

Dear Editor,

Dear Referees,

We made a comprehensive revision of the manuscript in line with the comments of the Referees (for more details please see our replies to the referees).

The modification make the paper very long and detailed. In order to avoid too much details in the main text we created two new appendices (E and F), which include the details about the calculation of the dislocation/mismatch errors and the discussions on comparability of satellite and reference data. In addition, we split the former Appendix A (“Theoretical considerations”) into two appendices (A and B): a first dedicated to the general theory of retrievals and a second to the specific theory of the combination of two retrieval products.

Furthermore, we expanded the empirical proof/validation of the combination method by analyzing now more than three years of the combined product (Nov. 2017 – Dec. 2020 instead Nov. 2017 – July/Dec. 2019). The validation part incudes now more TCCON stations (14 instead of 6), more AirCore profile data (36 instead of 24), and more GAW data (data for more than 185 days instead of 100 days). This makes the agreement between the theoretically predicted characteristics (errors and sensitivity) of the satellite products and the validation results even more robust.

Best regards,

Matthias Schneider