

The events

Storm Friederike - 18 January 2018

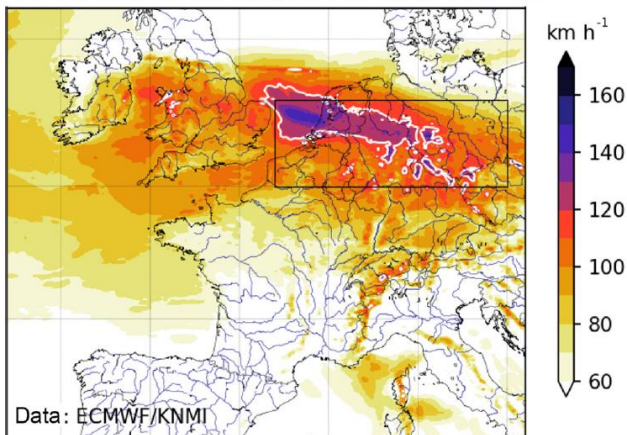
- At least eleven casualties and major disruptions (Netherlands and Germany)
- Estimated cost: €1,6 billion
- The second most expensive storm to strike Germany in the past 20 years

Storm Eleanor - 3 January 2018

- Thousands of homes affected by power cuts (UK and Ireland)
- Estimated cost: €700M (France)
- Sixth most severe storm since 1995 (France)

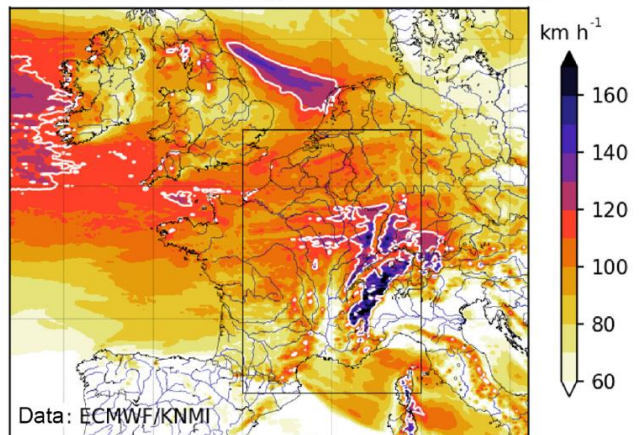
Western European countries have been struck by high-impact wind storms during the month of January 2018. The link between storms like Eleanor (on 3 January 2018) and Friederike (on 18 January 2018) and human-induced climate change have been studied through this attribution analysis involving several simulation ensembles and observations from tens of weather stations.

Friederike daily max. wind gust (2018-01-18)
ECMWF det.forecast. analysis: 2018-01-18 00:00 UTC



(a) Storm Friederike

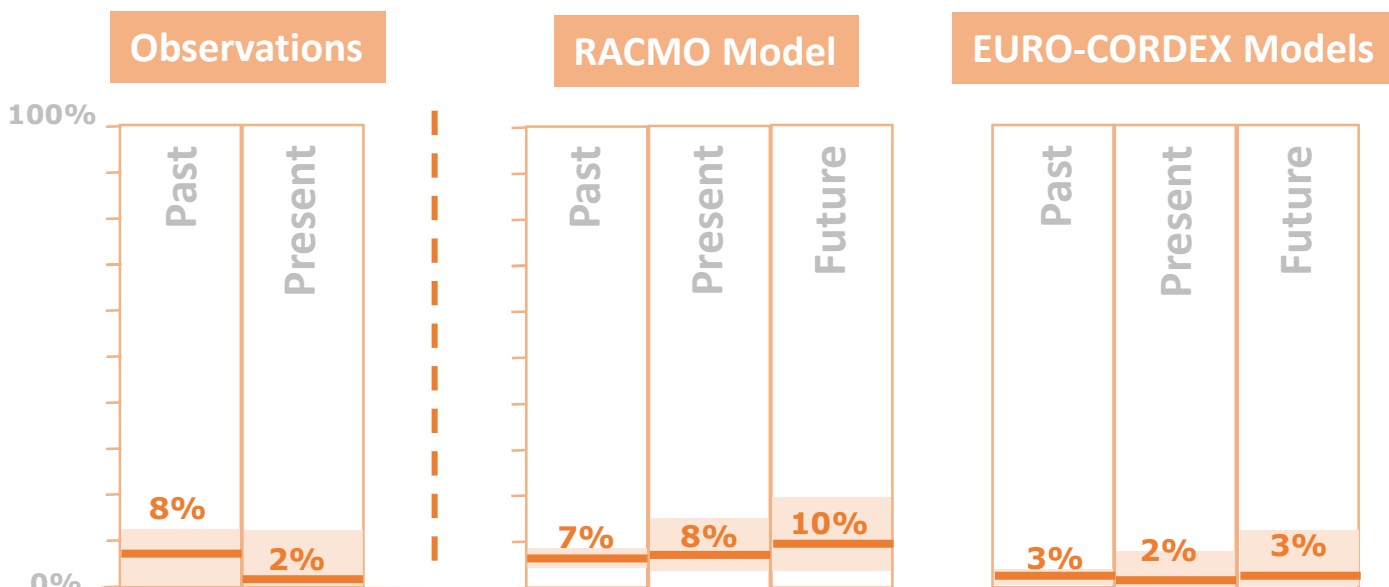
Eleanor daily max. wind gust (2018-01-03)
ECMWF det.forecast. analysis: 2018-01-03 00:00 UTC



(b) Storm Eleanor

Figure 1. Strongest wind gusts during the storms Friederike (a) and Eleanor (b) as estimated from the ECMWF deterministic forecasts starting at 18 January 2018 00:00 UTC and 3 January 2018 00:00 UTC respectively. White contours are used to indicate areas where gusts exceed $118 \text{ km}\cdot\text{h}^{-1}$. The boxes indicate the spatial event definitions.

Attribution analysis



Probability of occurrence of strong wind storms like Friederike (winter wind speed maximum $\geq 16\text{m/s}$)

- The considered future period in this graph is 2021 – 2050
- The study analyses also models using wind speed daily mean
- The study finds similar results for the wind storm Eleanor

What is observed?

- Observations exhibit a decreasing trend in the frequency of strong winds
- (4 times less probable)

The expected effect of climate change

- Climate models show no significant trend up to now
- Global warming could lead to a marginal increase (0% to 20%) in the probability

Conclusions

- In contrast to the observations, global and regional climate models do not simulate a decrease over the past decades.
- This observed negative trend may be due to other factors such as surface roughness, aerosols and decadal variability.
- Until these factors are correctly simulated by climate models, future storminess credible projection over land in Europe can't be provided.