

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

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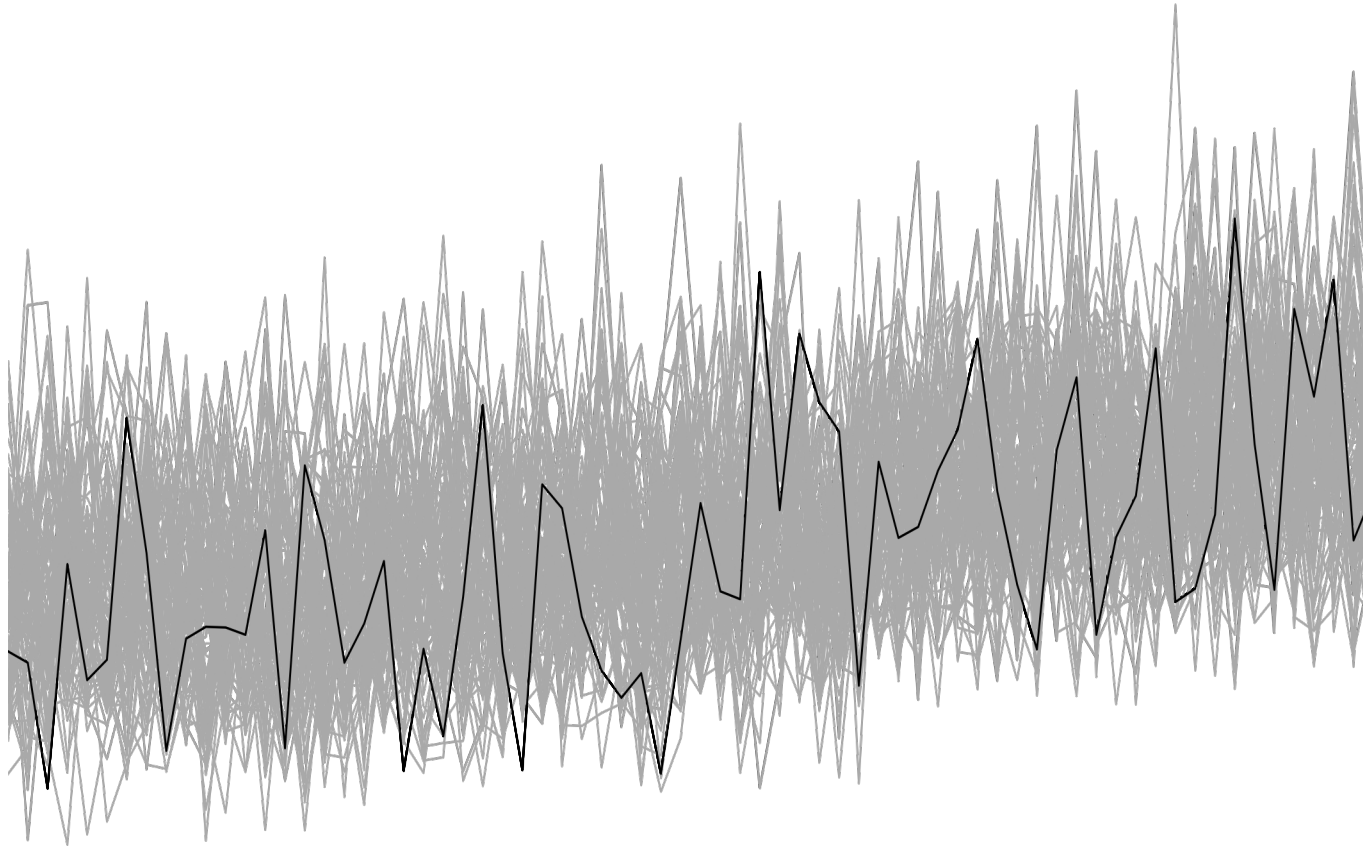
Aim | impact analysis with large ensembles

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 LENTIS¹ 800 years of meteorological data for:

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

Temporal resolution: daily

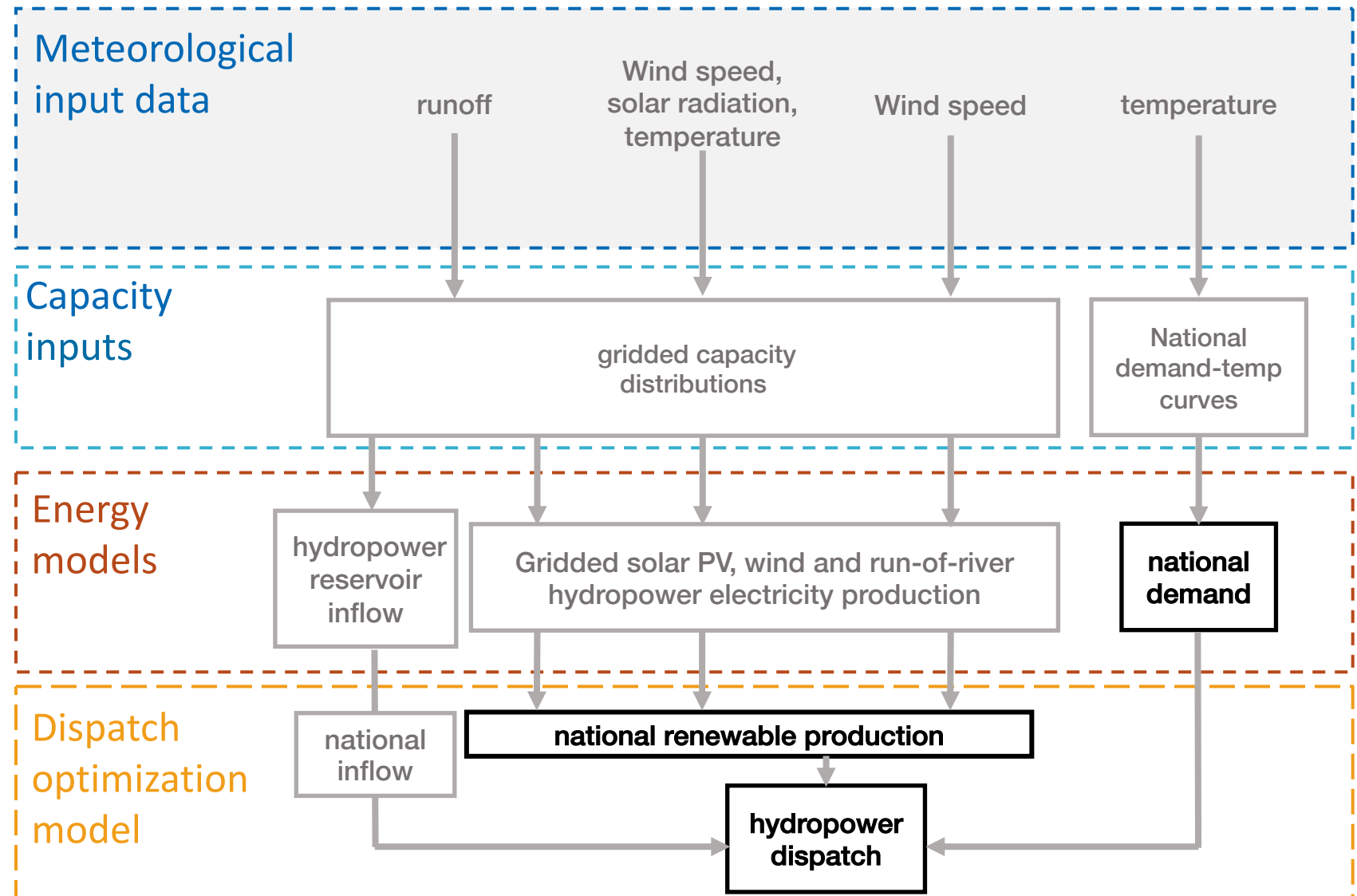
Spatial resolution: ~75km

Electricity system data | Installed capacities

Present-day gridded installed capacities

Model |

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



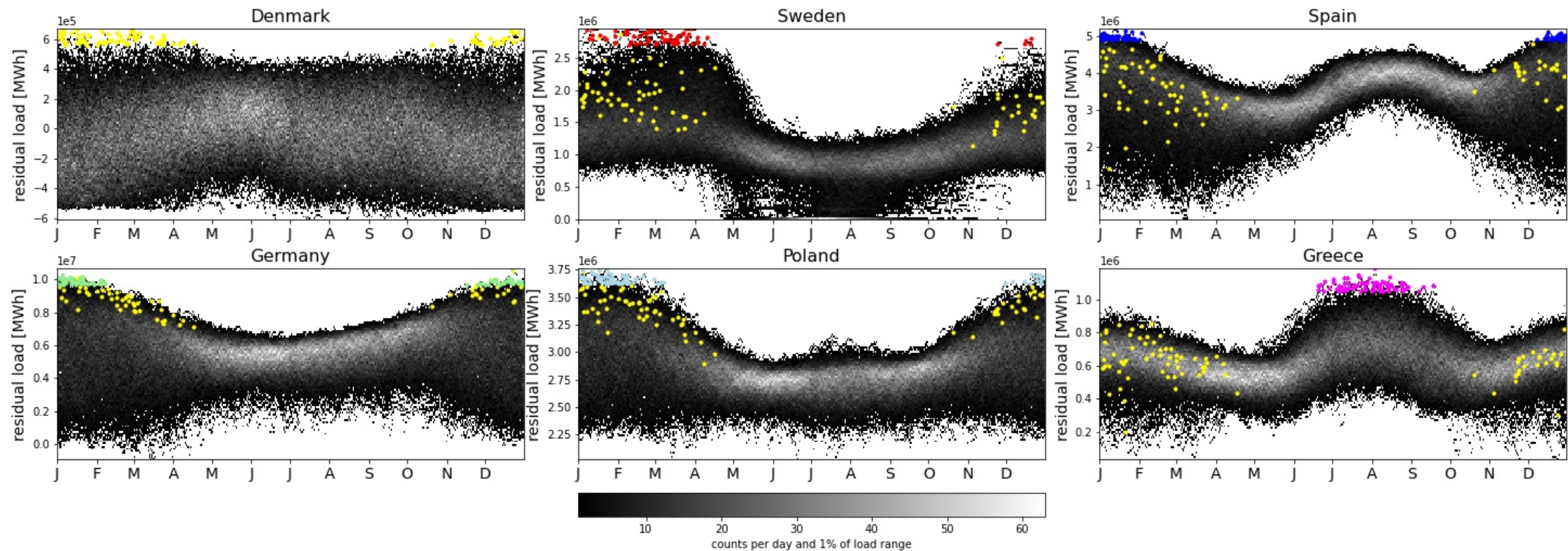
Type of events |

Residual load = demand – renewable production

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

1. Co-occurrence of events between countries

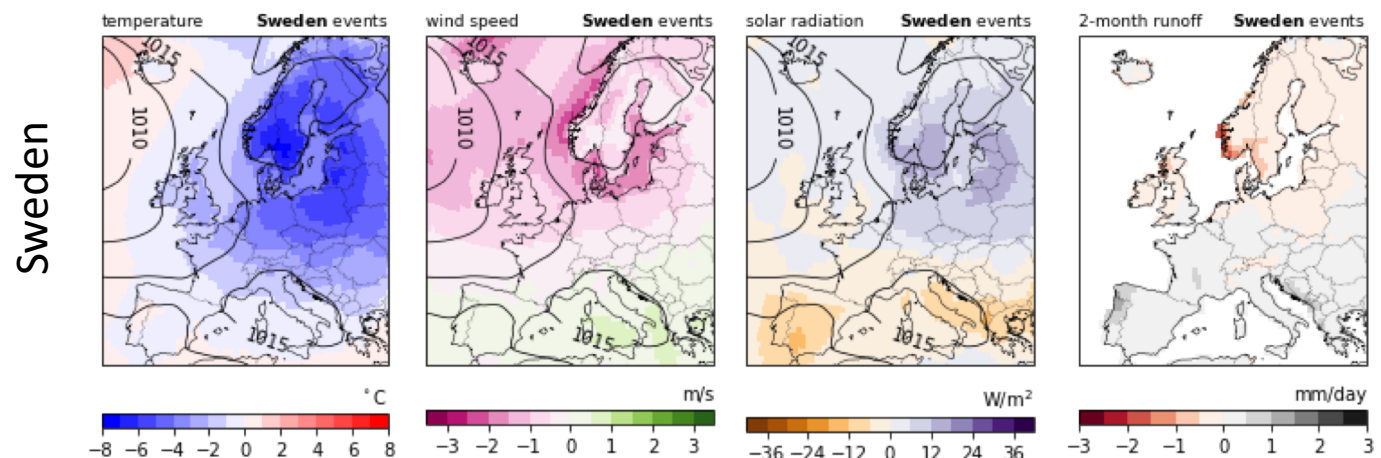
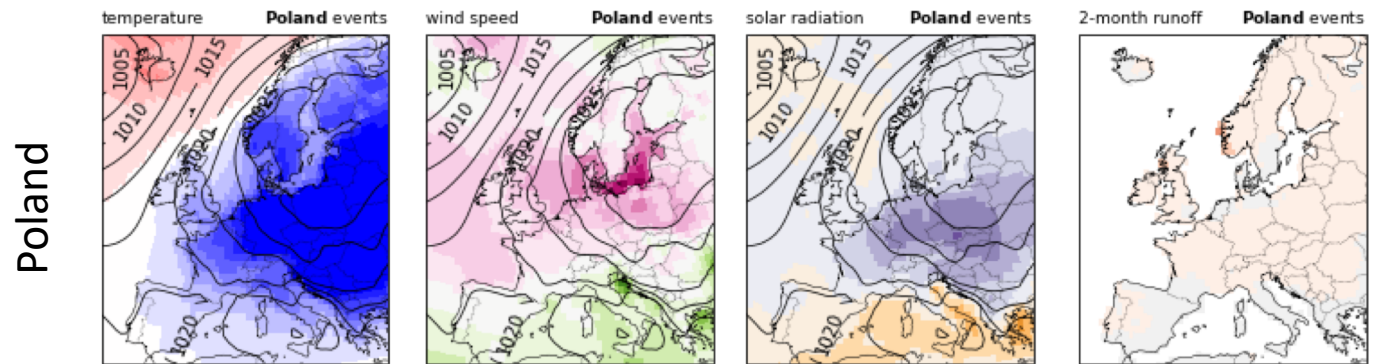
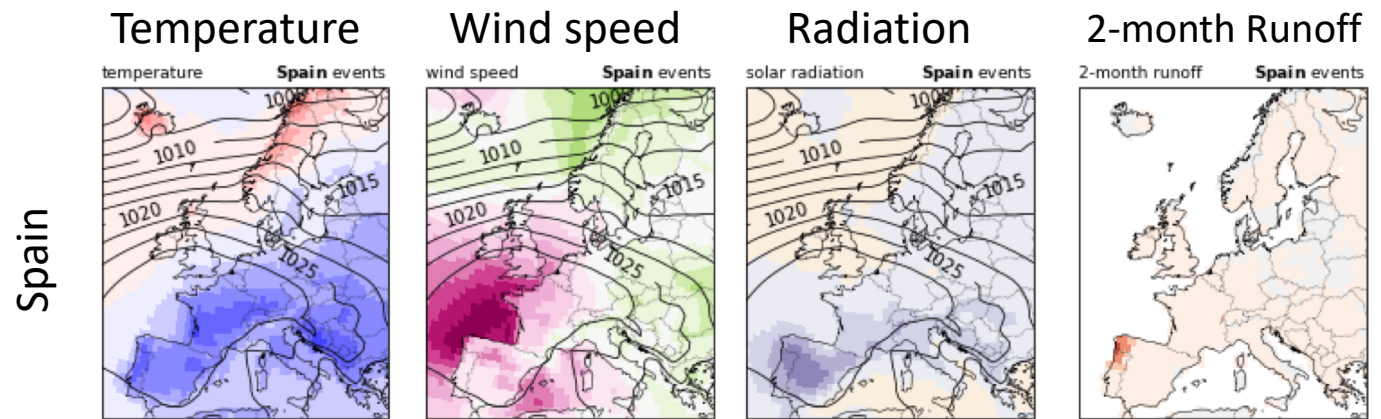
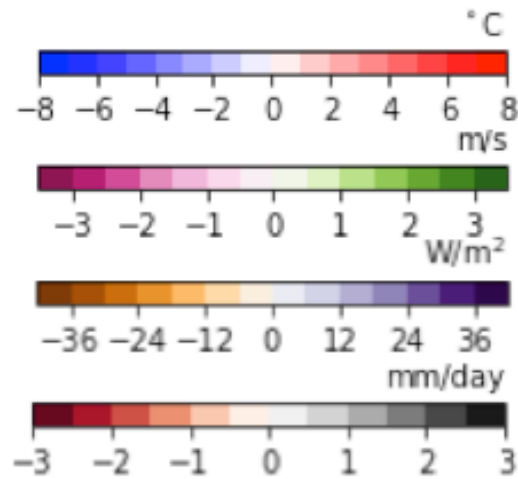
Co-occurrence | of extreme events



2. Meteorological conditions during events

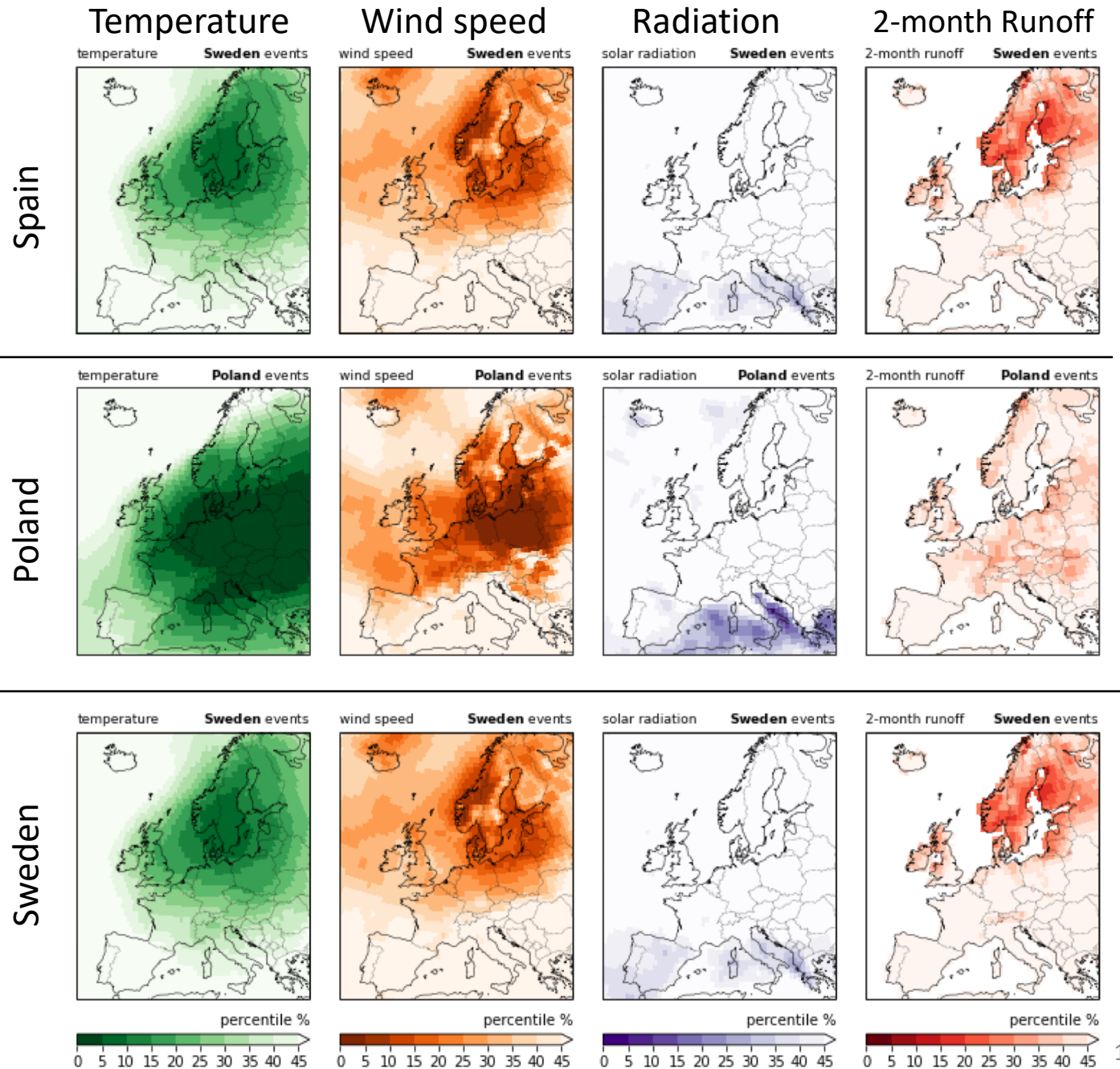
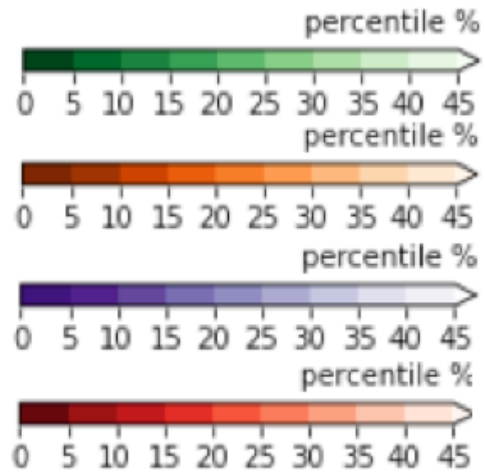
Weather| During events

- 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

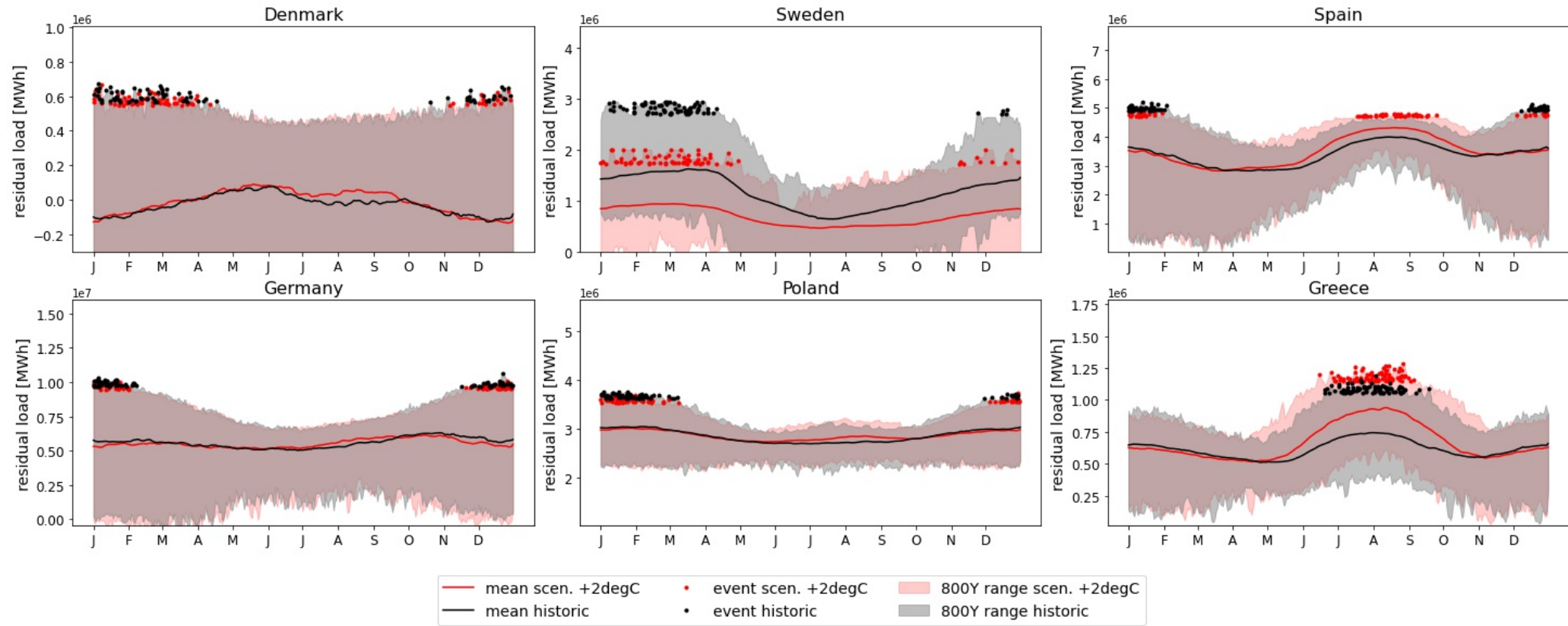


3. Impact of climate change on events

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

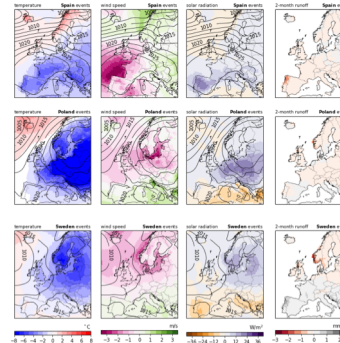
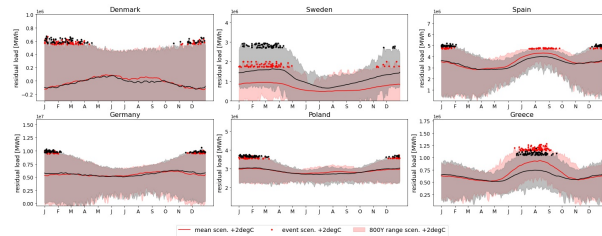
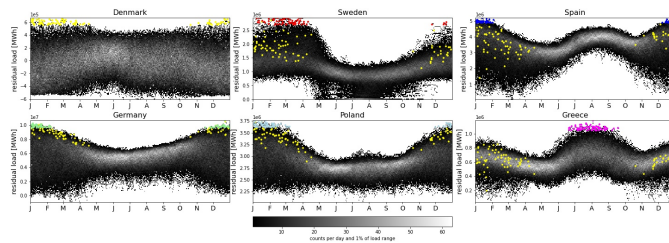
Sensitivity of **present-day electricity system** to climate change

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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