

# Extreme impacts in the European renewable electricity system as a result of climate variability

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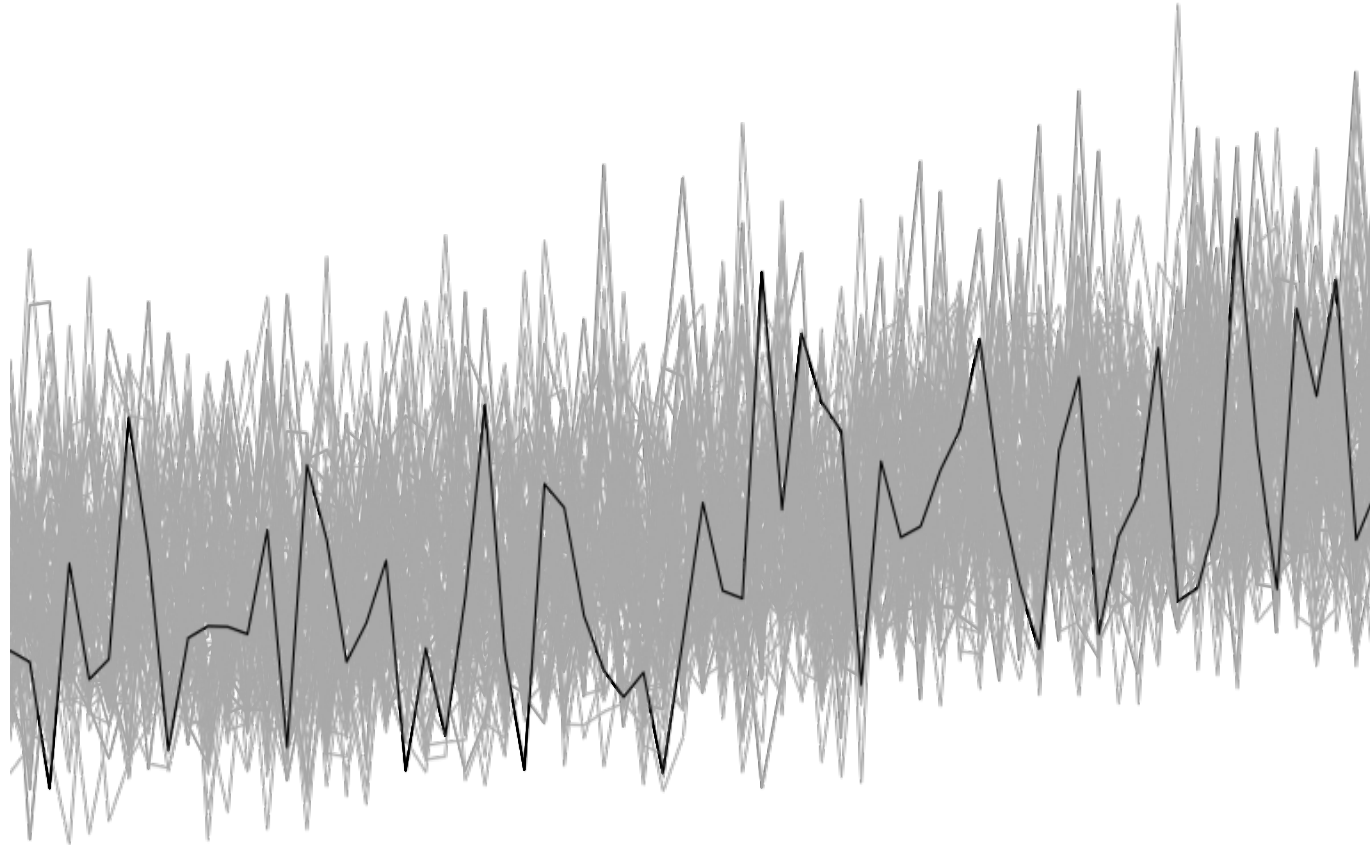
# Aim | impact analysis with large ensembles

Possibilities of application of :

- large ensembles
- a simplified energy model

Impact of **meteorological conditions** and **climate variability** on **extreme events** in the European electricity system.

# Meteorological data | Large climate ensembles



# Meteorological data | Large climate ensemble

## **KNMI LENTIS<sup>1</sup> 800 years of meteorological data for:**

- present-day climate (2000-2009)
- +2°C climate

Temporal resolution: daily

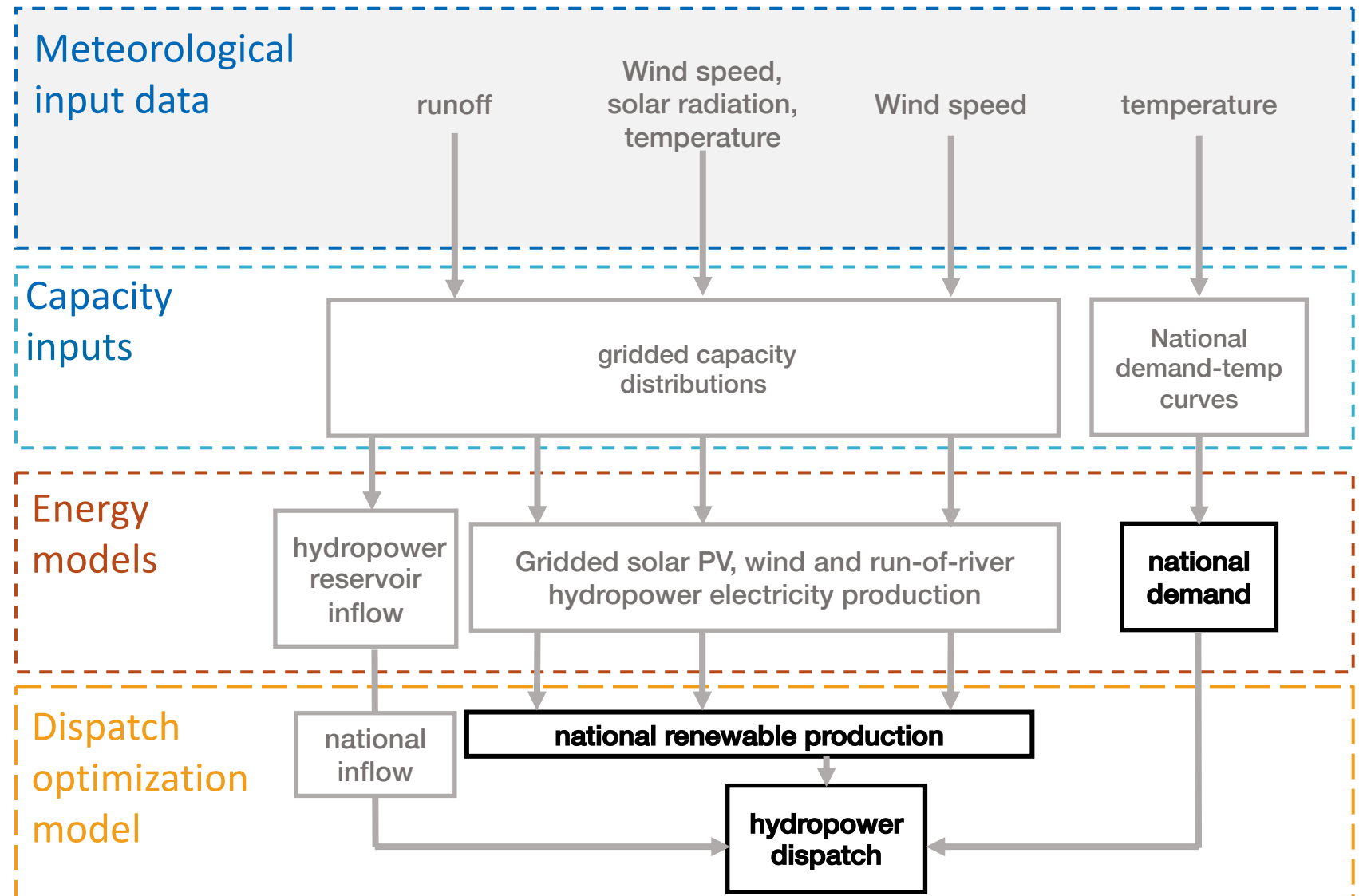
Spatial resolution: ~75km

# Electricity system data | Installed capacities

Present-day gridded installed capacities

# Model |

- Europe
- Copper plate theory within countries
- no cross-border connections



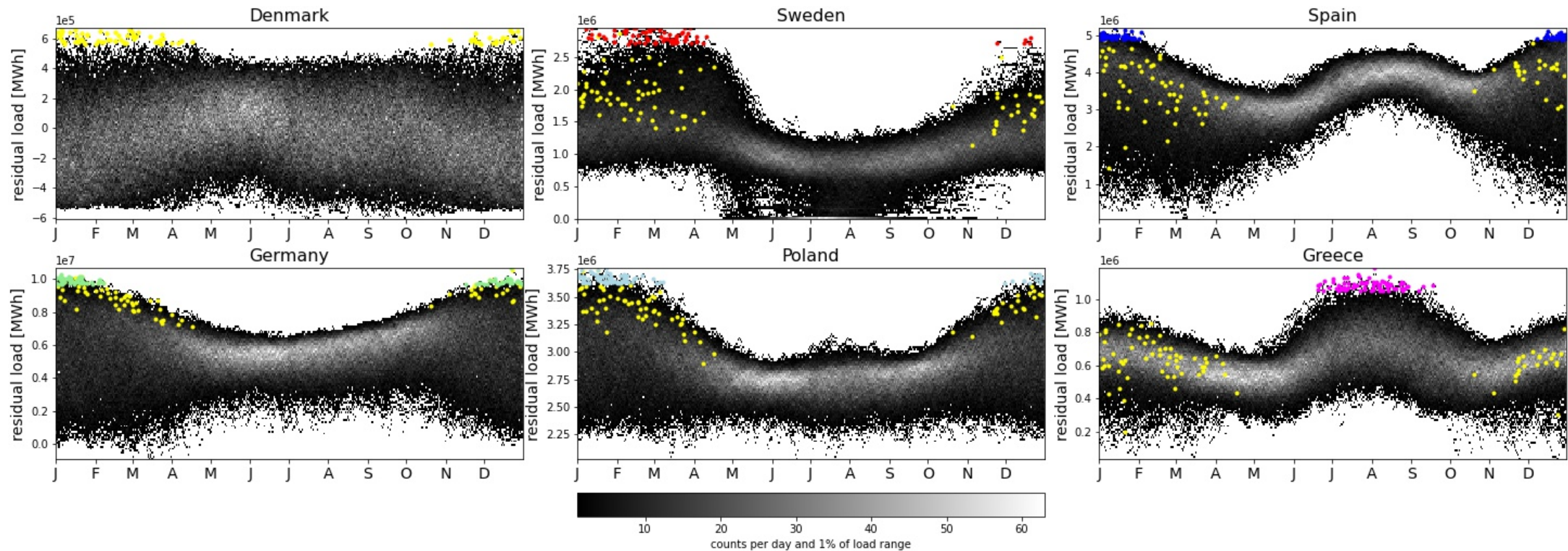
# Type of events |

**Residual load** = demand – renewable production

- 1 in 10 year events (80 events)
- 7-day events

# 1. Co-occurrence of events between countries

# Co-occurrence | of extreme events

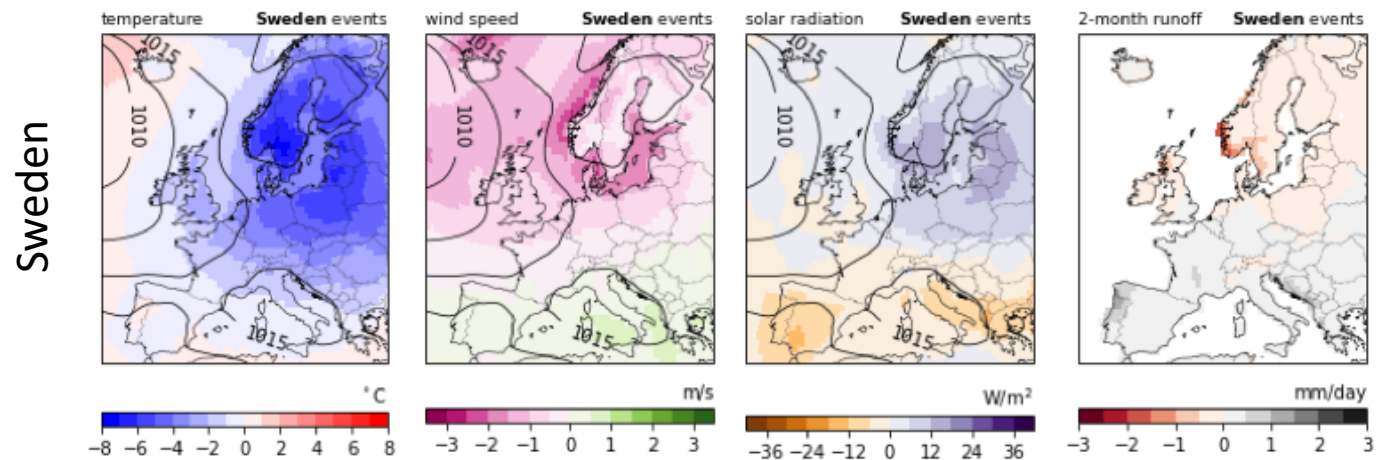
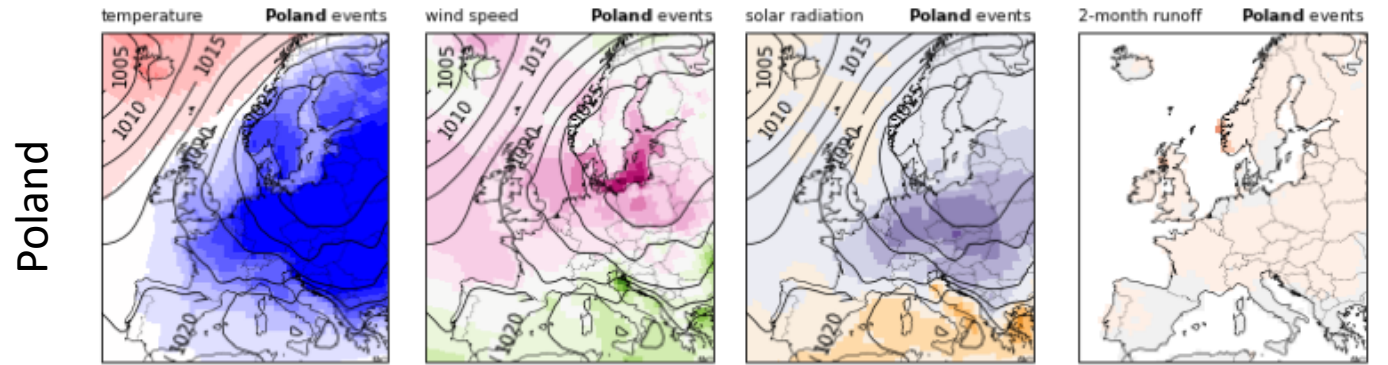
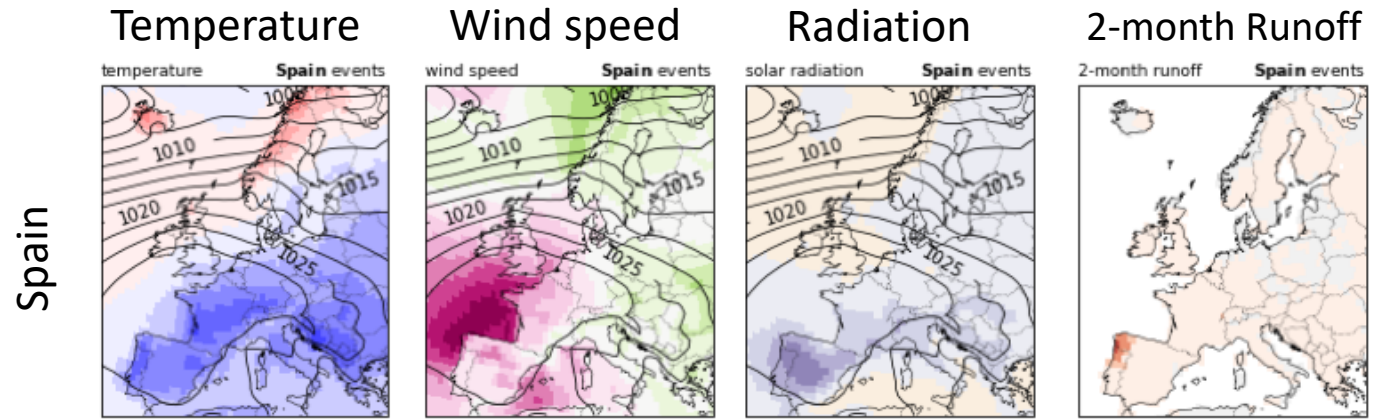
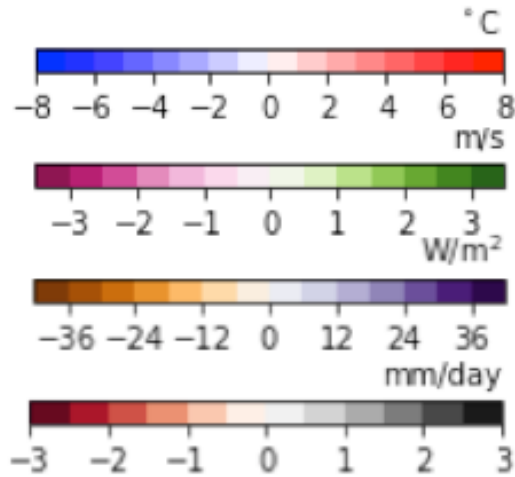




## 2. Meteorological conditions during events

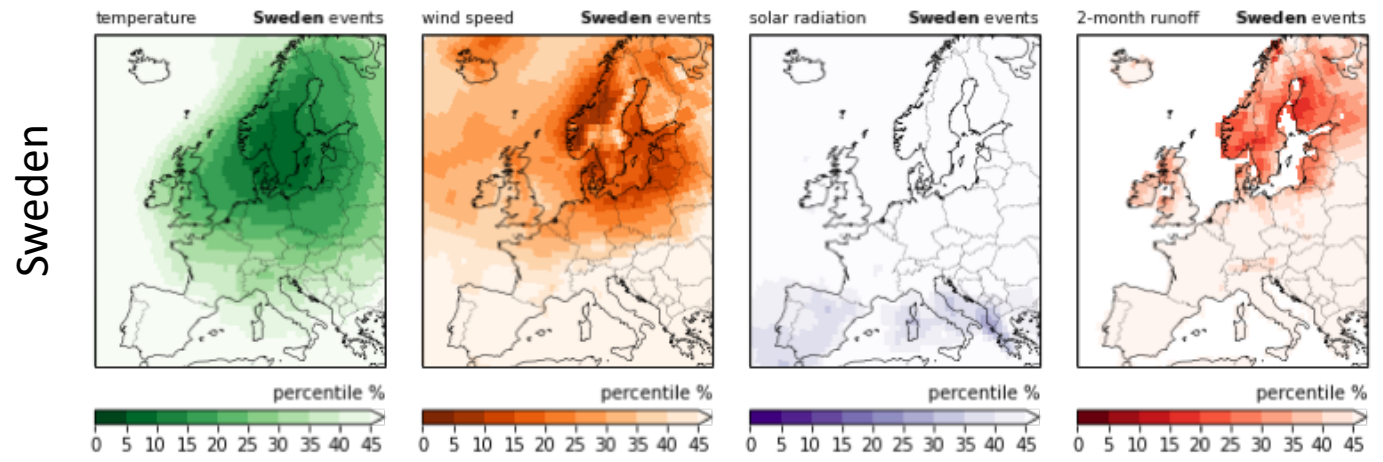
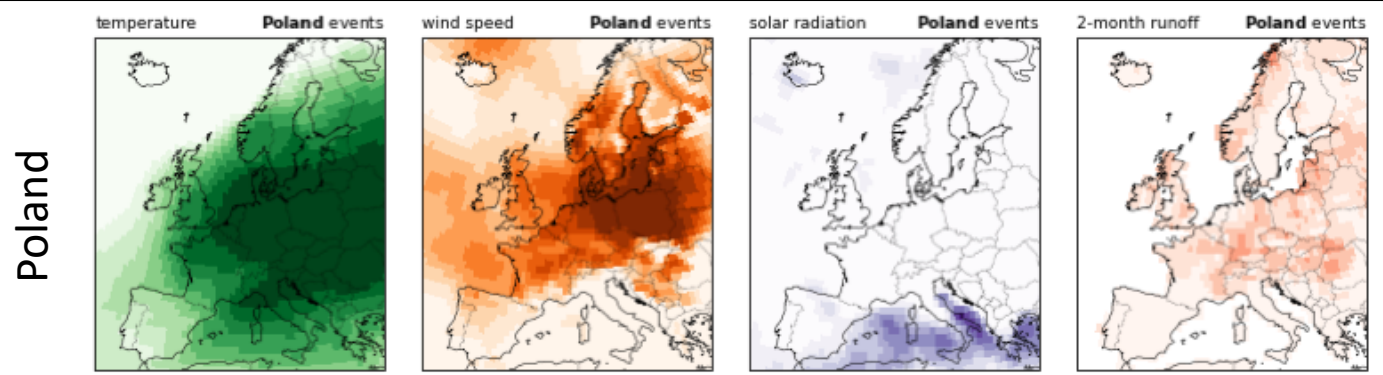
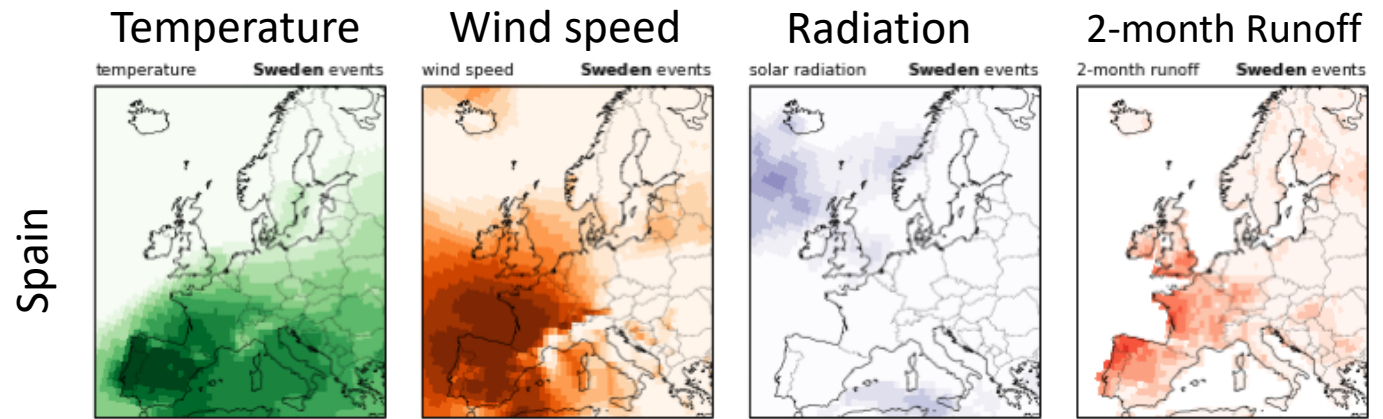
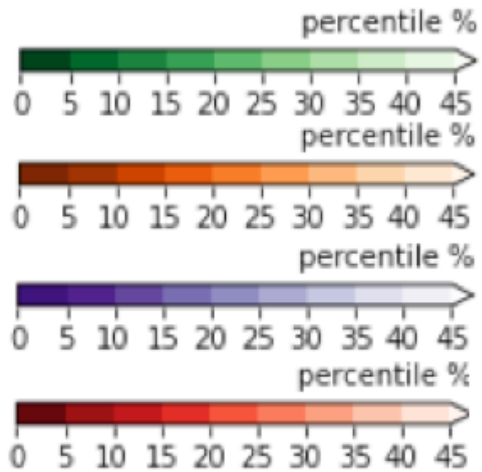
# Weather | During events

- Events in winter
- Composites of winter events
- Anomalies relative to 800 year daily means



# Weather | how extreme?

- Percentile of meteorological variable relative to 800 year

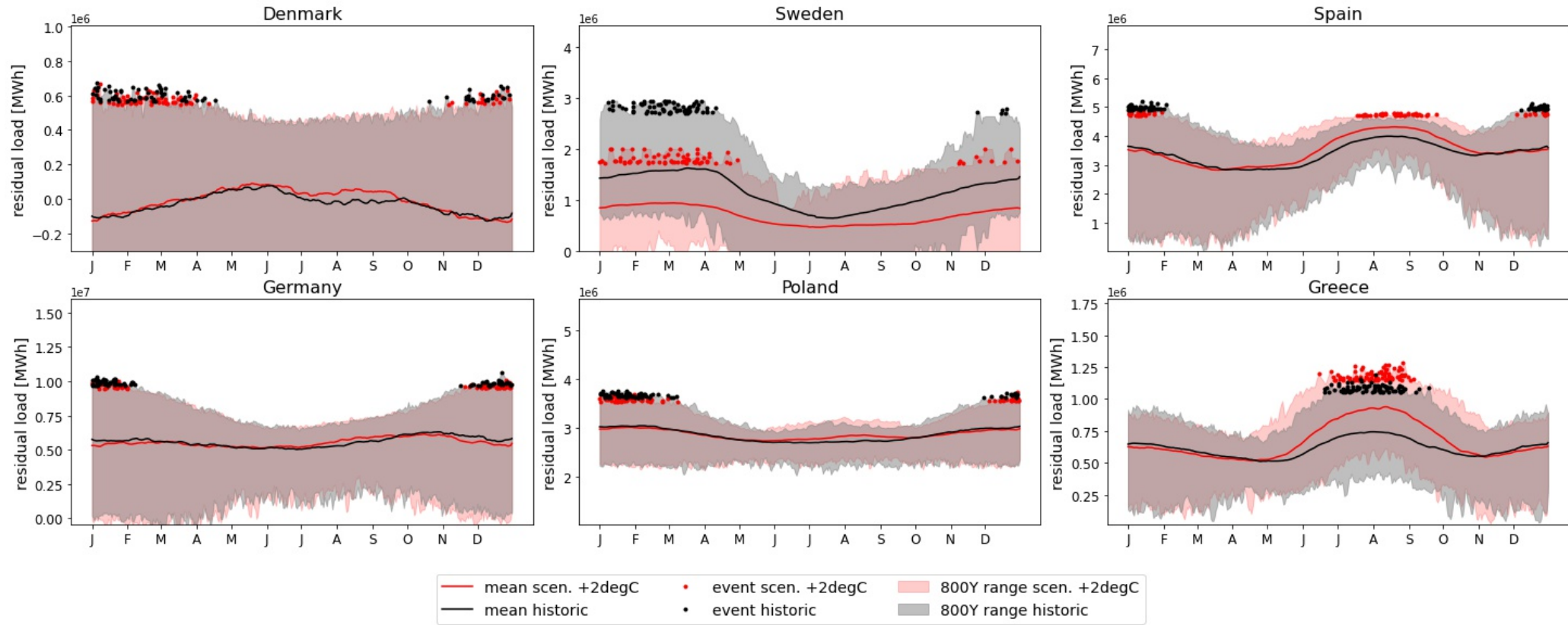


# 3. Impact of climate change on events

# Climate change | Events under +2degC and present-day climate

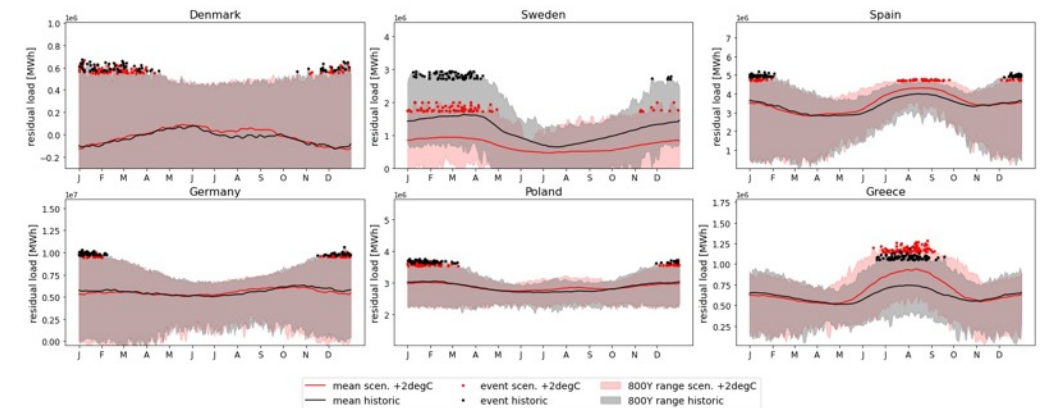
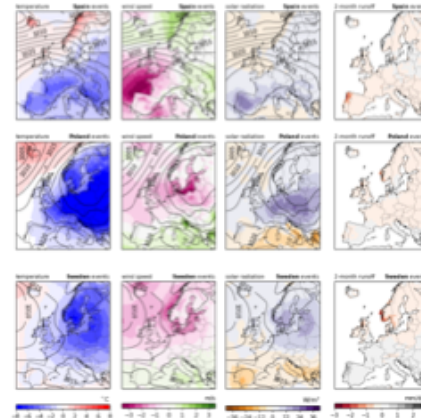
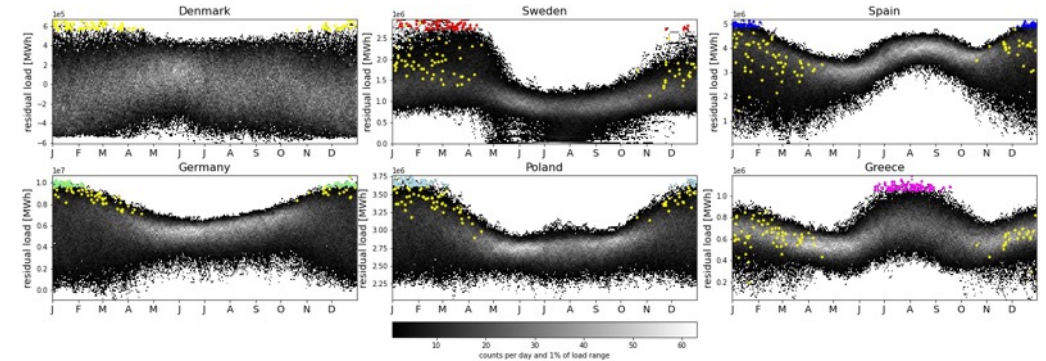
## Sensitivity of present-day electricity system to climate change

*Present day installed capacity and demand curves*



# Concluding

- large ensembles + simplified models =
- a full distribution of climate and energy variability
  - a tool for analyzing very extreme cases



Feel free to contact me with any questions or remarks!  
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