

BG-2022-85 – Author’s response

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Point-to-point responses

The point-to-point responses to the reviews RC1/RC3 and RC2 are available at <https://doi.org/10.5194/bg-2022-85-AC2> and <https://doi.org/10.5194/bg-2022-85-AC3>, respectively. The point-by-point responses to the comments by the handling
15 associate editor are stated below in blue color. Afterwards, we list all implemented changes which are based on the reviews and the author’s responses.

Answers to associate editor Alexandra Konings

1) The California boundary in Figure 3 is pretty different than the expected shape, suggesting a possible issue with the
20 projection or calculation. See Google Image searches for "California Boundary" or similar to compare to the shape in Figure 3. You may want to look into this.

Thank you for this comment. The ‘California’ shape is determined by the MODIS tiles which are used to derive this LFMC product, namely the tiles h08v04, h08v05 and h09v04. We added this information in section 2.1.2 Predictor variables (line
171-172 in the revised manuscript) and the referenced region is renamed western USA.

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2) The first paragraph in Section 3.2.1 on page 11 lists all delta_A values for Ku-VOD, X_VOD, and C-VOD , but not for L-VOD. Given the widespread use of SMOS L-VOD for biomass-related studies, it would be helpful if the authors could also include the L-VOD numbers here.

The associate editor is right that these numbers are missing. During the revision of chapter 3, the authors decided to avoid the
30 listing of Δ_A -values in favour of improved readability. An additional figure (Figure 7) was incorporated for a visual comparison of all Δ_A -values to help the reader for interpretation of the results.

- 3) While your plan to include more discussion of the results at different timescales in the text in response to Reviewer 2's comment seems reasonable, please make sure to also make the timescale of the analyses and results clear in the abstract text.
- 35 Thank you for this helpful reminder. The abstract was modified.

Relevant changes

- The whole text includes minor changes in word or phrase modifications.
- All changes proposed as finalized sentences or phrases in the line-by-line author comments are included.
- 40 - Abstract: We included the result for 8-daily analyses according to associate editor comment 3).
- Section 1: The information '*For reducing the degrees of freedom, this study will focus on VOD datasets retrieved with the same algorithm.*' was proposed to be included in line 125 but is now included in line 143 (section 2.1.1) of the revised manuscript.
- Section 2.1.2: Additional information regarding the AGB map based on RC1, the uncertainty of LFMC data set requested by RC2 and information about the spatial extent of the California study area renamed western USA requested by the associated editor are included.
- 45 - Section 2.2: The text structure was revised. Information about grid search and hyper-parameters are included (RC2).
- Section 2.4: The efficiency coefficient (R^2) was renamed Nash-Sutcliffe model efficiency coefficient (NSE) to avoid possible confusion with the Pearson correlation coefficient (based on RC2). In addition, the describing formula is included.
- 50 - Section 2.5: The text was revised to improve the understanding of the ALE concept. (RC1 and RC2)
- Section 3.1: The text and figures are revised. Specifically, 8-daily results are discussed in more detail in sections 3.1.1-3.4. In Figure 2, 8-daily and GAM results are included. Figure 3 is displayed with a discrete colorbar to improve the interpretation. A new figure (Figure 4 in revised manuscript) is added to support our findings in section 3.1.5.
- 55 - Section 3.2: Text and figures are revised. 8-daily results are discussed in more detail and are included in Figure 5 (revised manuscript). With the aim of improving the readability, Δ_A -values are removed from the text. Instead, two new figures (Figure 6 and 7) were added to allow the user a visual inspection of the Δ_A -results. Figure 5 of the unrevised manuscript is excluded as the authors found that it is no longer necessary due to the new figures.
- Section 4: A text segment discussing the uncertainties of the LFMC data set as well as VOD error quantification are added (RC2).
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