



Utrecht University



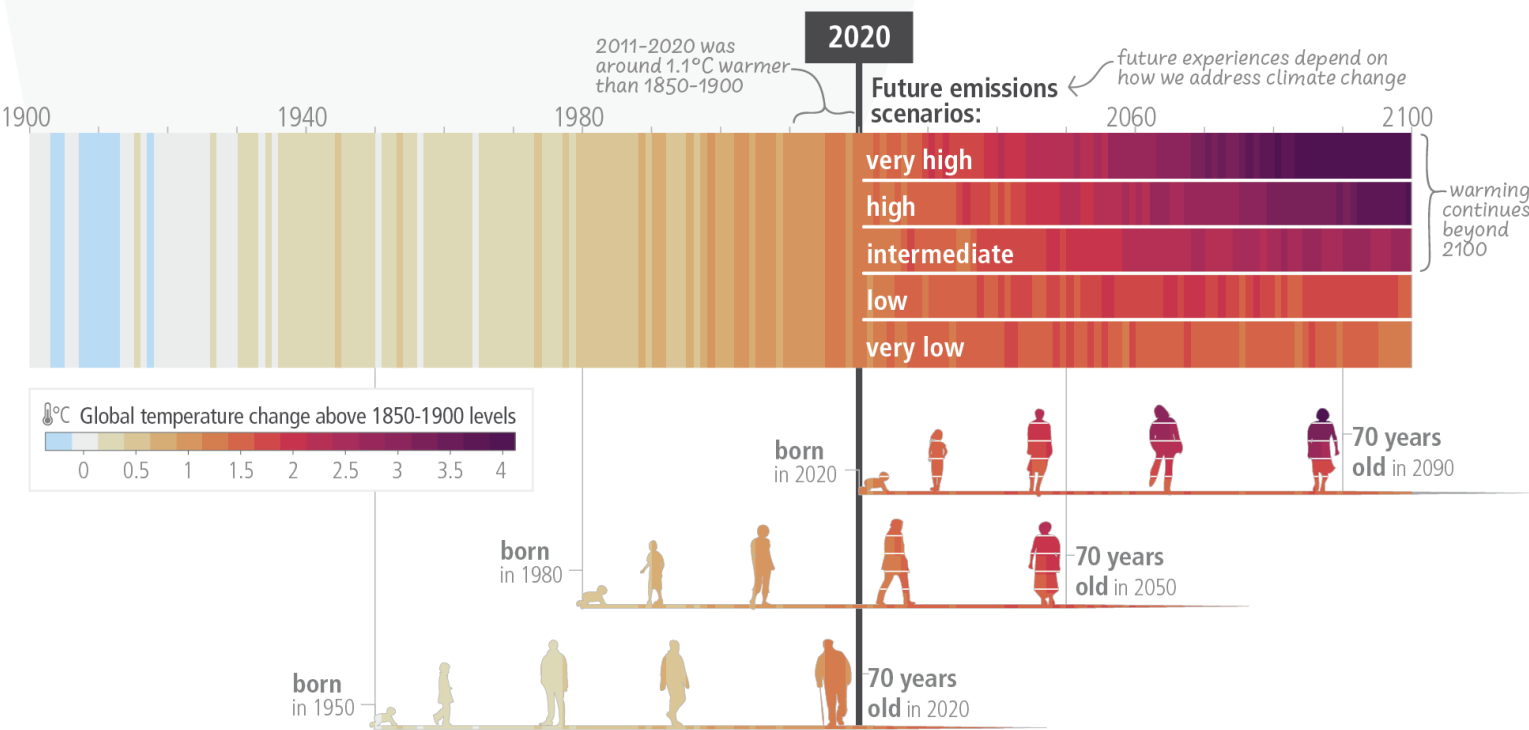
Koninklijk Nederlands
Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat



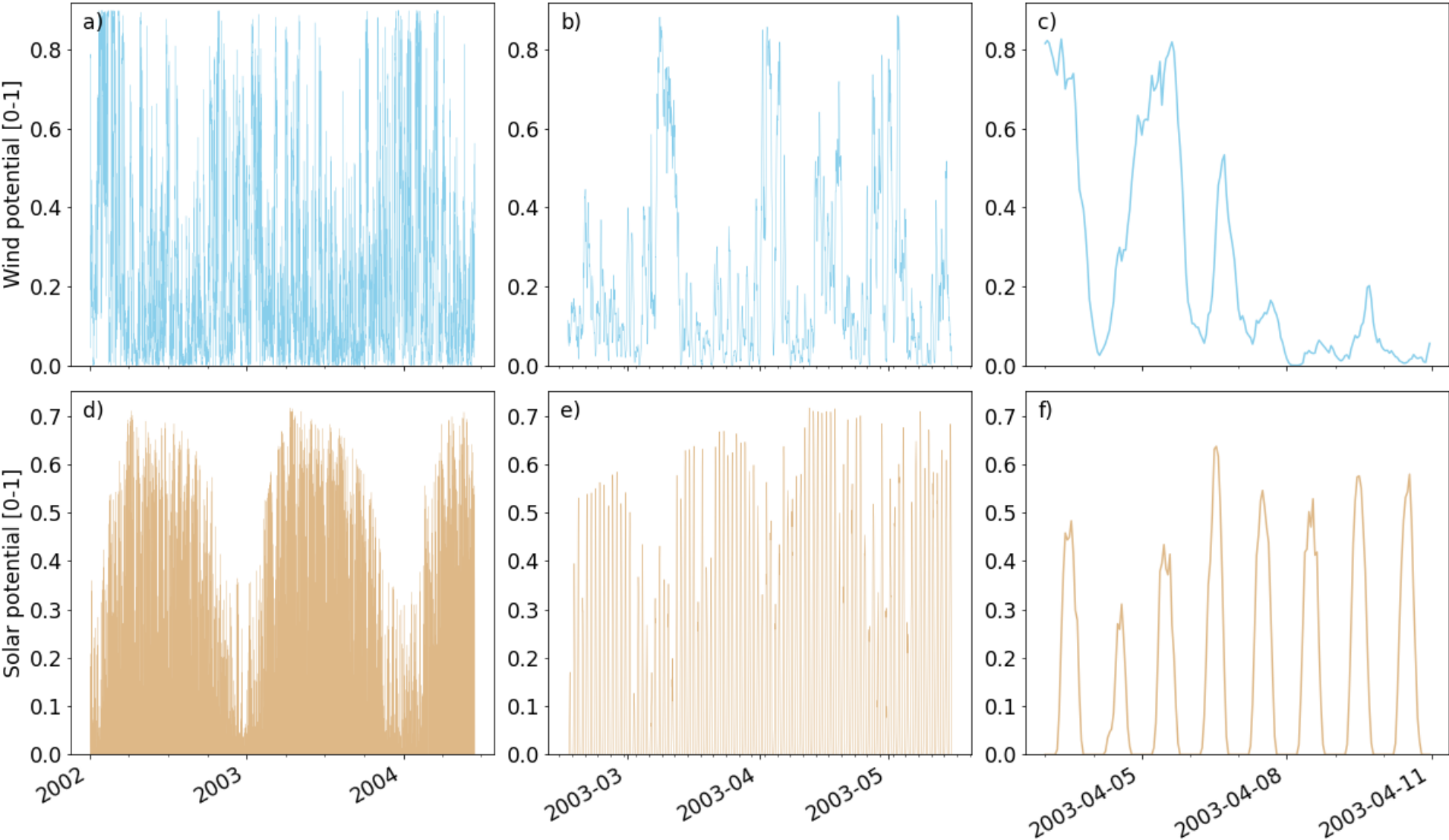
LAURENS STOOP

METRICS FOR ASSESSING CLIMATE CHANGE IMPACTS

MODES OF VARIABILITY



MODES OF VARIABILITY



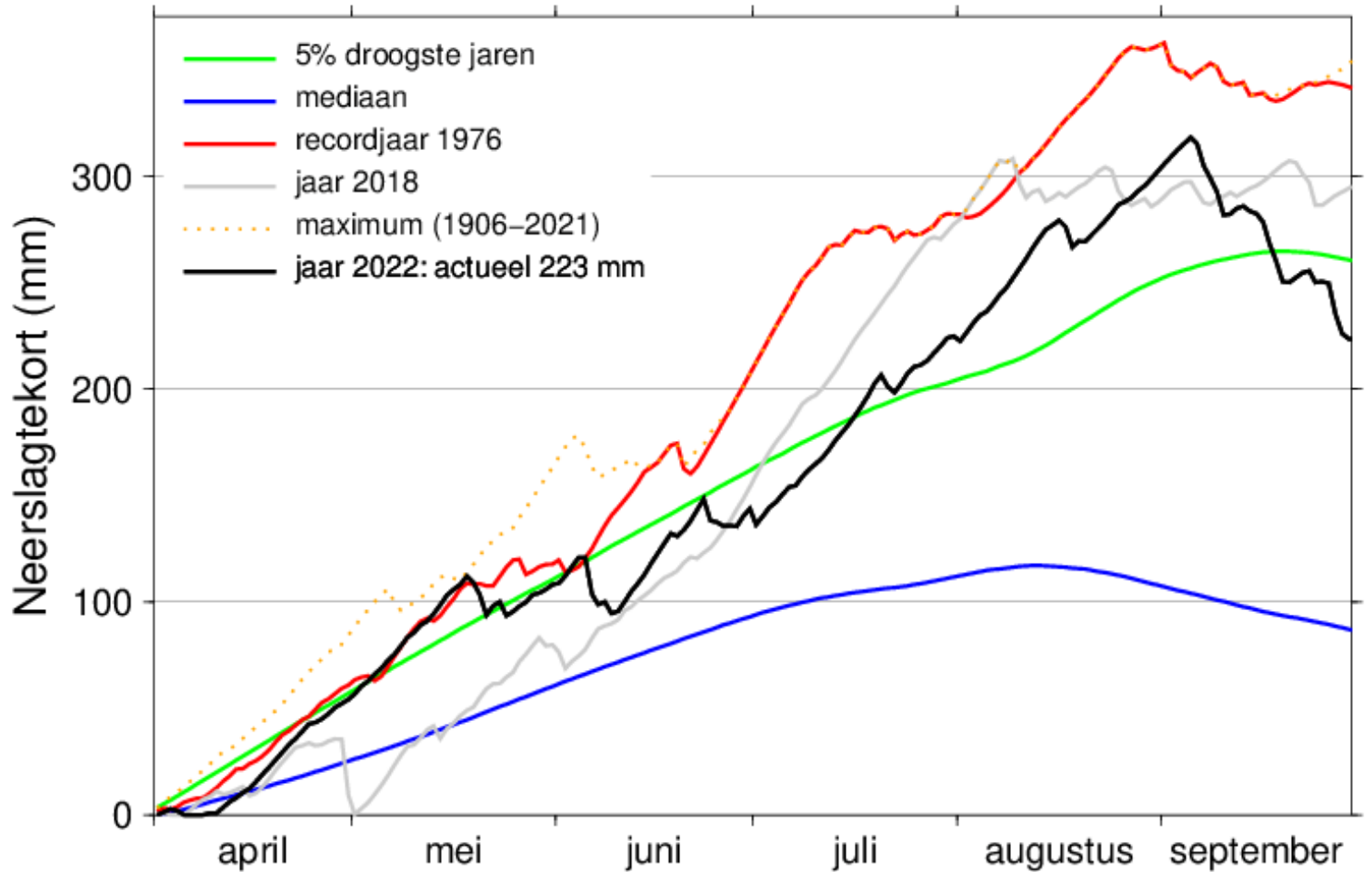


IDEA

INSPIRATION IN HYDR

Neerslagtekort in Nederland in 2022

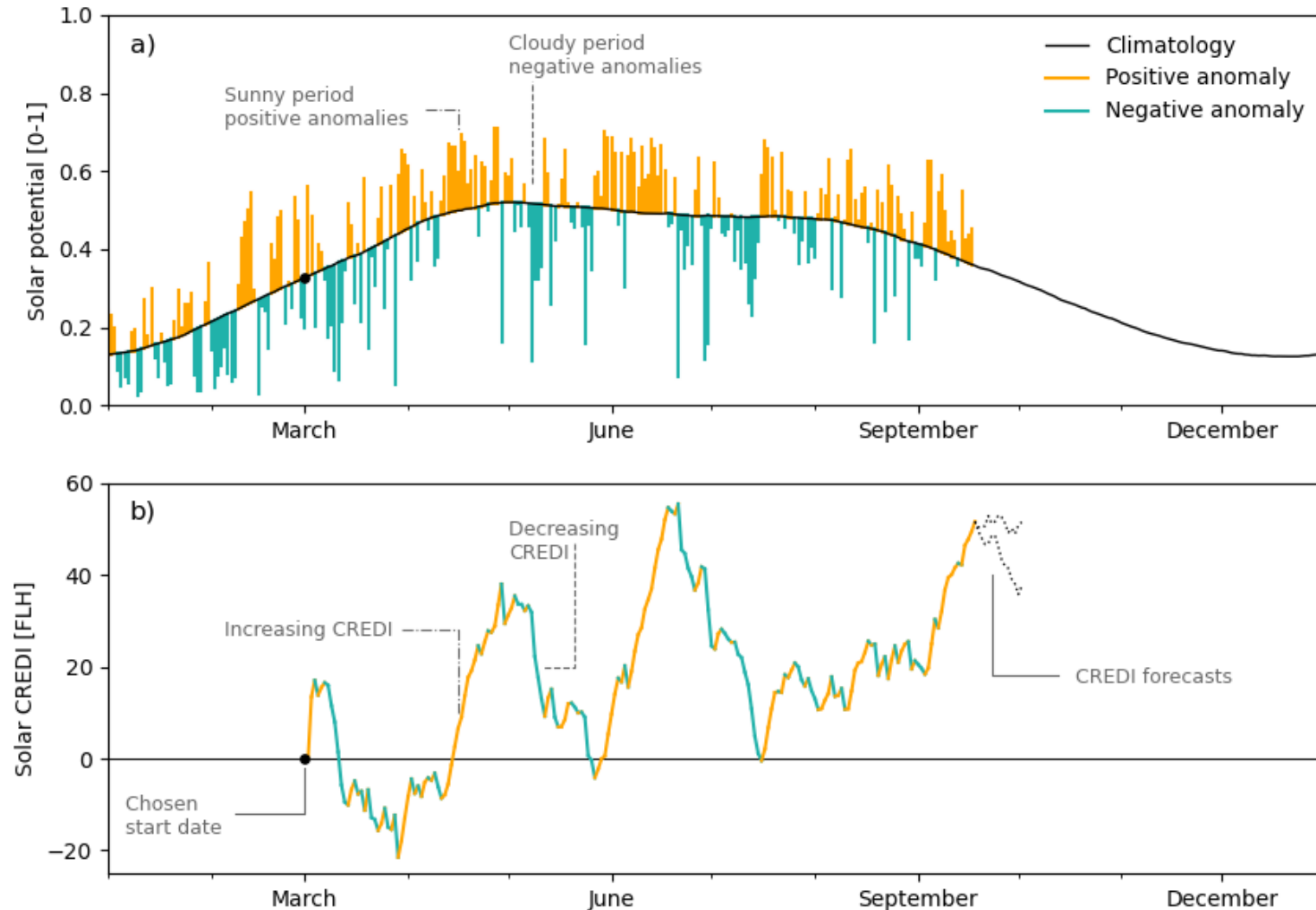
Landelijk gemiddelde over 13 stations



CLIMATOLOGICAL RENEWABLE ENERGY DEVIATION INDEX (CREDI)

- ▶ Cumulative sum
- ▶ Anomaly w.r.t. 'climate'
- ▶ Period of interest

- ▶ in Full Load Hours

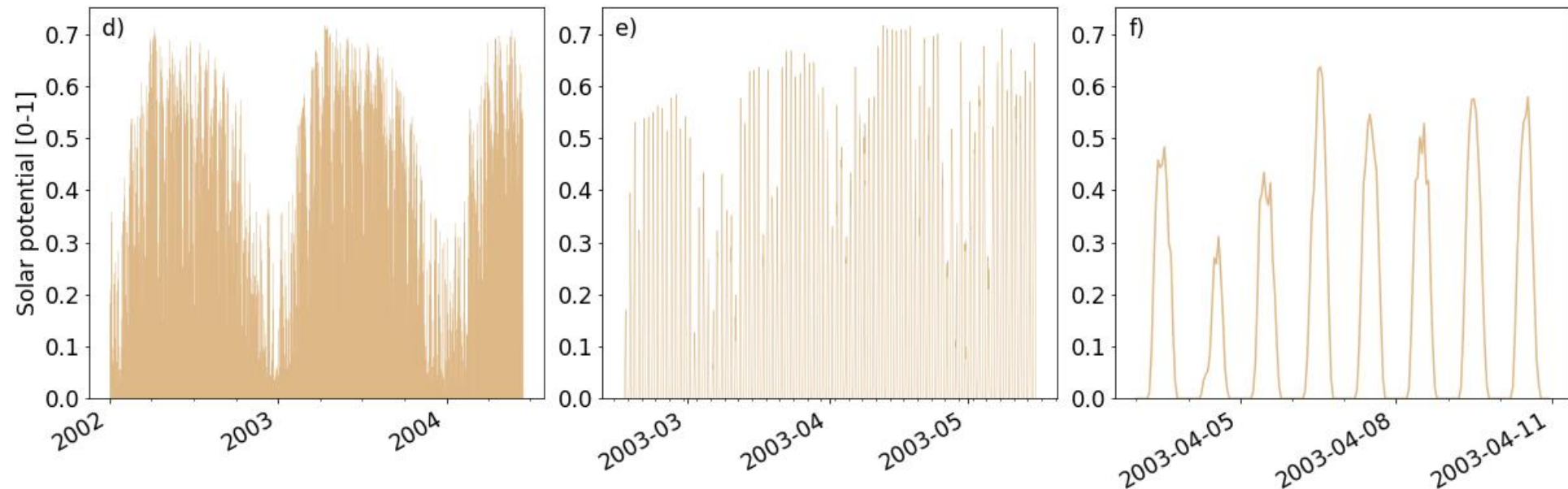




CLIMATOLOGY

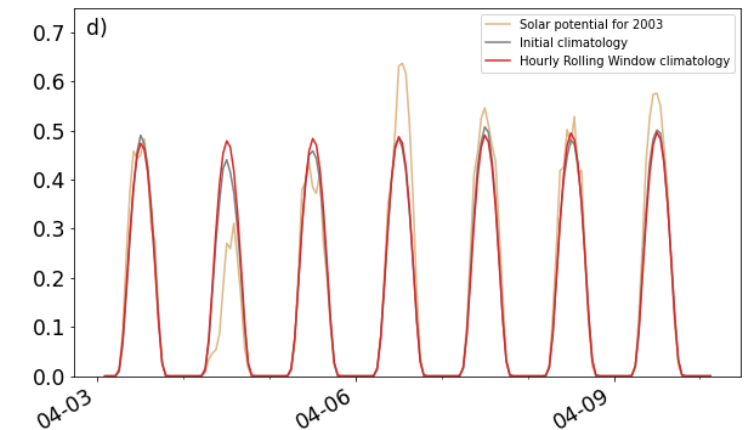
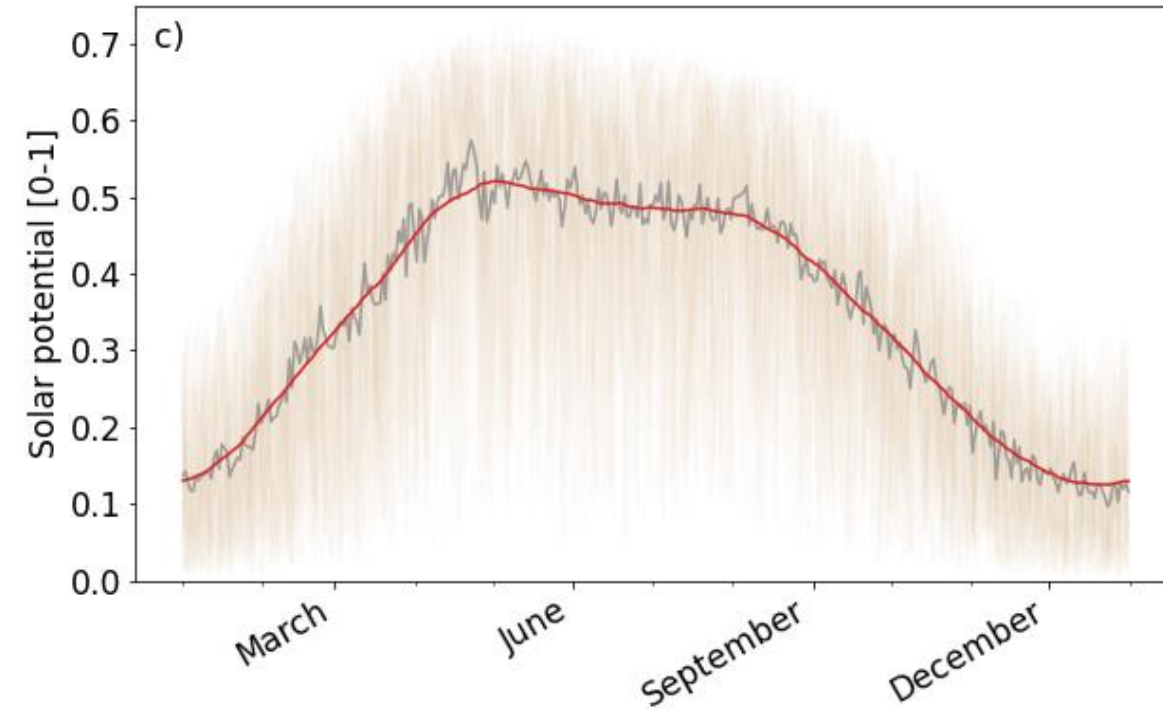
SOLAR CLIMATOLOGY

- ▶ Daily cycle *big* issue
 - ▶ Very low values —> Hourly needed!
 - ▶ Data needed for smooth & physical climatology

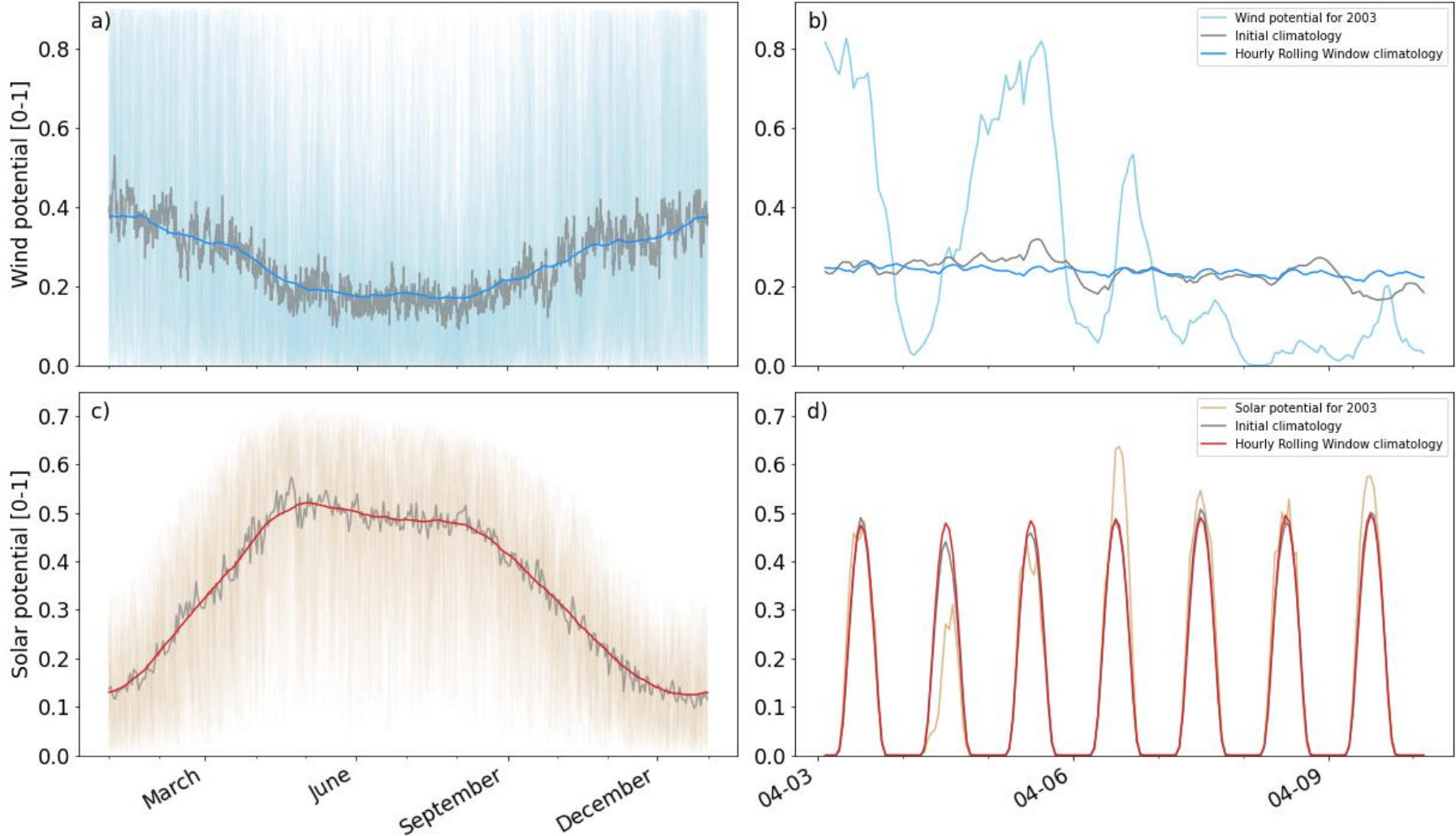


SOLAR CLIMATOLOGY

- ▶ Rolling window (on hour of day)
 - ▶ Window size; >20D, <60D
 - ▶ Quantitative assessment needed
 - ▶ Initial assessment (qualitative; 40D)



CLIMATOLOGICAL DEFINITION





APPLICATION & CONSIDERATIONS

INTER-ANNUAL TO DECADEAL

▶ WON:

- ▶ Long term large variation observed
- ▶ In line with found variations of extremes [others]

▶ SPV:

- ▶ Long term inter-annual and decadal variability

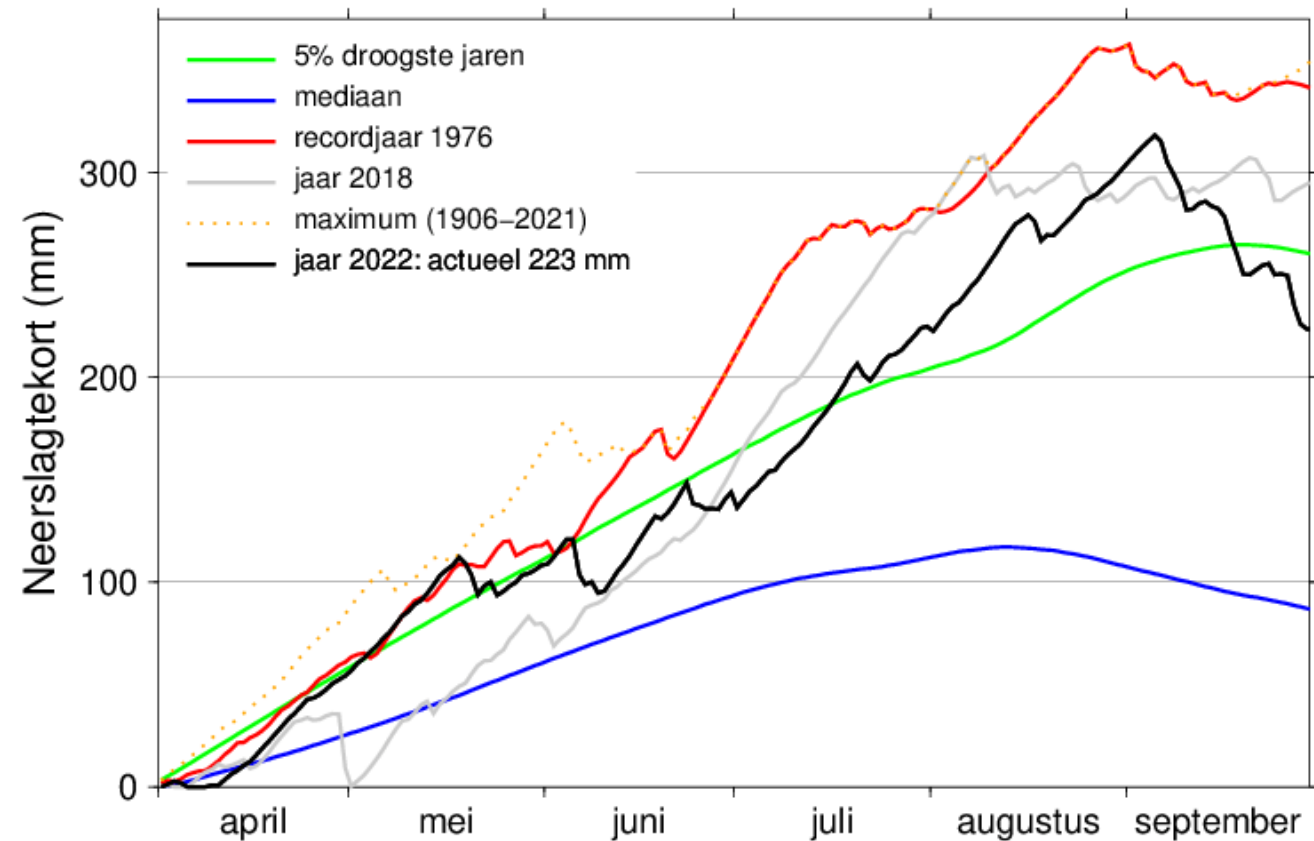


ASSESSMENT DURING THE YEAR

- ▶ Startpoint is vital
 - ▶ Annual cycle
 - ▶ Seasonal changes

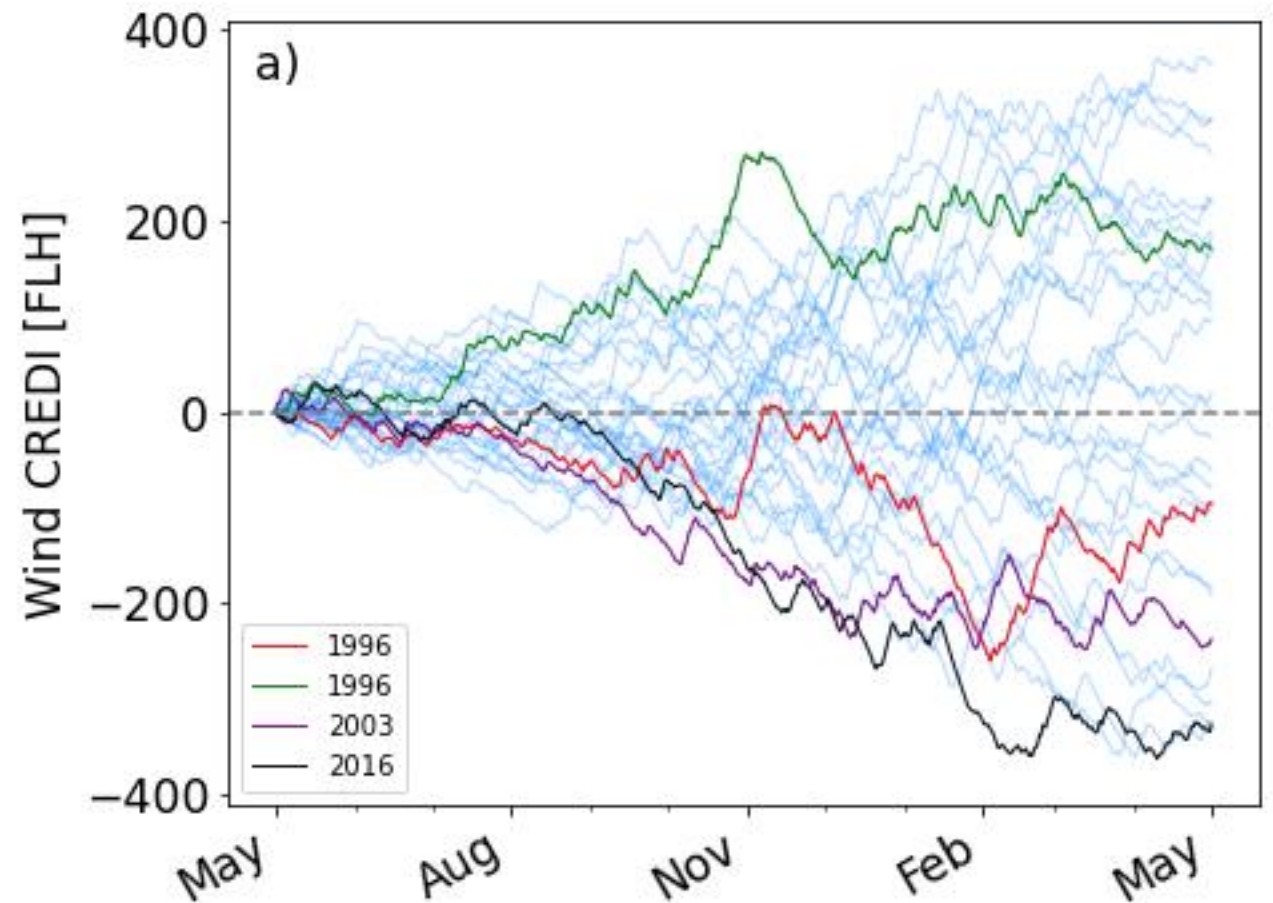
Neerslagtekort in Nederland in 2022

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ASSESSMENT DURING THE YEAR

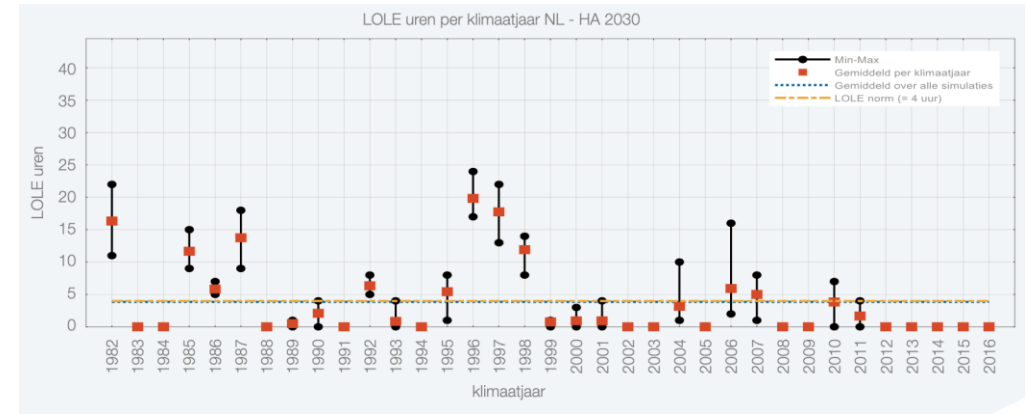
- ▶ Startpoint is vital
 - ▶ Annual cycle
 - ▶ Seasonal changes
- ▶ Widest spread in *storylines*
 - ▶ Wind -> May 1st
 - ▶ Solar -> Jan 1st



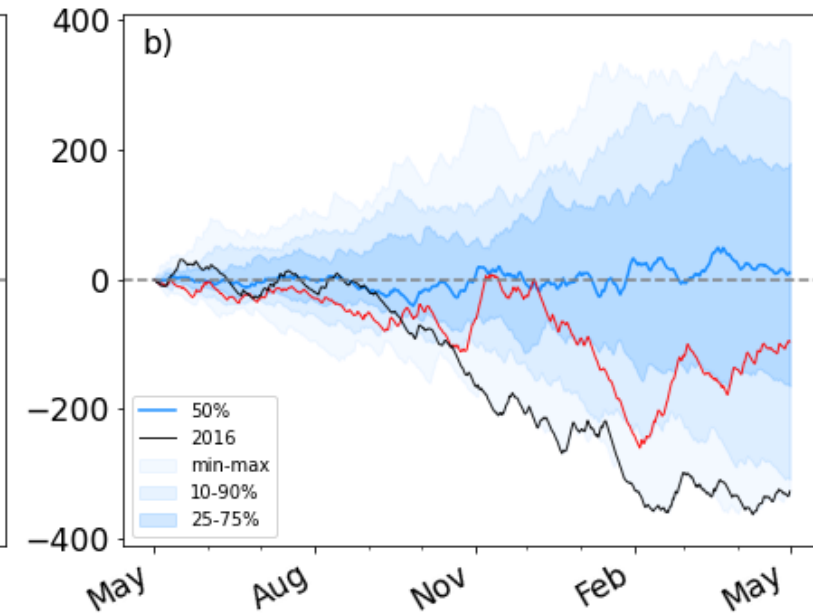
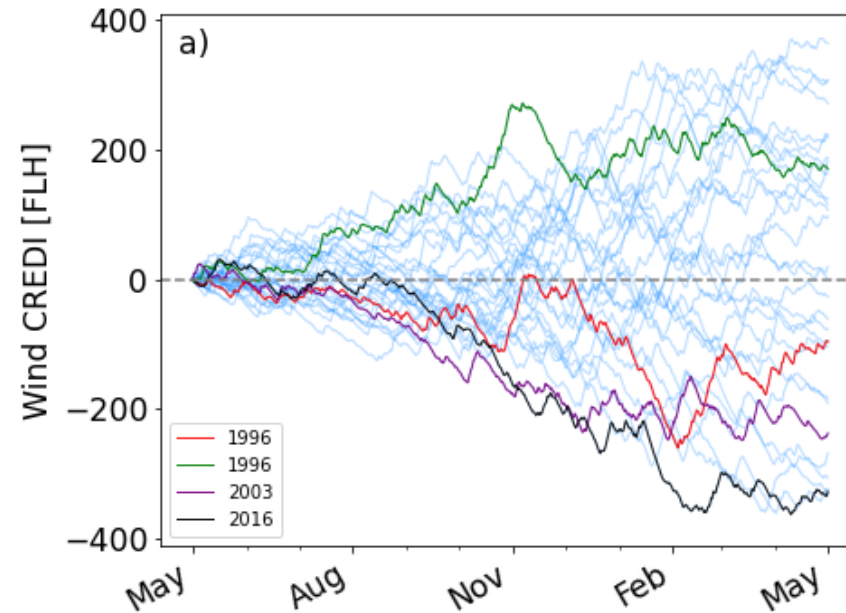
ANNUAL WIND CREDI

- ▶ Large values observed
- ▶ Variation between years
 - ▶ Path is important

▶ *Storylines!*

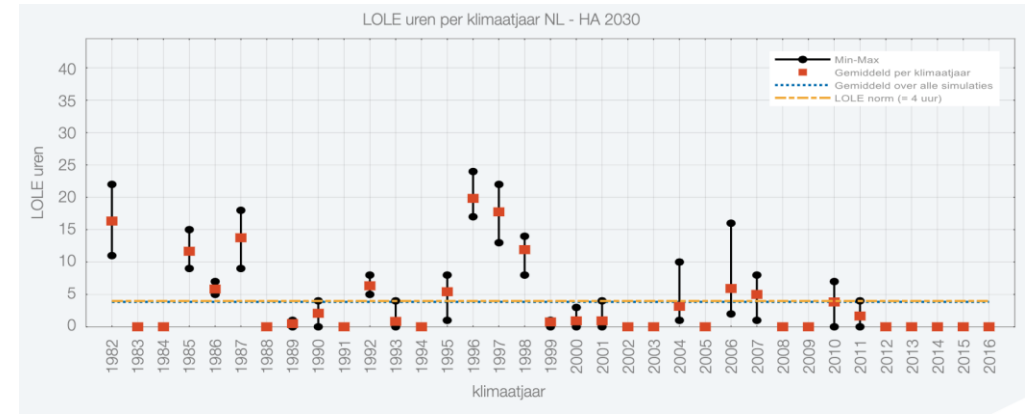


See: <https://www.tennet.eu/nl/nieuws/monitoring-leveringszekerheid-2022>



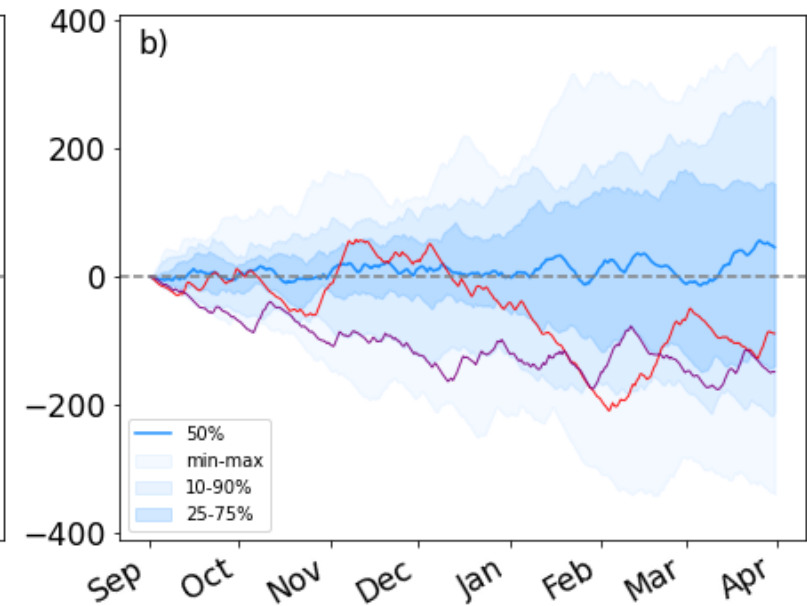
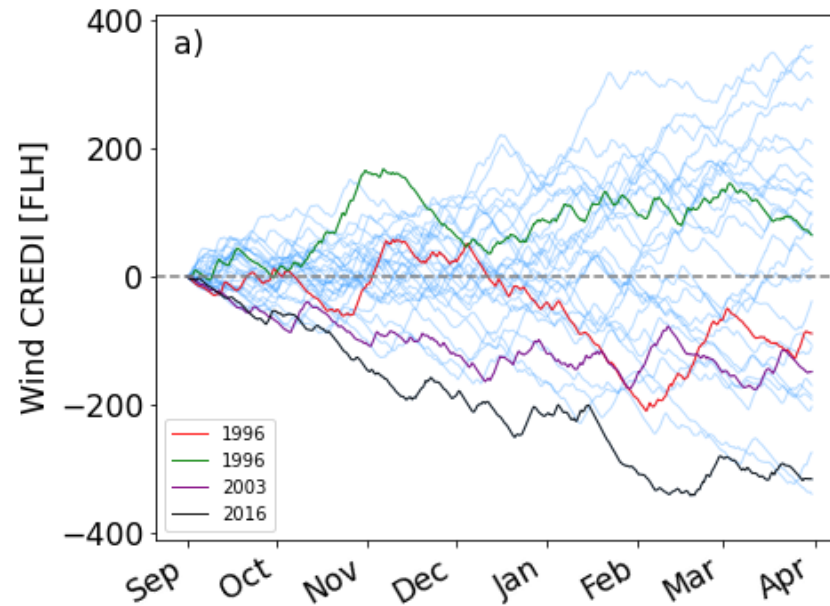
SEASONAL STORYLINES

- ▶ Large values observed
- ▶ Variation between seasons



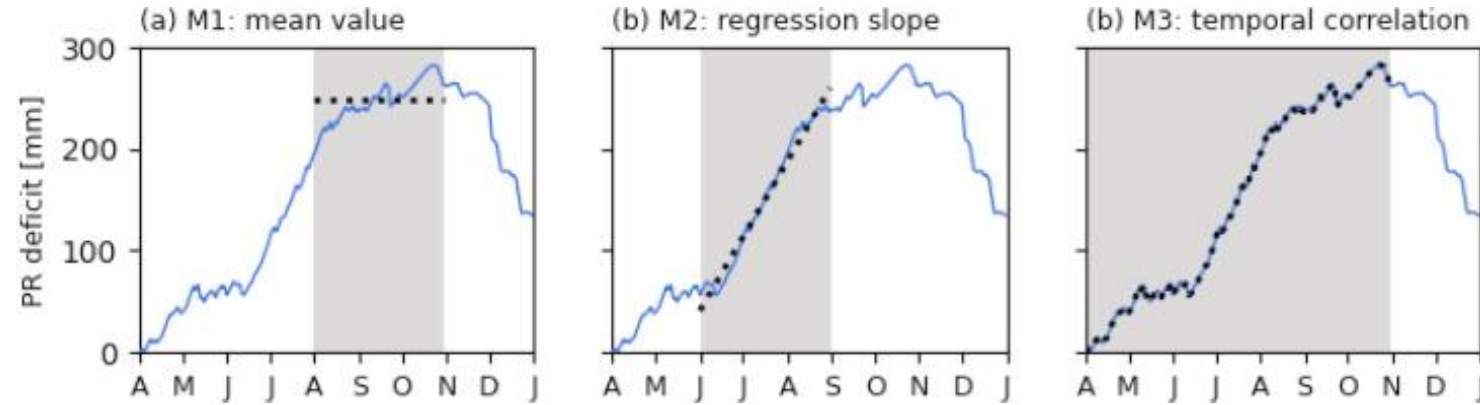
See: <https://www.tennet.eu/nl/nieuws/monitoring-leveringszekerheid-2022>

- ▶ *Storylines!!*



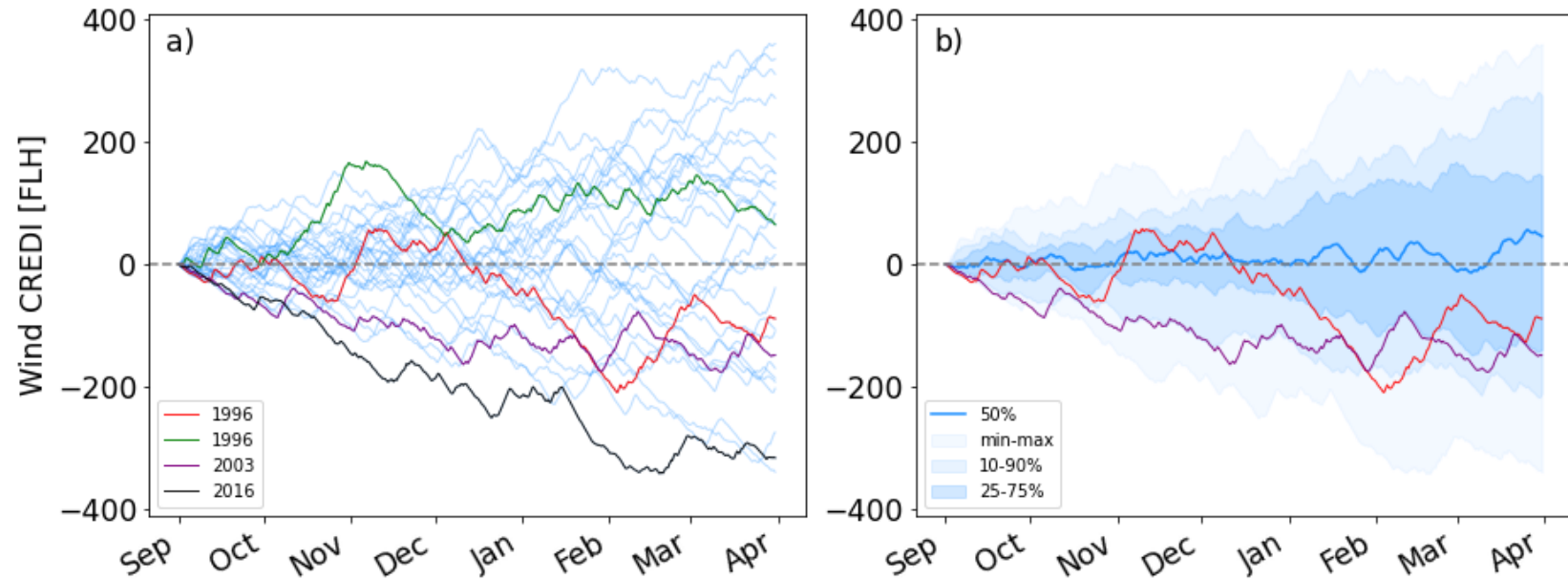
SEASONAL STORYLINES

- ▶ Large values observed
- ▶ Variation between seasons



Inspired by: <https://www.10.1016/j.wace.2021.100350>

- ▶ *Storylines!!!*



CONCLUDING REMARKS

- ▶ Look to other fields for inspiration
- ▶ CREDI
 - ▶ Climatology is vital
 - ▶ Period correct of analysis

