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Part of Norconsult

Will we experience less ice induced losses in 2050?

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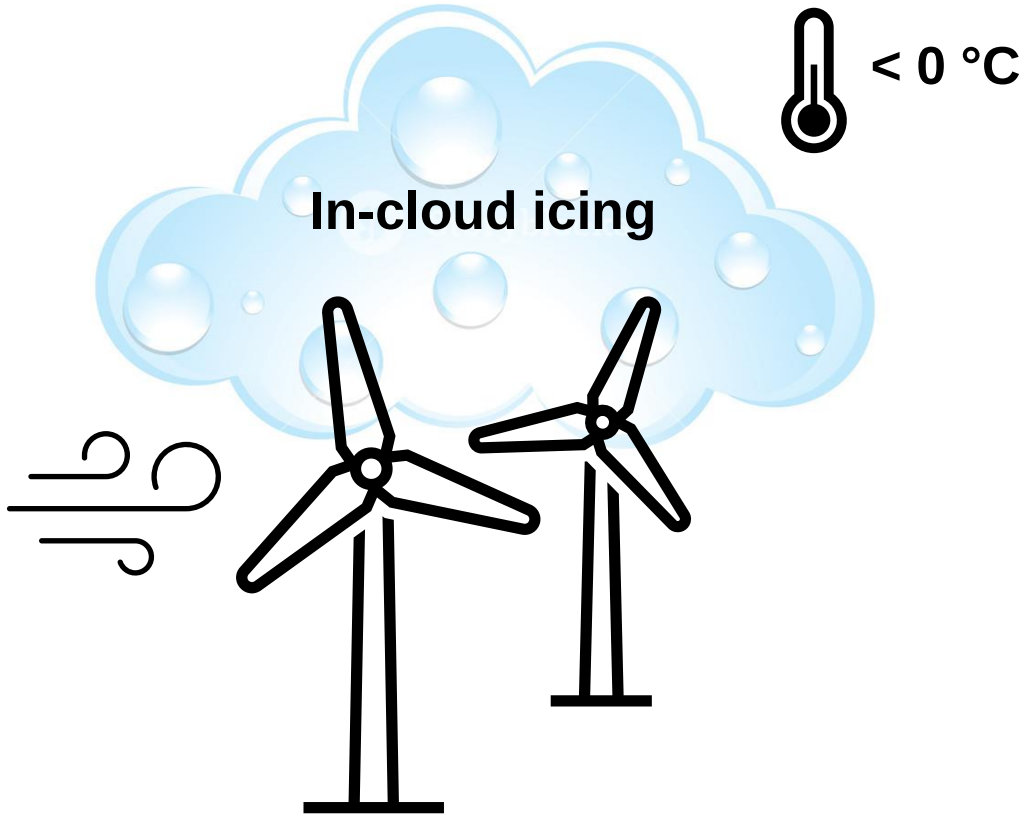
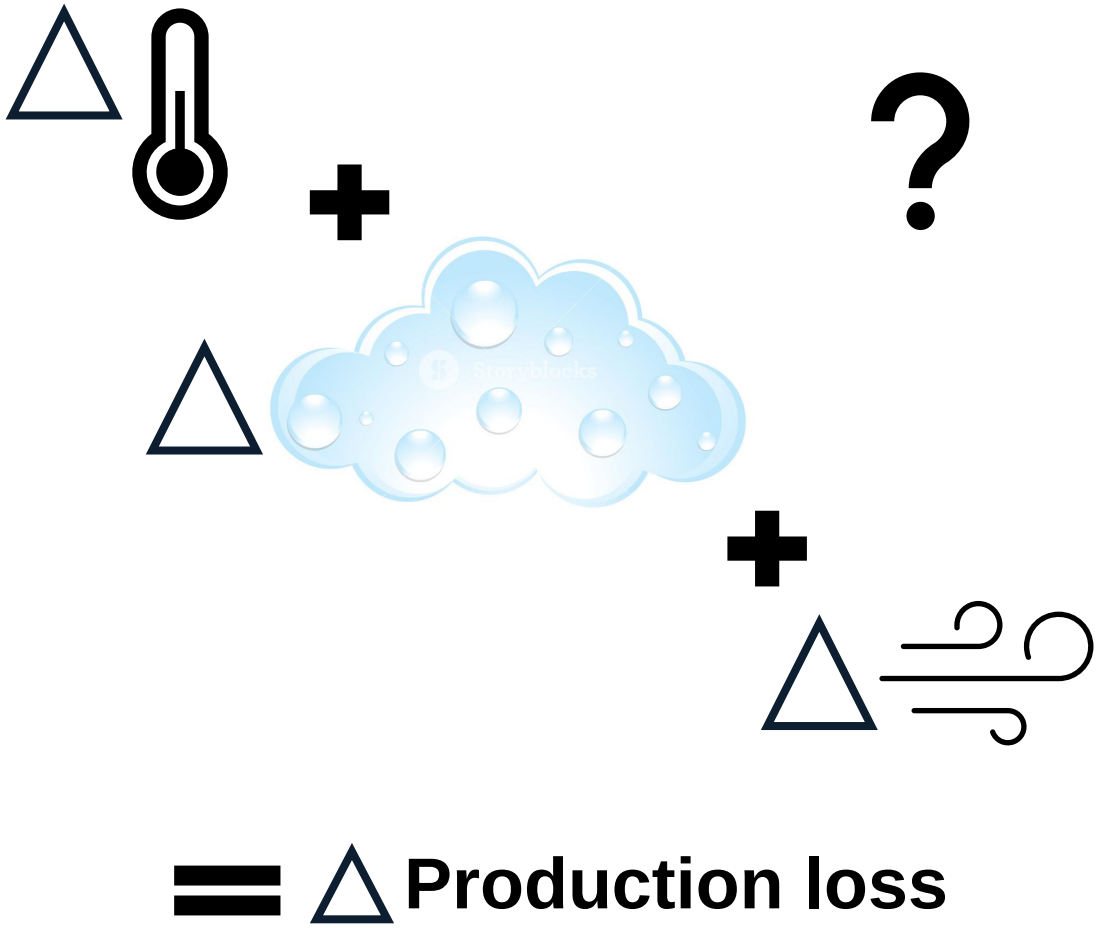
WinterWind 2024

What causes production loss?



What will happen in the future?

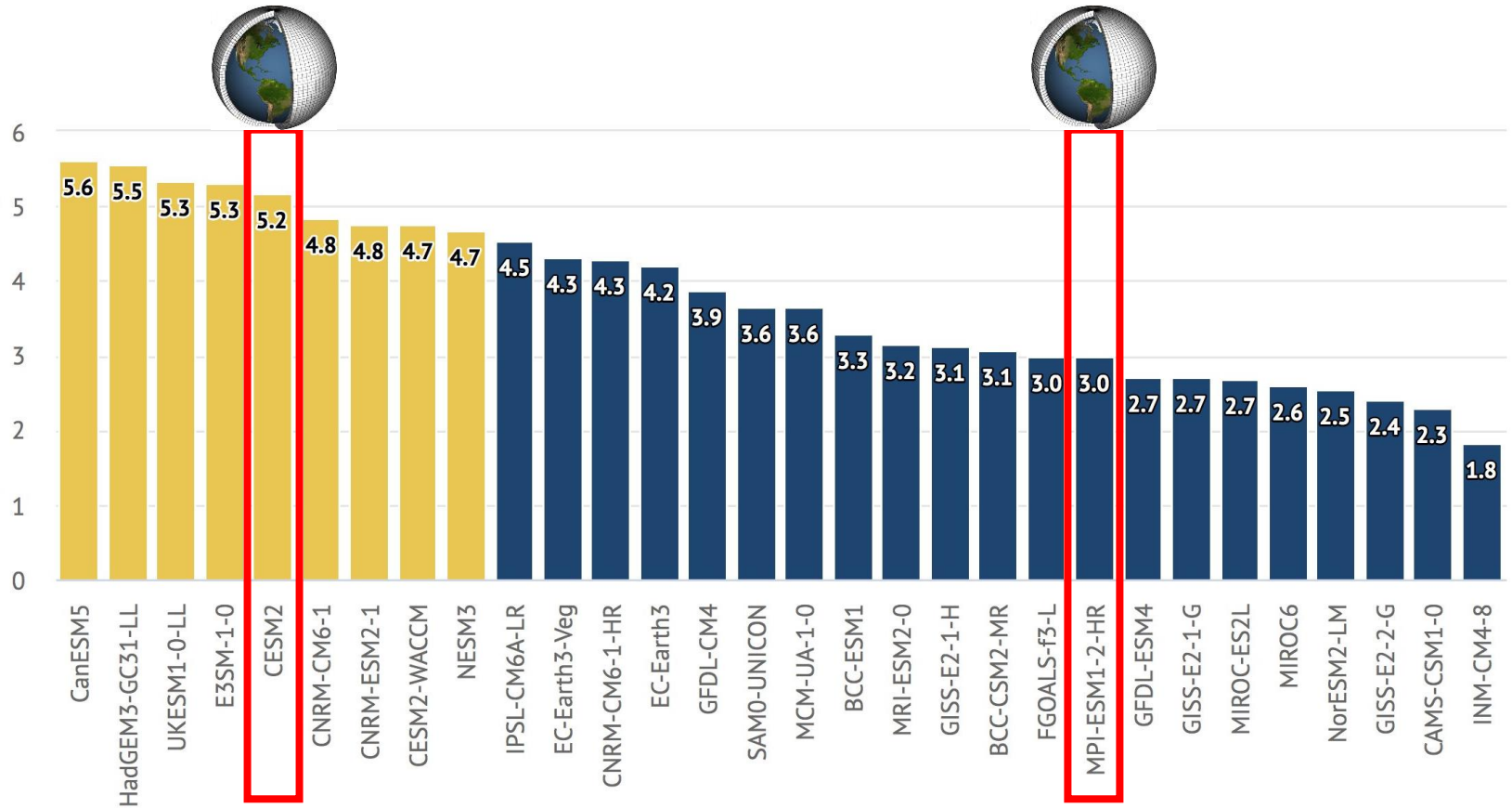


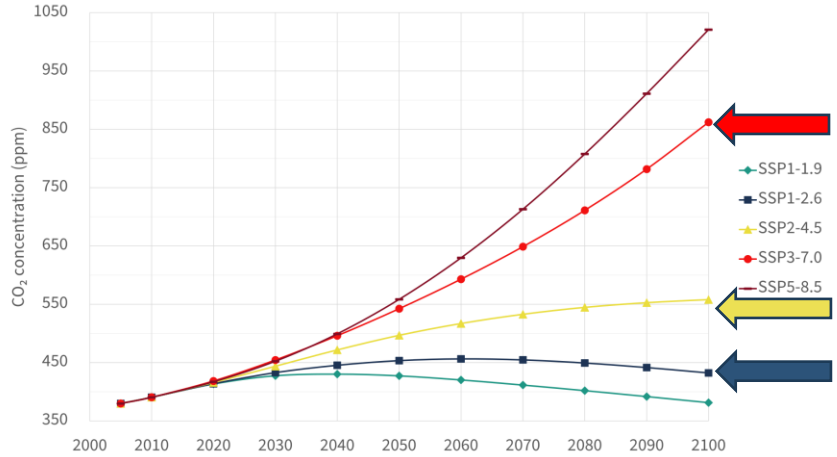
How can we assess future icing loss?

Icebox
Statnett

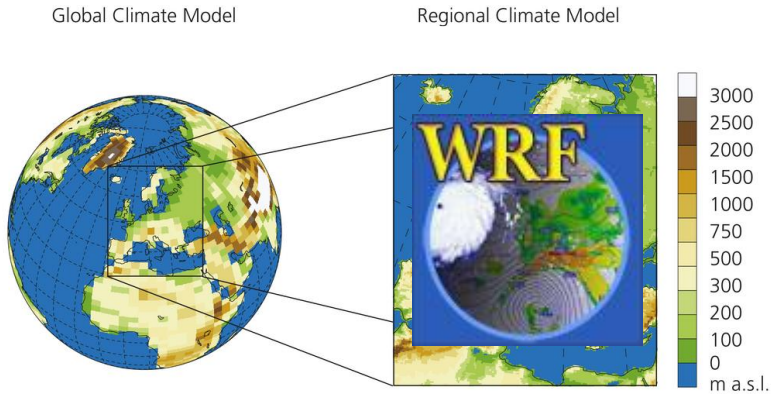
We chose two climate models,

and three future scenarios





and performed downscaling



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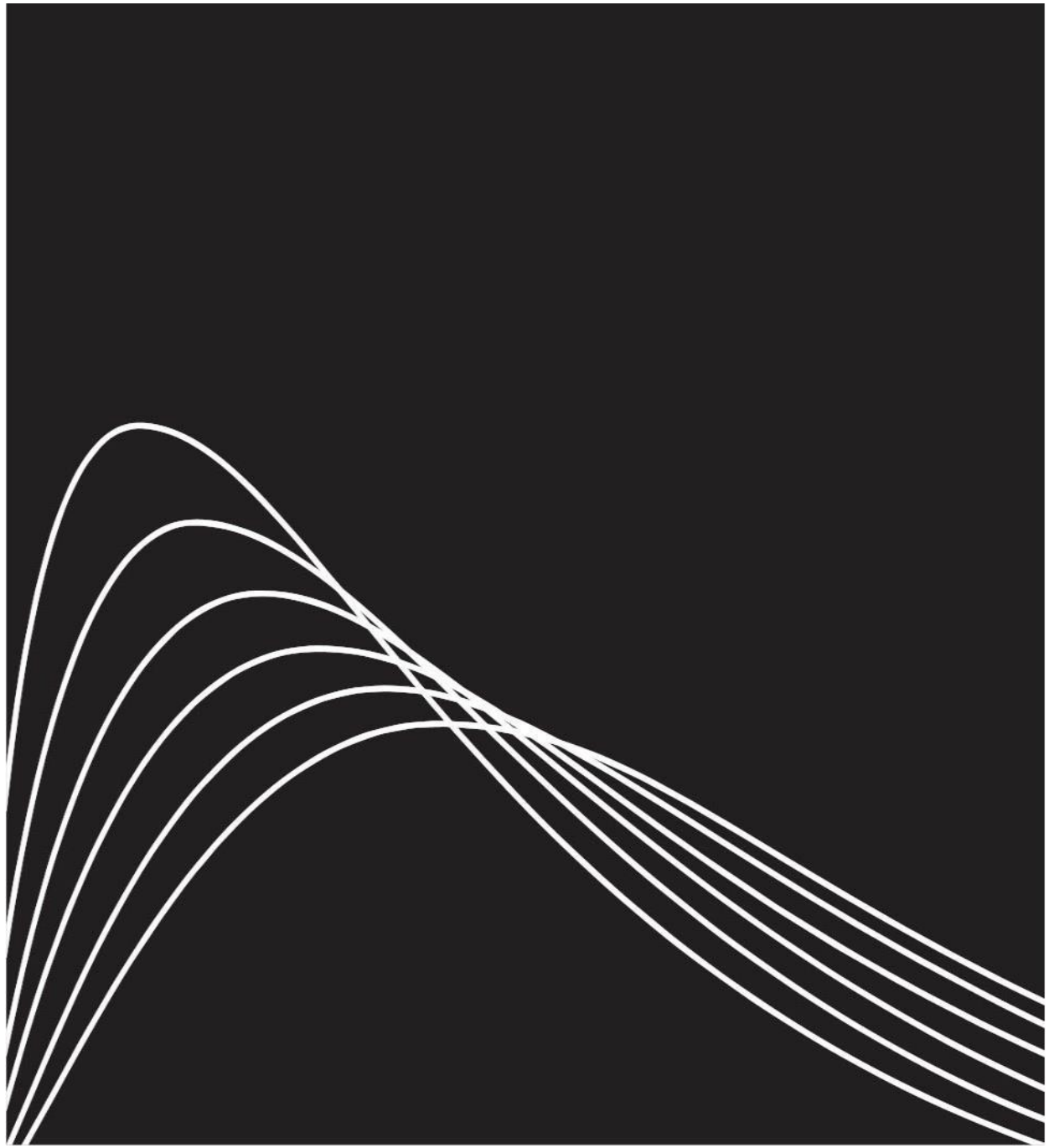
Results

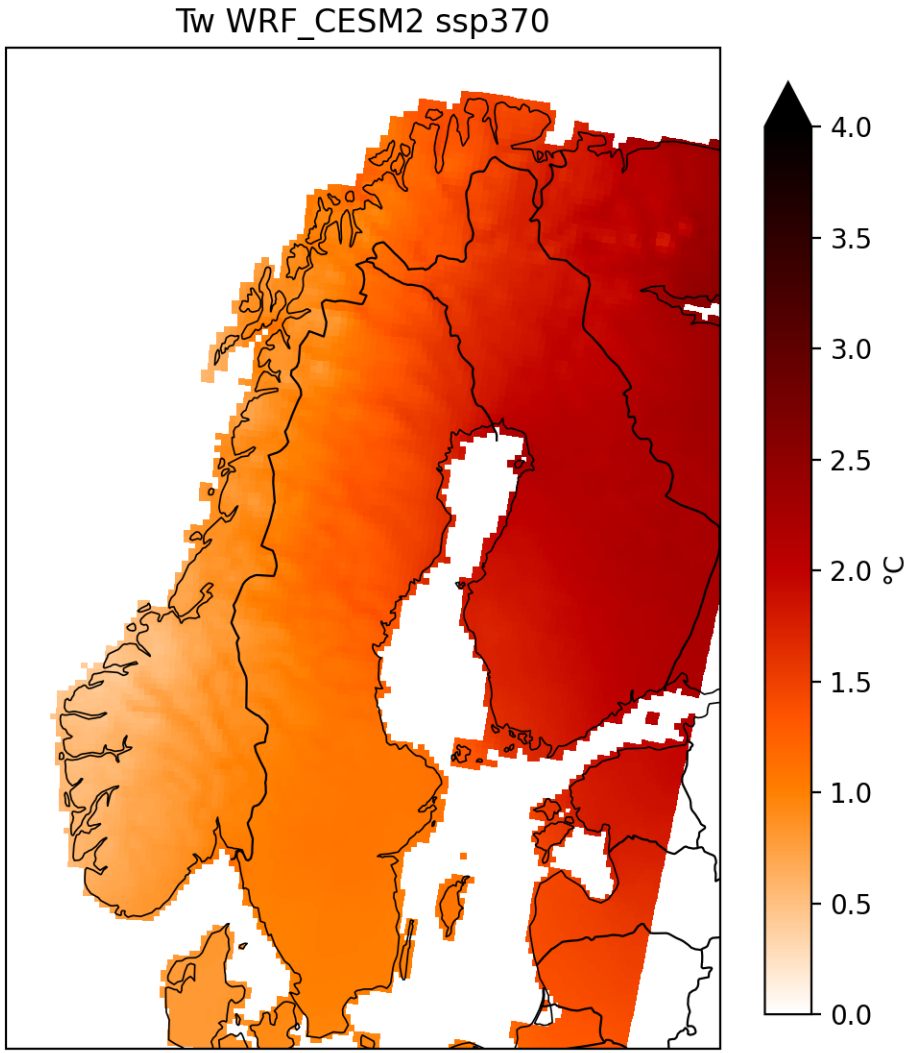
- WRF-CESM2 and WRF-MPI
- SSP 3-7.0
- 2040 – 2065 relative to 1990 – 2015
- 100 m above ground level

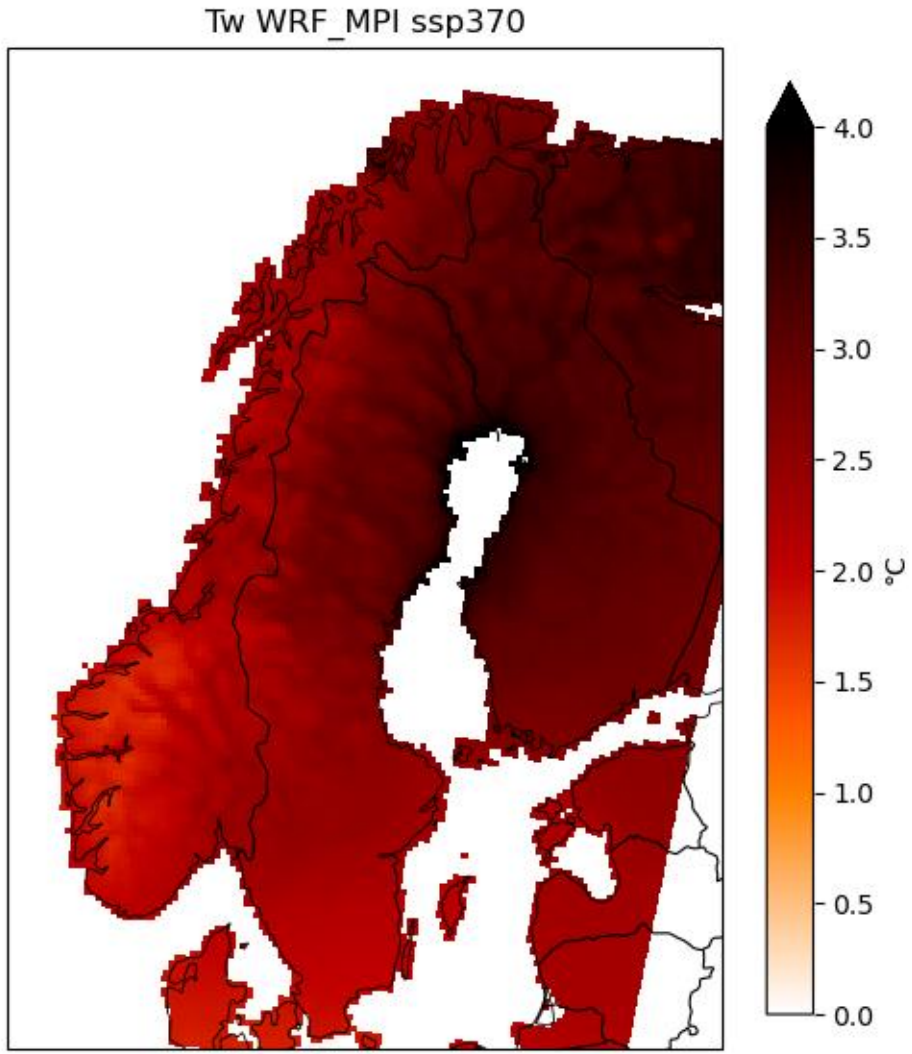
- Temperature
- Wind speed
- Cloud liquid water content
- **Icing hours**
- **Icing intensity**

→ Have run an icing model

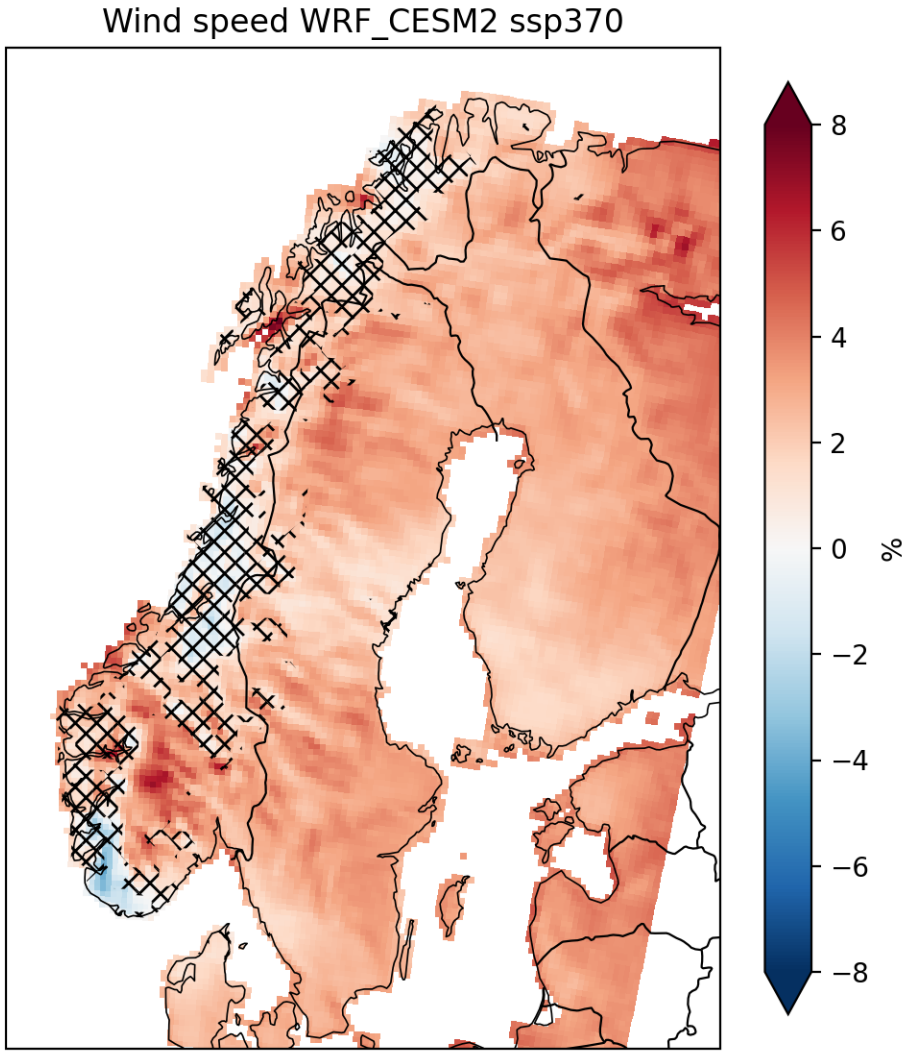


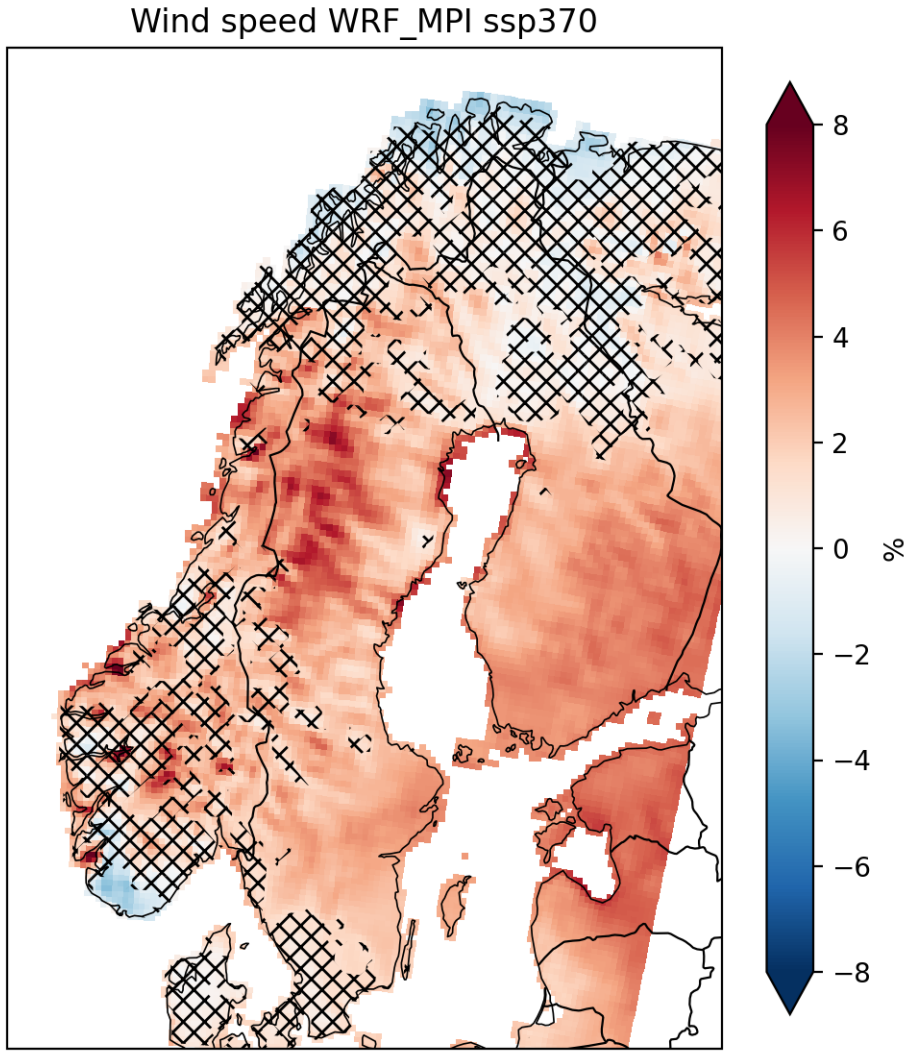
Change in mean temperature



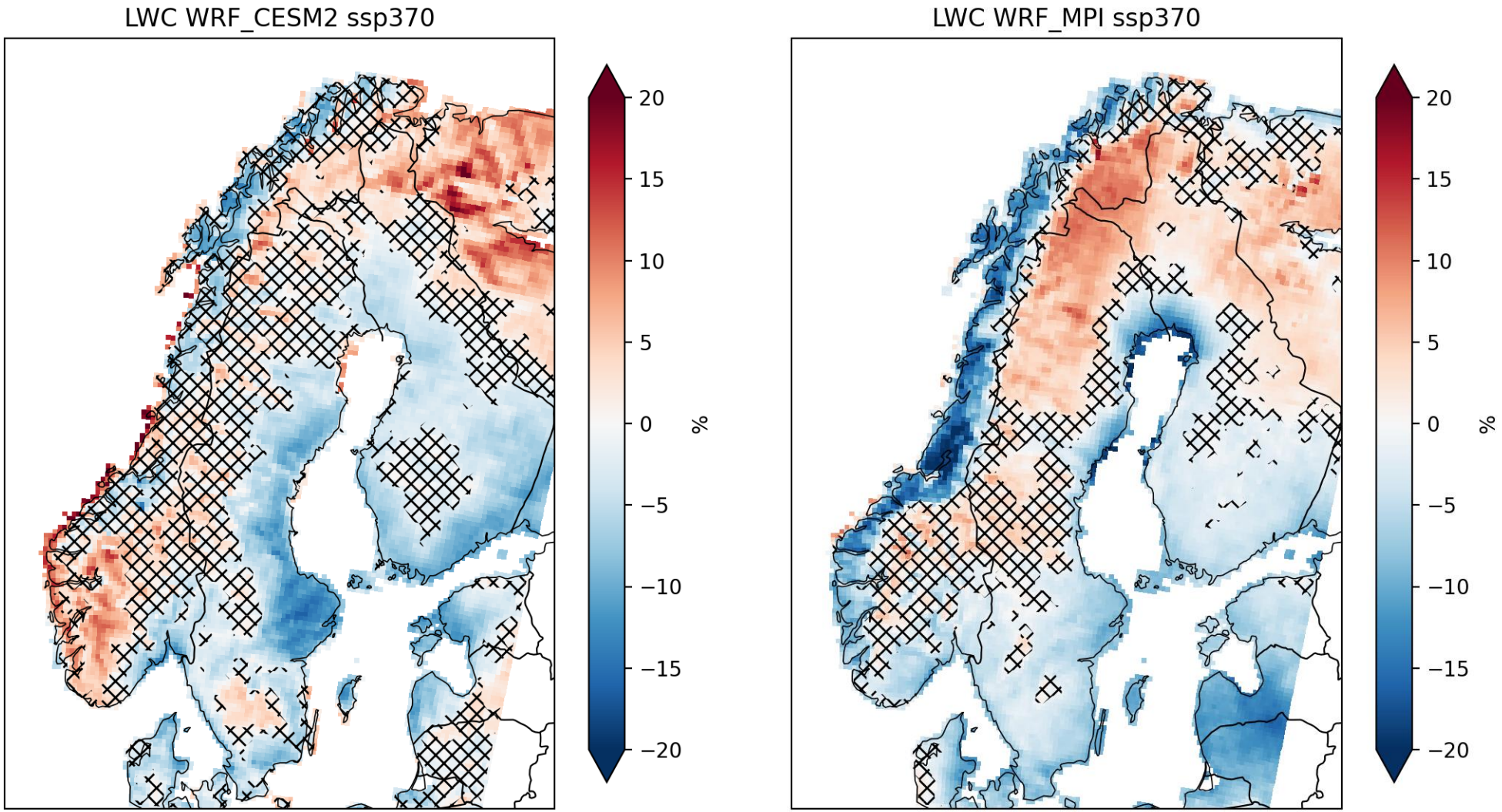


Change in mean wind speed

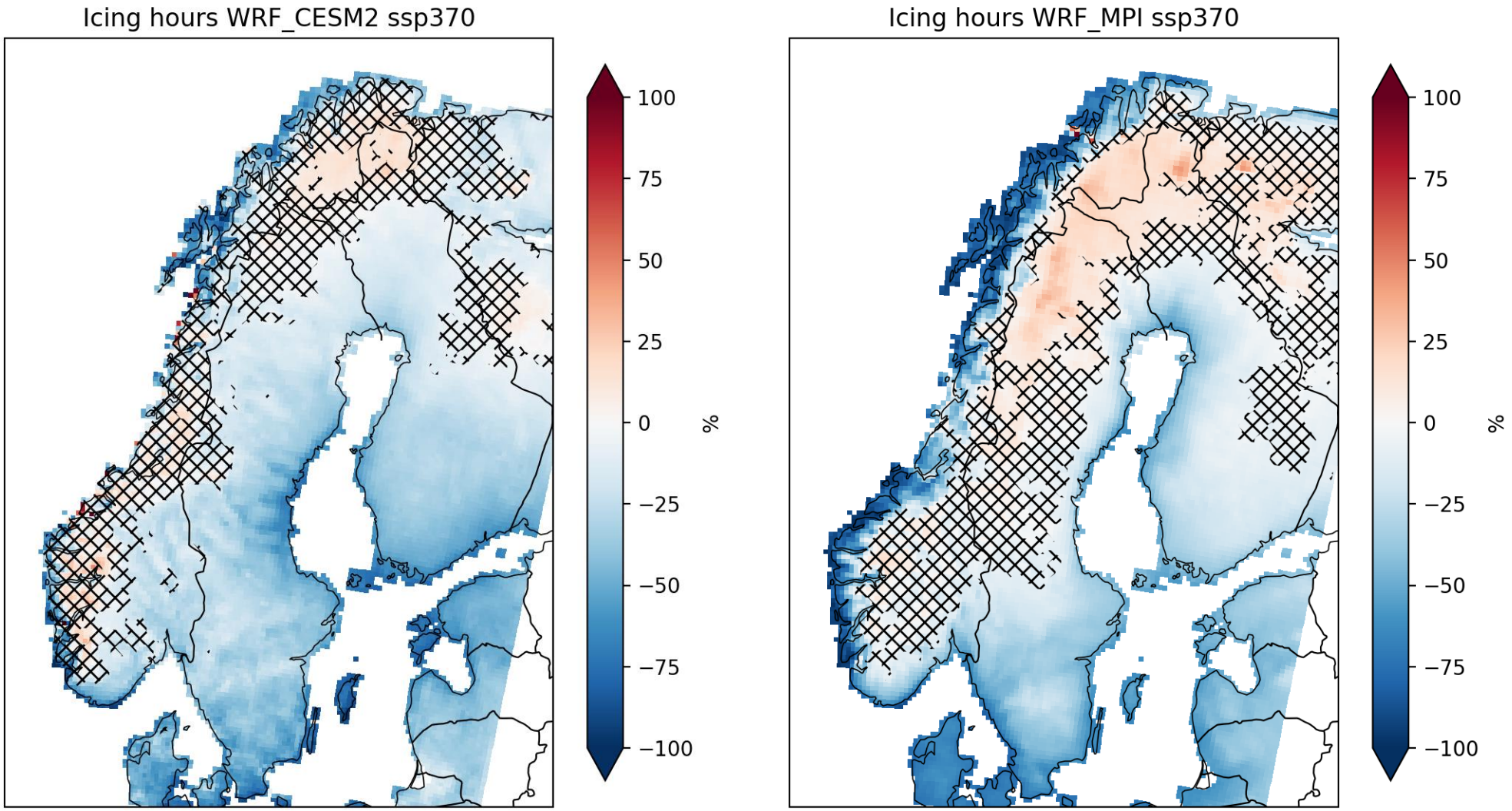




Change in mean cloud Liquid Water Content (LWC)



Change in mean icing hours



Icing hours = dM/dt > 10 g/t

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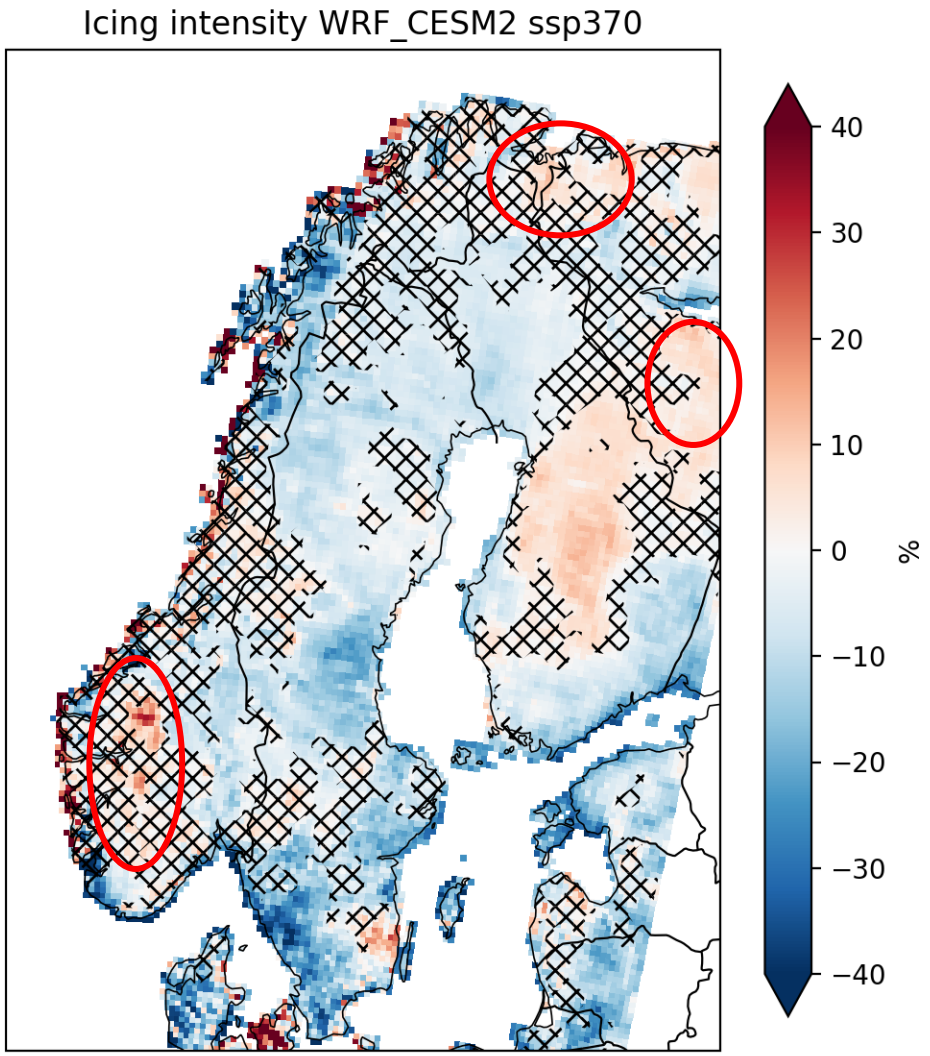
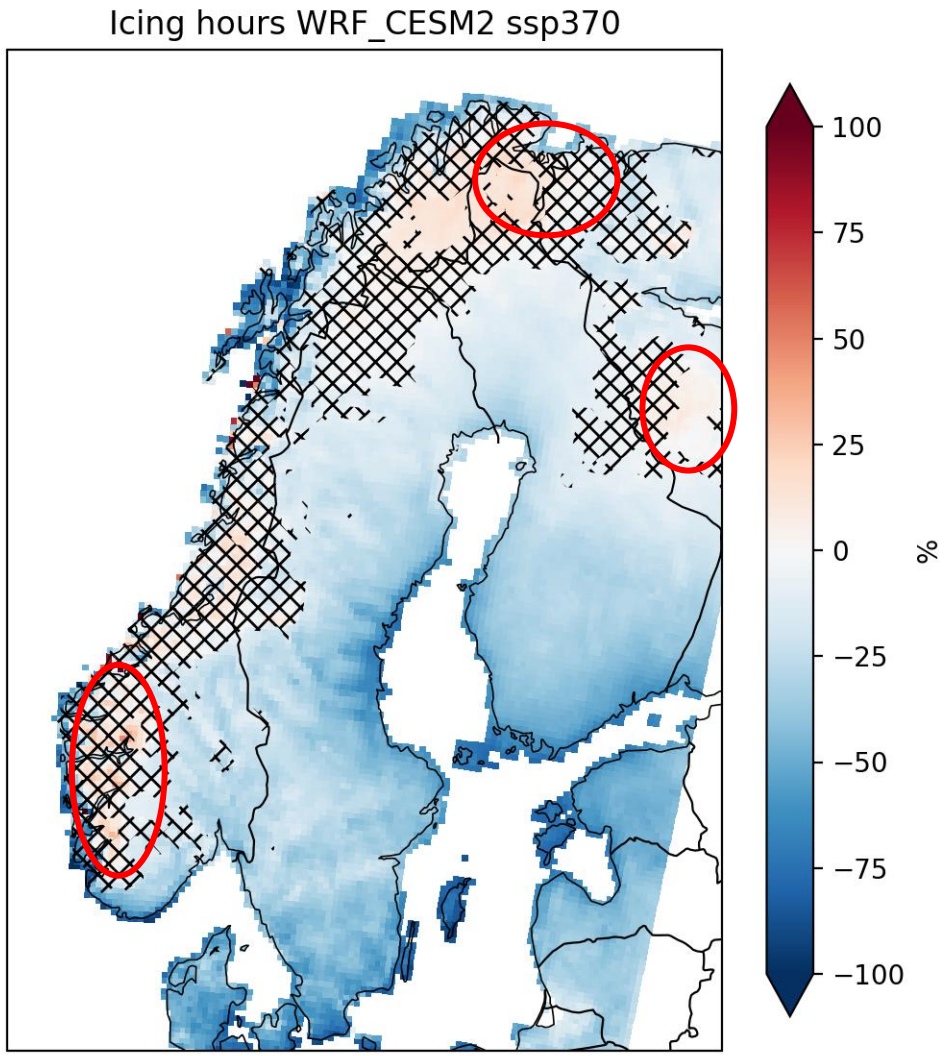
Change in WRF-CESM2 icing conditions





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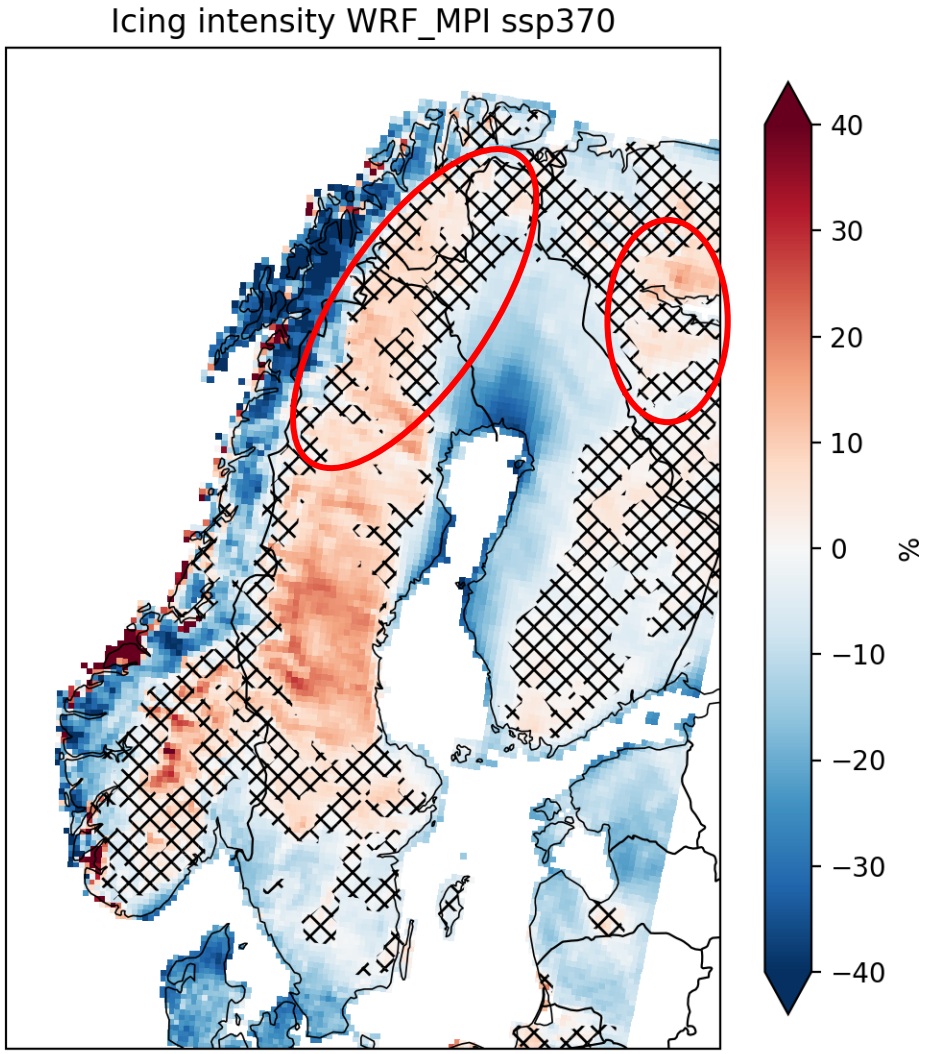
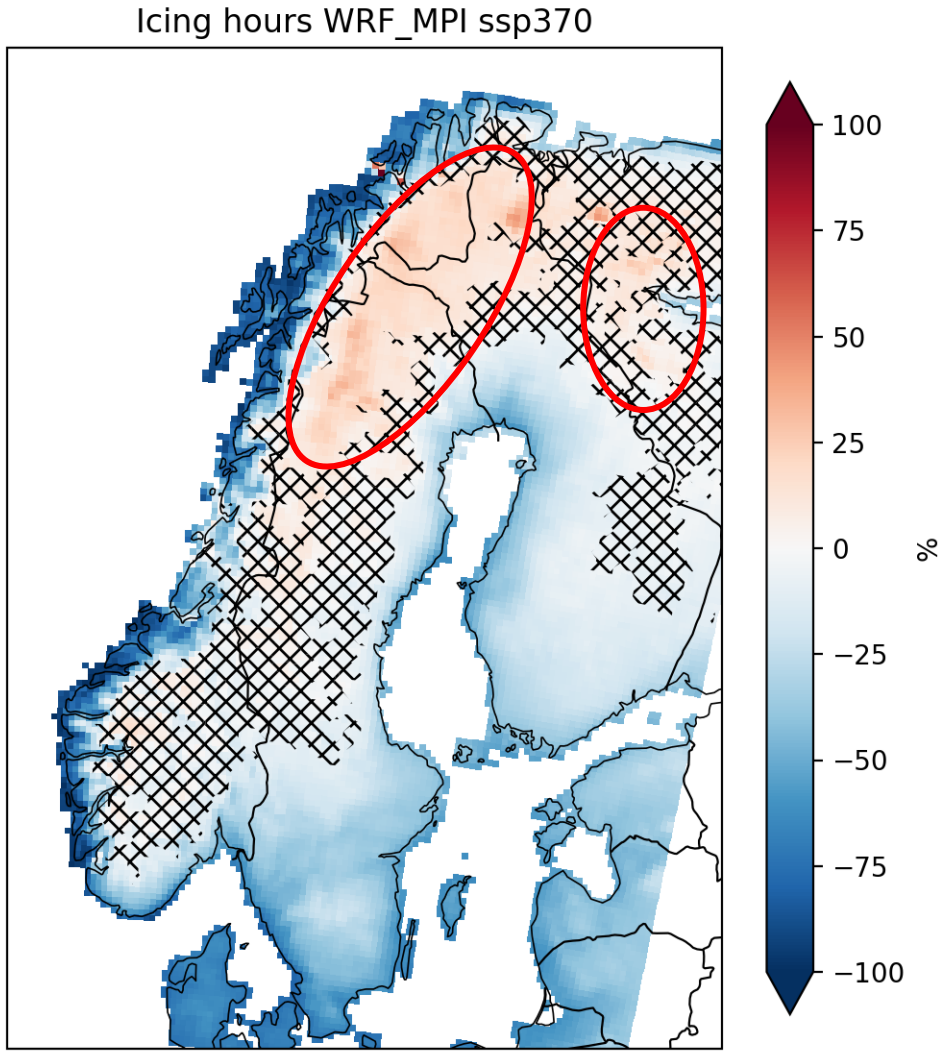
Change in WRF-MPI icing conditions





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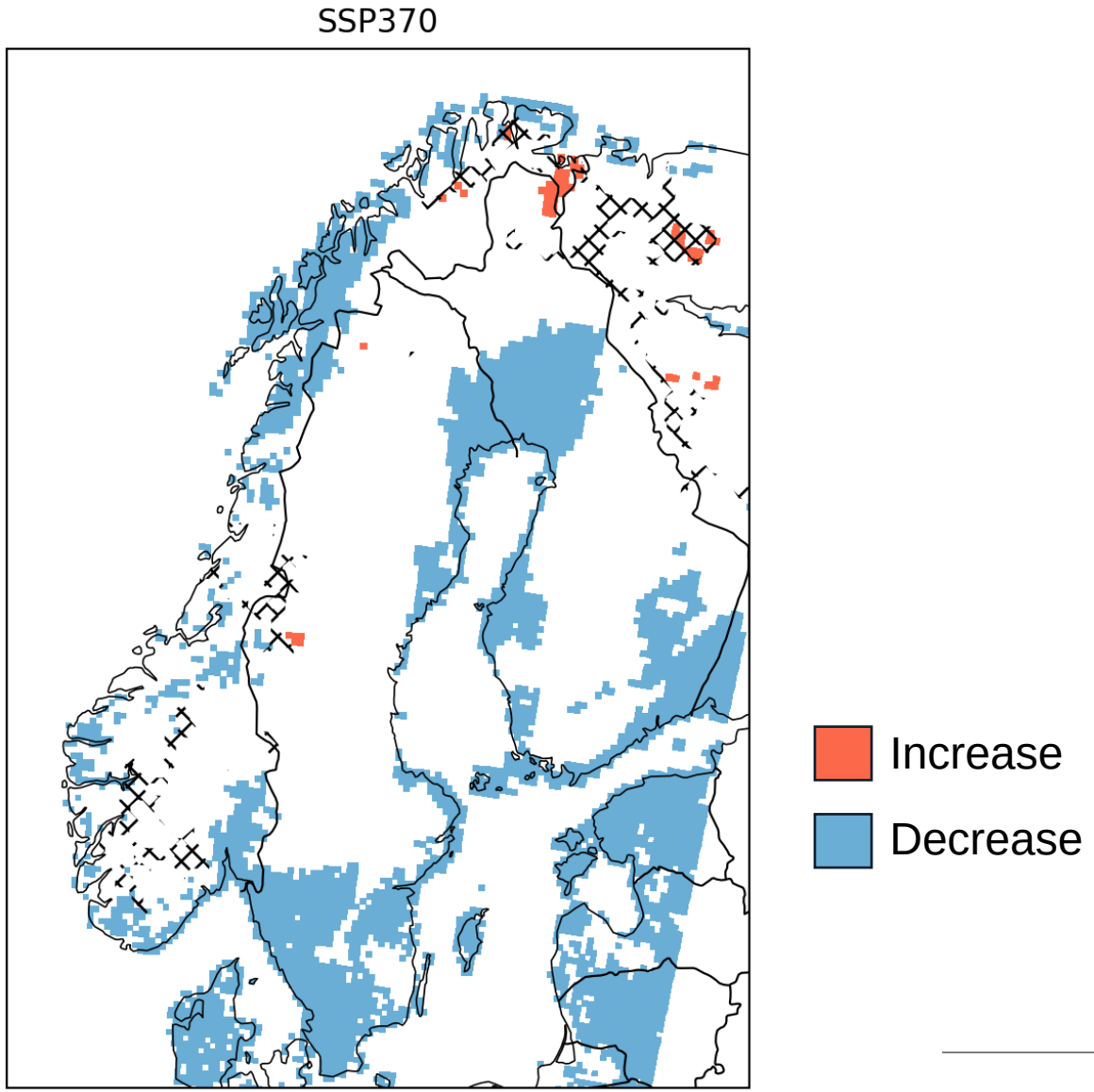
Agreement in icing condition changes = indications of prod.loss changes



Agreement in:

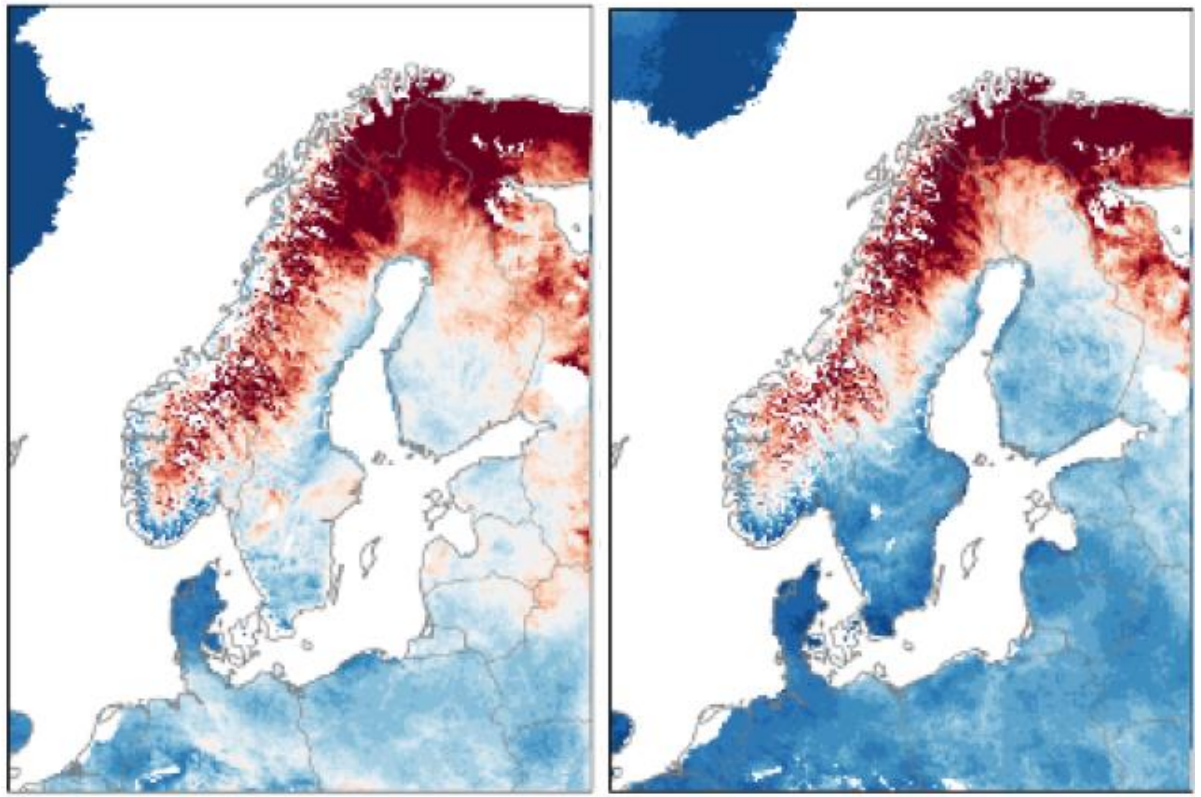
- Icing hours
- Icing intensity
- WRF-CESM2
- WRF-MPI

Change in icing hours DJF

2081 – 2100

HCLIM3 ECE RCP85

HCLIM3 GFDL RCP85

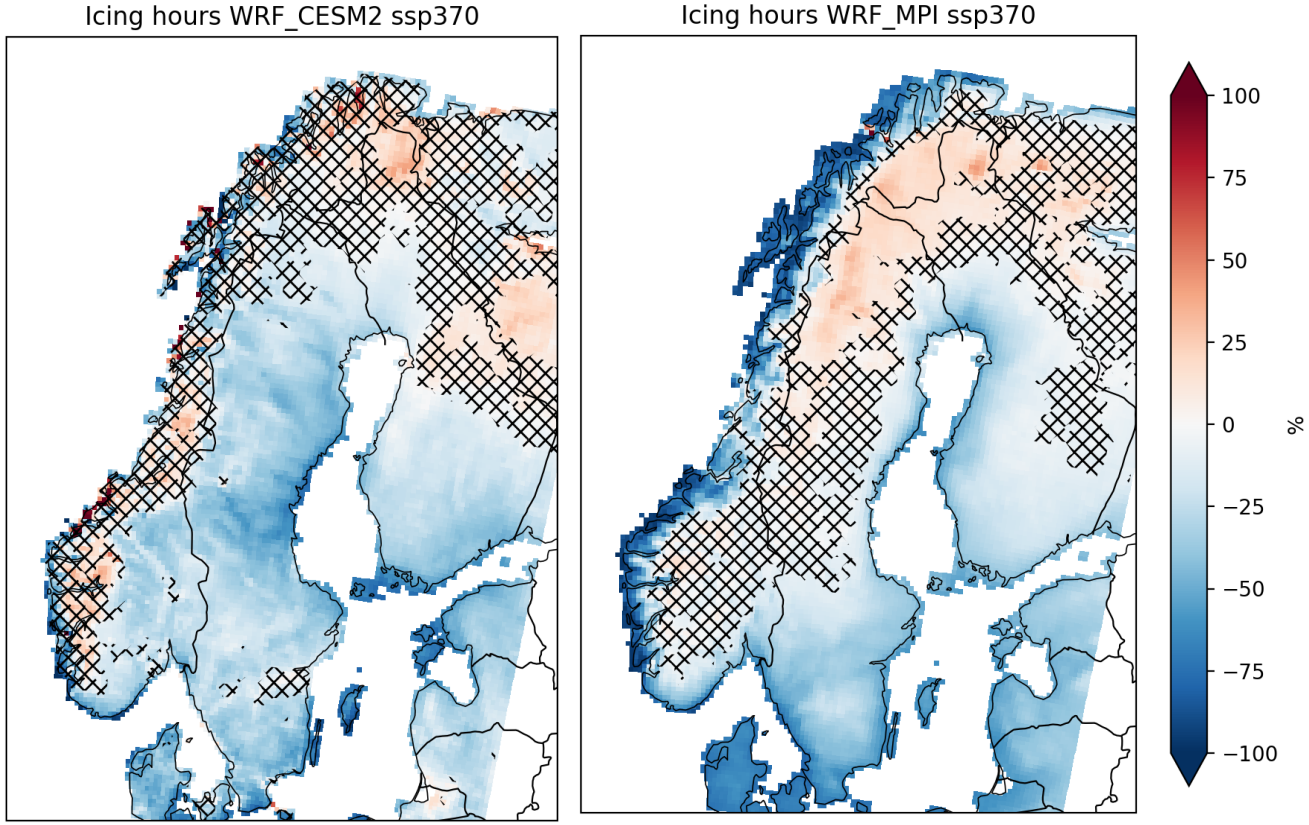


Icing hours = T < 0°C and LWC>0.5*10-4

2050 – 2065

Icing hours WRF_CESM2 ssp370

Icing hours WRF_MPI ssp370



Icing hours = dM/dt > 10 g/t

Kjellström et al. (2023)
Energiforsk report 2023:949

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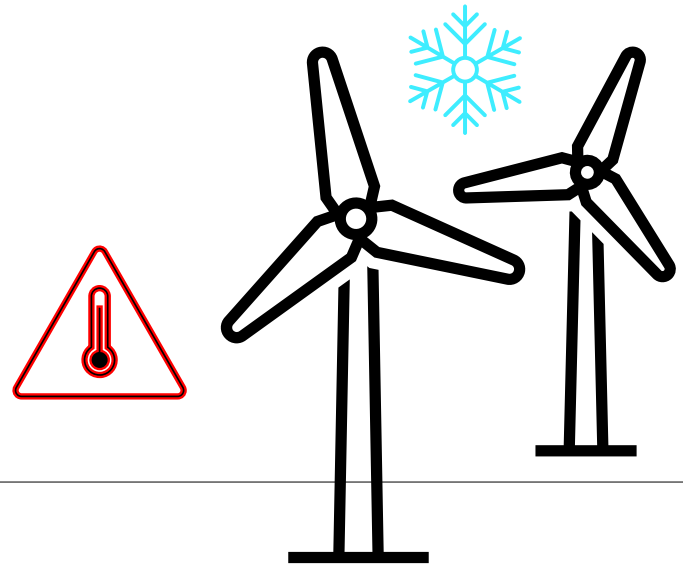
Summary

- Icing hours and icing intensity is decreasing in low-lying areas towards 2050 in our data.
- → Strong indications of decreasing production losses in these areas.
- We cannot say for certain how production loss will change in other areas based on these results.
- Need to run a full ice loss model to know how all contributing variables combine to form actual production losses.
- However, in our data and Kjellström et al. (2023) data, icing hours are decreasing in:
  - Eastern and coastal parts of Norway
  - Southern half and coastal parts of Sweden
  - Large parts of Finland except northernmost part
- …And increasing in:
  - Higher elevation areas
  - Northernmost part of Scandinavia.



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Thank you!

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