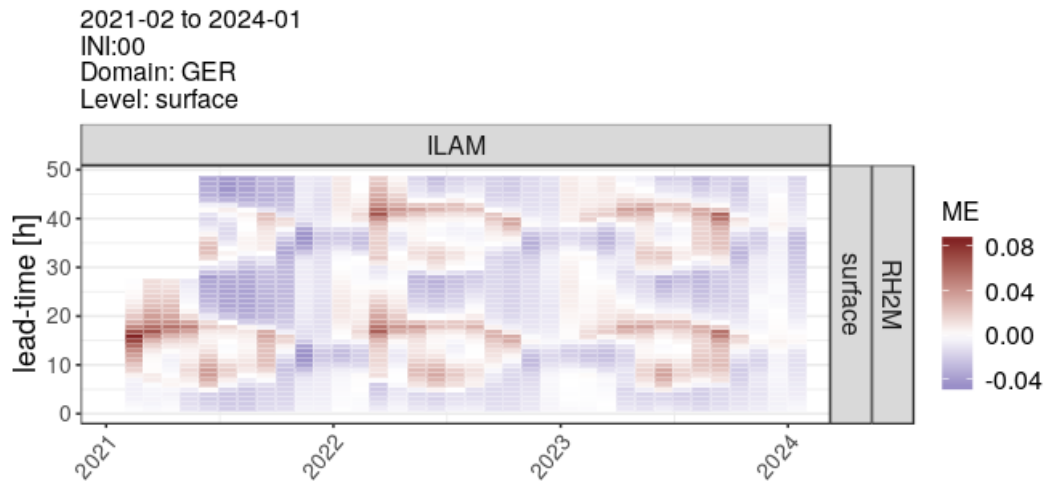
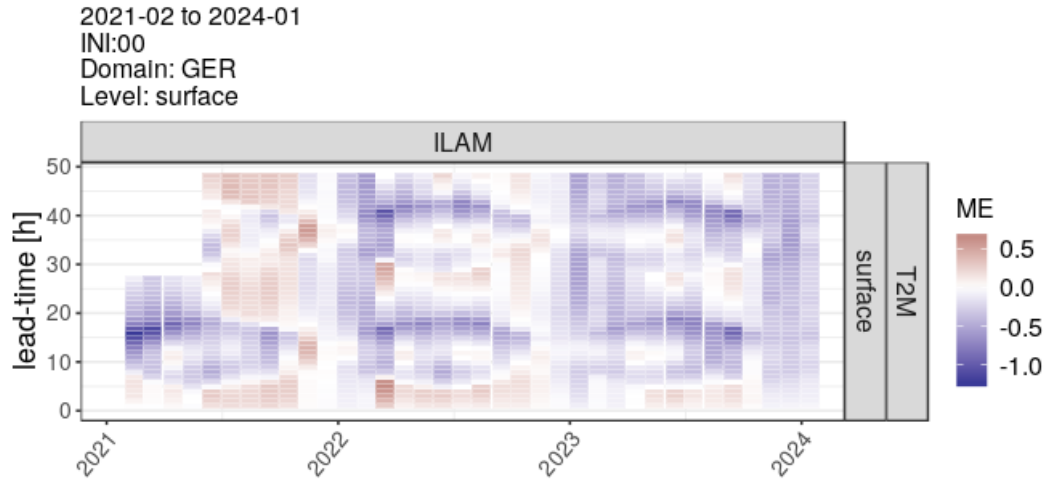


ICON D2 Model Errors

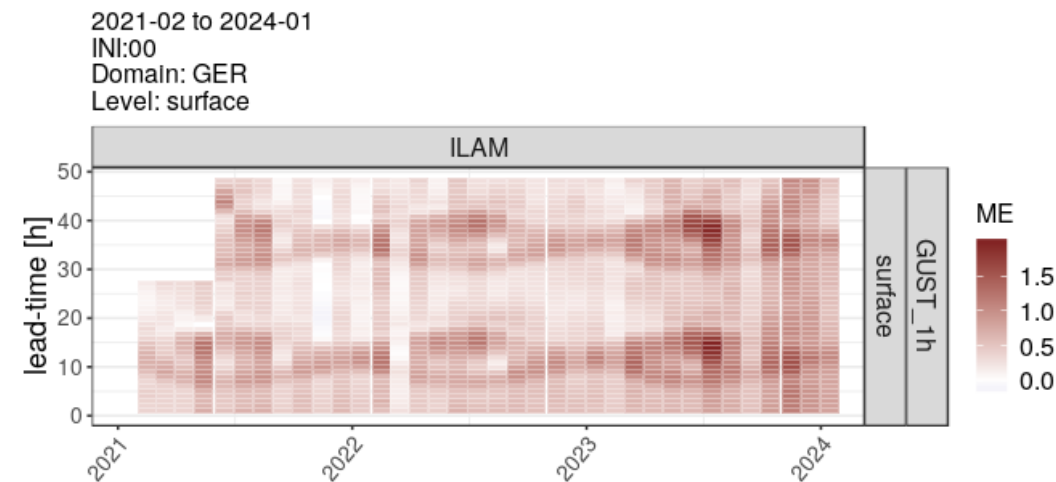
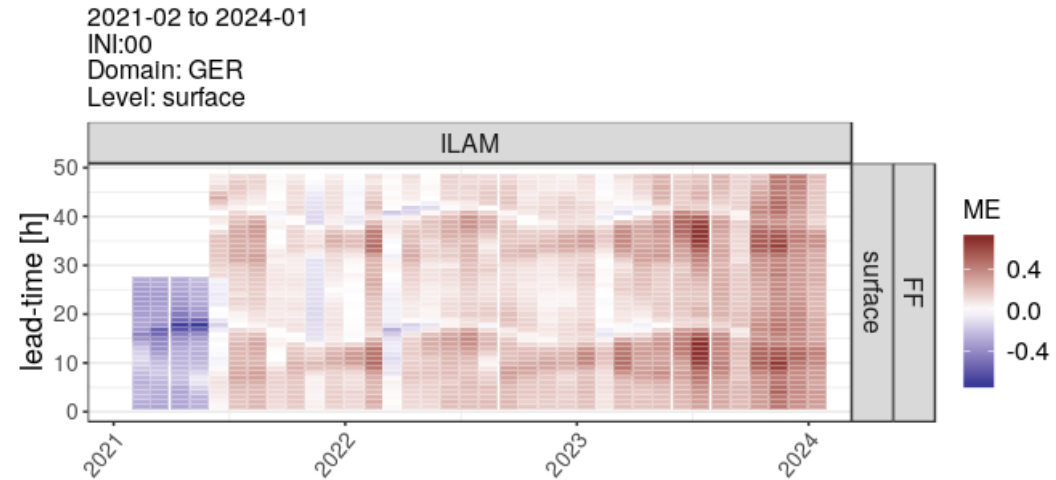
National Domain Verification

Felix Fundel

Deutscher Wetterdienst
Referat FE 12
Frankfurter Straße 135
63067 Offenbach am Main



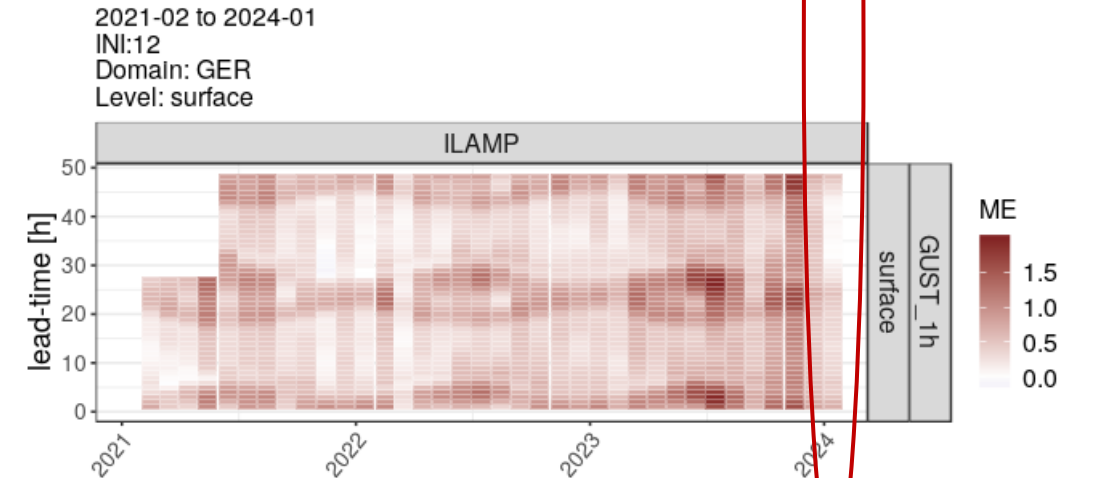
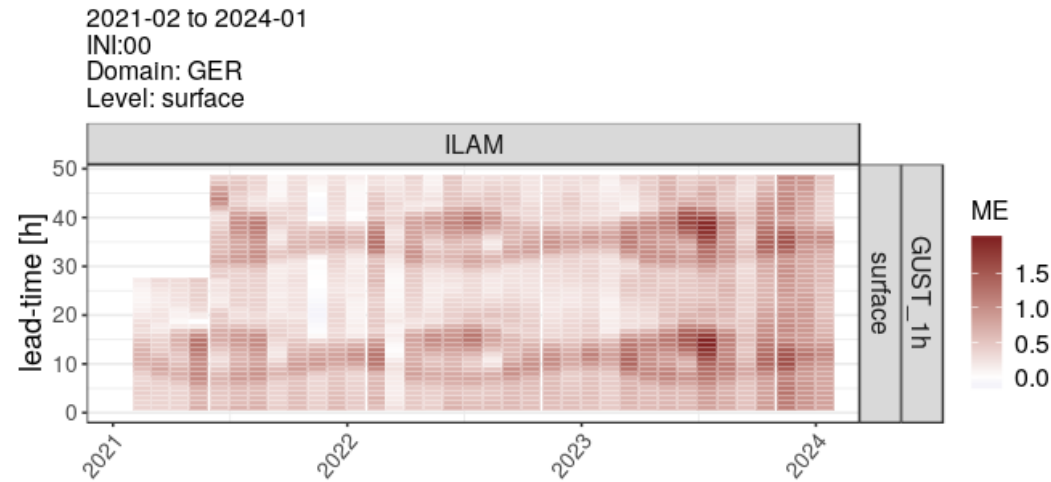
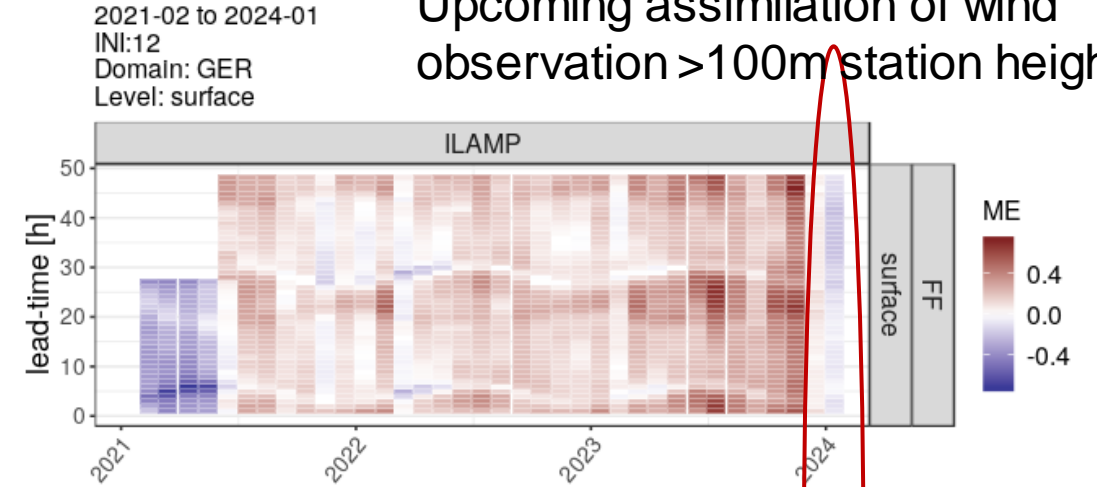
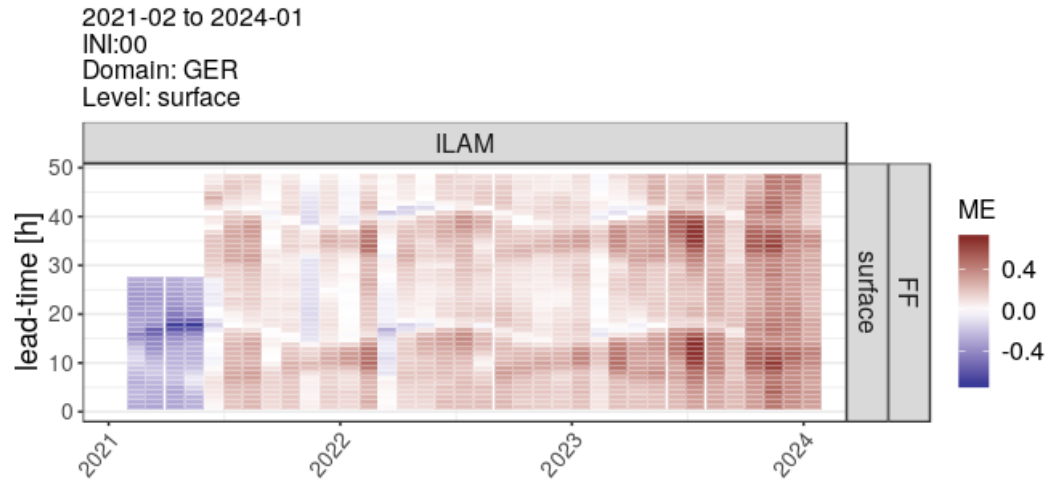
- Biases in diurnal cycle is less strong in cold months
- Starting too warm (summer)
- Daily warming period to narrow
- Too humid during day time
- Too dry during night



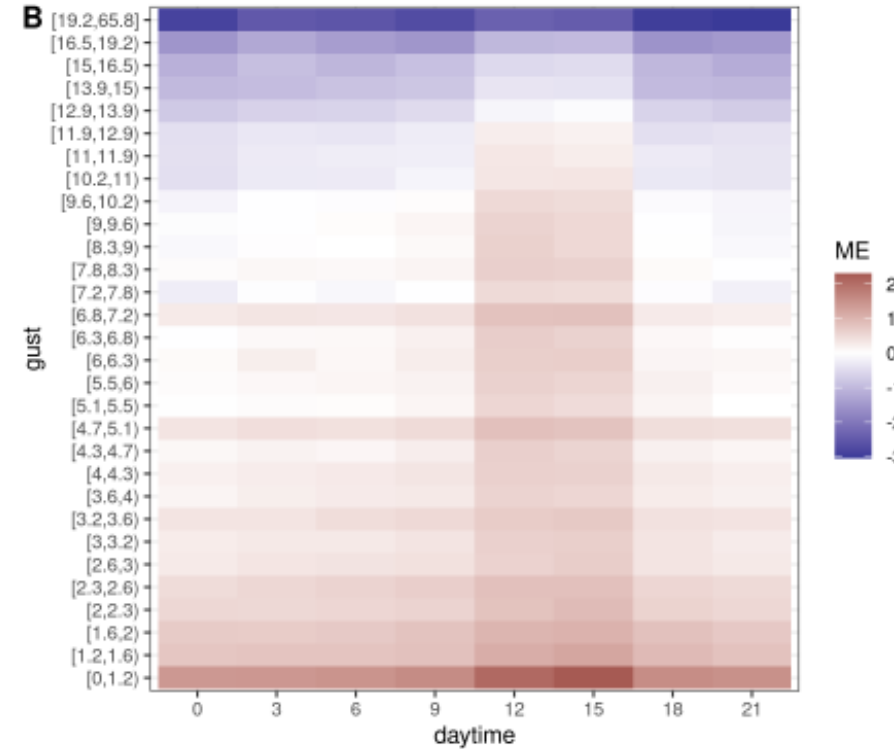
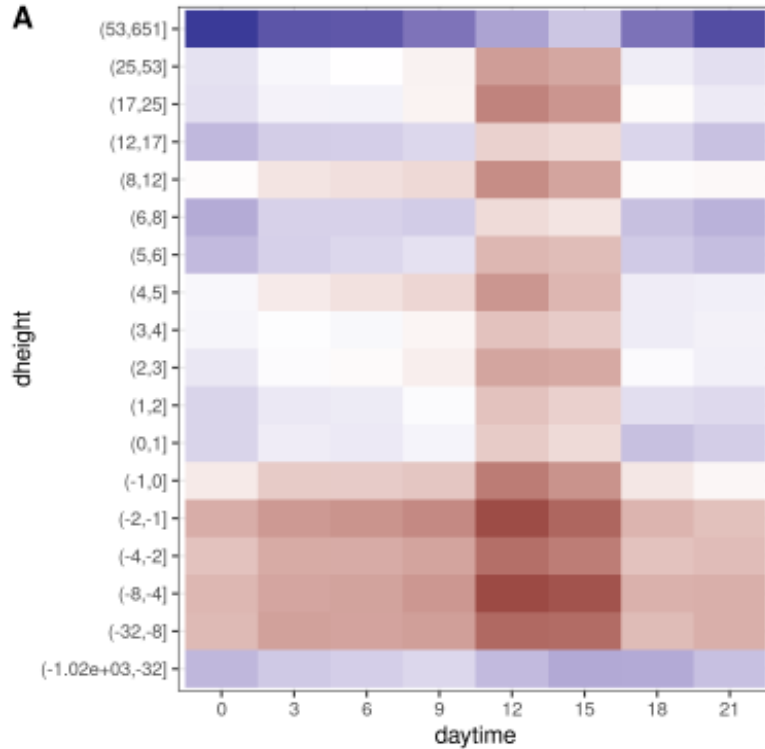
- Too high winds/gusts
- Even stronger bias around noon
- Improvement coming very soon...

Bias Daily/Seasonal

Upcoming assimilation of wind observation >100m station height

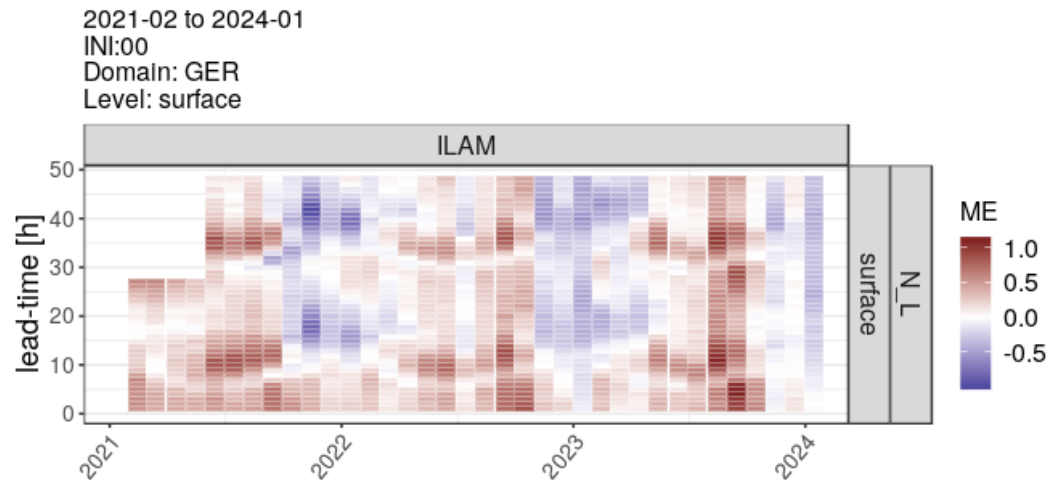
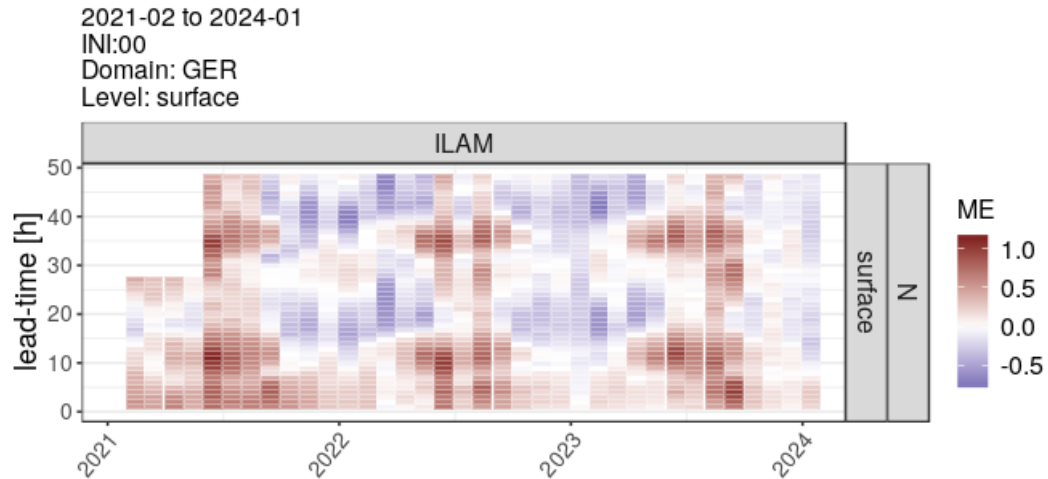


ICON-D2 DJF 2021-22 gusts



- Consistent gust over-estimation of gusts at noon
- Consistent gust under-estimation if station is far above model surface
- Consistent under-estimation of higher gusts

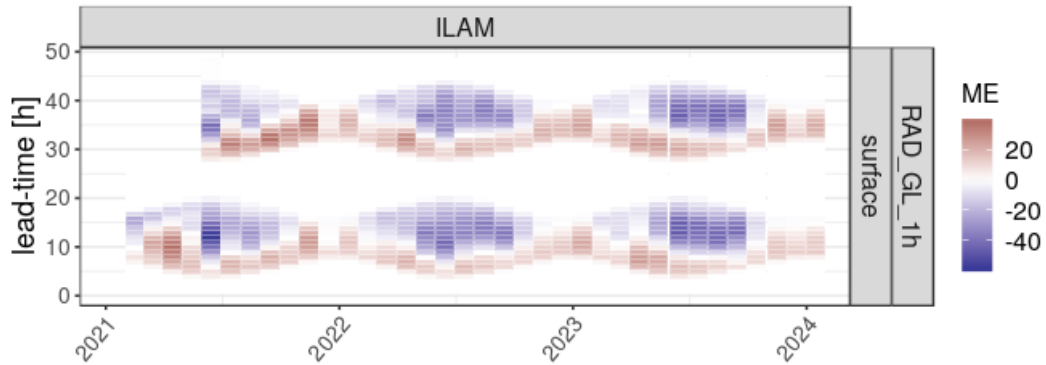
Bias Daily/Seasonal



- Too many clouds in summer
- Too few clouds in winter at day time
- Always starting with too many clouds
- (problems with cloud cover reporting, e.g. from France)

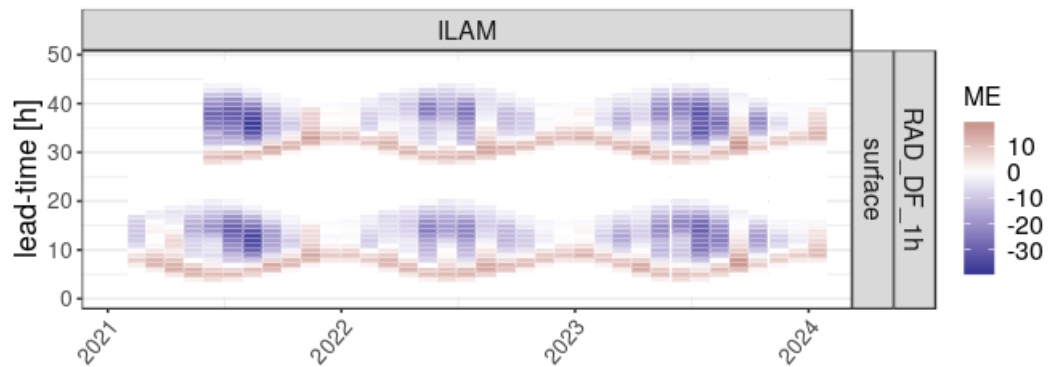
Bias Daily/Seasonal

2021-02 to 2024-01
INI:00
Domain: GER
Level: surface



- Onset of radiation is too strong
- Radiation Maxima not reached
- Naturally strong seasonal dependency

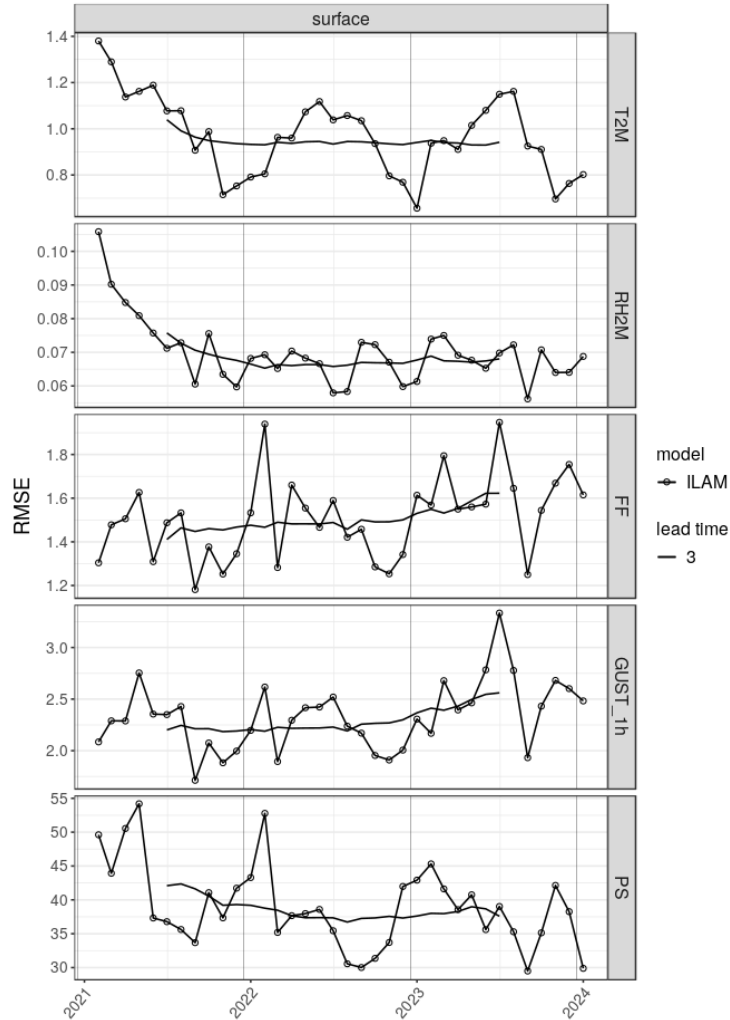
2021-02 to 2024-01
INI:00
Domain: GER
Level: surface



RMSE Trends

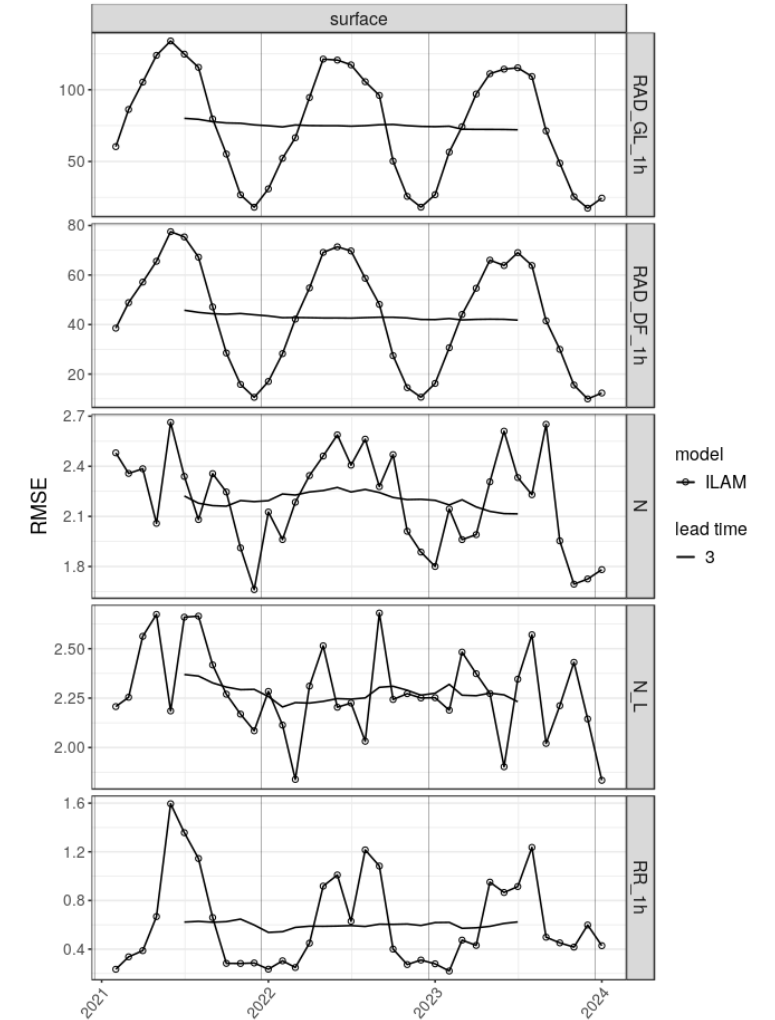


2021-02 to 2024-01
INI: 12 UTC
domain: GER
RMSE



- As seasons vary, forecast quality also varies with season
- Weather variability exceeds any model development signals
- Observation basis varies, further complicating interpretation

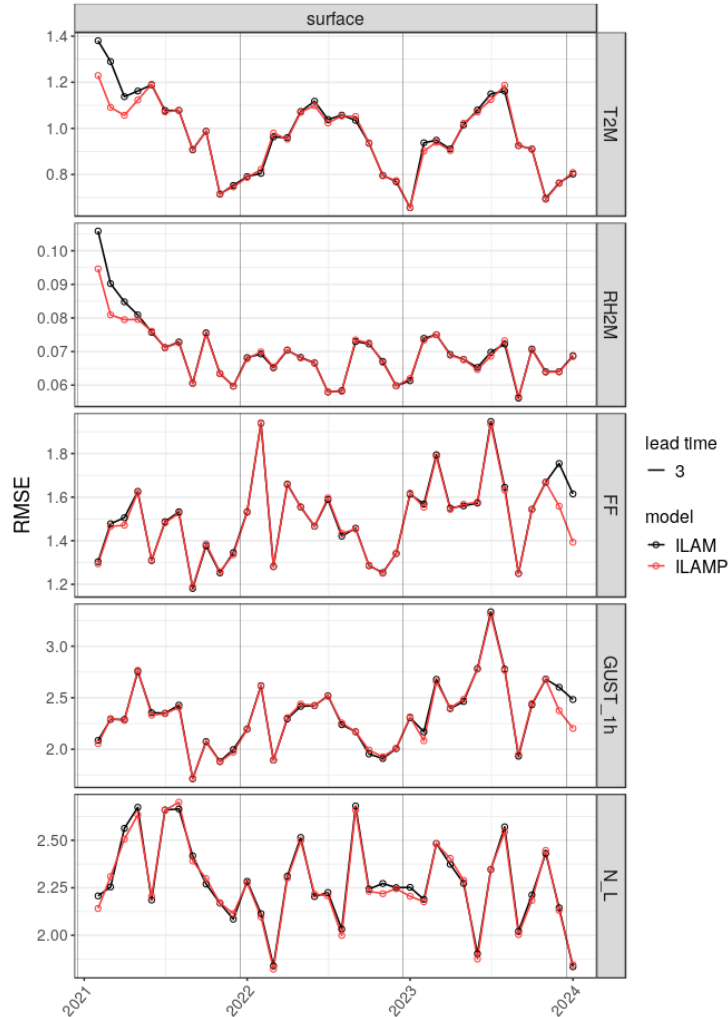
2021-02 to 2024-01
INI: 12 UTC
domain: GER
RMSE



RMSE Trends

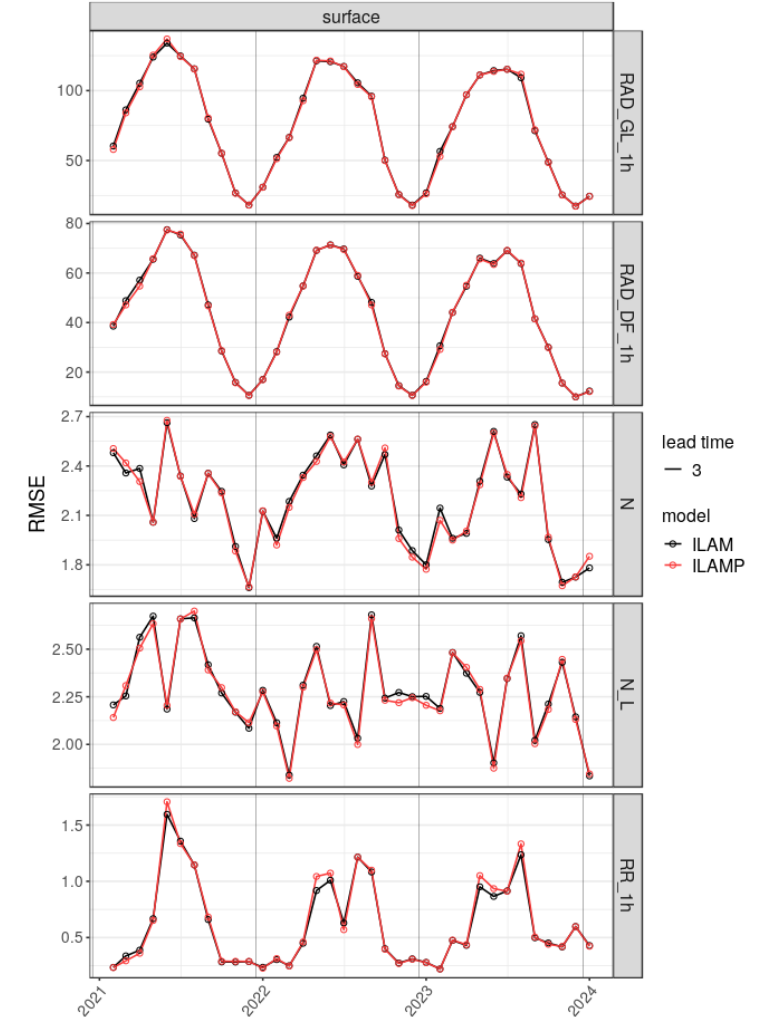


2021-02 to 2024-01
INI: 12 UTC
domain: GER
RMSE



- Comparison to paralel routine shows model development improvements more fair
- Here only a slice (12UTC run, 3h forecast) is shown

2021-02 to 2024-01
INI: 12 UTC
domain: GER
RMSE





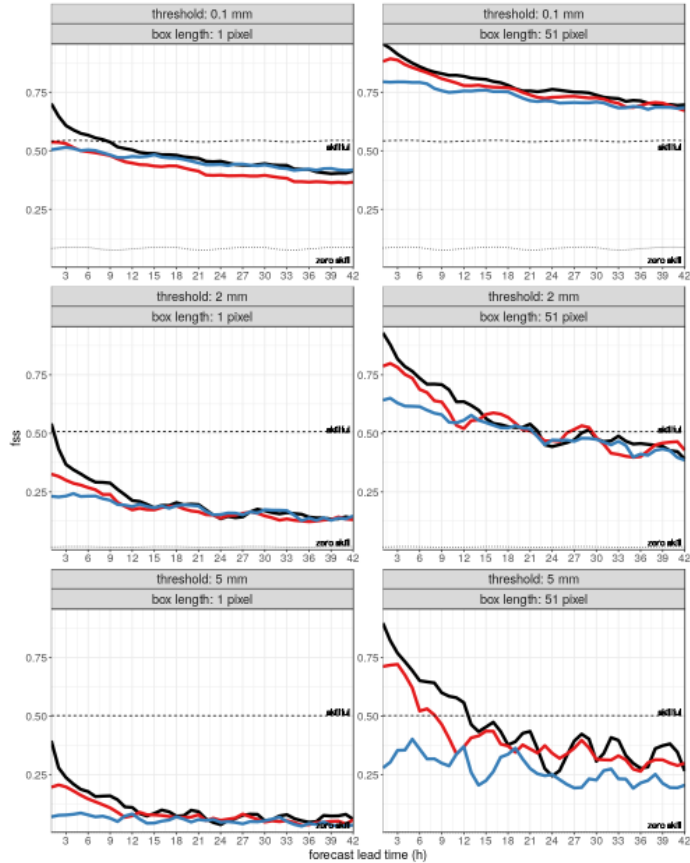
FSS against calibrated german radar composite



JJA 2023

TIME SERIES PLOT for
period: 20230601 to 20230910
OS: 12H 0M 0S UTC + 11H 0M 0S to 1d 18H 0M 0S
Forecast IDs: ILAM, AROME, ICONEU
members: 0
method: fss
score: fss
#valid files: 147996/154224
horizontal resolution: 1px = 2.2km

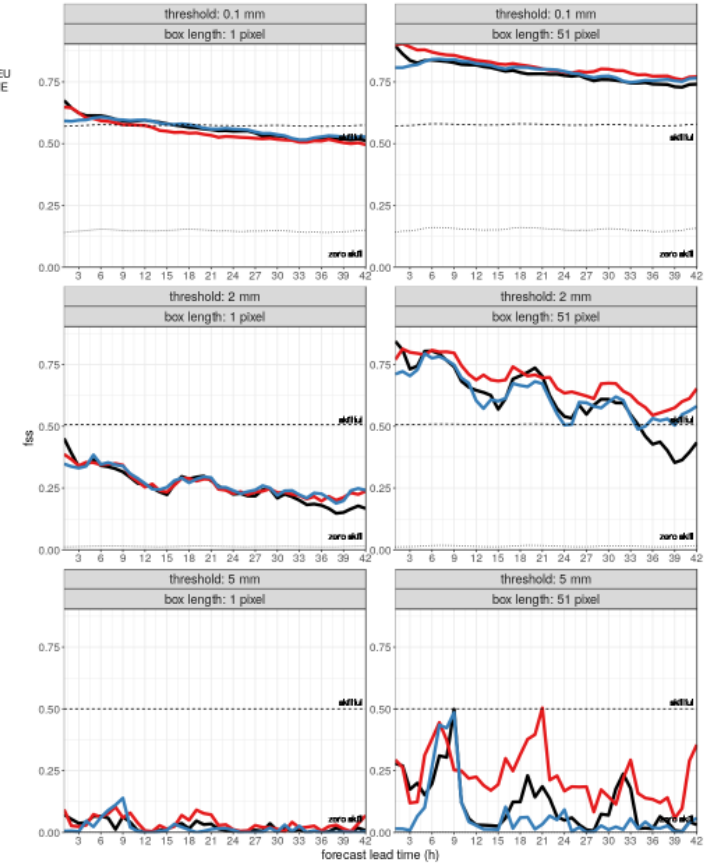
Forecast ID
ICONEU
AROME
ILAM
member type
det



DJ(F) 2023-24

TIME SERIES PLOT for
period: 20231201 to 20240113
OS: 12H 0M 0S UTC + 11H 0M 0S to 1d 18H 0M 0S
Forecast IDs: ILAM, AROME, ICONEU
members: 0
method: fss
score: fss
#valid files: 61248/66528
horizontal resolution: 1px = 2.2km

Forecast ID
ICONEU
AROME
ILAM
member type
det



FSS against Radar

