 – Define an ‘agricultural parcel’ – do you mean a field or unit of similar land use? Also see earlier comments about the description of the field area.

Figure 1 - How representative is one extensometer site at the eastern margin of the study area. You should address this point in the text to assure readers it is representative.

L85 - You state “while the displacement signals are assumed to be correlated in time with limited spatial correlation”. Why do you assume limited spatial correlation - this is not always the case with subsidence over wide areas? How can you justify this assumption?

L88-89 – See earlier comments - define ‘parcel’ and provide some statistics on the size distribution of these parcels.

L92-93 - It is stated ” In peatlands, we assume that surface elevation changes are driven by environmental (meteorological) conditions.” – If this is the case then give some context for the seven-year period over which subsidence was measured.

L103-104 - You provide some insights into the agriculture of the area (ploughing events) but because you have not provided a fuller description of the area these events are hard to contextualise.

L134-135 - You say “ We group parcels by soil type and water table zone and include only grassland parcels. The contextual grouping reduces the number of segments, thereby aiming to reduce segment shift noise. The group is formed if there are at least 15 and no more than 50 parcels. “ This fundamentally affects the dataset but the background to this is not really explained in detail or justified. By how much are the segments are reduced? Why are only grassland parcels included? How are the group limits (15-50) determined?

L162-167 - The results and data could be much better explained. See suggestions above.

Figure 2 (page 8) – Add additional information to the Figure caption. Plots (a) and (b) explain scaling factor vales. Also state whether the data shown in the Figure is averaged over the 7-year observation period?

Figure 3 (Page 9) – Explain why the length of record differs for the extensometer period compared to the whole data series and why there are no recent observations 2022-2023. It is also stated in the caption " InSAR-based relative elevation estimates (red dots), and the SPAMS model (blue line) showing similar agreement levels" but this should be quantified.

Technical corrections

L51 – You do not need to say, 'see Figure 1.' You can just bracket it (Figure1).

L114 (bottom of page 5) – You provide one footnote. This is the only one in the document and is at odds with the general style. You should remove it and add the relevant text to the main body of the paper.

L270 – 'Van Asselen@ should be 'van Asselen'

L273 – Subscripts for CO_2 and CH_4