General comments

1. **Comment:**
   Line 25: "Northern Finland" should be "northern Finland". It could be useful to add a sentence on what you mean with cold and clean or also cite some overview paper of the location like Lohila et al. 2015.

   Response:
   We revised the paragraph and added another citation describing the Pallas environment.

2. **Comment:**
   Line 29: Do you have references for these three PaCE campaigns? I would suggest to add them if you have them.

   Response:
   This is the first paper on the remote sensing measurements during the PaCE campaigns. Publications on the in situ measurements during the earlier campaigns are cited in the manuscript (e.g., Kivekäs et al., 2009; Anttila et al., 2012; Doulgeris et al., 2023).

3. **Comment:**
   Line 34: "Northern Finland" should be "northern Finland".

   Response:
   Corrected.

4. **Comment:**
   Line 71: "up to about 7.6 km" should be "up to a range of about 7.6 km".

   Response:
   Corrected.

5. **Comment:**
   Line 99: "single channel" should be "single-channel". There is no good correlation, please change this to indicate the actual correlation coefficient and call it a positive correlation. It would sound a bit more clear, if you split the sentence into two: "Measured LWP values... 7 g m^{-2}. For smaller values the single-channel passive radiometer measured a higher LWP with a mean difference of 21 g m^{-2}."

   Response:
   Corrected the text as suggested and updated Fig. 5 (population correlation coefficient ρ changed to sample correlation coefficient r).

6. **Comment:**
   Line 135: "multichannel" should be "multi-channel".

   Response:
   Corrected.

7. **Comment:**
   Line 142: You should add this as a citation and add a date to the link for when you last accessed it: https://www.ecmwf.int/en/publications/ifs-documentation, last access: XX Month YYYY. If applicable you should also add authors and year of publishing, as you did for the GitHub repositories.

   Response:
   Added proper citation with access information.

8. **Comment:**
   Line 147: "2022 PaCE" should be "PaCE 2022".

   Response:
   Corrected.

9. **Comment:**
   Line 168: You adjusted the wording earlier in line 156 to categorization. I would suggest to do the same here.

   Response:
   The categorization and target classification are different. Clarified the text to first discuss the categorization, then geophysical properties derived from the categorization, and finally the target classification also derived from the categorization.

10. **Comment:**
    Line 180: "machine learning-based" should be "machine-learning based".

    Response:
    Corrected.

11. **Comment:**
    Line 328: Toledo 2020 is cited as a discussion paper and should be upgrade to the final published version (https://doi.org/10.5194/amt-13-6853-2020).

    Response:
    Corrected.

Comments regarding figures

1. **Comment:**

   Figure 2: I am not sure, but it looks like the hatched areas are added outside of matplotlib. If you can, I would suggest to add hatched areas directly to the plot via Matplotlib. The following is a small snippet:

   ```
   ax.axvspan(start_time, stop_time, color='none' , hatch='/')
   ```

   y-label of panel (b) does not contain the quantity (LWP).

   Response:

   Corrected.

2. **Comment:**

   Figure 5: "multichannel" should be "multi-channel"

   Response:

   Corrected.