

Interactive comment on “Spatio-temporal variability of lightning activity in Europe and the relation to the North Atlantic Oscillation teleconnection pattern” by David Piper and Michael Kunz

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Received and published: 22 April 2017

Spatio-temporal variability of lightning activity in Europe and the relation to the North Atlantic Oscillation teleconnection pattern

by David Piper and Michael Kunz

Submitted to NHESD

This paper presents an interesting study based on the analysis of 14-year lightning data over a part of central/western Europe. The paper is well written and of interest for

C1

many readers. I would like to mention that the major part of the paper consists of a description of the temporal and spatial distribution of lightning (especially Section 3.1 is a rather long juxtaposition of locations with low/high lightning activity), while the discussion about NAO (although stated explicitly in the title of the paper) is not fully exploited. I recommend however publications of the paper, taking into account the following remarks.

Specific remarks

1. My main concern is the robustness of lightning data: the authors do not provide information about the location error and to the detection efficiency of the observing network. The latter information is very important to the reader in order to have a clearer idea on how the selection of 5 lightning flashes is justified in order to characterize a TD. Moreover, if the network experienced significant changes/modification through the elapsed 14 years (e.g. adding new sensors and/or applying modification to the location algorithms) these changes can jeopardize the robustness of results. Finally no information is given on the transformation of strokes to flashes (although I do not understand the necessity of such a transformation).
2. Reference to previous work on lightning climatology: I bring to authors' attention the recent publication of Kotroni and Lagouvardos (2016) (Lightning in the Mediterranean and its relation with sea-surface Temperature, Environmental Research Letters, 2016) which comprises a 10-year lightning climatology over a major part of Europe. Therefore the authors should modify accordingly their remarks in p2, lines 16-17. In this publication you can also find a discussion on the relationship of SST with lightning, an issue that is also mentioned in your paper.
3. The analysed area lacks a part of NE Italy and Slovenia, areas being identified by previous studies have as the hot-spots of lightning in Europe (Anderson and Klugmann, 2014; Kotroni and Lagouvardos 2016), is there any reason for that?
4. In Section 3.1, p6, line 12: Which is the meaning of “local moisture anomalies”?

C2

5. In the discussion in Section 3.3.2: how the authors believe that different vegetation types can influence the correlation between regions? Since many studies in the past have discussed this issue, I would suggest the authors having a look on this.

6. As stated in the beginning, Section 3.3.3 devoted to the relation with NAO is not satisfactorily developed. Since this aspect of investigation is original, one would expect a more thorough discussion, maybe based on the analysis of other upper-level meteorological fields. In any case, I strongly believe that additional work on this issue would result in a more solid publication. In the light of the same remark, I would suggest further refining the last sentence of the abstract and a more comprehensive concluding part (in the conclusion section, only 3 lines are devoted to NAO relation to lightning).

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2017-35, 2017.