Replies to comments of referees of paper "A European lightning density analysis using 5 years of ATDnet data", following open discussion in NHESSD.

General notes:

The authors are grateful for the helpful responses of the referees in clarifying and improving this paper.

One minor concern that the authors still bear prior to acceptance in NHESS is the figure size. The authors are satisfied that it is possible, with care, to format the figures such that the information they present is clear, even at half page width size necessary for two column publication. If the editor is concerned that the figures are not sufficiently readable at this scale, then the authors will endeavor to provide updated versions of the existing figures that present the same information in a clearer manner.

Two errors have been noticed in the manuscript since publication in NHESSD:

- The reference to Diendorfer should refer to the 'International Conference on Lightning Protection', not the 'International Lightning Detection Conference'.
- An error was made in the fix/flash totals in page 6885, lines 17 and 19. These values should be 91,656,076 / 59,061,989, respectively, not 92,127,912 / 59,322,285. The average multiplicity remains unchanged.

Referee 1 comments:

All previously communicated shortcomings have been remedied:

Thank you for your contribution.

Referee 2 comments:

It was noted by the authors that the comments submitted during open discussion were exactly the same as those submitted prior to publication in NHESSD, and had largely already been addressed. Normally the term "flash density" refers to densities of cloud-to-ground (CG) flashes. The reason is...:

The authors feel this issue has been satisfactorily addressed by removing the term 'flash' from the title, and by adding an explanatory paragraph of the terminology in page 6882, lines 24-29.

There is no comment about the accuracy of the flash density (or lightning density) in the paper. The accuracy depends...:

Commentary has been added about the reliability of flash density values (page 6884, lines 14-19; page 6894, line 25 to page 6895, line 11) with reference to the specified Diendorfer paper.

To understand the effect of DE of the ATDnet a multiplicity distribution could be presented. What is the average multiplicity...:

This issue was addressed in response prior to publication in NHESSD: multiplicity of the entire dataset not included, but no additional plots/sections added.

Detailed remarks

Line 45: LF networks easily detect over the North Sea or the Mediterranean – for VHF networks you are correct! Same in line 48:

This issue was addressed in response prior to publication in NHESSD: terminology changed to 'short-range' networks, to avoid ambiguity.

Line 145: I do not understand the term flash density 'rate'. Maybe the authors should explain it:

This issue was addressed in response prior to publication in NHESSD: an attempt was made to clarify the meaning of 'rate'.

To avoid differences in the grid size it is better to define the grid cell already in a projection and extract data for each grid cell already in the projection.

This issue was addressed in response prior to publication in NHESSD: See previous point on grid size.

Line 168-173: You should make sure you compare those flash densities for the same grid size – otherwise the comparison doesn't make sense. I know of regions in Europe with flash densities up to 20 flashes year-1 km-2 but the grid size for determination of those densities was 1x1km.

This issue was addressed in response prior to publication in NHESSD: Section removed.

Line 181-184: I do not understand the region enclosed by 4 points... - what do you mean with this because those 4 points basically covers half Europe.

This issue was addressed in response prior to publication in NHESSD: section removed.

Line 226-227: Hard to see in the figure.

This issue was addressed in response prior to publication in NHESSD: Accepted, efforts will be made to find a suitable figure size.

Line 418: It is dangerous to advertise the results for risk assessment because the data is averaged over large areas (e.g. 20x14km at 50° latitude) where much flash higher densities could occur. Therefore averaging over such a large region could underestimate the risk for some smaller regions. For risk assessment flash densities with better spatial resolution should be used.

This issue was addressed in response prior to publication in NHESSD: Warning note added to this paragraph.

Minor problems: All figures with flash densities are definitely too small. It is not possible to see something on a printout – in the PDF version you have to zoom. Basically all figures should be enlarged:

Accepted, efforts will be made to find a suitable figure size. See comment to editor at the start of this response.