



*Supplement of*

## **The climatology and nature of warm-season convective cells in cold-frontal environments over Germany**

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# 1. Lightning Climatology

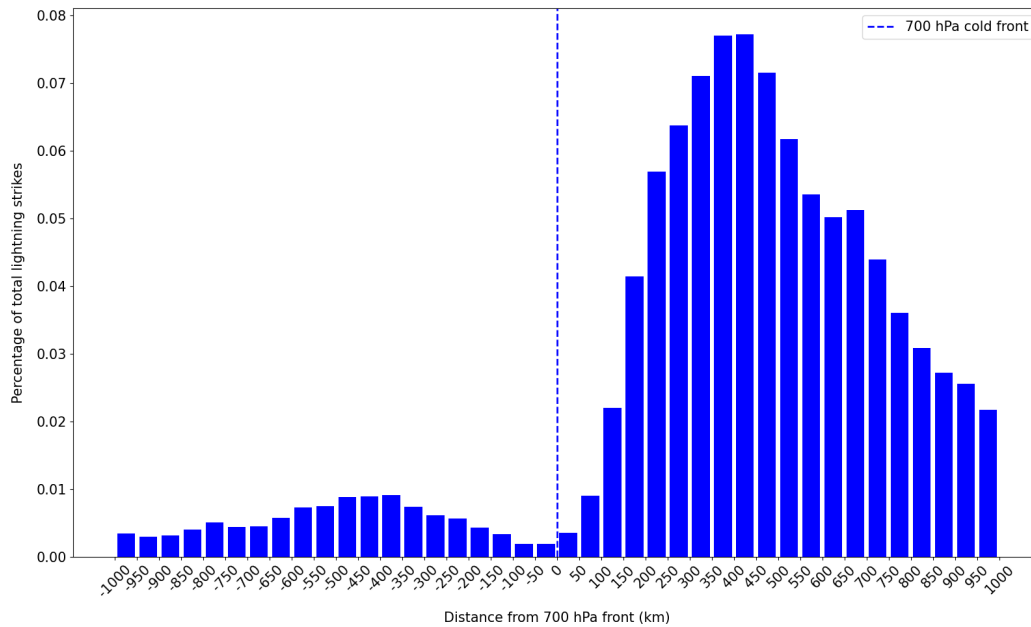


Figure S1.1: Lightning strike frequency for Germany depending on the distance from the 700 hPa front between 2010–2016 (April–September). Lightning data were provided by the Met Office, which uses an arrival time difference network (ATDnet) to detect lightning strokes (Met Office, 2020).

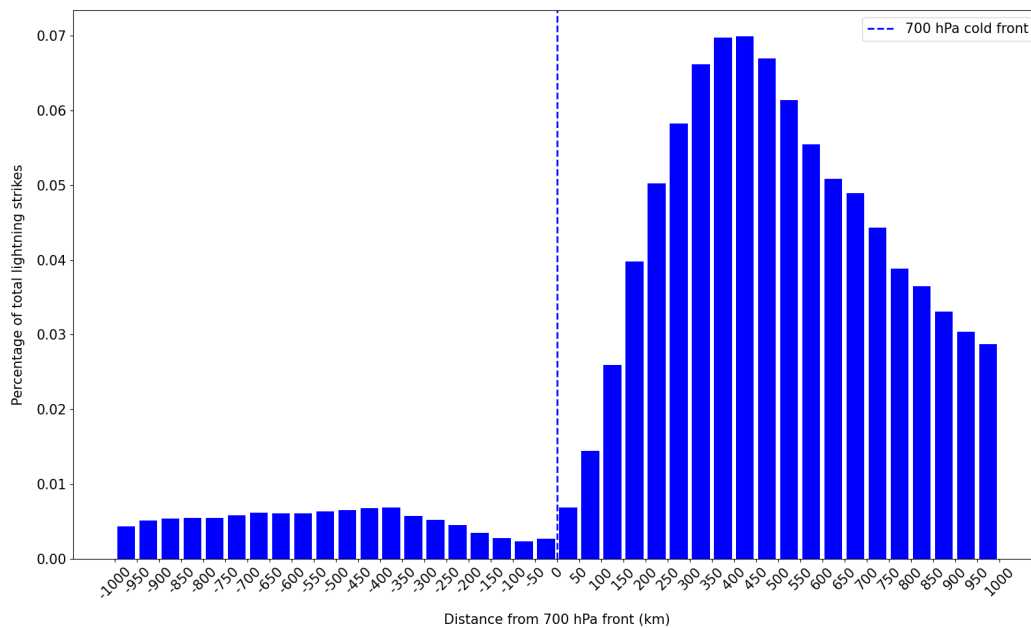


Figure S1.2: Lightning strike frequency for a sub-European domain (see grey domain in Figure 1) depending on the distance from the 700 hPa front between 2010–2016 (April–September). Lightning data were provided by the Met Office, which uses an arrival time difference network (ATDnet) to detect lightning strokes (Met Office, 2020).

## 2. Randomised Test

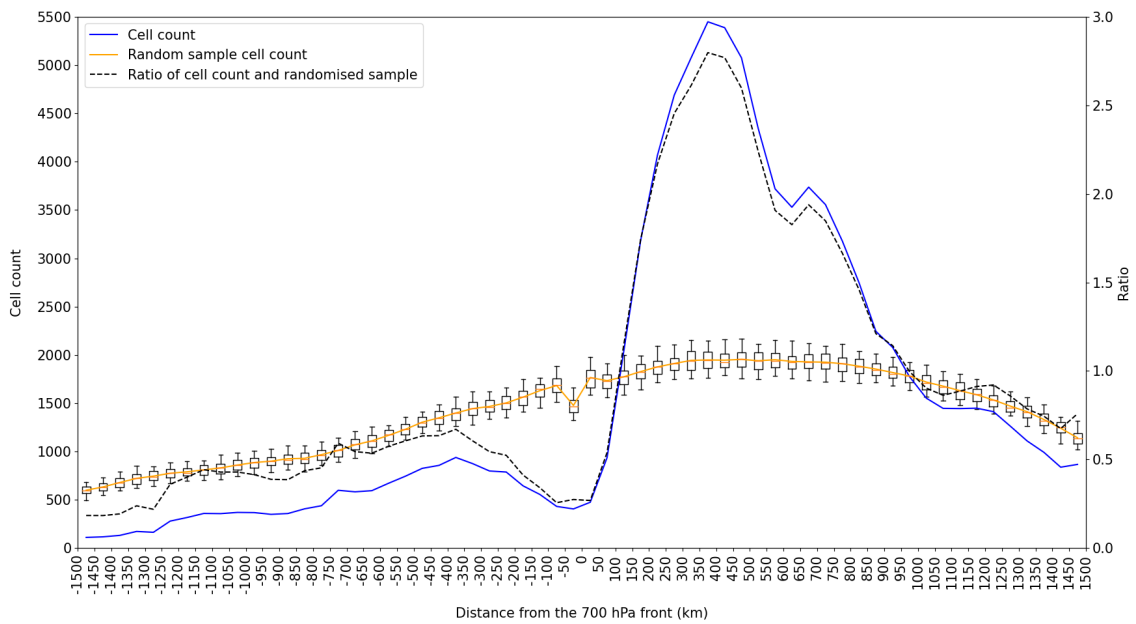


Figure S2.1: Cell count (blue), random sample cell count mean (orange) and ratio of cell count and randomised sample (black) on the secondary axis. The random sample was performed 100 times and the 5th and 95th percentiles are shown by the whiskers of the boxplots.

### 3. Clustering

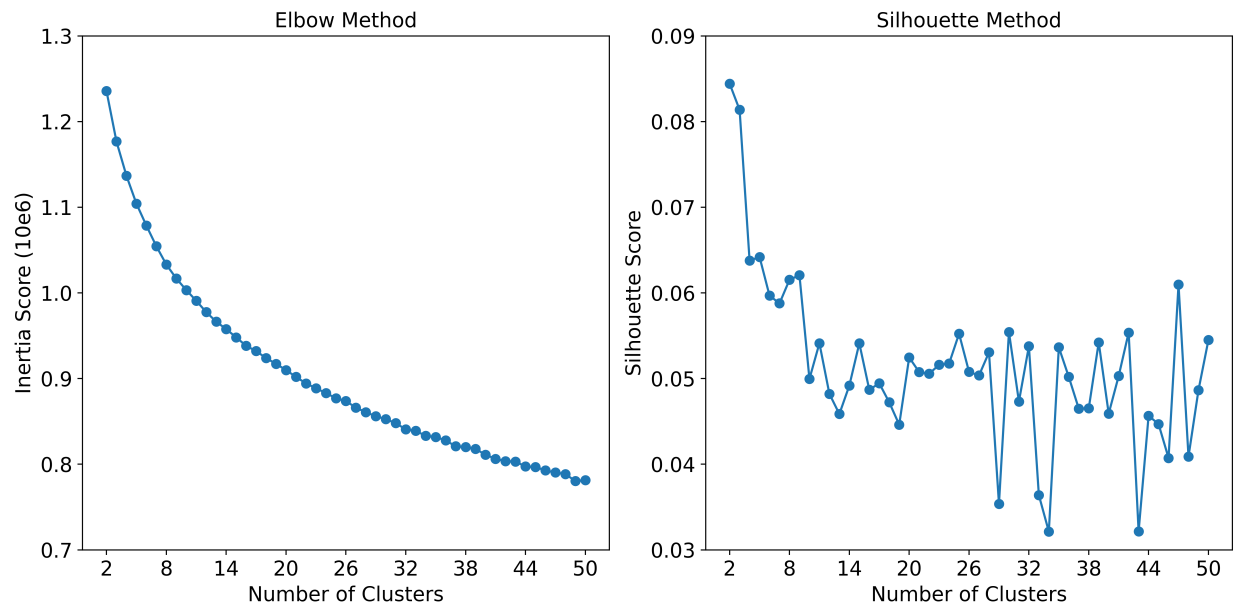


Figure S3.1: Elbow method (left) and silhouette score method (right) applied for cluster numbers between 2 and 50.

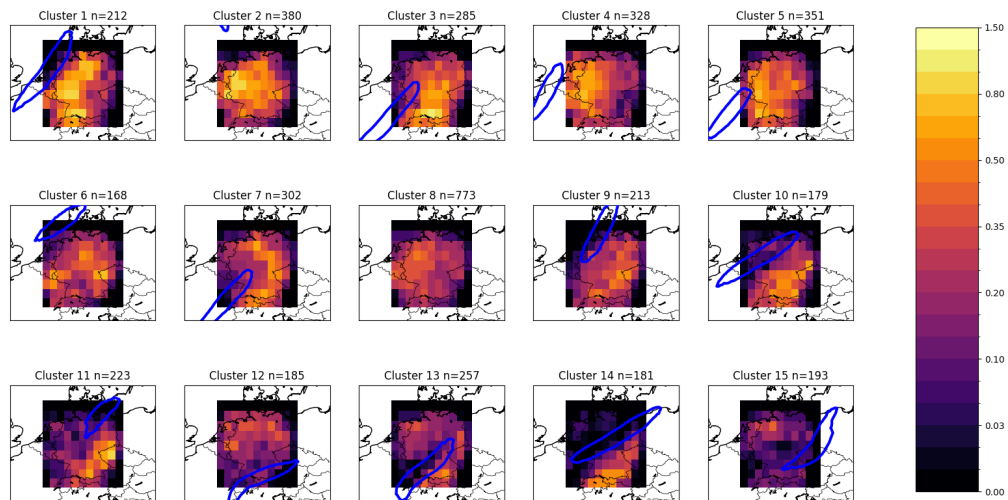


Figure S3.2: As Figure 9 but for 15 clusters. Absence of a blue contour indicates high within-cluster variance and no common front type associated to that cluster.

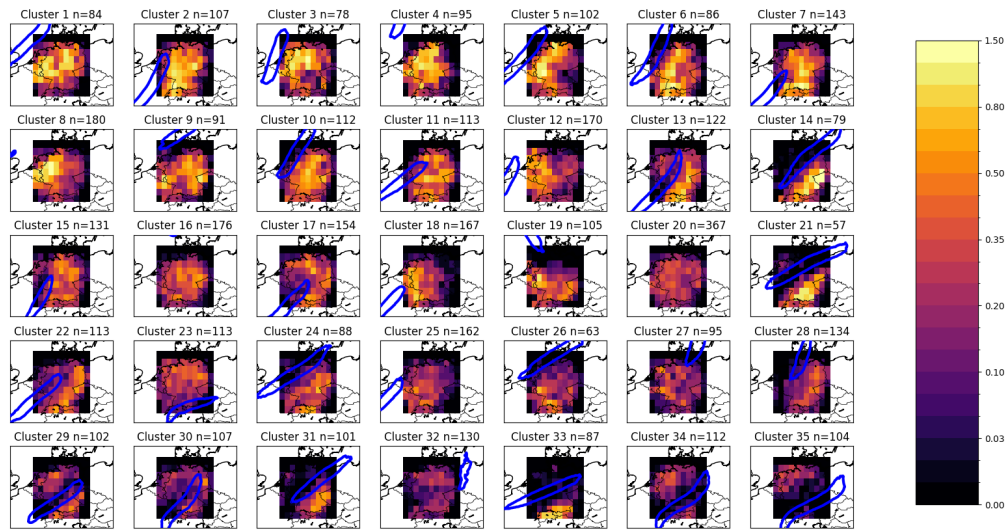


Figure S3.3: As Figure 9 but for 35 clusters. Absence of a blue contour indicates high within-cluster variance and no common front type associated to that cluster.

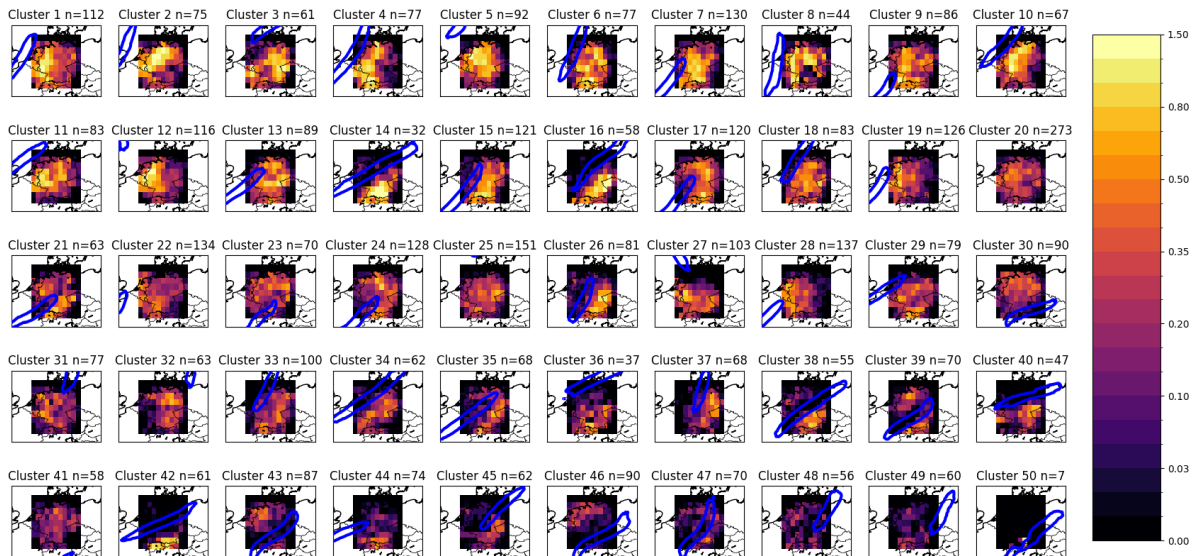


Figure S3.4: As Figure 9 but for 50 clusters. Absence of a blue contour indicates high within-cluster variance and no common front type associated to that cluster.

## References

Met Office: Lightning strike location data, [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/data/adtnet\\_data\\_sheet.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/data/adtnet_data_sheet.pdf), Met Office, 2020.