

2nd review of Eriksson et al., revised title: “Advancements and continued challenges in observations and global modelling of atmospheric ice mass”.

Recommendation: accept after minor revisions.

General comments:

The authors revised their submission significantly, figures and captions were appropriately revised. I appreciate and thank the authors' for efforts in addressing many of my previous comments. While a few minor issues that require additional clarification remain, I believe the manuscript is almost ready for publication pending minor revisions.

Specific comments:

1. My previous comment regarding Figure 3a, units of pdf: I do not see how the integral can be equal to 1 as units in y axis go above 1. Could you provide information about dFWP so it is clear? Or did you multiply by hundred so the integral is equal to 100? Additionally, could you explain the difference between PDF in Figure 3a and Figure 14 (which integral I can see is equal to 1 but no units, which, personally, I am more familiar with)?

2. Satellite uncertainty (3.6) section. Thank you for clarification regarding the numbers, the reasoning behind the uncertainty range is now perfectly clear. While I do feel that there are quite a few speculative elements contributing to the uncertainty range, the authors do mention that they are unable to assign a likelihood to it, which I find acceptable.

3. Section 5.1 starting with line 553: “The (24 h) mean of CCIC for February 2020 is about 3% lower than the (1:30) 2015 all-year mean in Table 4. Considering this shift, both IFS and GEOS end up inside the range between DARDAR and 2C-ICE. If we apply the broader range motivated in Section 3.6, which sets a lower limit of approximately 0.082 kg m⁻², three additional models fall within this range: ARPEGE, FV3, and MPAS.”

Please clarify more explicitly what is being compared, as the stated 3% difference is not immediately clear. This comparison can only be followed by readers who carefully work through Section 3.6 and reproduce the calculation themselves. Specifically, starting from line 440 (“With a possible 20% over-/underestimation by DARDAR/2C-ICE, we get a 30% uncertainty with respect to the best estimate based on their combined mean (that is 10% above/below the mean of DARDAR/2C-ICE)”), this results in a combined mean of 0.1328 kg m⁻² for the 2015 all-year estimate, with a ±30% uncertainty range. Based on this, the CCIC value for February 2020 (0.129 kg m⁻²) is about 3% lower than the 2015 combined mean. In addition, should the lower limit not be 0.093 kg m⁻² (0.7* 0.1328 kg m⁻²)? It is unclear to me how the value of 0.082 kg m⁻² was obtained.

Technical corrections:

Regarding my earlier comment about defining CCIC, I realize that I did not express myself clearly, and I apologize for the confusion. What I meant is that CCIC, along with several other abbreviations, is missing a definition when first introduced (for example, DARDAR (raDAR–liDAR)). While some abbreviations, such as ice water path (IWP) or particle size distribution (PSD), are properly defined, others are not. Please check the manuscript and ensure that all abbreviations are defined at their first occurrence.