IFS forecast performance

UEF June 2021

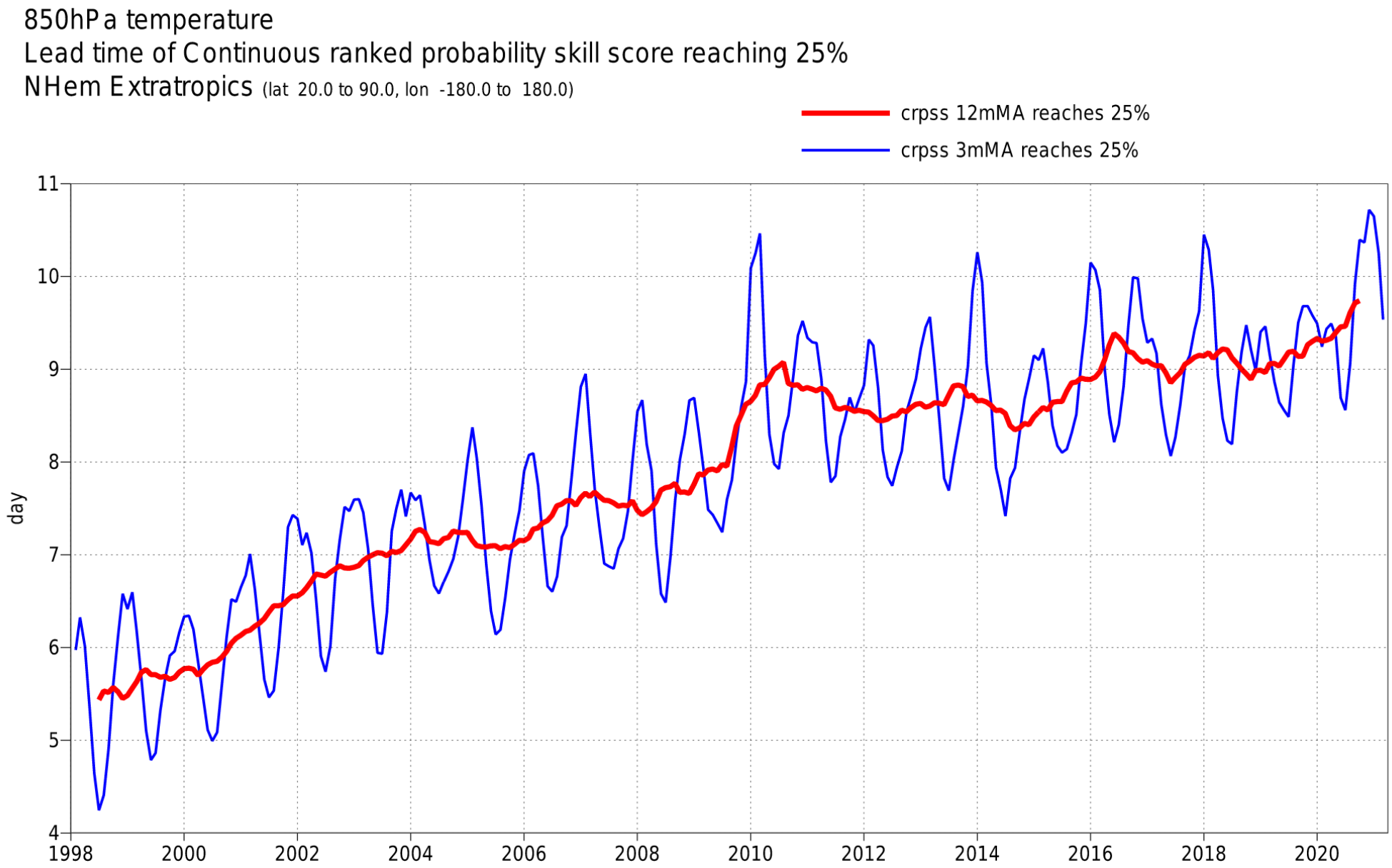
Thomas Haiden

ECMWF

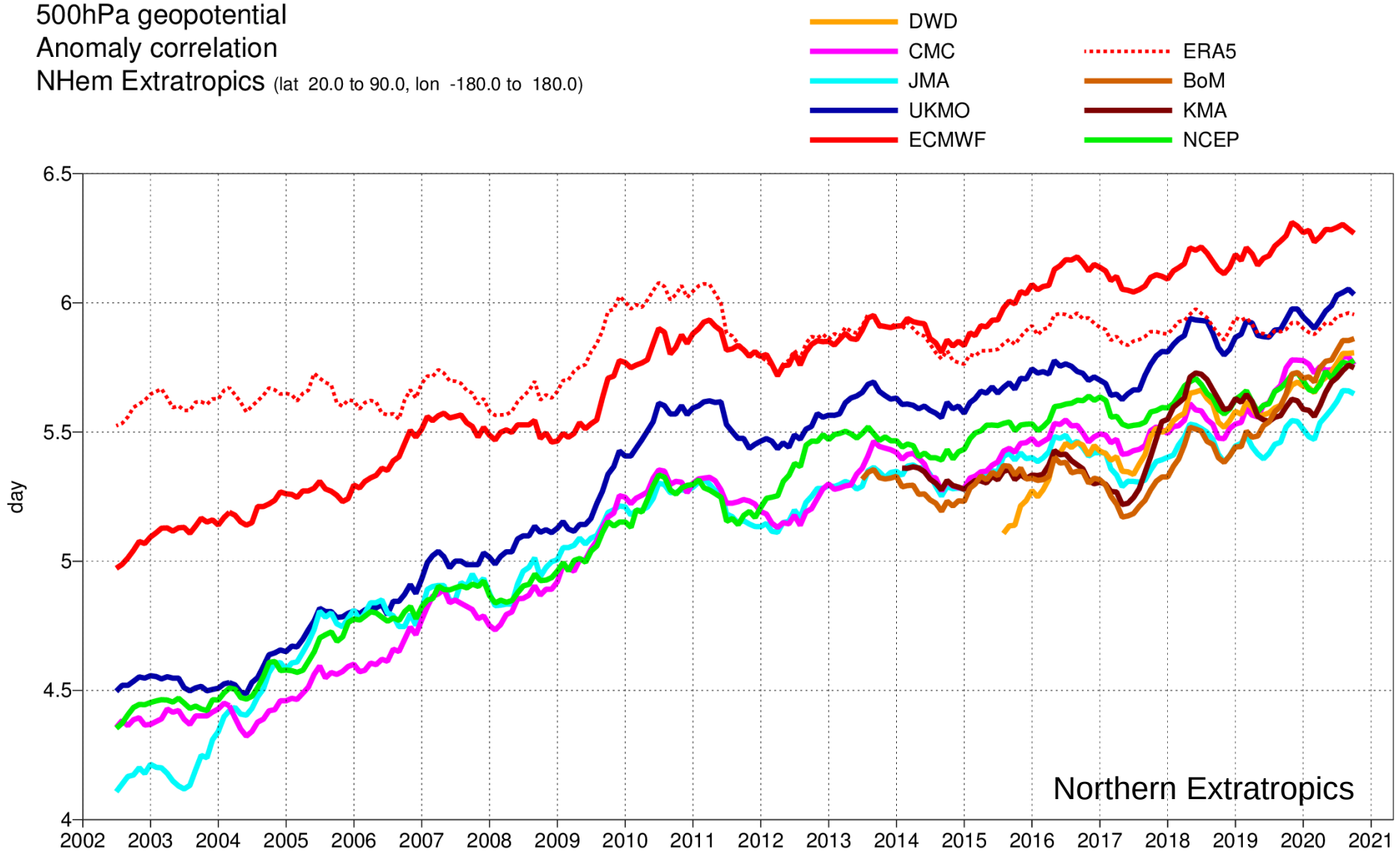
Overview

- **Evolution of headline scores**
- **ECMWF compared to other centres**
- **Stratosphere**
- **CAMS vs HRES**
- **Surface parameters**
- **Ocean waves**
- **Extended range and seasonal forecast**

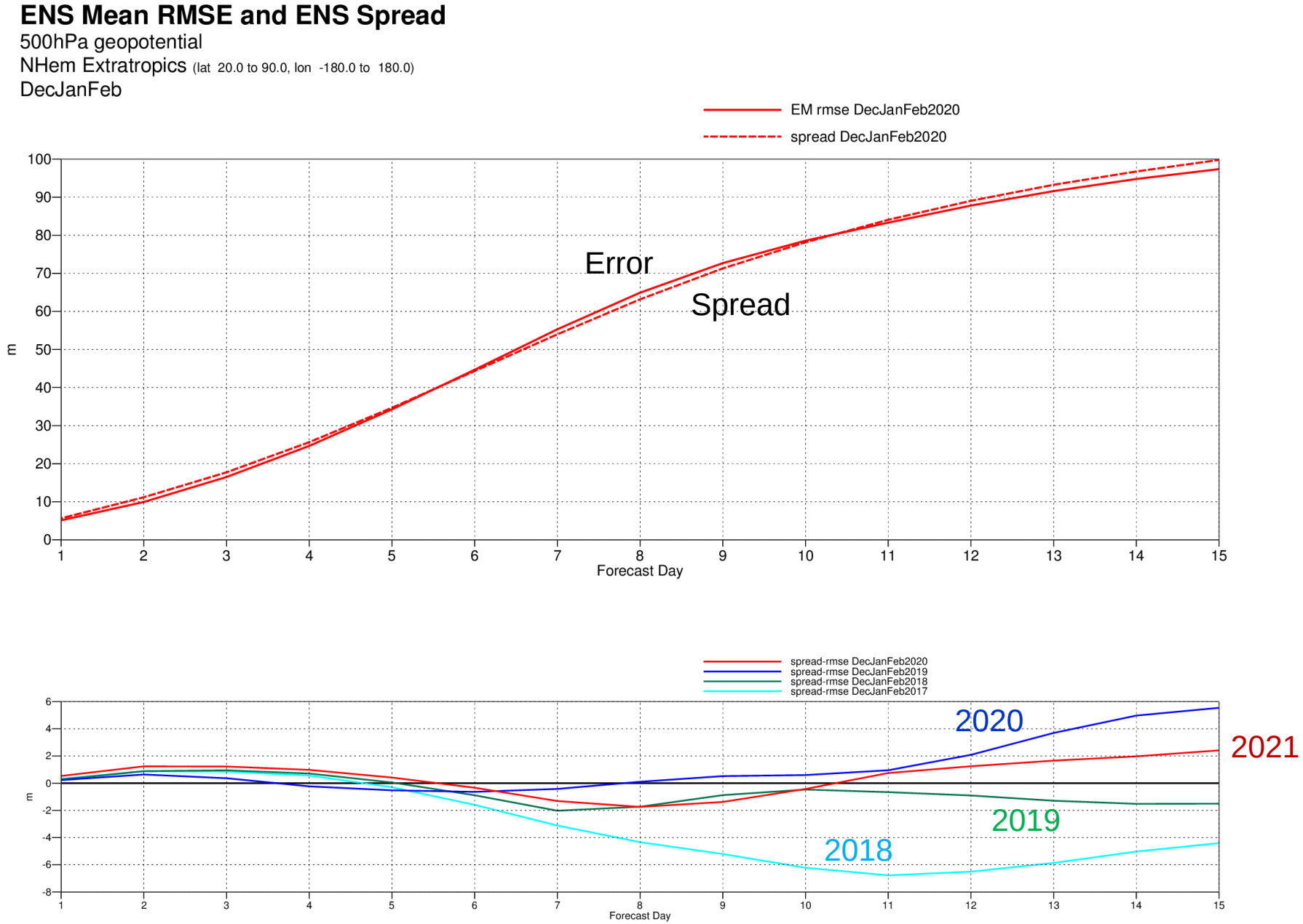
Upper-air ensemble forecast (850 hPa temperature)



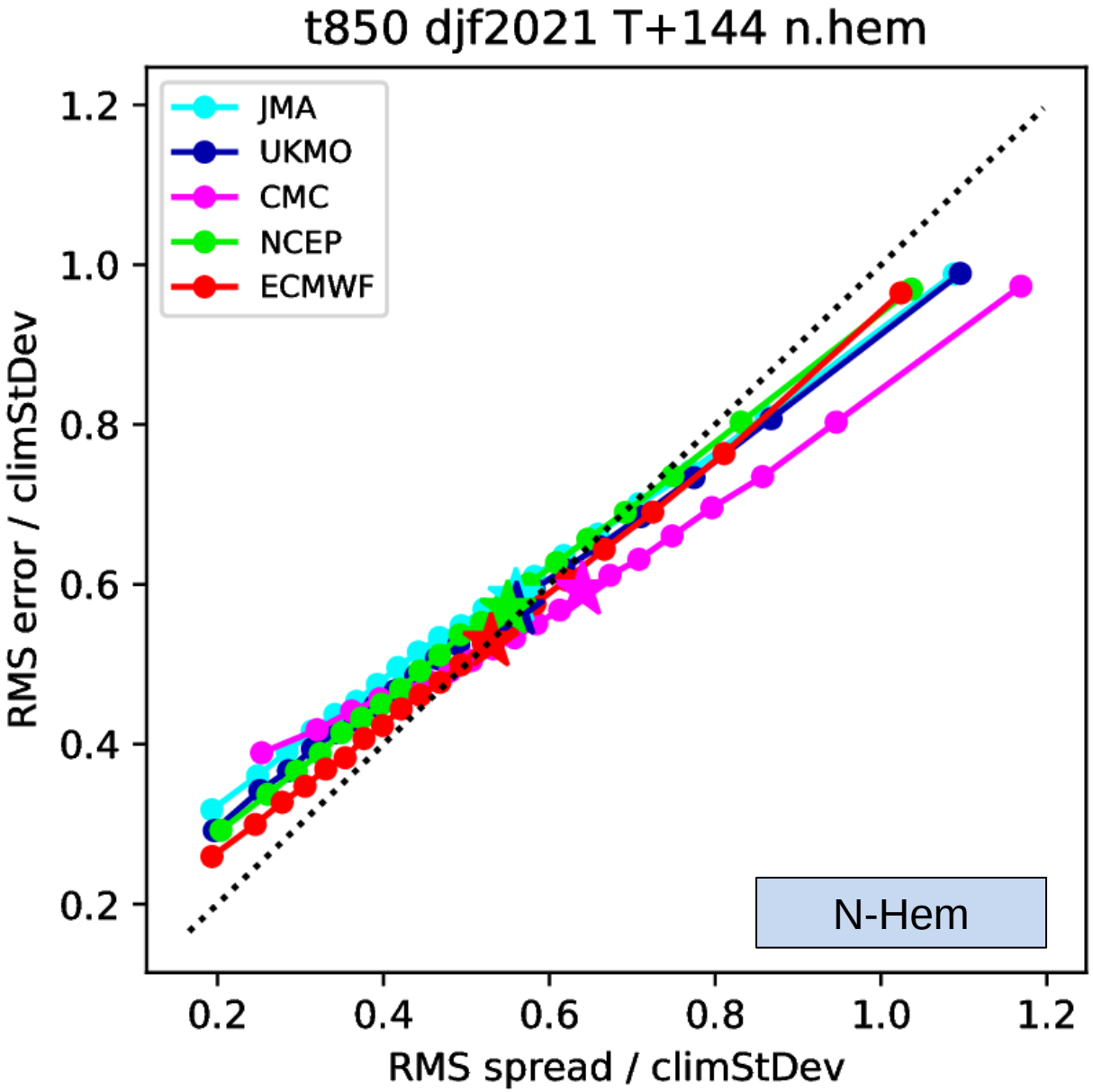
Upper-air skill of the HRES (Z500 anomaly correlation)

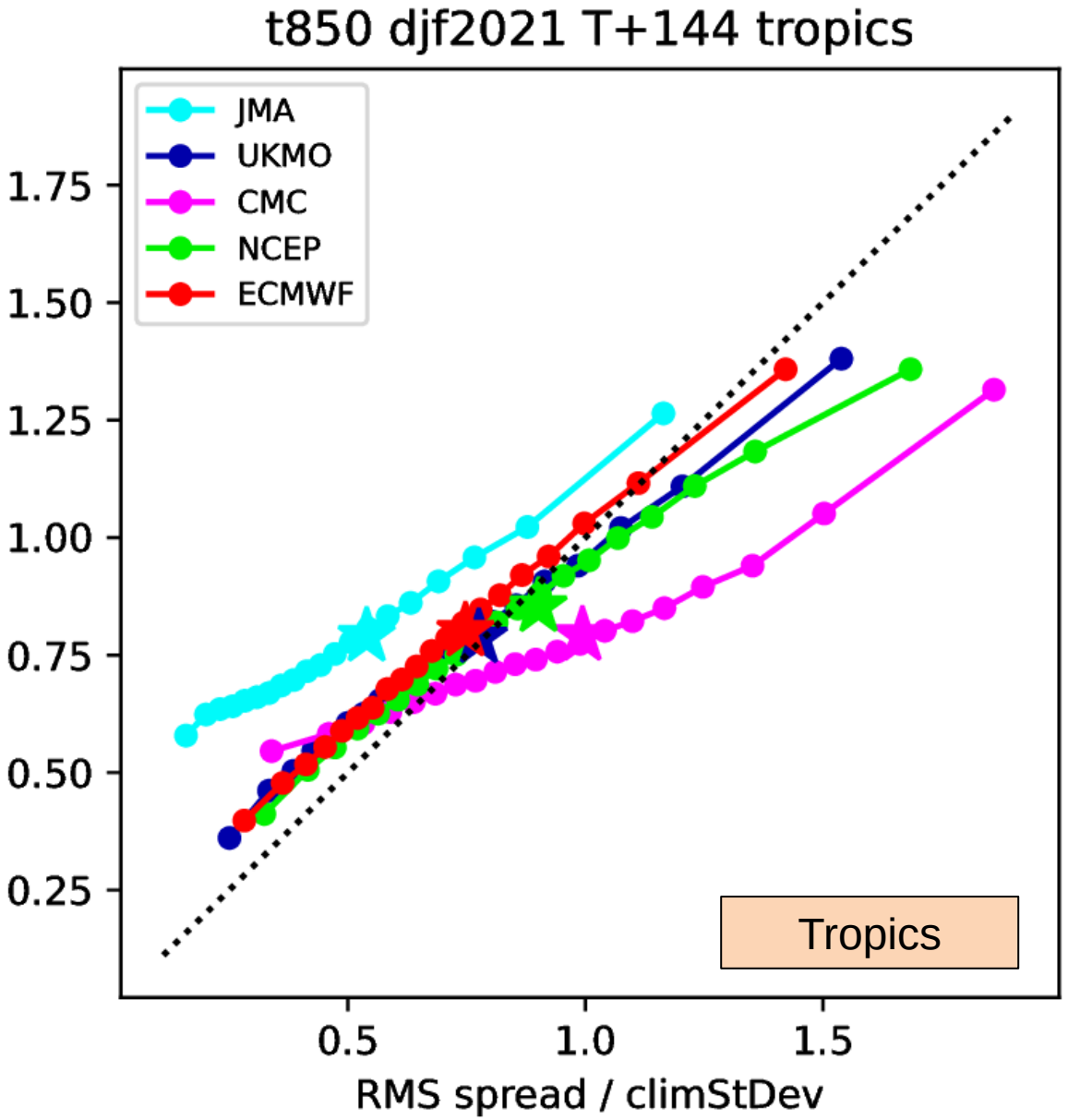


Ensemble spread and error

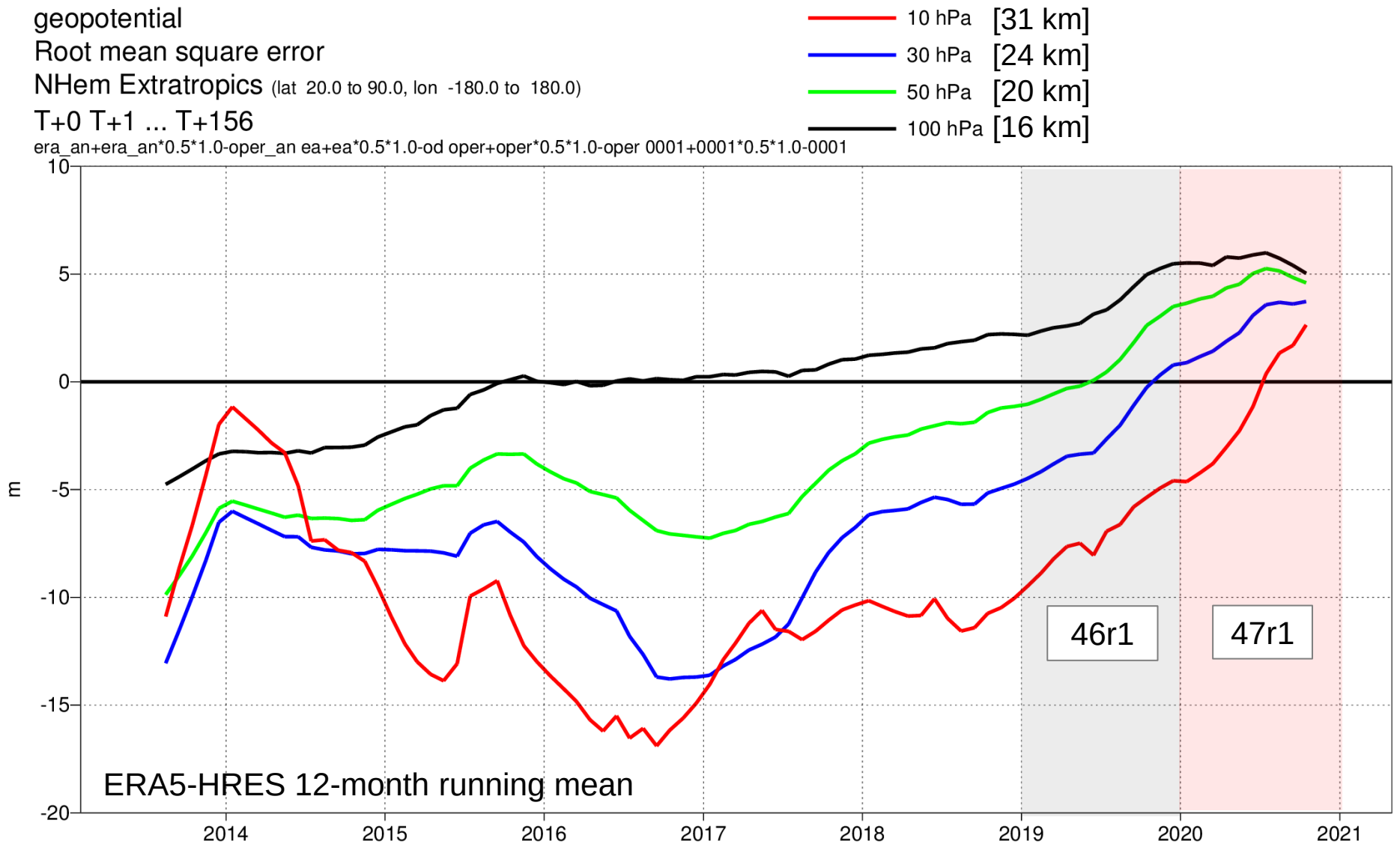


Spread reliability – comparison between centres



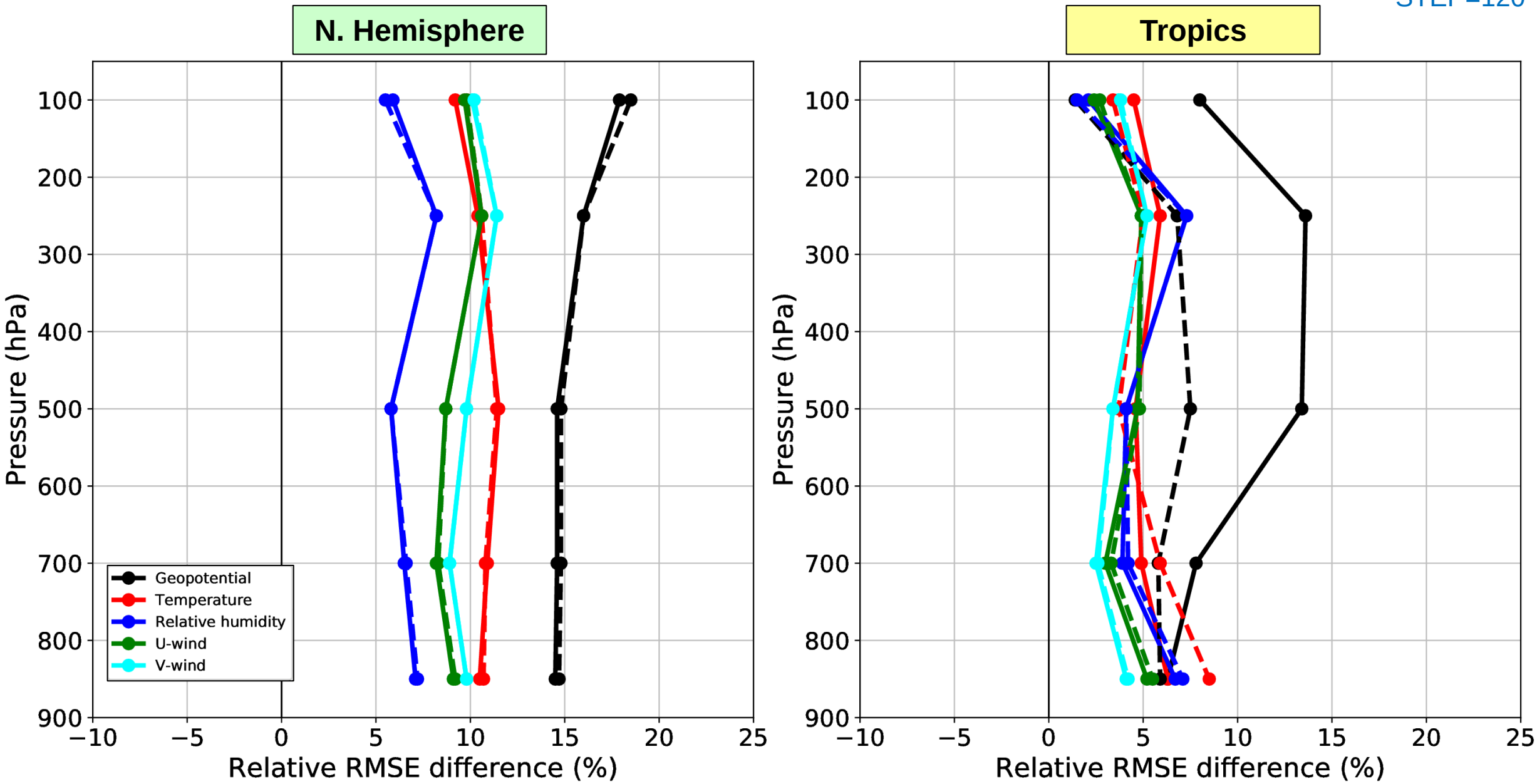


Stratosphere: RMSE of geopotential height



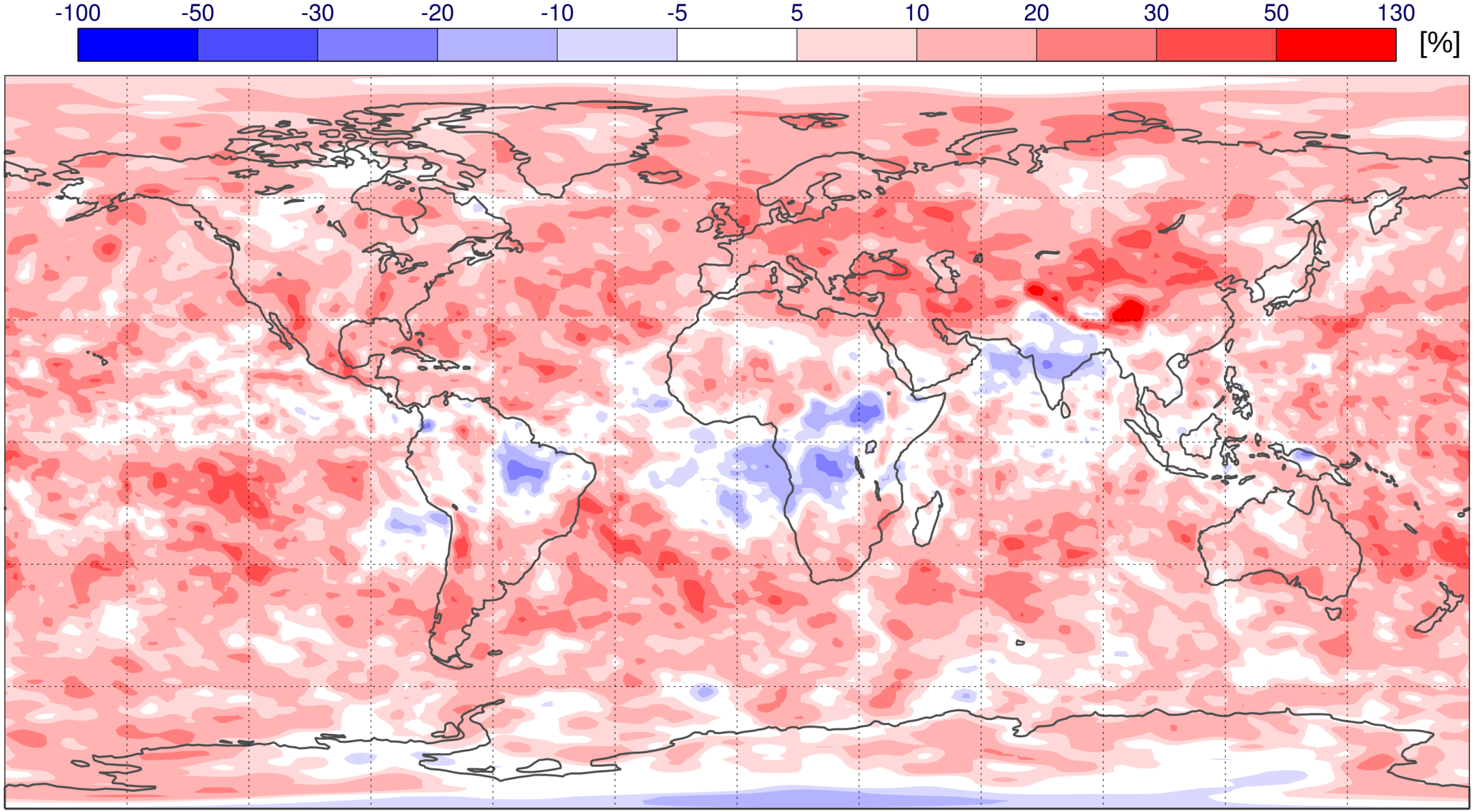
CAMS-HRES error differences

Mar 2020 – Feb 2021
STEP=120

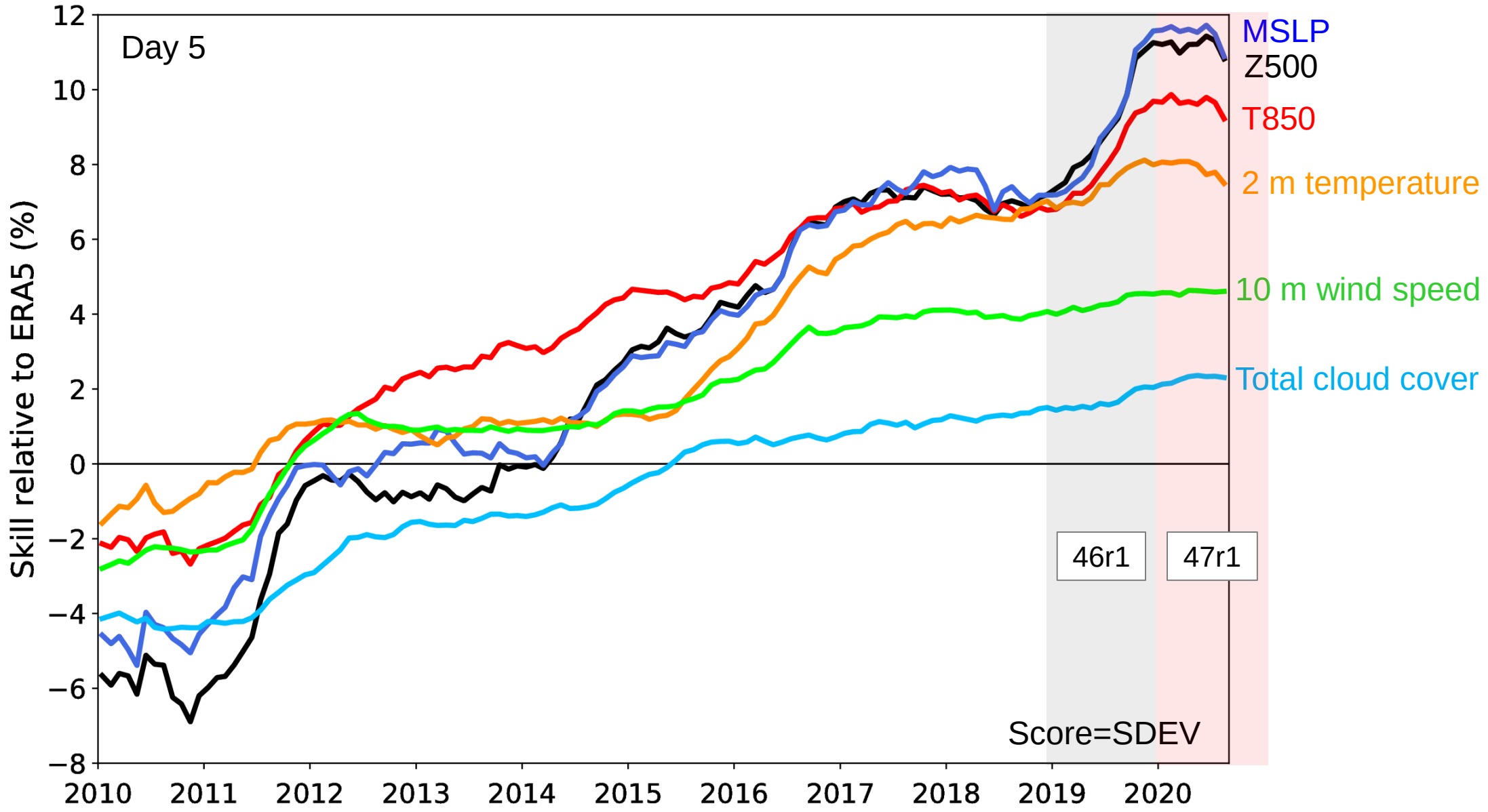


850 hPa Temperature RMSE: CAMS vs HRES

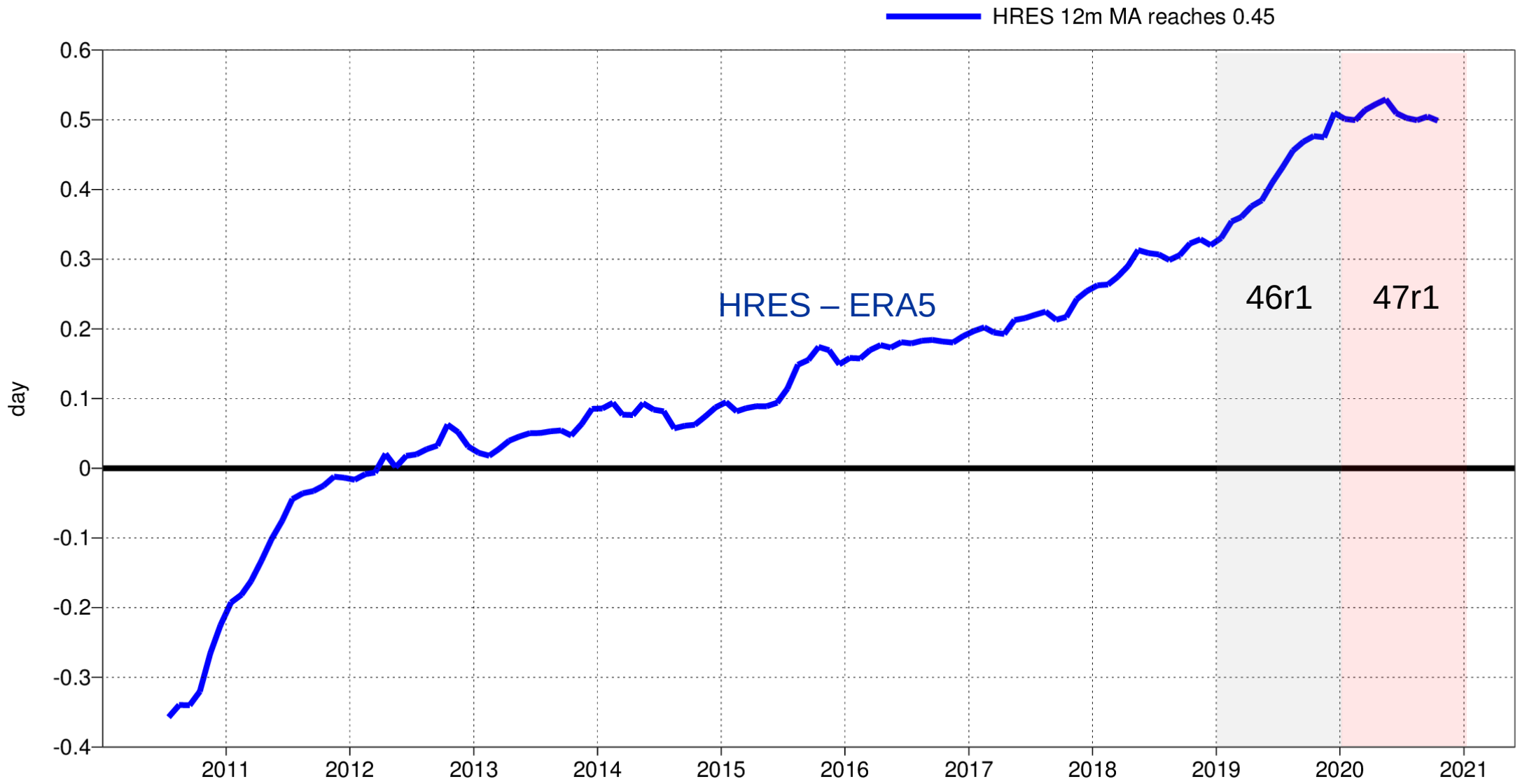
Period: Mar 2020 - Feb 2021
Run: 00 UTC
Step: 120 h



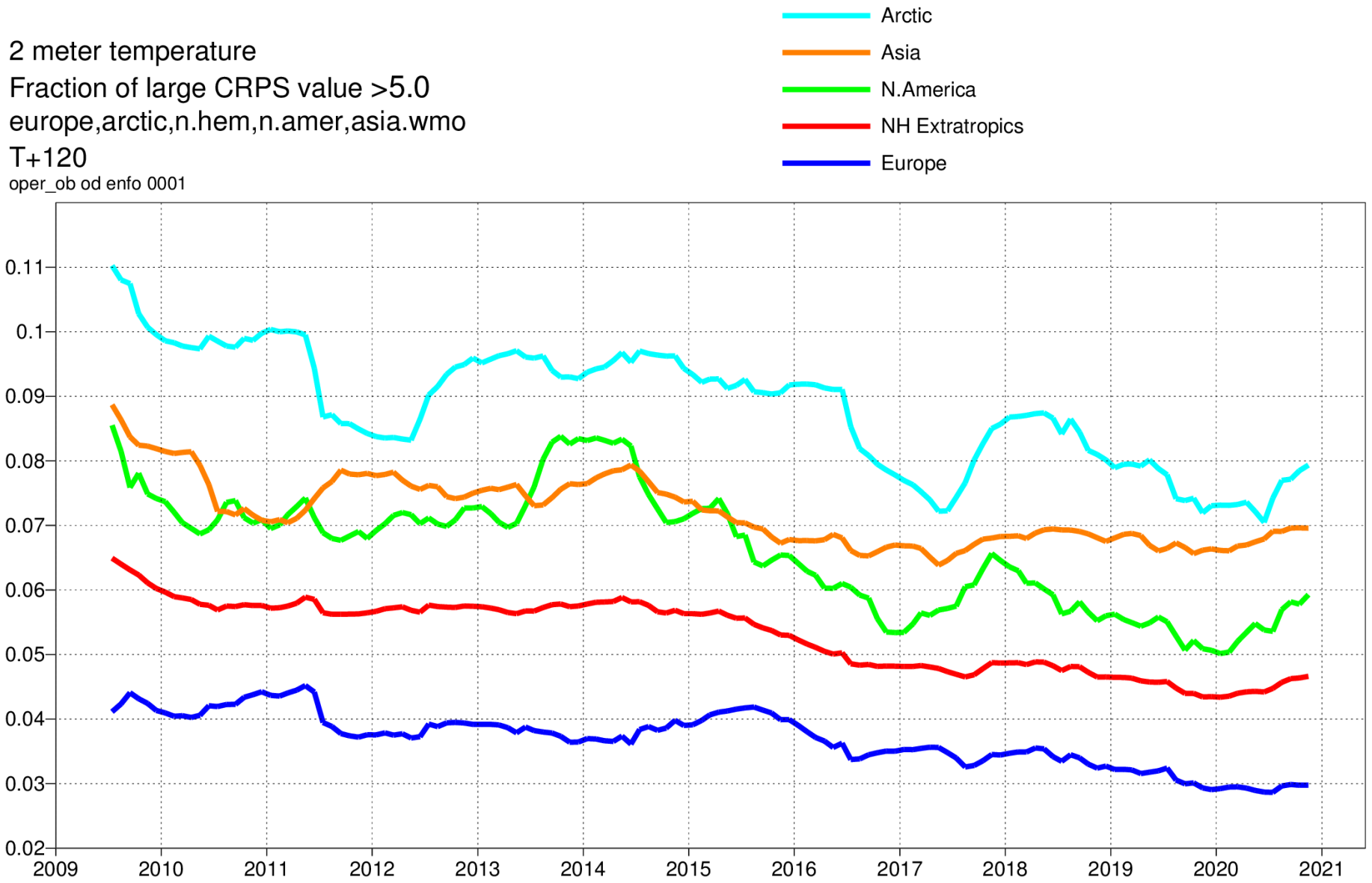
HRES skill relative to ERA5 – N.Hem Extratropics



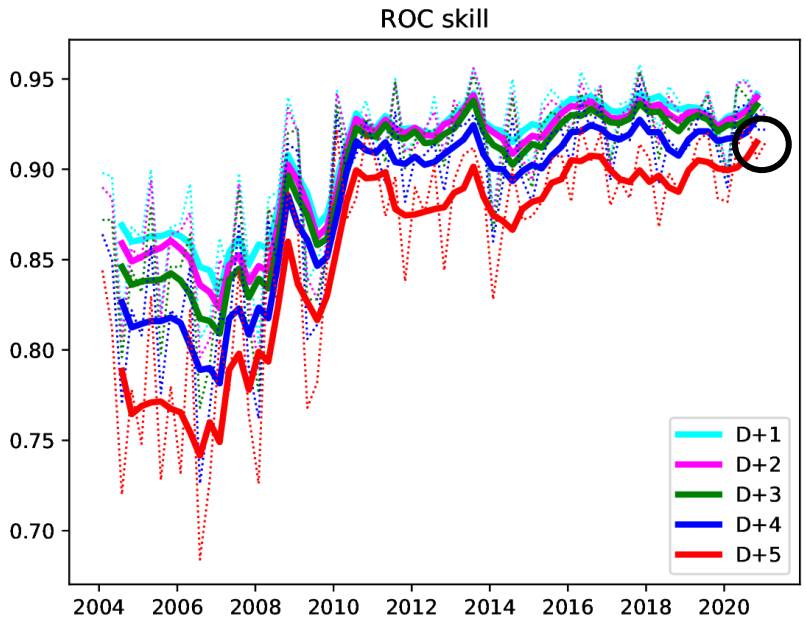
HRES precipitation headline score - SEEPS



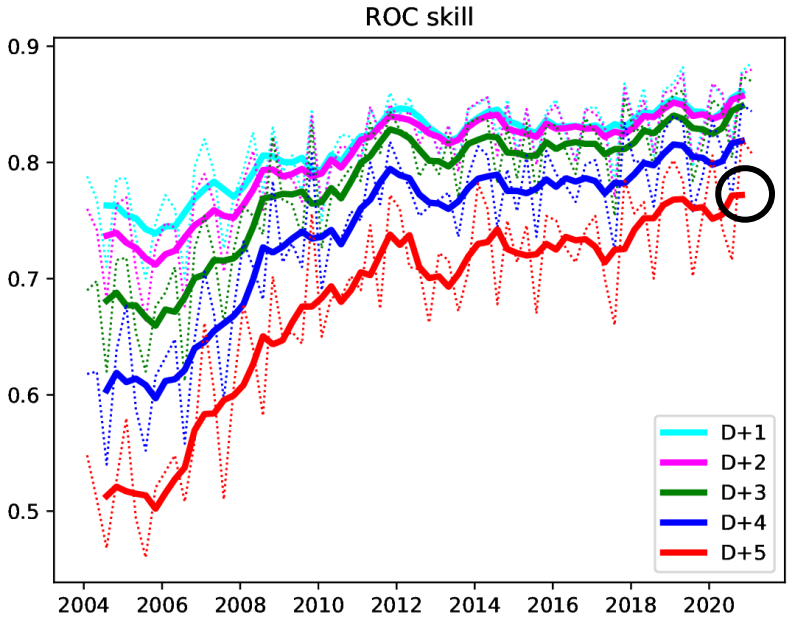
Fraction of large T2M errors – ENS



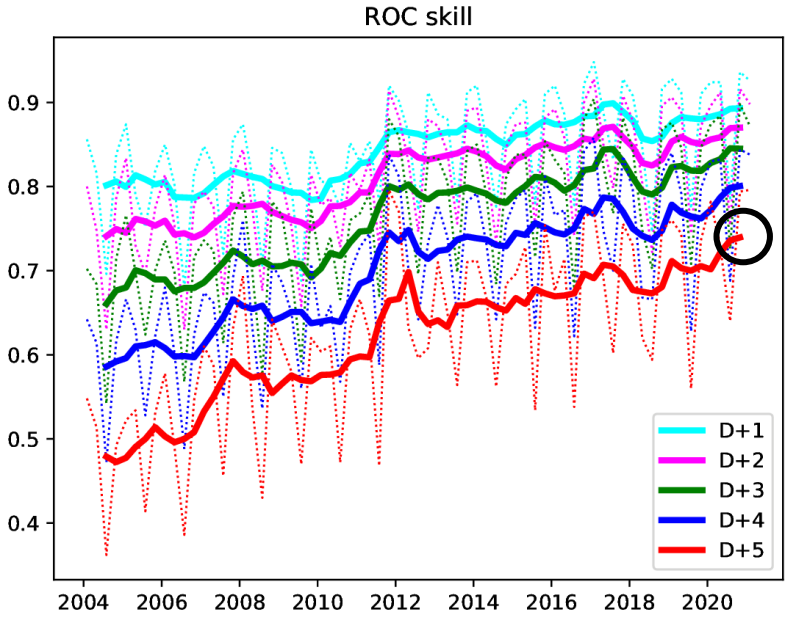
Extreme Forecast Index (EFI): ROC skill in Europe



2m temperature



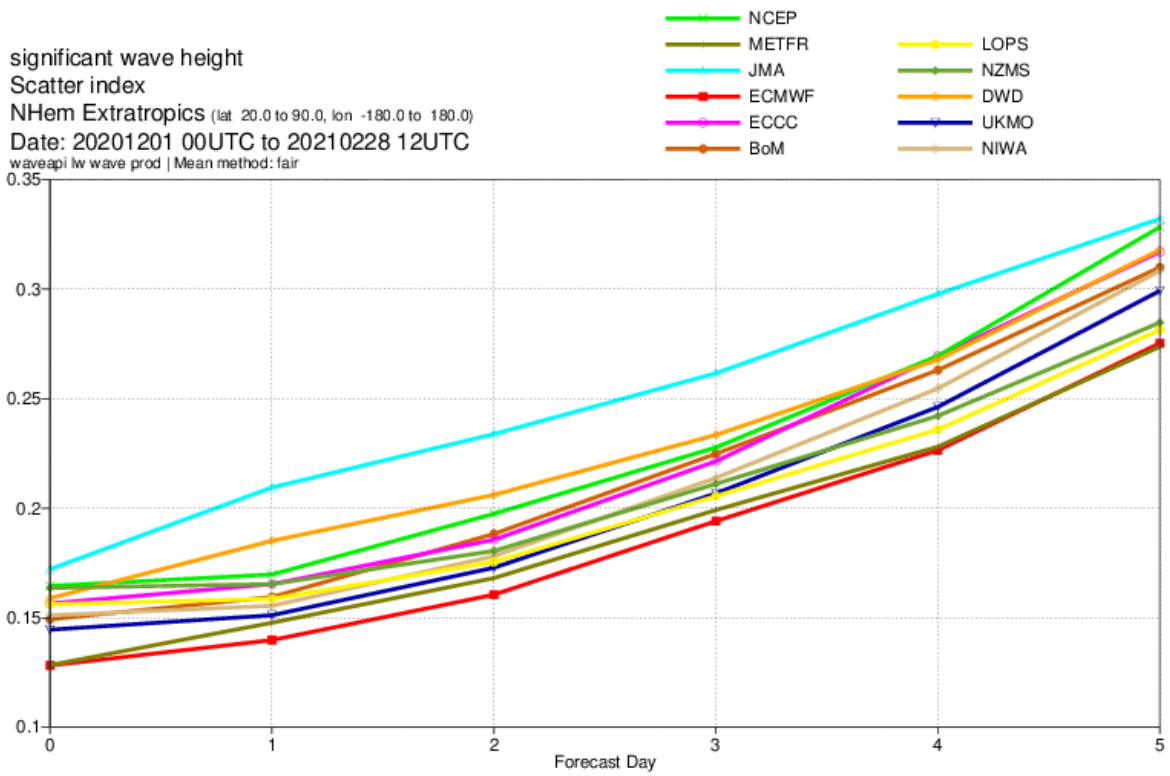
10m wind speed

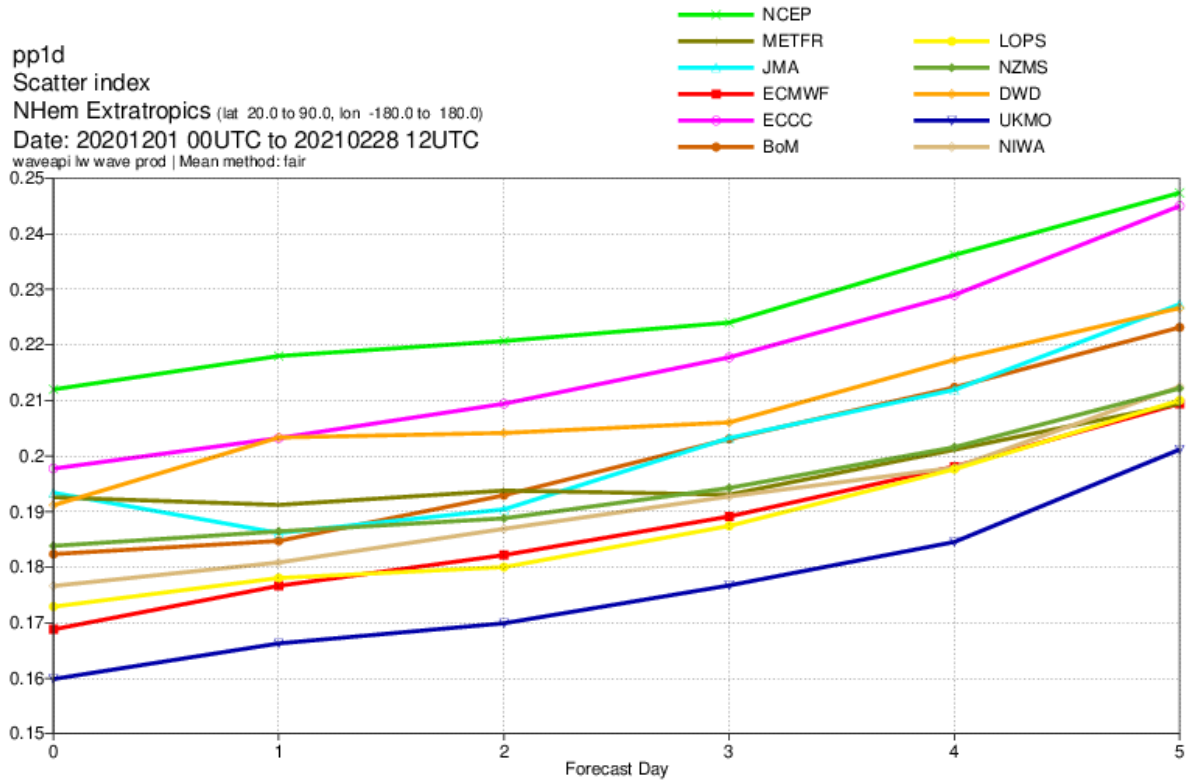


24h precipitation

- EFI forecast at day 5: **highest skill so far**

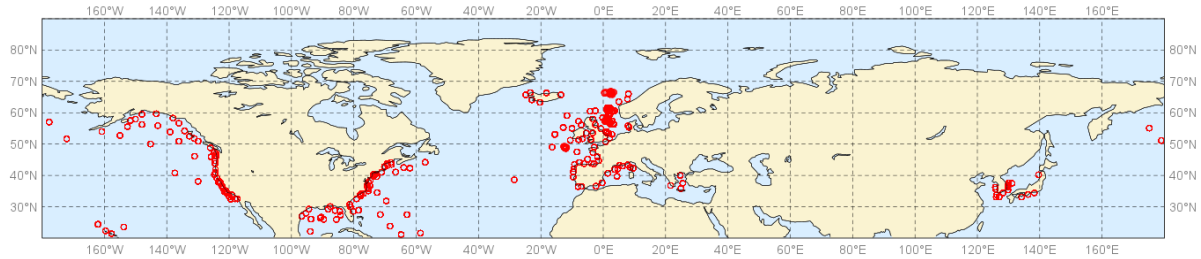
Wave forecast – N.Hem Extratropics

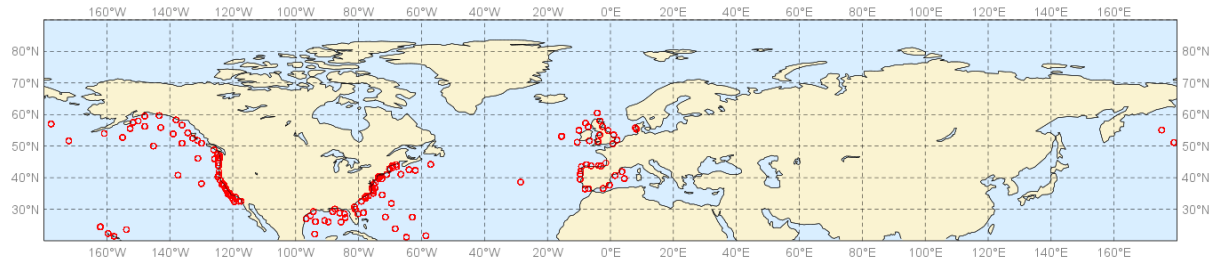




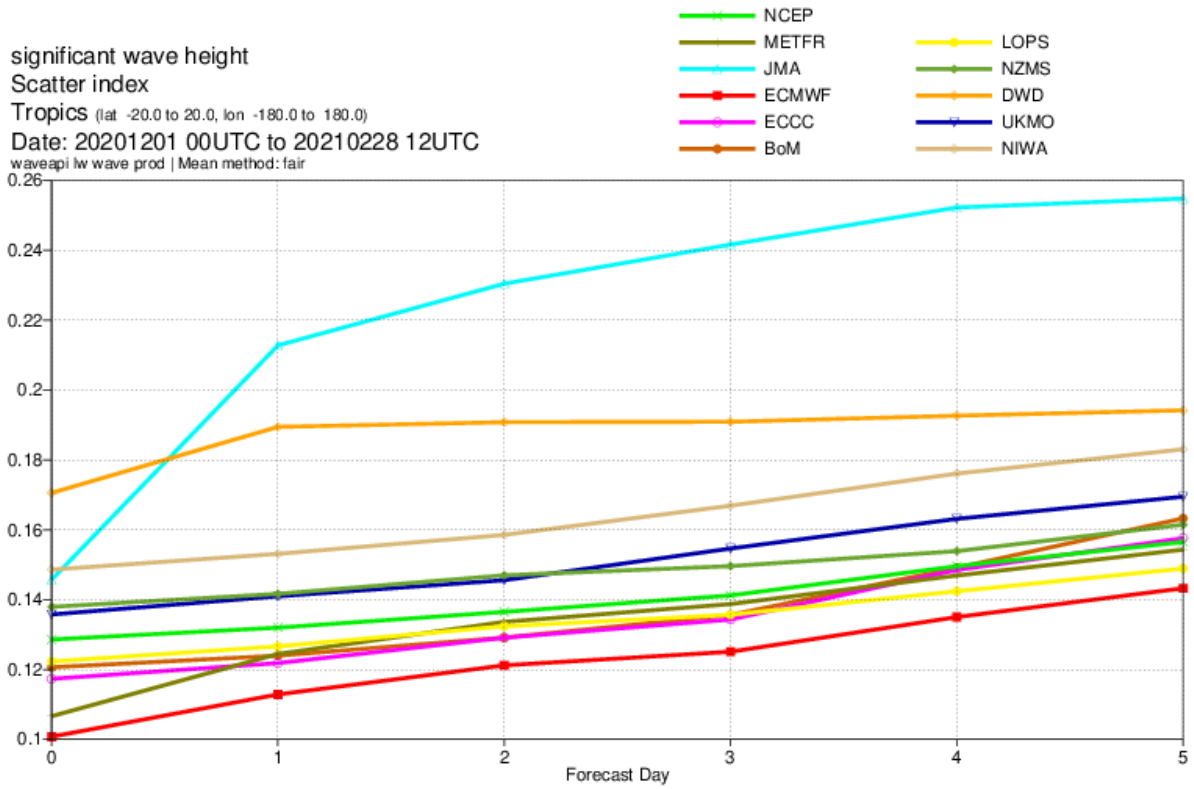
Significant wave height

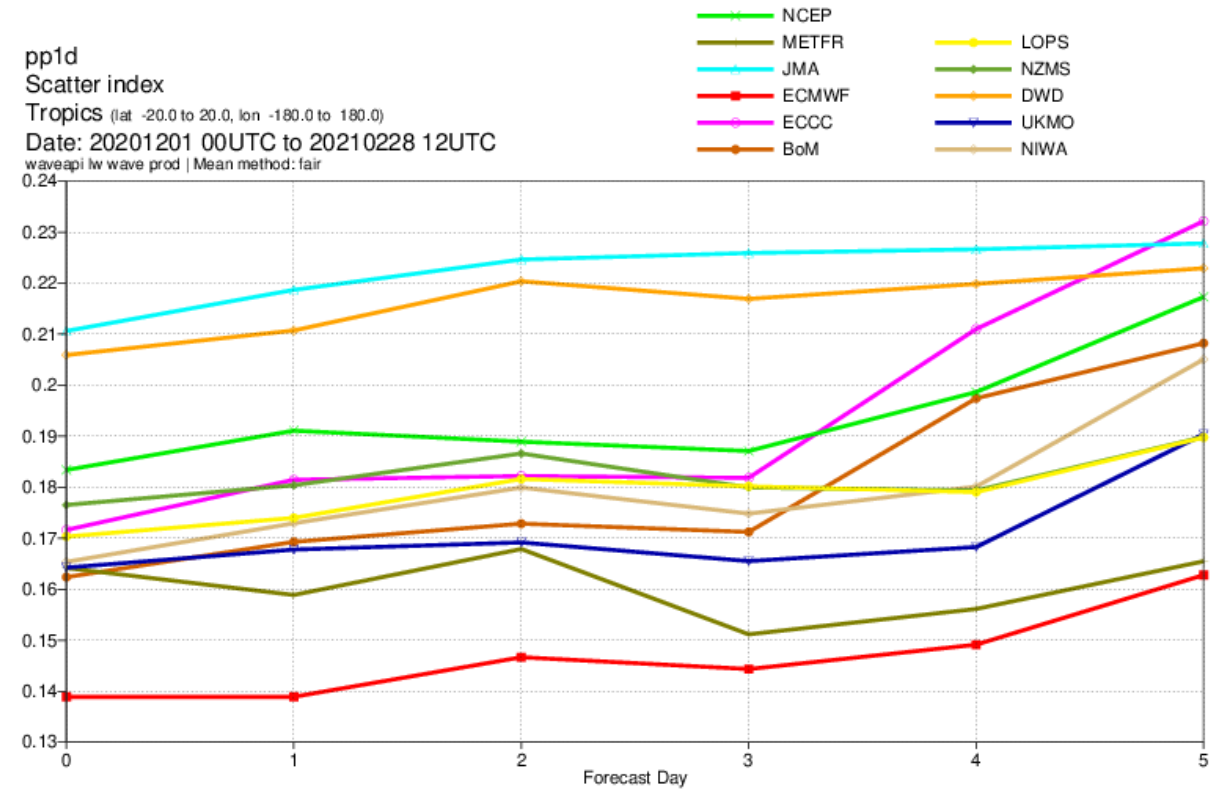
Peak period





Wave forecast – Tropics





Significant wave height

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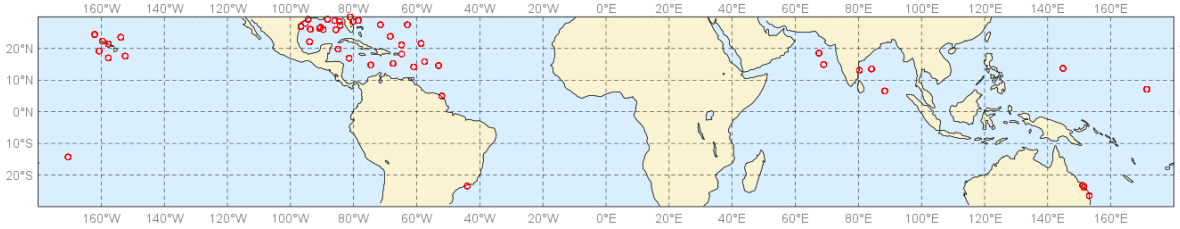
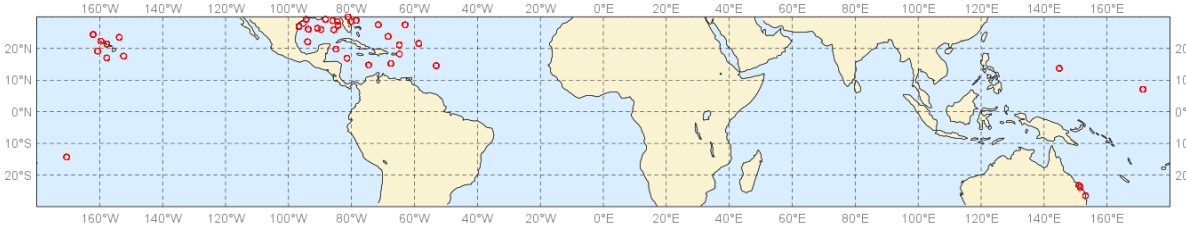
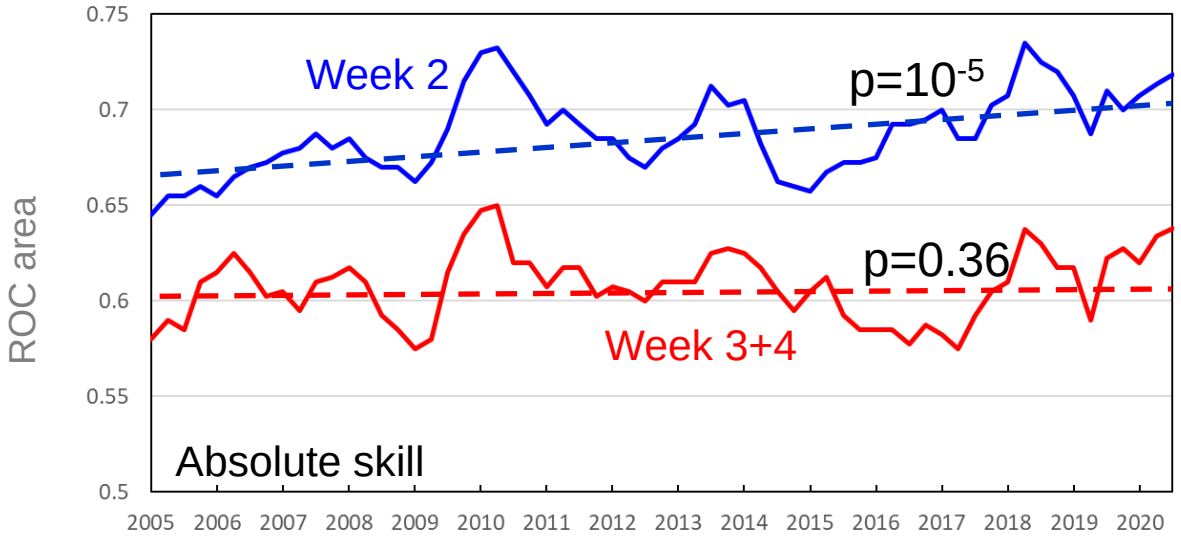
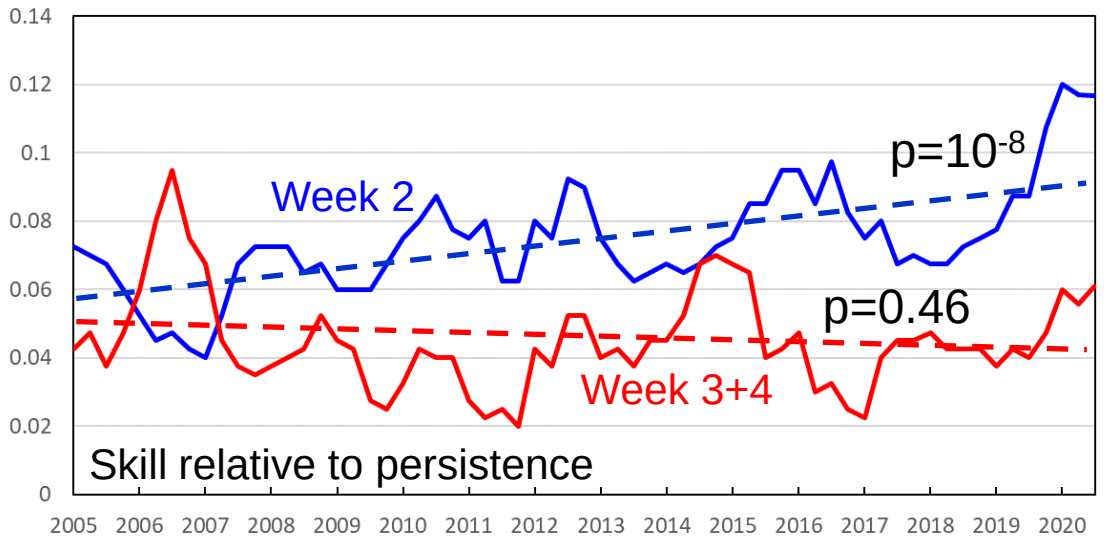




Extended range – evaluation of real-time forecasts

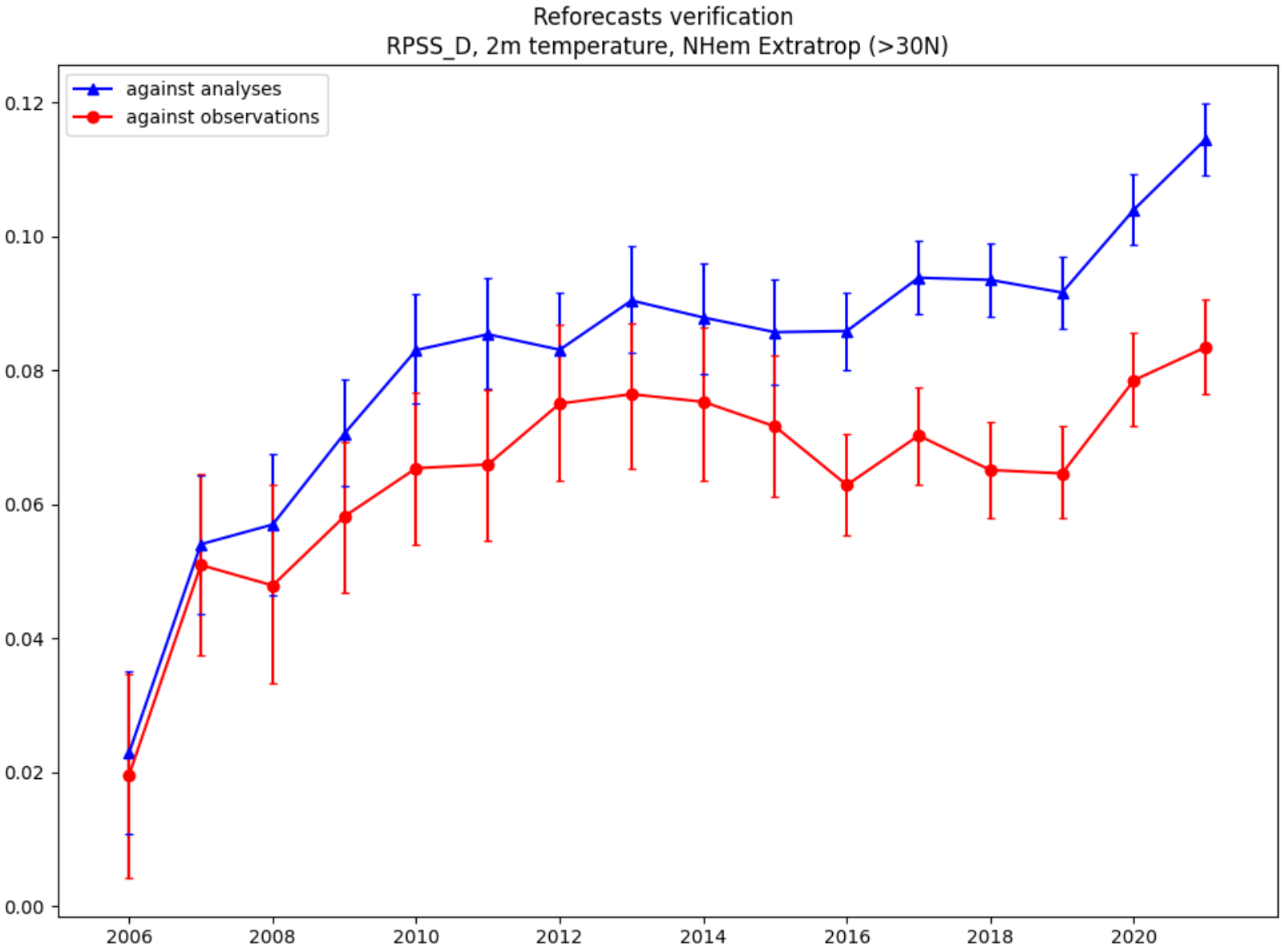




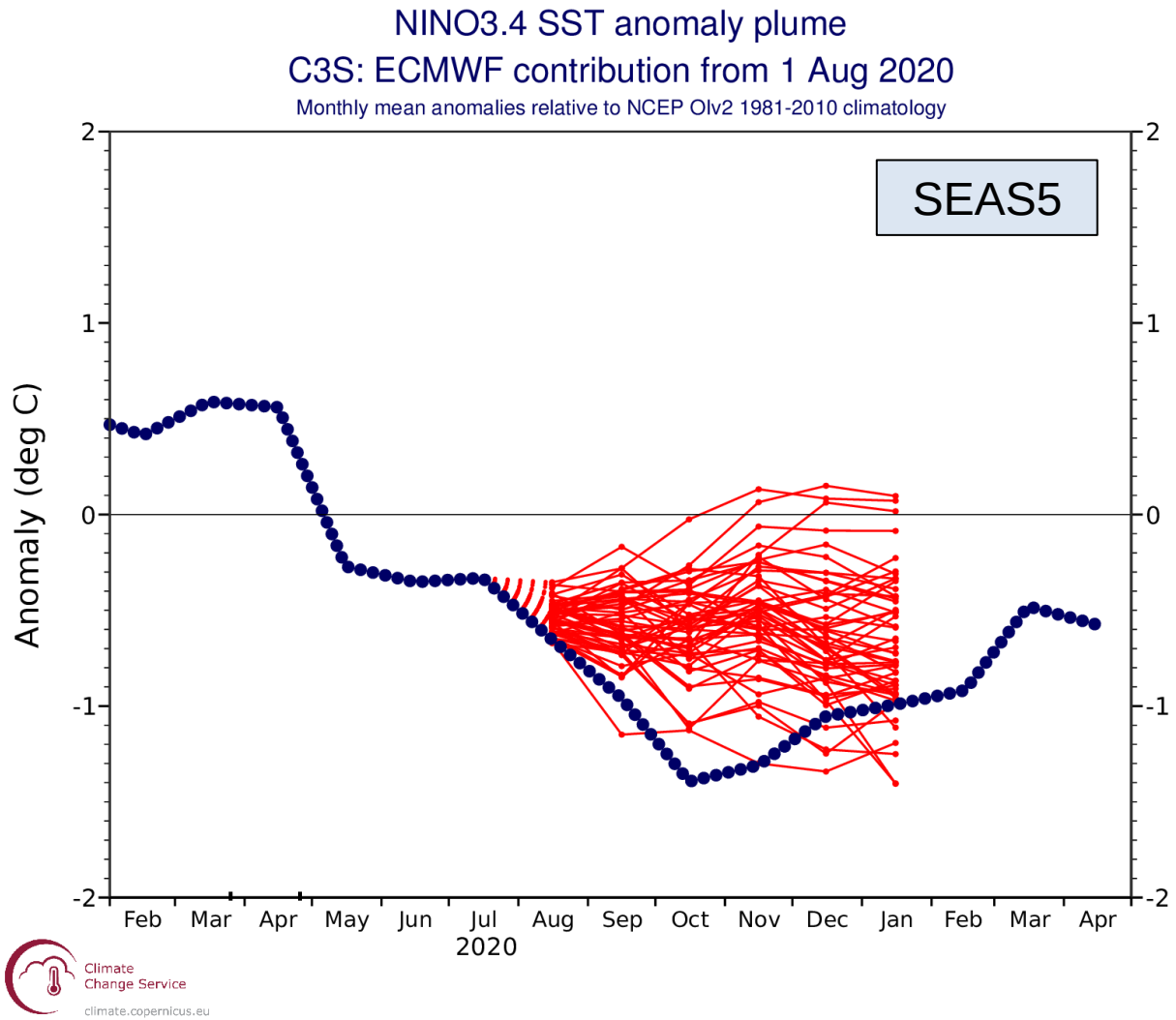
- Statistically significant positive trend for week 2
- No statistically significant trend for weeks 3+4

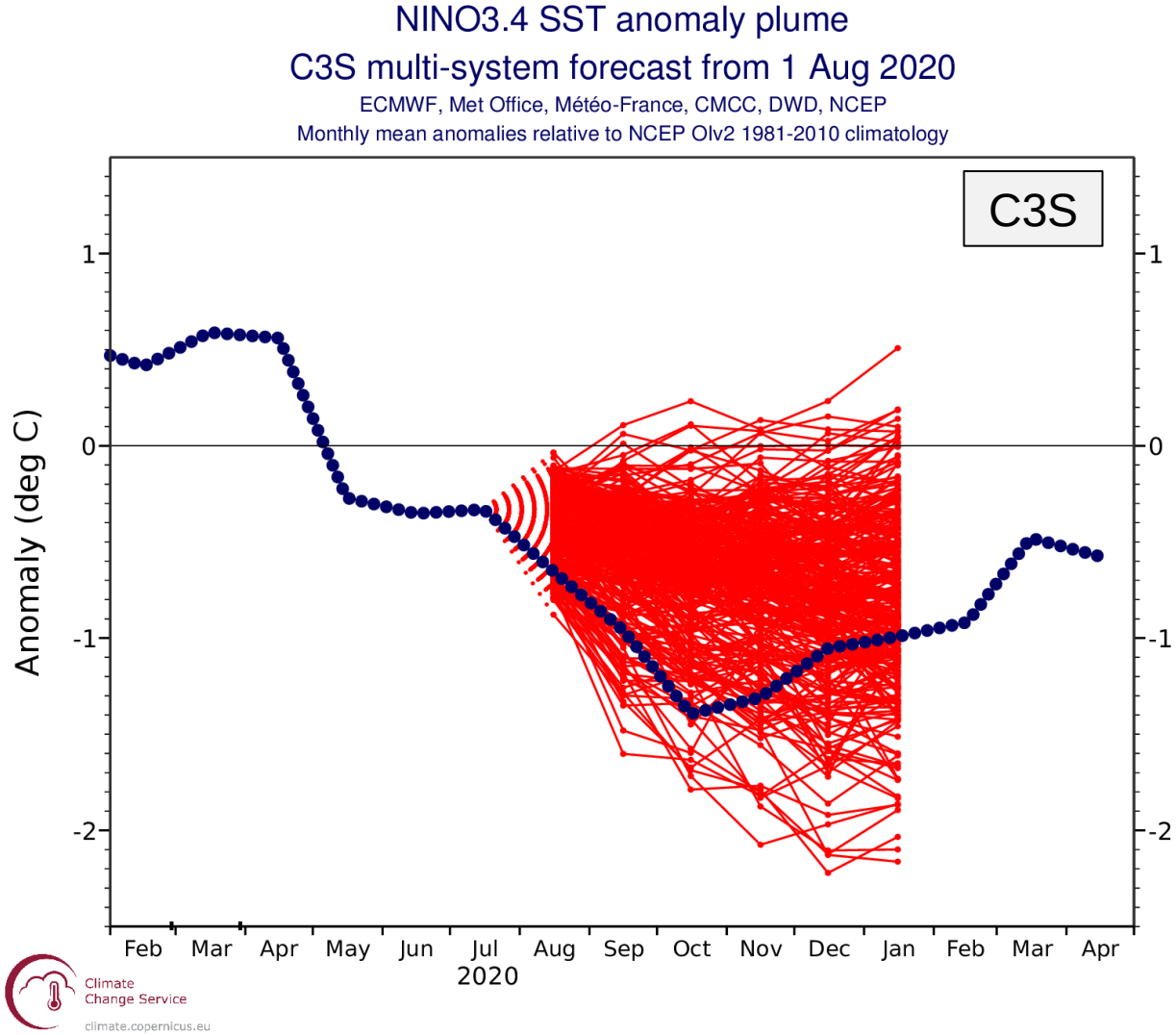
ECMWF

Extended range – evaluation of re-forecasts (week 3)



La Niña


NINO3.4 SST anomaly plume
C3S: ECMWF contribution from 1 Aug 2020
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology
SEAS5
Anomaly (deg C)
2
1
0
-1
-2
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
2020
Climate Change Service
climate.copernicus.eu
ECMWF


NINO3.4 SST anomaly plume
C3S multi-system forecast from 1 Aug 2020
ECMWF, Met Office, Météo-France, CMCC, DWD, NCEP
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology
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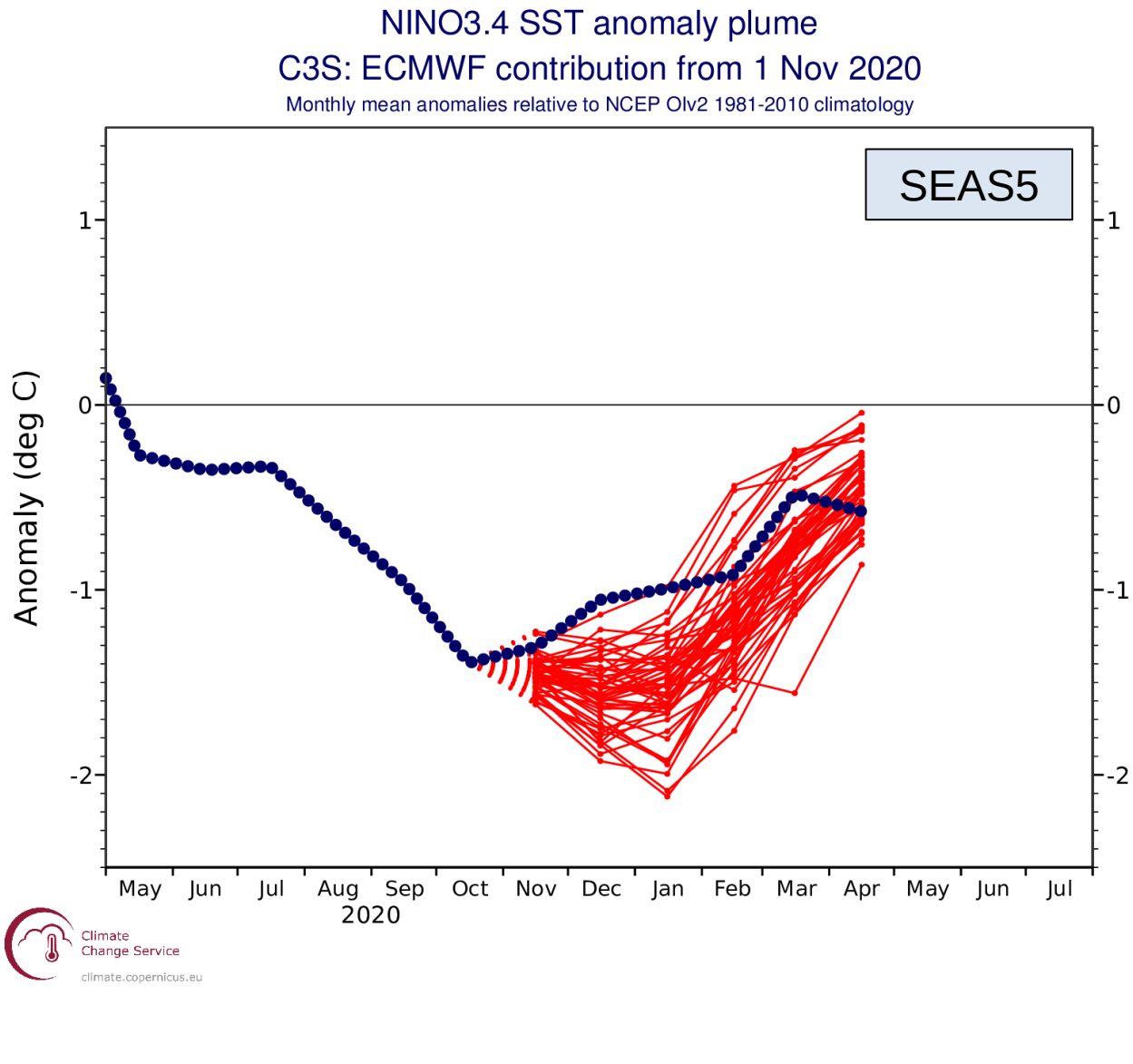
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Anomaly (deg C)
1
0
-1
-2
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
2020
Climate
Change Service
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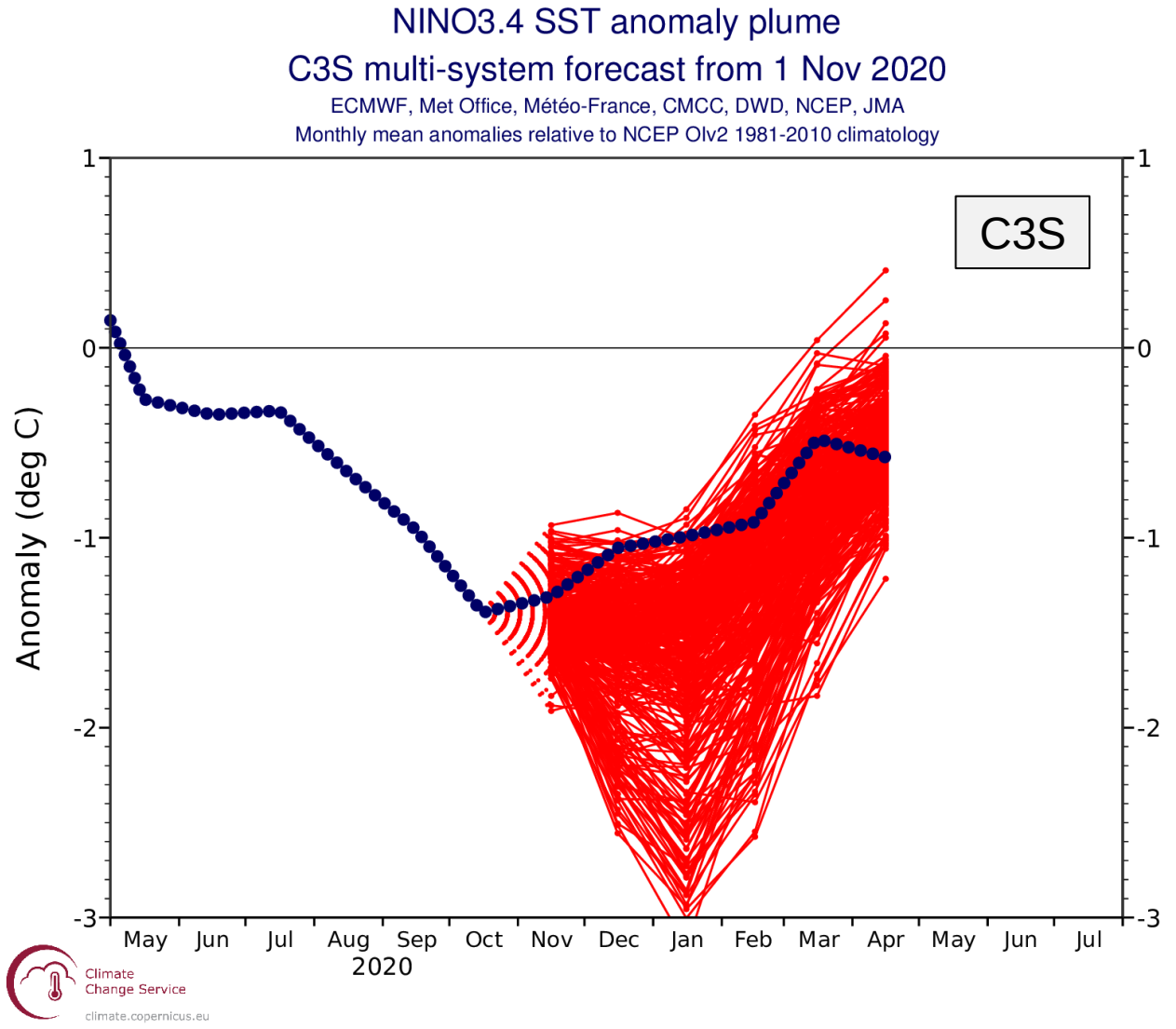
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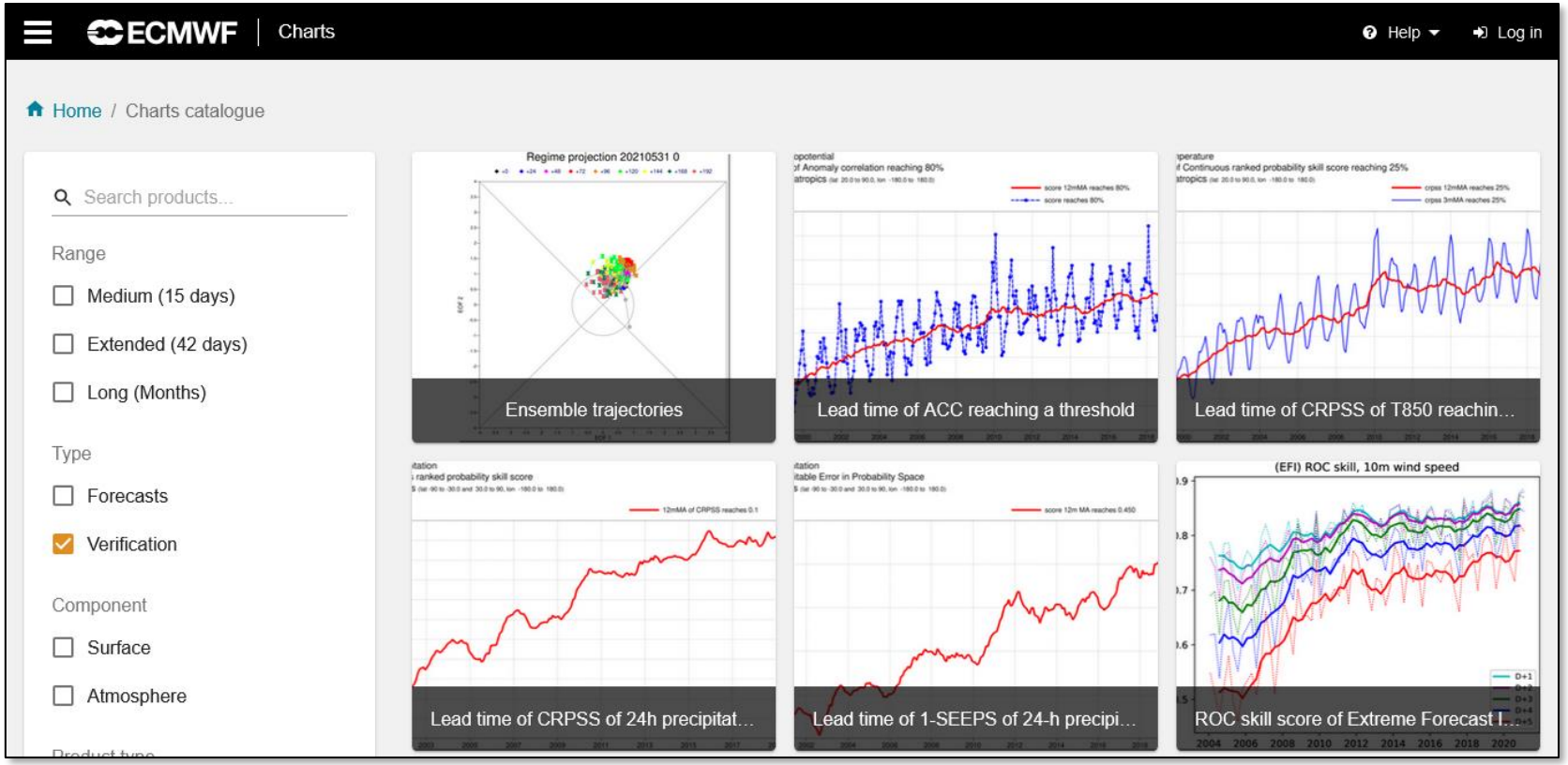
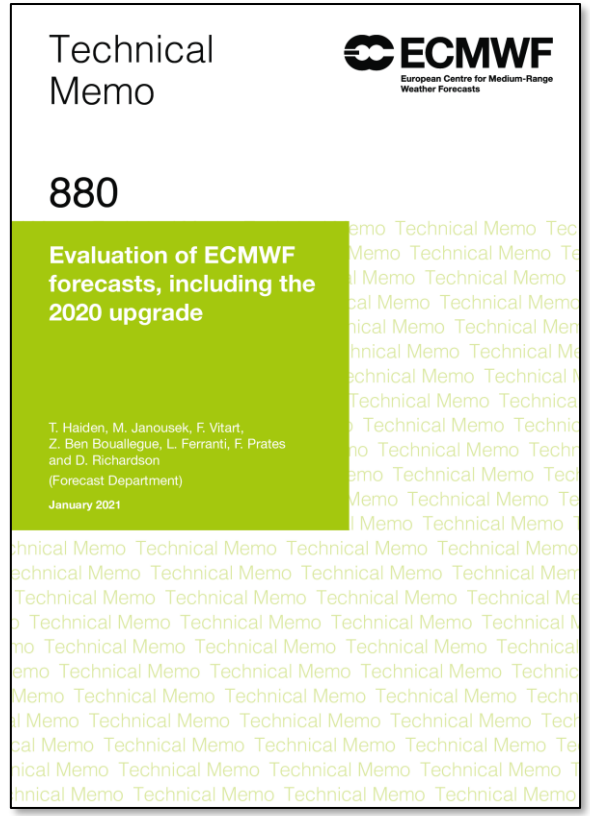
C3S
Anomaly (deg C)
1
0
-1
-2
-3
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
2020
Climate
Change Service
climate.copernicus.eu

More verification results: ECMWF Charts & Tech Memos





Also:

WMO Lead Centre for Deterministic NWP Verification: https://apps.ecmwf.int/wmolcdnv

WMO Lead Centre for Wave Forecast Verification: https://confluence.ecmwf.int/display/WLW

Summary: IFS performance

- **Upper-air:** highest ever ENS skill, high HRES skill; stratosphere improved
- **Spread/error:** very good DJF spread-error; lead in medium-range spread reliability
- **CAMS:** 5-15% behind HRES overall, but leading in biomass burning areas in tropics
- **Weather parameters:** little change relative to last year
- **Extremes:** best medium-range EFI scores ever
- **Ocean waves:** leading in wave height, but not in peak period in the extratropics
- **Extended range:** positive trends in week 2 and week 3
- **Seasonal:** La Nina forecast OK; cold continental anomalies (winter, spring) not well predicted