C2WIND

Quantifying and Validating the Impact of Climate Change on Wind Resources in the Mediterranean Sea and Southern North Sea.

Rémi Gandoin, Daniel Hatfield and Jorge Garza
C2Wind

The effect of Climate Change on future wind resources should be quantified using region-specific filtered CMIP6 Climate Model datasets, Reanalysis, and long-term measurements.

Cases description:

Gulf of Lion and **Southern North Sea**

- One ERA5/MERRA-2 node
- Closest data note for all the CMIP6 model data (1850-2014),
- Météo-France weather station measurements (blue dots, where available).
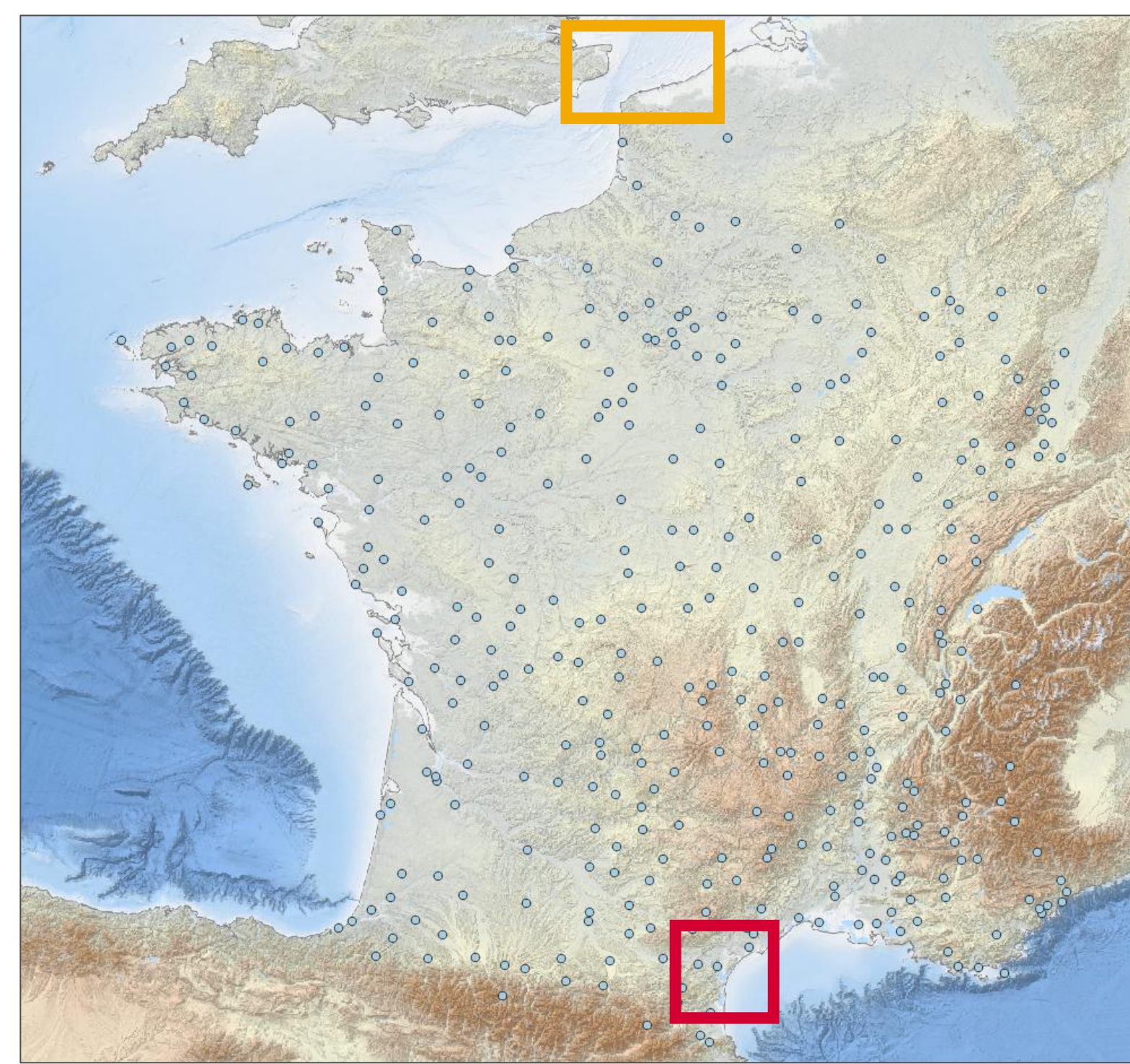

Method:

CMIP6 model selection based on the methodology developed by C2Wind and presented at the WindEurope Technology Workshop 2024 [WE24], using three criteria:

- Interannual Variability
- Similarity of wind speed distributions
- Correlation on long-term moving averages with ERA5

Monthly correlations between wind speed and temperature are computed, to assess seasonal effects and isolate the effect of air temperature on wind speed and validate models against measurements where available.

Results: Historical (1850-2014) and Future (2015-2100) SSP5-8.5 Trends
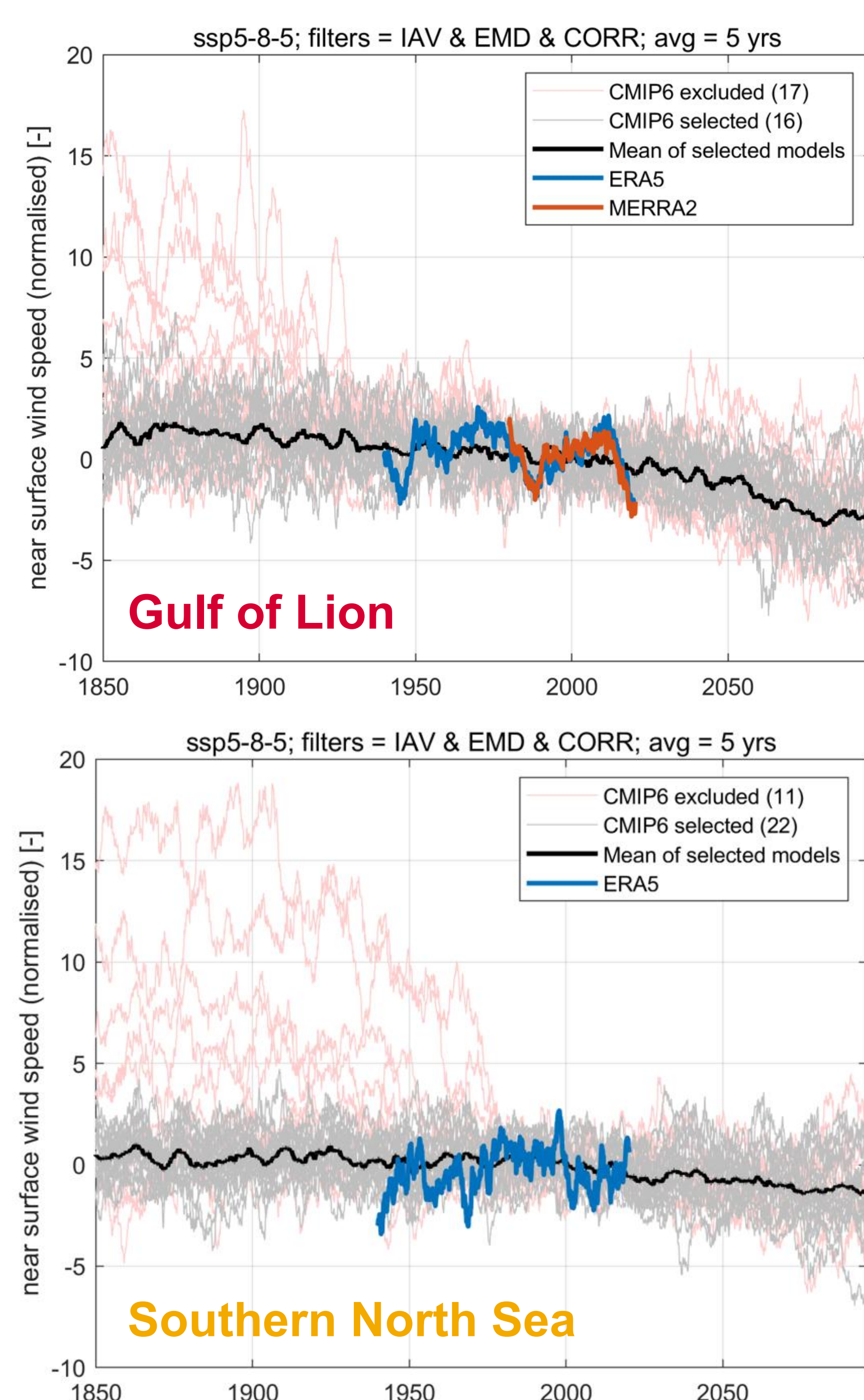

Gulf of Lion (Med. Sea):
- Medium/strong negative correlation between monthly temperatures and wind speeds.
- Downward future trend in future annual mean wind speed (see also [OH18]).
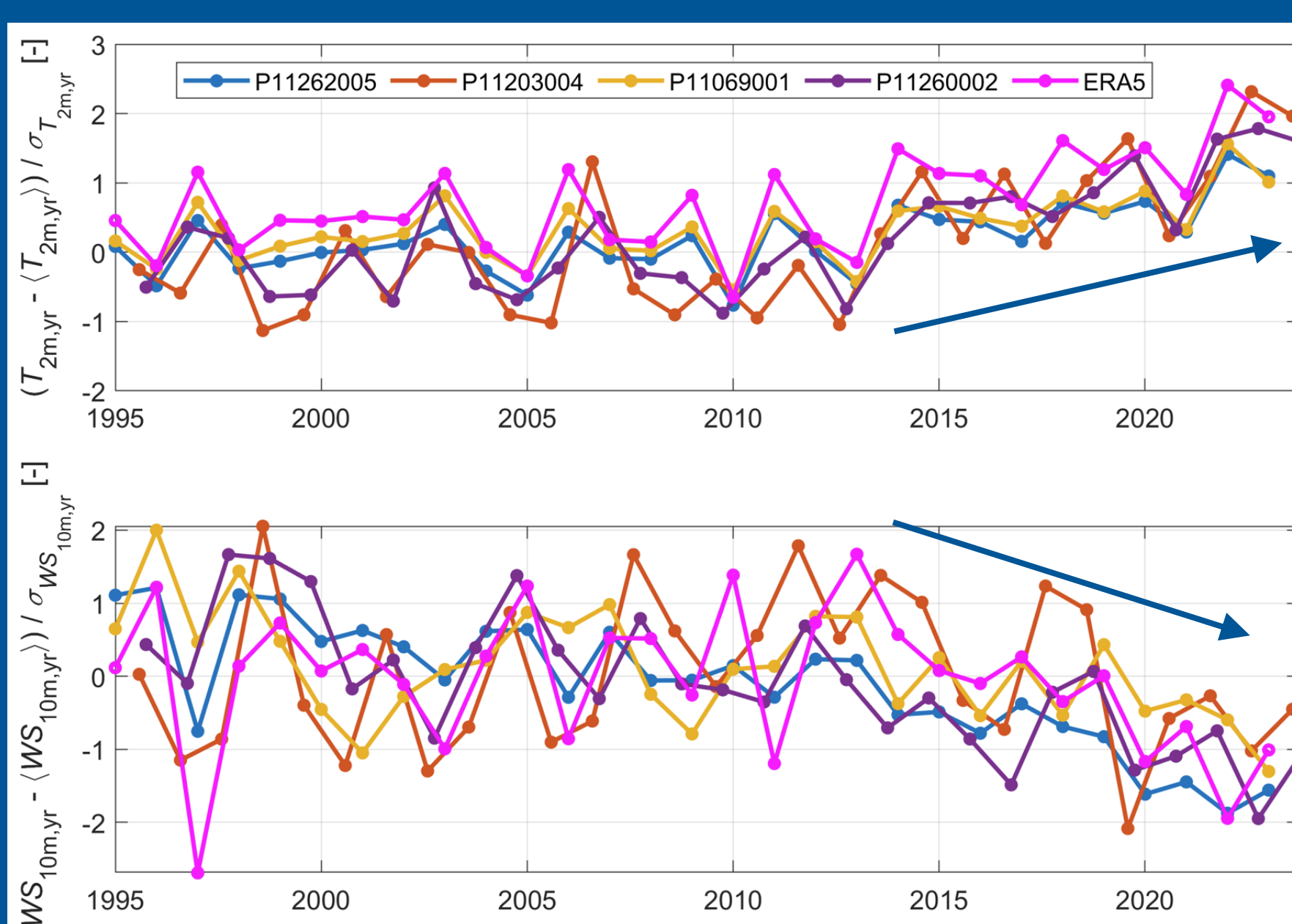
Southern North Sea:
- Medium/weak negative or positive correlation between monthly temperatures and wind speeds.
- No significant trend in future annual mean wind speed, but changes expected in seasonality.

Results: Monthly Correlation Coefficients

PX = Météo-France weather stations

* Note the different y-scales
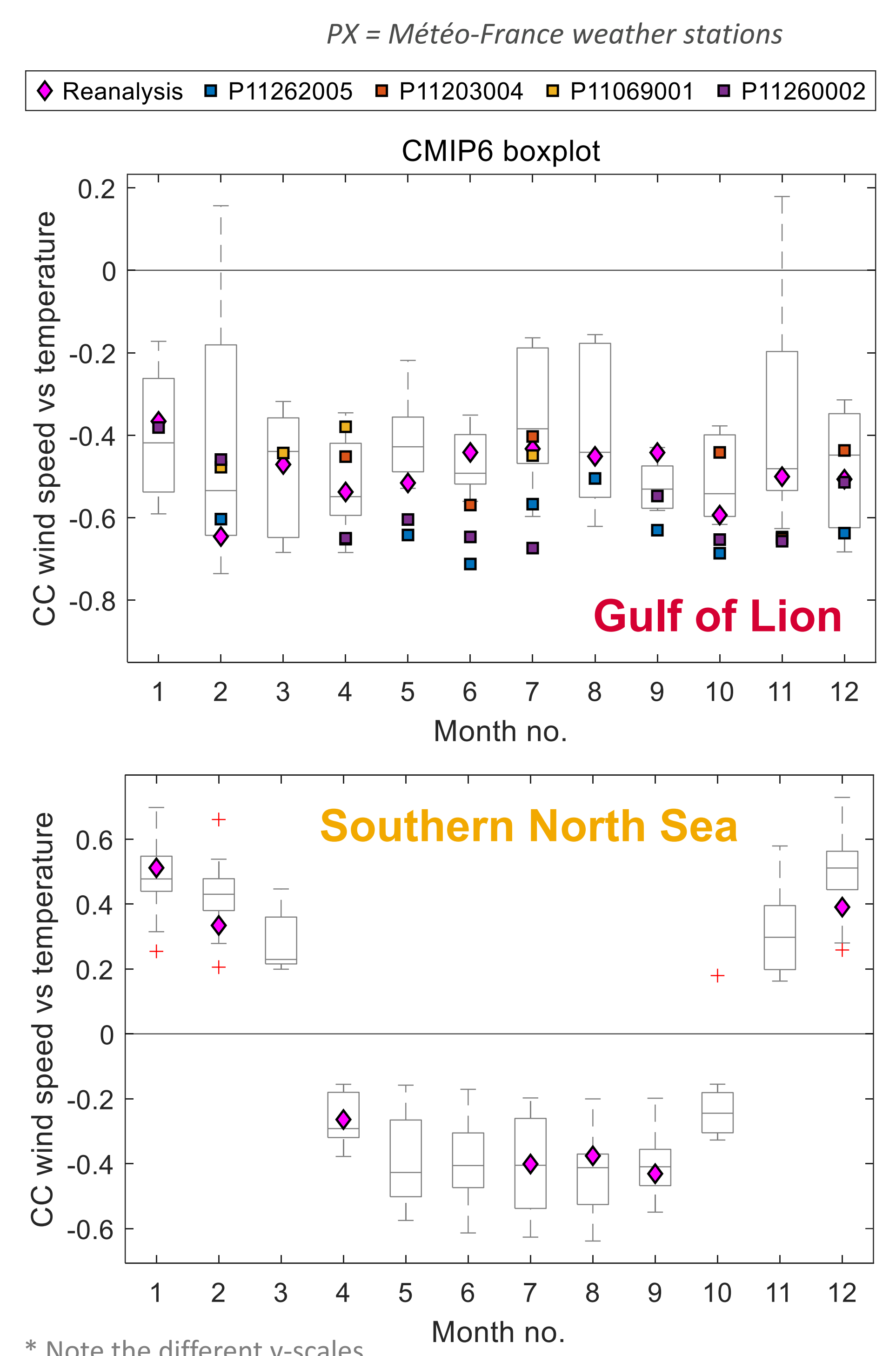
[WE24] C2Wind. Quantitative approach for climate model selection and application in WRA & EYA (2024) https://c2wind.com/f/content/pres08ge_v2.pdf
[OH18] Obermann-Hellhund, A., Conte, D., Somot, S. et al. Mistral and Tramontane wind systems in climate simulations from 1950 to 2100. Clim Dyn 50, 693–703 (2018). https://doi.org/10.1007/s00382-017-3635-8

Watch this presentation

Download the poster

Wind EUROPE

TECHNOLOGY WORKSHOP 2025 19-20 JUNE ISTANBUL

windeurope.org/tech2025
#WindTech25