Reply for 1# Referee:

The paper investigates the impact of windstorms on Finland's electricity grid. The authors present a new classification method for identifying windstorms, which is based on the impacts (here: power outages) rather than on meteorological aspects. They analyze the different windstorm classes in terms of their meteorological properties and impacts, focusing on regional and seasonal differences.

The paper covers an interesting and relevant topic. It is well written and clearly structured. Apart from some comments below, I can recommend the paper for publication and I feel it will provide a useful contribution to the field.

We thank the reviewer for their constructive comments and are pleased to hear that they found the manuscript interesting. We have copied all detailed comments below in blue and provided our responses to each specific comment in black.

1. When I read the paper, I was quickly confused about how you differentiate between extratropical cyclones and windstorms. Only when I got to Section 3.2 on page 7, I was sure that windstorms are those extratropical cyclones that cause high power outages. Maybe it would be good to define this as early as possible.

   Reply: In the Introduction, we have clarified this on lines 68-70 as follows: *"This study examines the impacts of extratropical cyclones and windstorms on Finland's electricity grids between 2005 and 2018. Out of the 3,304 extratropical cyclones examined, 92 are considered significant windstorms by having caused at least 50,000 power outages (Section 3.2)."*

2. Section 3.2

   1. How many cyclones did you analyze in total - in addition to the 92 windstorms?

      Reply: In lines 166-167 (section 3.1) of the original manuscript we state that after we apply the different filters to all of the objectively determined cyclone tracks, we have 3304 extratropical cyclones. This is the total number of cyclones that we analysed. We have revised this sentence to make this clearer.

   2. Line 187: You state that you exclude dates if the same windstorm caused power outages during consecutive days. Which dates did you exclude in these cases - the whole storm or just one of the days? And which day did you keep? Please clarify.

      Reply: We excluded "the less significant date" and included the day which had the largest impacts i.e. the largest number of delivery points without electricity. In lines 200-201, we added an additional sentence to clarify this: "*In the case of (1), we retain the date that had the largest NDPs.*"

We included for instance Tapani and Hannu windstorms although they occurred on two consecutive days, because there were clearly two separate storm tracks and cyclones identified.

3. Section 3.3: What are the borders of the "Outside Finland" domain?

Reply: The borders of the class O windstorms are the domain of extratropical cyclones potentially affecting Finland (0–60°E, 50–75°N.)*"*. This is mentioned in section 3.1 on the lines 177*: "…the tracks that passed through the domain of 0–60°E, 50–75°N."*

For improving clarity, we have added the same information into section 3.3, where we explain the classification. You can find the additional information in the caption of Figure 2 and in lines 209-210: *"…whether it does not pass directly across Finland at all (class O, Outside of Finland, but inside of 0–60°E, 50–75°N box)."*

4. Figures 3 and 4: Would it make sense to use the same color coding for windstorms and extratropical cyclones in both figures?

Reply: We appreciate the comment and have now unified the color coding of the two figures. Figure 3 has been updated.

5. Section 4.4.1: How exactly did you compute the correlation coefficient between ERA5 and NDP or between observations and NDP given their different spatial scales?

Reply: We used the daily sum of NDP and faults to calculate the correlation coefficient with the selected meteorological parameters. For example, we calculated the mean of the maximum wind gusts across all FMI's observation stations in Finland to maximize spatial coverage for each windstorm day and correlated it with the daily NDP sum. A similar analysis was done with ERA5 data, using the mean of the maximum wind gusts across all grid cells within the Finland domain (20.0–31.4°E, 59.5–70.1°N). Likewise, correlations with NDP and faults were calculated for other meteorological parameters, such as minimum MSLP and propagation speed.

We have revised the sentence in lines 367-374 to make it more clear: *"To examine the most significant windstorm-related factors impacting the electrical grid, we computed the correlation coefficients between the daily sums of NDP and electrical grid faults with ERA5 wind gust parameters, wind gust observations from the Finnish Meteorological Institute (Figure 8), and daily storm track parameters (e.g., minimum MSLP) over the Finland domain (20.0–31.4°E, 59.5–70.1°N). For example, we calculated the mean maximum wind gusts across all FMI observation stations for each windstorm day and correlated them with the daily NDP sum. A similar analysis was performed using ERA5 data by computing the mean maximum wind gusts across all grid cells within the Finland domain. Similarly, correlations were also computed for other parameters, such as minimum MSLP and propagation speed."*

Section 5

1. Could your classification method be applied to any other country in Europe given that the impact data is available? Or would one need a comparable country size, cyclone statistics, …?

   Reply: The classification method could likely be applied especially to other northern European forested countries with available impact data, though some adjustments may be needed. For instance, if applied to a smaller country than Finland, the initial classification step dividing the country into two regions could be omitted. In Mediterranean regions, modifications may also be required, for example, include tracking shorter-duration windstorms, such as Mediterranean cyclones, which often have shorter storm tracks.

   We have included a sentence in the end of Conclusions, lines 545-546: "*The classification method could likely be applied especially to other Northern European forested countries, though some adjustments may be needed.*"

2. Could your method be used to estimate the impacts of windstorms on power outages under climate change conditions?

   Reply: Possibly yes. For example, our methodology could be applied to climate model output, although first a careful examination of how well windstorms are resolved by the climate model would be needed. As this work is beyond the scope of this current study, and somewhat speculative, we have not added any text to the manuscript on this topic.