Public justification (visible to the public if the article is accepted and published):
Dear Felix Erdmann, Olivier Caumont, and Eric Defer!

I am pleased to inform you that the revised version of your manuscript NHESS-2022-637 can now be accepted for publication subject to very minor revisions (as indicated by reviwer 2) in our journal Natural Hazards and Earth System Sciences (NHESS). Please inform your co-authors of the editorial decision. The minor changes will be reviewed by myself.

You will soon be contacted by the journal publication office for the preparation of the final version of your manuscript. Please respond promptly to the requests of the publication office, as this will condition the time of your publication, and read carefully any copy-editing recommendations that they make. Let me remind you that final publication of your paper on the journal web site is subject to the payment of the appropriate service charges. Also, do not forget that as an open-access journal you can freely distribute your paper once it is published.

I take this opportunity to thank you and your co-authors for having selected Natural Hazards and Earth System Sciences (NHESS) for the publication of your scientific work. I look forward to receiving further contributions to our journal from you and your co-authors.

Yours Sincerely,
Gregor Leckebusch

Response to Final review of manuscript egusphere-2022-637 by Erdmann et al. (2022)

The authors thank the reviewer for this final review and final recommendations. We are responding to each point below using bold face.

Final recommendation:

I find that the authors have addressed (most of) my major comments in the revised version of

their manuscript. Therefore, I now deem it suitable for publication.

Some final minor comments:

* line 25: MTG was launched in December 2022. This would be worth updating in the text.

The authors changed the text

"A similar instrument, the Meteosat Third Generation (MTG) Lightning Imager (LI), will be launched in the 2022 time-frame to monitor lightning over among others Europe, Africa, and wide parts of the Atlantic Ocean (Dobber and Grandell, 2014)."

To

"A similar instrument, the Lightning Imager (LI), was launched in December 2022 aboard the first Meteosat Third Generation (MTG) satellite to monitor lightning over Europe, Africa, and large portions of the Atlantic Ocean, among other regions (Dobber and Grandell, 2014)."

* line 55: proxies based on [...].

done

* line 109: Section 7 describes [...].

done

* Figure 3: Following on the other reviewer's comments, I would agree that column-integrated graupel

mass should be expressed in units of kg m−2 rather than just kg (kg per which unit of space?).

Based on the AROME-France output and units, graupel mass is given as a mass for each grid point. Thus, we could express it as a value integrated over an AROME-France pixel (1.3km x 1.3km). However, Figure 3 uses the horizontal FED grid (about 7km x 7km) and refers to the closest AROME-France grid point to a given FED observation. For simplicity, the authors kept the unit of the mass over a point.

We added to the figure caption: "The graupel mass is integrated vertically over the AROME-France grid point for a 1.3km x 1.3km pixel."

* line 223: "[...] AROME-France dBFED by converting the output of the FFO to dB units."

done

* Figure 4 (caption): ”cycles” (mistyped).

done

* line 249: ”cycles” (mistyped).

done

* line 281: ”In example, the HA generates 1.6% of almost [...]” → ”For instance, the HA only contributes to 1.6% of almost [...]”.

ok, accepted

* Figure 6 (caption): ”B” (resp. ”H”) indicates low (resp. high) geopotential (rather than pressure) values, since pressure on geopotential surfaces is constant, by definition (500 hPa here).

The caption was updated: “(a) Météo-France 500hPa analysis of geopotential height (in geopotential metres, gpm, solid lines) and temperature (in °C, dashed lines) **with centers of low (“B”) and high (“H”) geopotential**, and (b) Météo-France surface analysis **with low- and high-pressure centers shown as “D” and “A”, respectively,** on 08 Aug. 2018, 12:00 UTC~~**. Surface (altitude) low-pressure centres are indicated by “D” (“B”) and high-pressure centres by “A” (“H”).**~~ Maps from the Météo-France daily weather bulletin archive https://donneespubliques.meteofrance.fr/?fond=produit&id_produit=129&id_rubrique=52 (accessed 19 October 2022).”

* Figure 8 (caption): ”Vertical cross-sections along 44 N [...]”.

done

* Figure 8: Out of curiosity, would the authors have an explanation for the strange saw-tooth features on the RH fields at longitude around 4◦ W (along the edges of the column with very high RH)?

The authors are convinced that these structures in the plot emerge from an interpolation problem in the plotting method. The features were not visible when we tested another plotting methods, which completely failed to depict some grid points. These difficulties are related to the fact the AROME-France grid is not regular on the vertical, and also the grid points are not located exactly along the 44 deg latitude since AROME-France uses an equi-distant grid of 1.3km. In addition, there is a very strong gradient with very high and very low RH in adjacent grid points that did not allow for a smooth interpolation in these columns.

The authors updated the figure caption and added “Sawtooth features visible at 4 °E are interpolation artefacts caused by the grid's irregularity.”

* Figure 10 (caption): I would suggest: ”The size of the neighbourhood used to calculate the FSS was set to 0.5 deg”.

The authors accept the suggestion.

* line 414: ”overestimate”.

done