

Dear editor,

In the revised version of the manuscript we have focused on improving the manuscript using the constructive suggestions as provided by the two referees. Below we summarized the content of the improvements and a few notes on other decisions we made concerning suggested changes.

- In general the text has been improved for readability. The referees highlighted several areas in the manuscript that needed some extra clarifications, which we followed up on in order to improve it. For example, this was done by adding some extra information on the intercalibration minimization function in Section 3.2.1 and better describing why we choose these datasets. The specifics can be found in the document with tracked changes.
- On the figures, Fig. 2 (EF), Fig. 3 (EF), and Fig. (4 CDEFGH) have been improved following the advice of the referees. The X/Y labels have been added and the correlations have been placed in the figures. Also, both in the figures and throughout the rest of the manuscript, correlations are now reported to two decimal places.

After a discussion, we have decided not to follow up on the request to add the figure on the LST time series for ERA5, as we think Fig. 4F and the text sufficiently support the statement made and we want to keep the images to a reasonable limit that matches well with the text.

A similar decision was made for the intercalibrated brightness temperatures. We appreciate the interest of the referee on this topic, however the focus of this study is on the resulting datasets, the climate data records, not on the brightness temperatures that go into it. If there were any issues with this data, this would be directly visible in the passive microwave derived anomaly time series as breaks. Therefore, we think the reference to Van der Schalie et al. (2021), which includes examples of the requested imagery, is sufficient. Of course, if the referee is interested in this work, he can always reach out and I am happy to share some results on X-band specific.

- The affiliation of three authors, including myself, have changed. As the company VanderSat was acquired by Planet at the end of 2021, the affiliation of R. van der Schalie, M. van der Vliet and R. de Jeu changed from VanderSat to Planet too.

We hope that the editor and referees are content with the improved manuscript provided, on both the applied changes and other choices made.

Kind regards,

Robin van der Schalie, on behalf of all authors