
Resolution-dependence of forecast quality in the global ICON model, and resulting plans for a resolution upgrade in 2022

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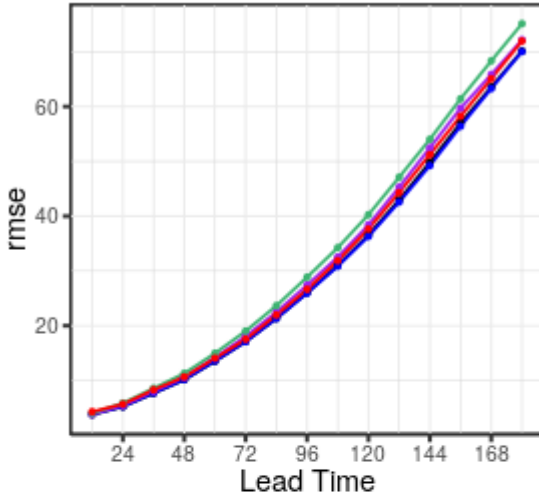


- The increase in computational power being smaller than expected/desired a few years ago, we'd like to optimize the gain in forecast quality that can be achieved with increasing the model resolution by a certain factor
- First step of test strategy: forecast experiments with interpolated IFS analysis data (with surface fields taken from ICON analyses); verification against observations and IFS analyses
- Next slide: results for January 2021 (00-UTC runs for each day), analysis verification for 500 hPa
- Considered resolutions: Reference 13 km / 6.5 km (EU-nest); 40/20 km, 26/13 km, 10/5 km, 6.5 km globally without nest
- Also investigated: increase of vertical resolution

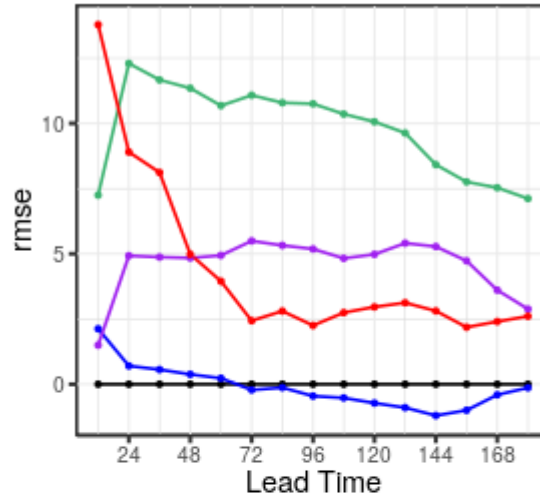


Verification against IFS analyses, 500-hPa geopotential and temperature, RMSE/ANOC

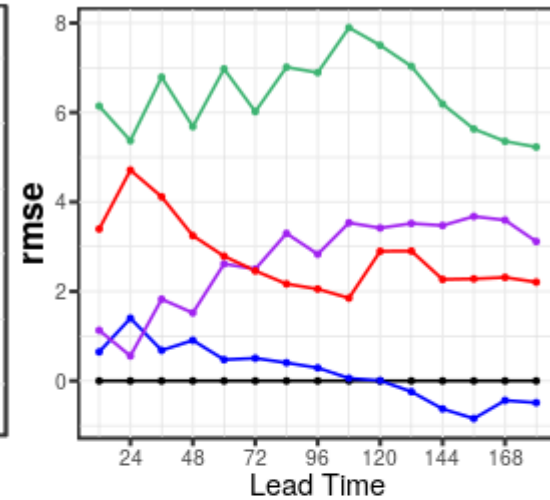
GEOP



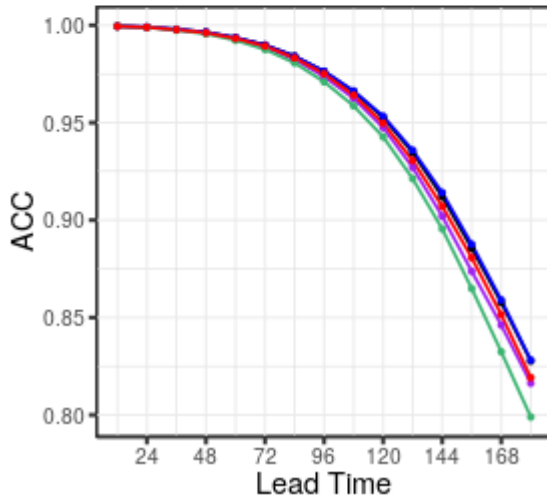
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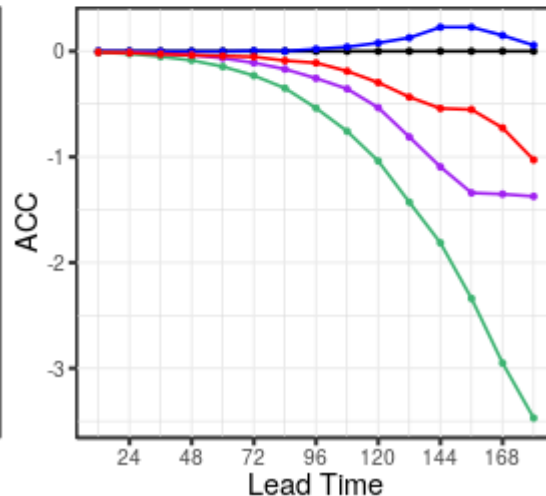
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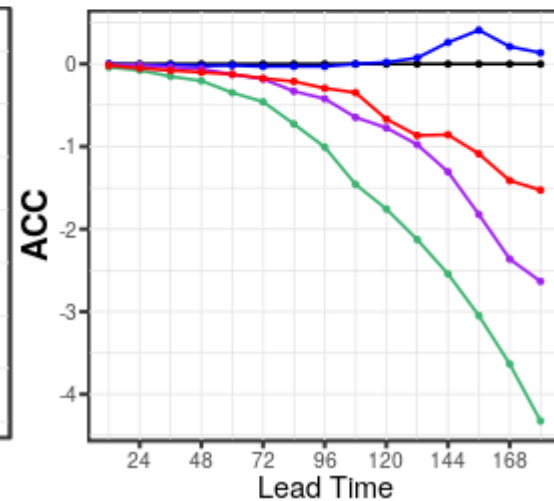
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GEOP



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13/6.5

40/20

26/13

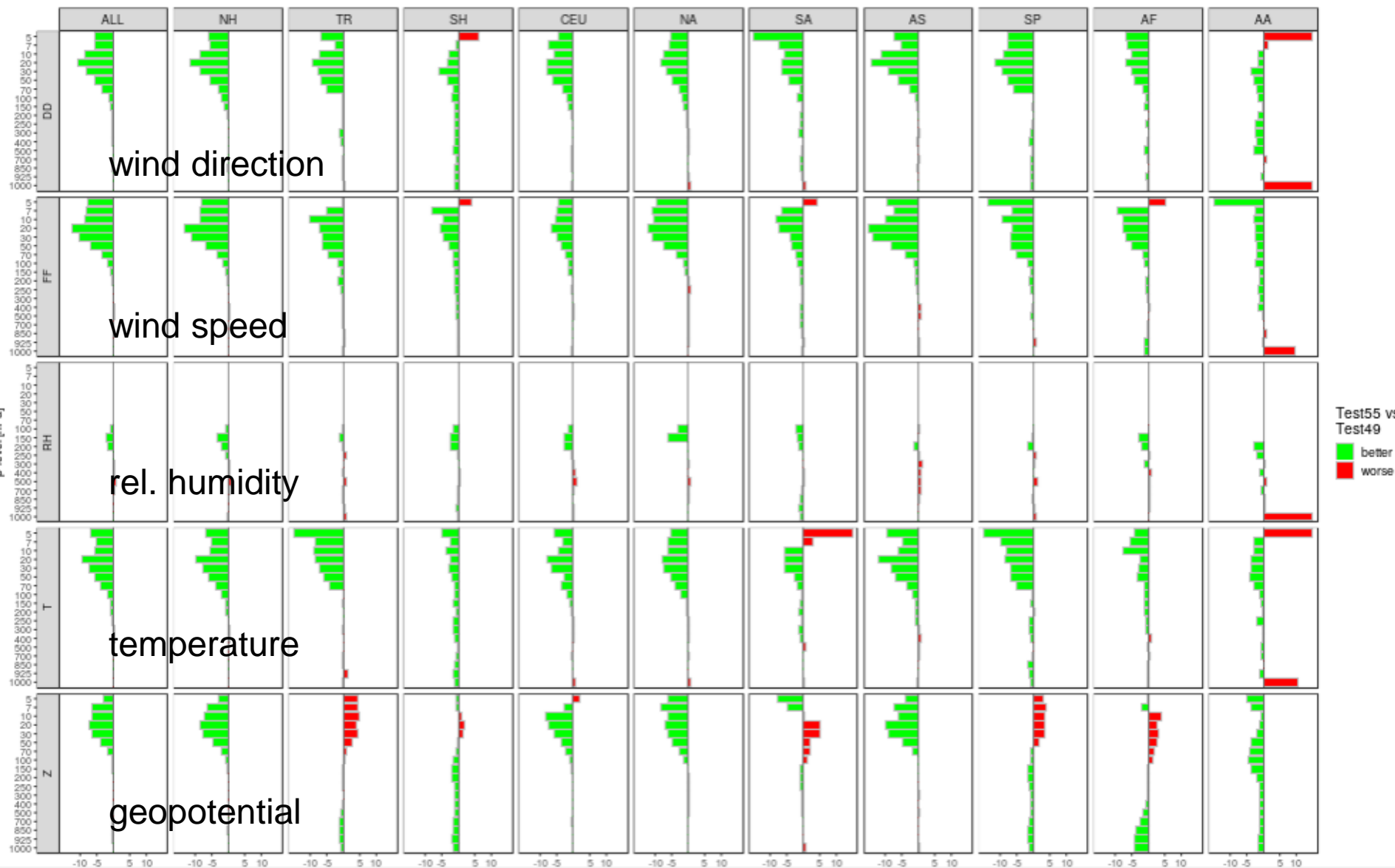
10/5

6.5

relative differences to operational resolution (13/6.5 km)



Scorecard for radiosonde verification; 120 vs. 90 levels (green: 120 levels better)



- **Increase number of vertical levels from 90 to 120, targeting the resolution increase to the upper troposphere and higher levels (boundary layer turned out to be difficult...)**
- **Increase the horizontal resolution of the EPS from 40/20 km to 26/13 km while keeping the horizontal resolution of the deterministic system unchanged**
- **This means that even the deterministic data assimilation runs at a higher internal resolution, which gives a small benefit for the deterministic forecast quality in the troposphere as well (see next slide)**
- **Time plan for operationalization to be made in the next weeks; expected in summer 2022**

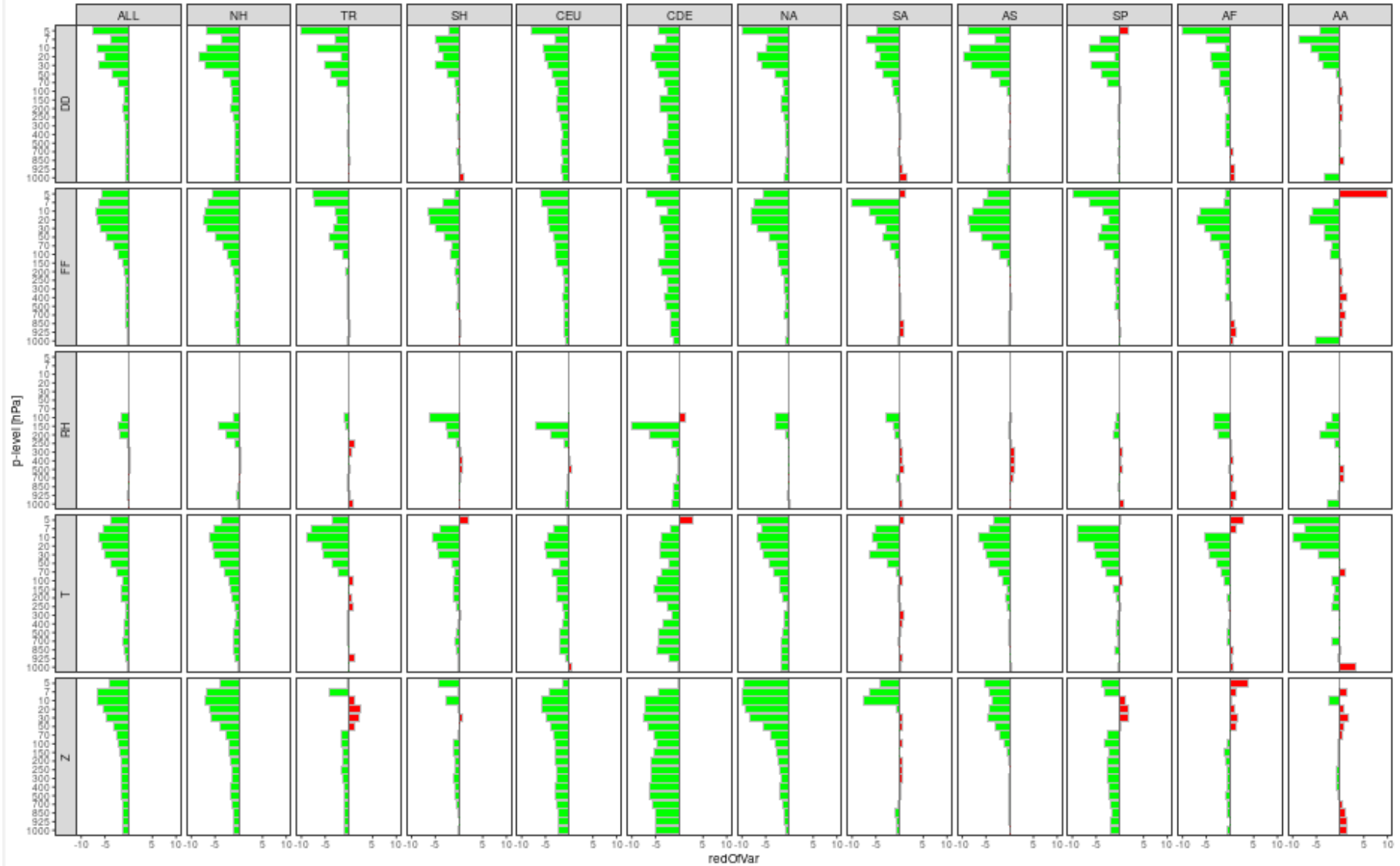


Scorecard for radiosonde verification; full assimilation cycle with higher-resolved EPS

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Verification period: 2020/10/20 - 2021/01/08
Data selection by Initial-date
Reduction of RMSE [%]



Improvement of SYNOP scores in EPS (CRPS)

26 km/L120 vs. 40 km/L90

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Forecasts initialized from 2020/10/20 00UTC - 2021/01/08 00UTC
Change in CRPSF [%]

Test918EPS better Test935EPS better Significance 0.00 0.25 0.50 0.75 1.00

