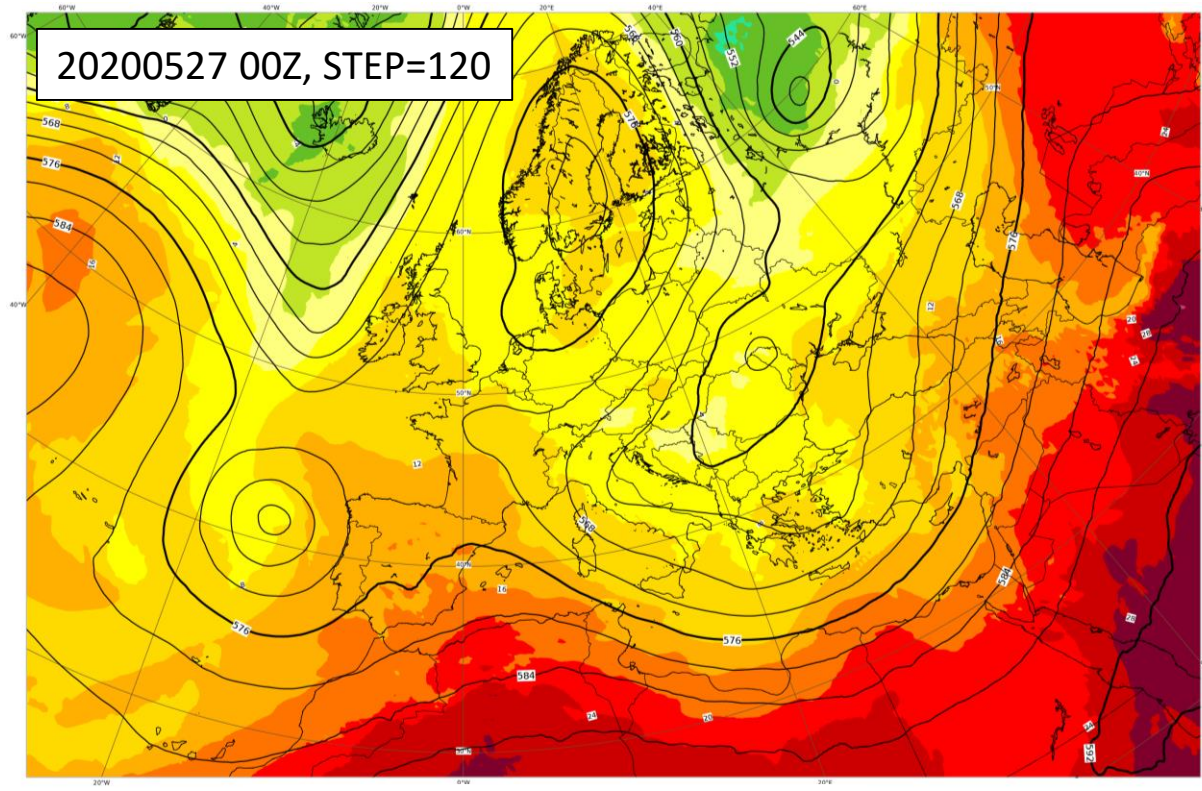
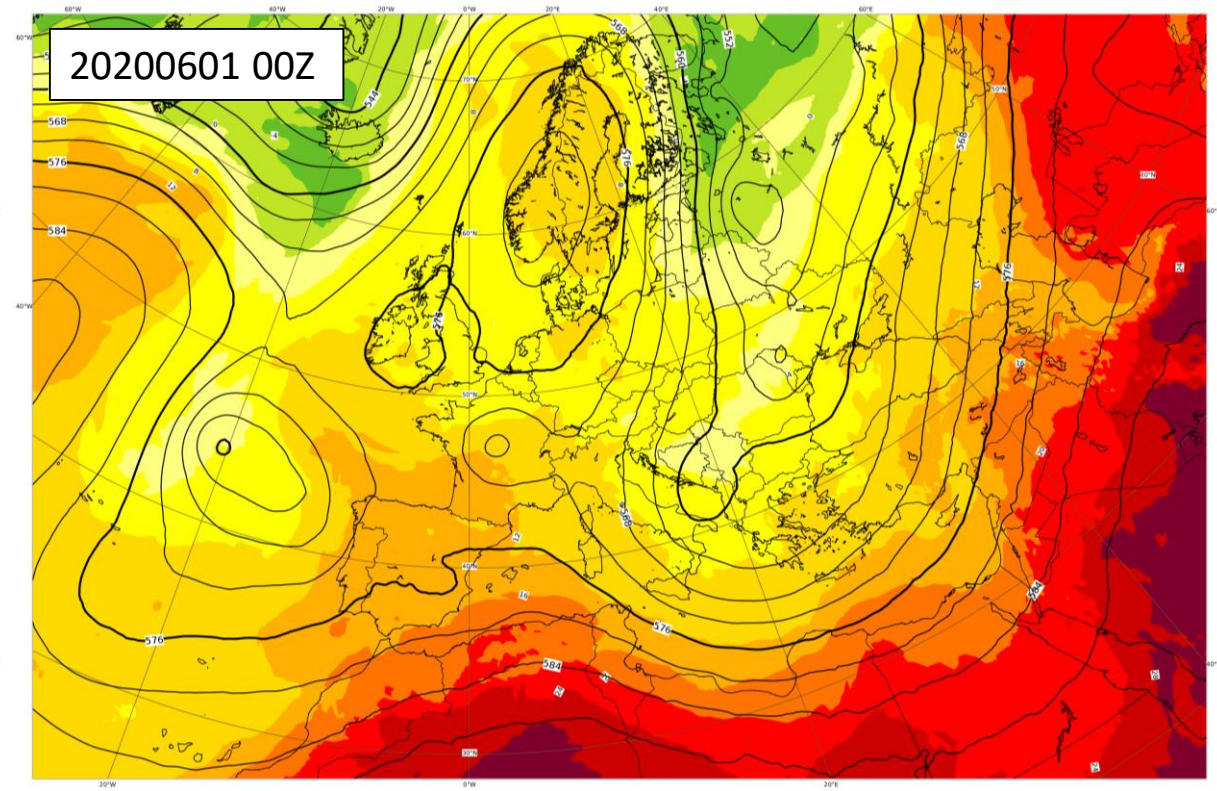


# ECMWF forecast performance

Thomas Haiden, Martin Janousek, Mohamed Dahoui



Day 5 forecast for today



Verifying analysis

# Overview

- Changes since UEF 2019: model cycle 46r1
- Weather parameters
- Extended-range forecast skill
- Covid-19 (reduced number of aircraft observations)

**Model cycle 46r1 (11 June 2019)**

# ENS upper-air forecast skill: 850 hPa temperature

850hPa temperature

Continuous ranked probability skill score

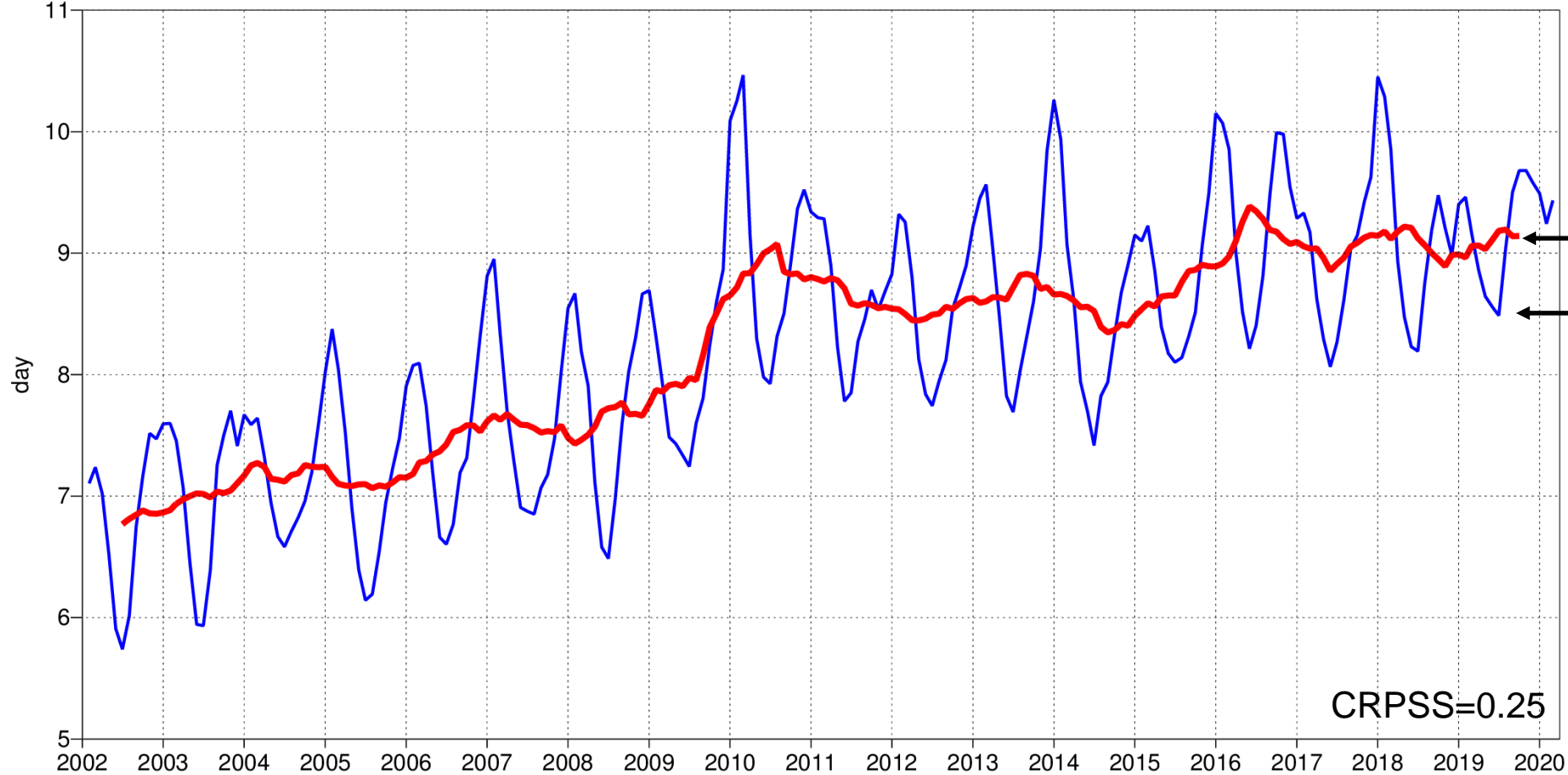
NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)

T+12 T+24 ... T+360

oper\_an od enfo 0001 | 00UTC,12UTC,beginning

— crps 12mMA reaches 25%

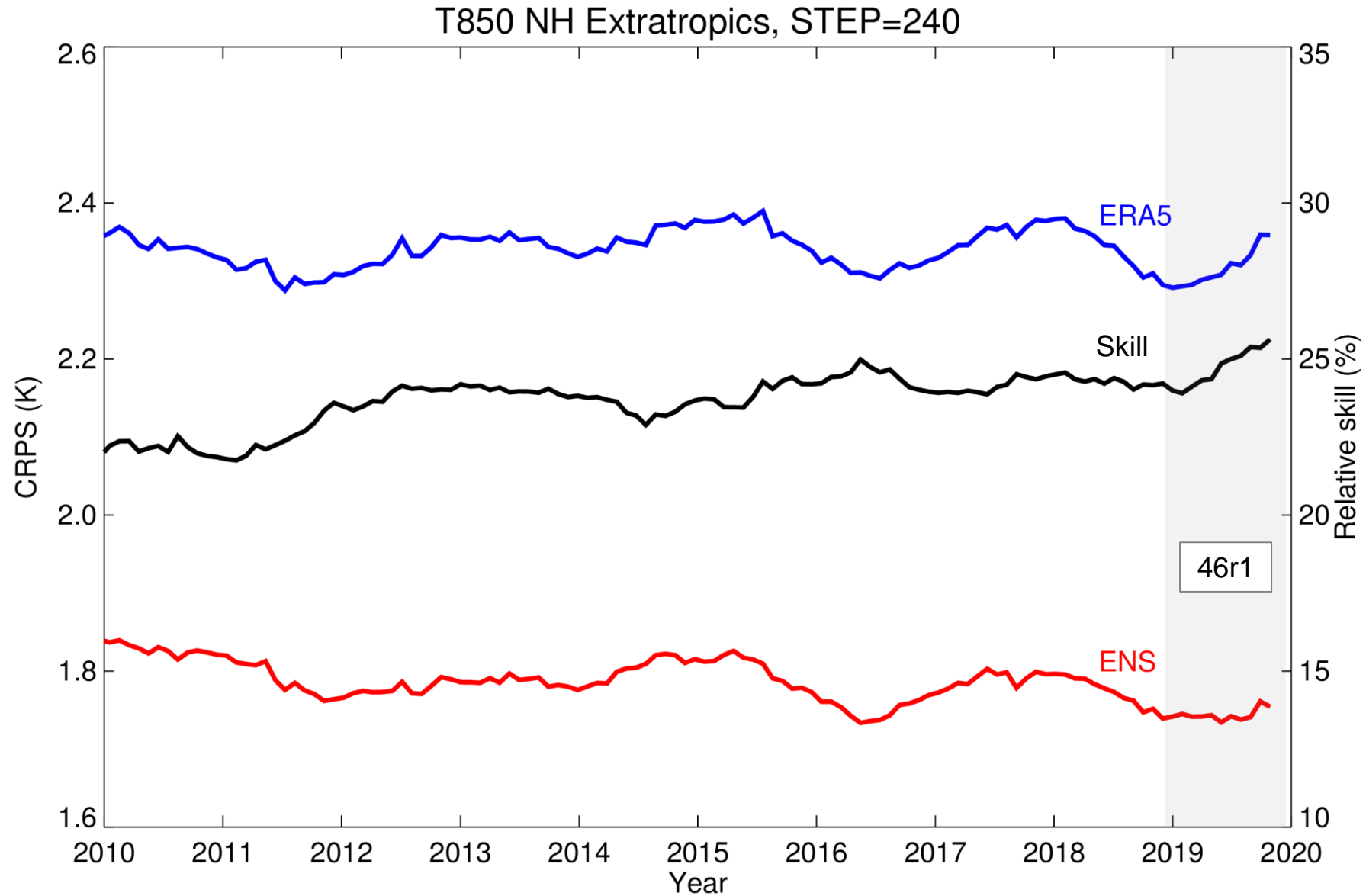
— crps 3mMA reaches 25%



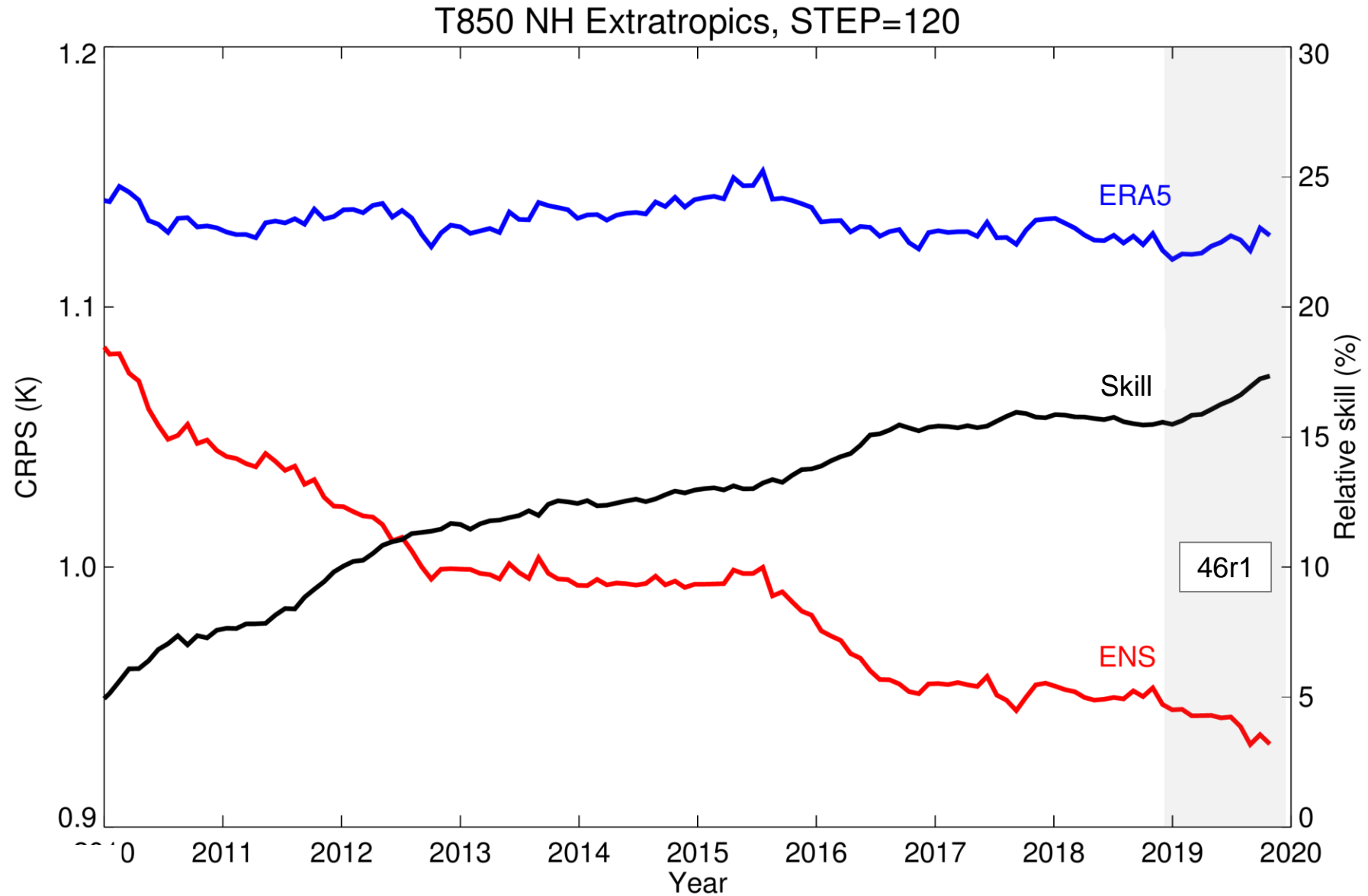
.. but no new high in 12-month average skill

Best summer performance ever ..

# ENS upper-air forecast skill: T850 at day 10

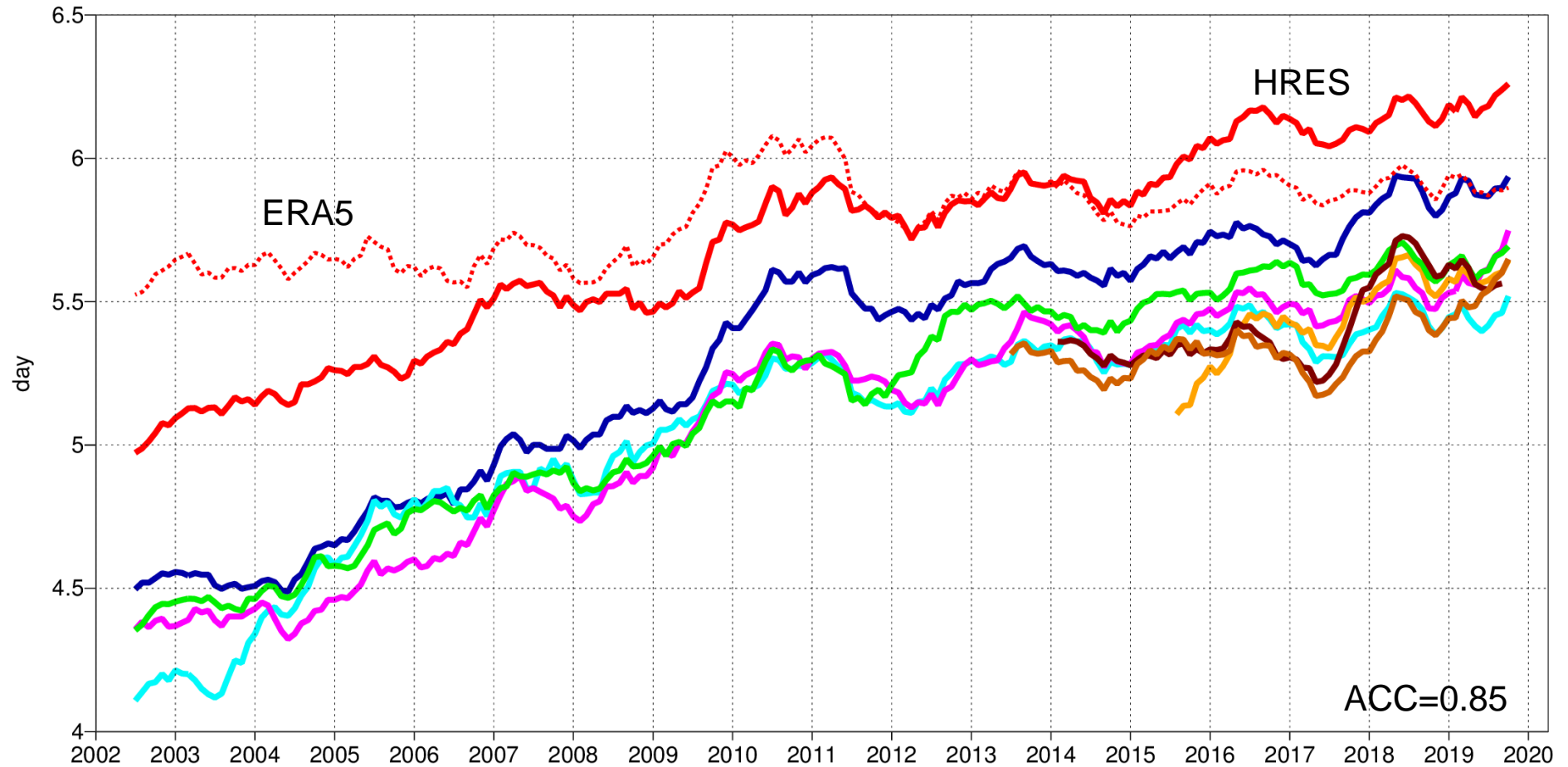
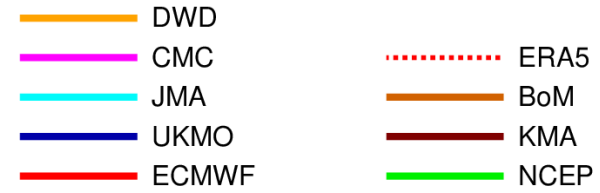


# ENS upper-air forecast skill: T850 at day 5

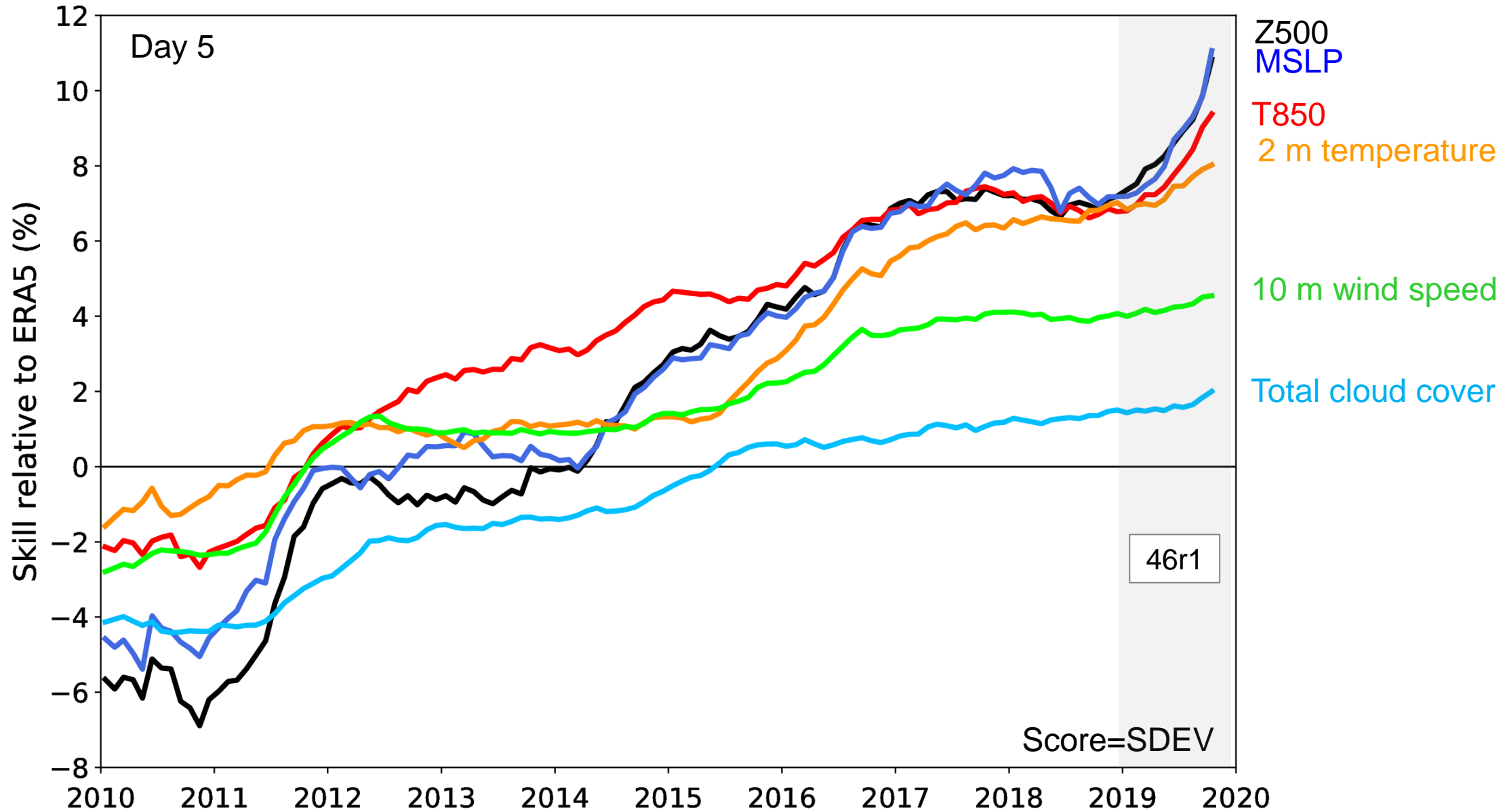


# HRES upper-air forecast skill

500hPa geopotential  
Anomaly correlation  
NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)

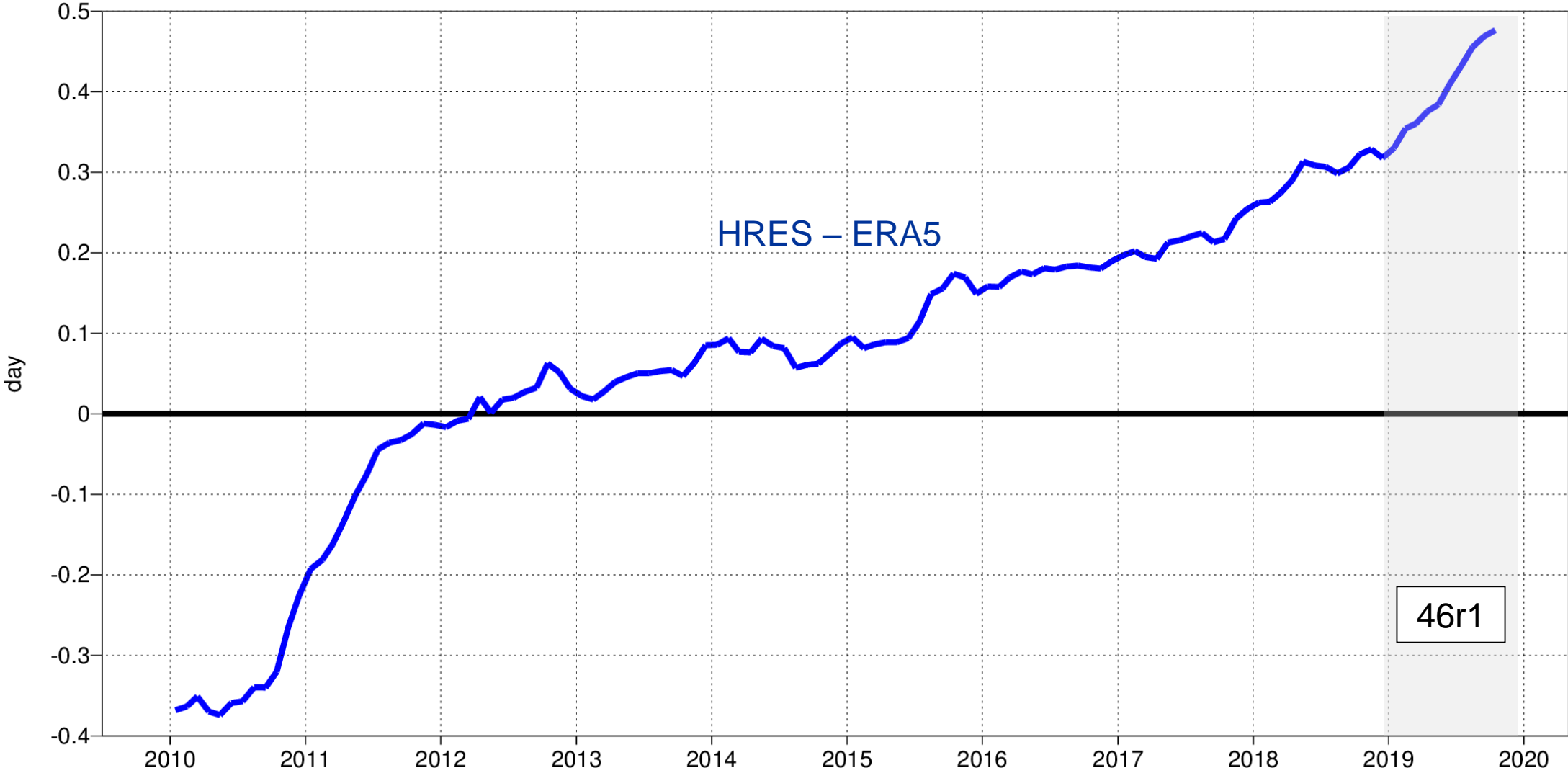


# HRES upper-air and near-surface forecast skill





# HRES precipitation headline score (SEEPS, Day 4-5)



# ENS 2m temperature headline score (Day 5)

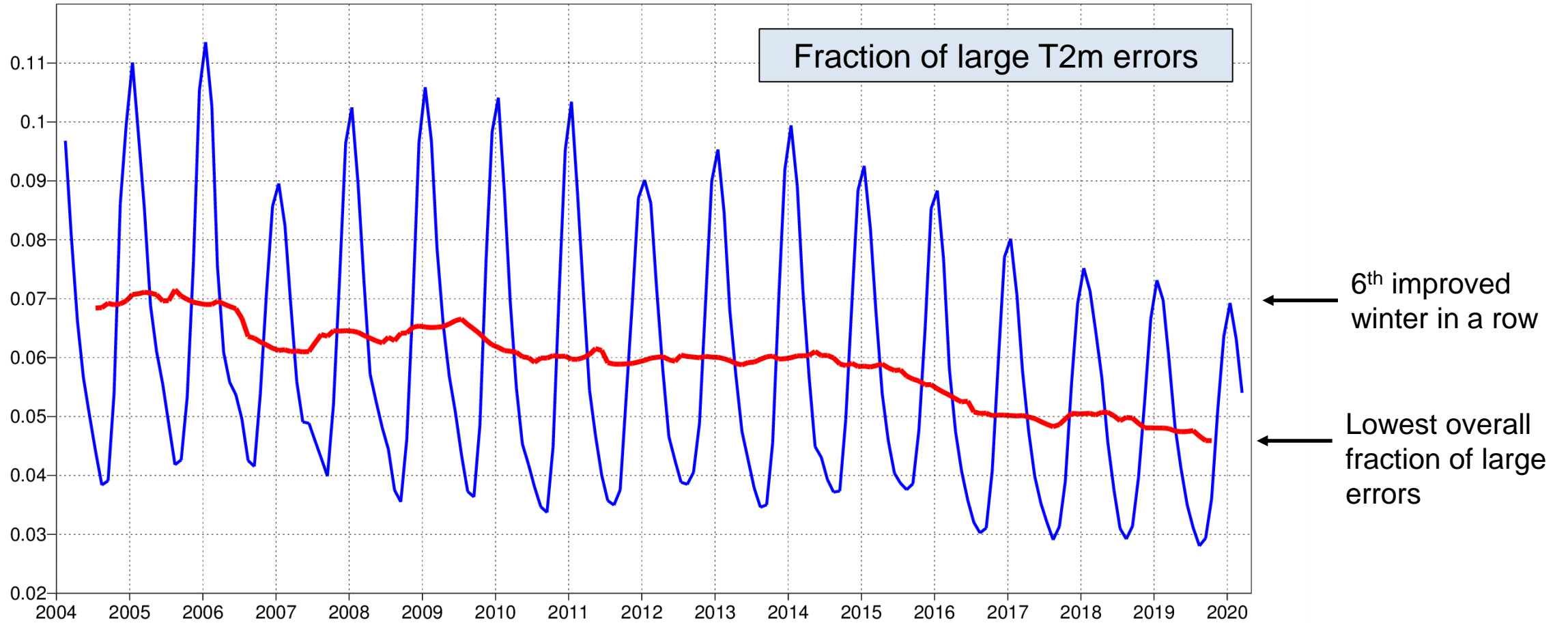
2 meter temperature

Fraction of large CRPS value >5.0

Extratropics (lat -90 to -30.0 and 30.0 to 90, lon -180.0 to 180.0)

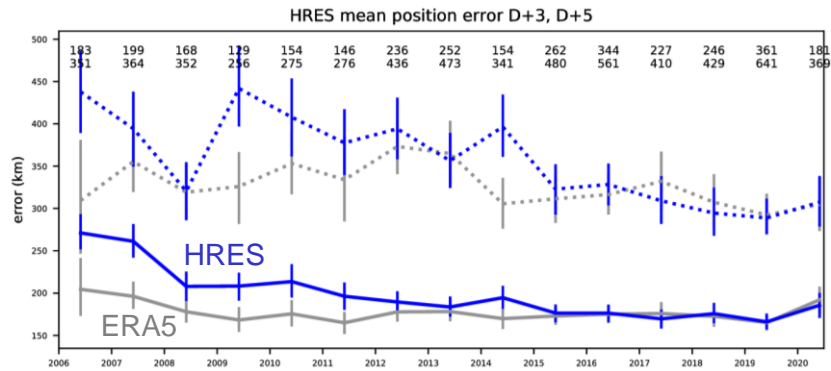
T+120

oper\_ob od enfo 0001

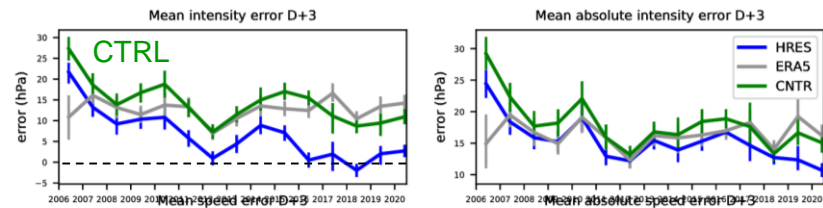


# High-impact weather

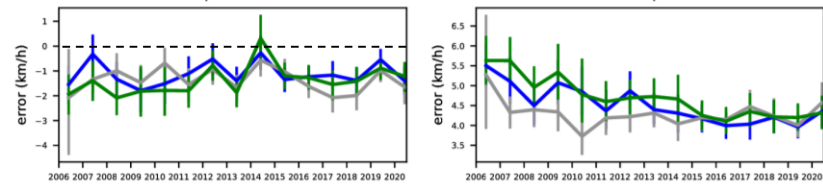
## Tropical cyclones



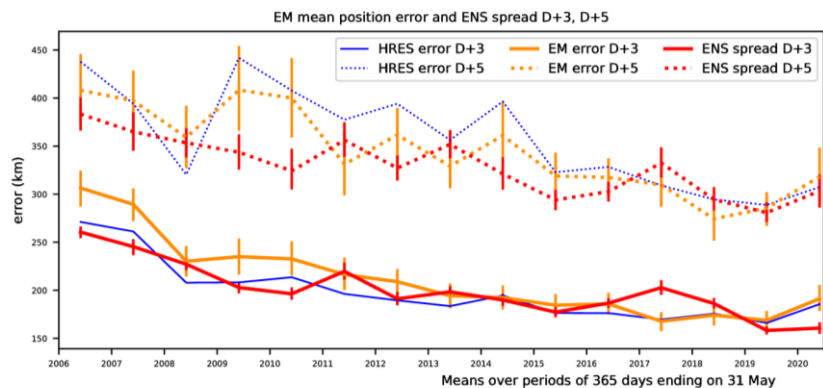
Position



Intensity



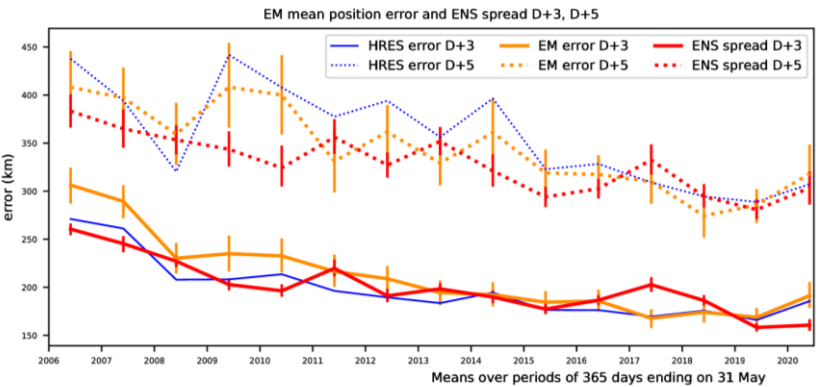
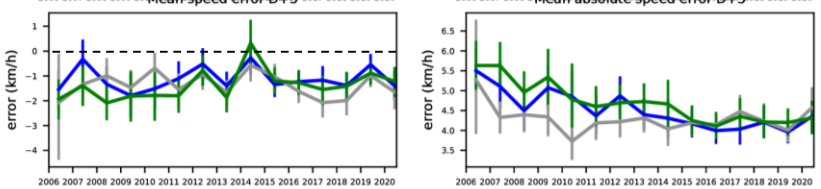
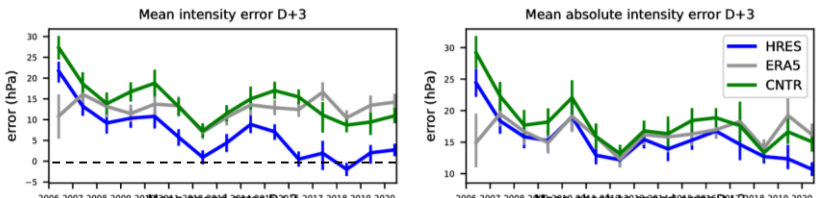
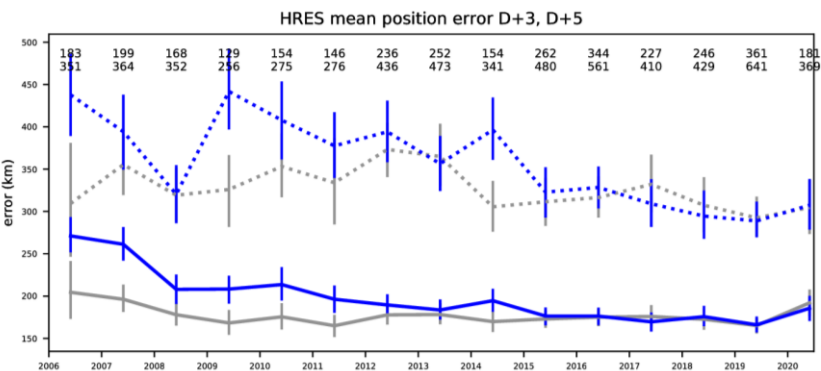
Speed



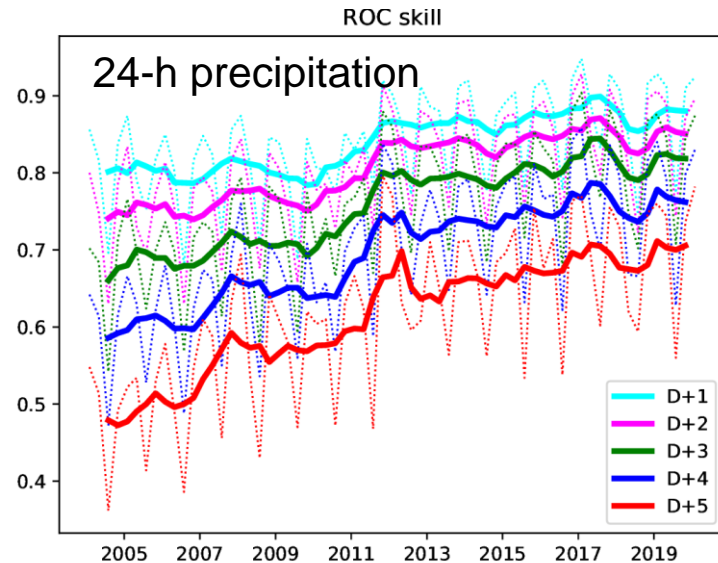
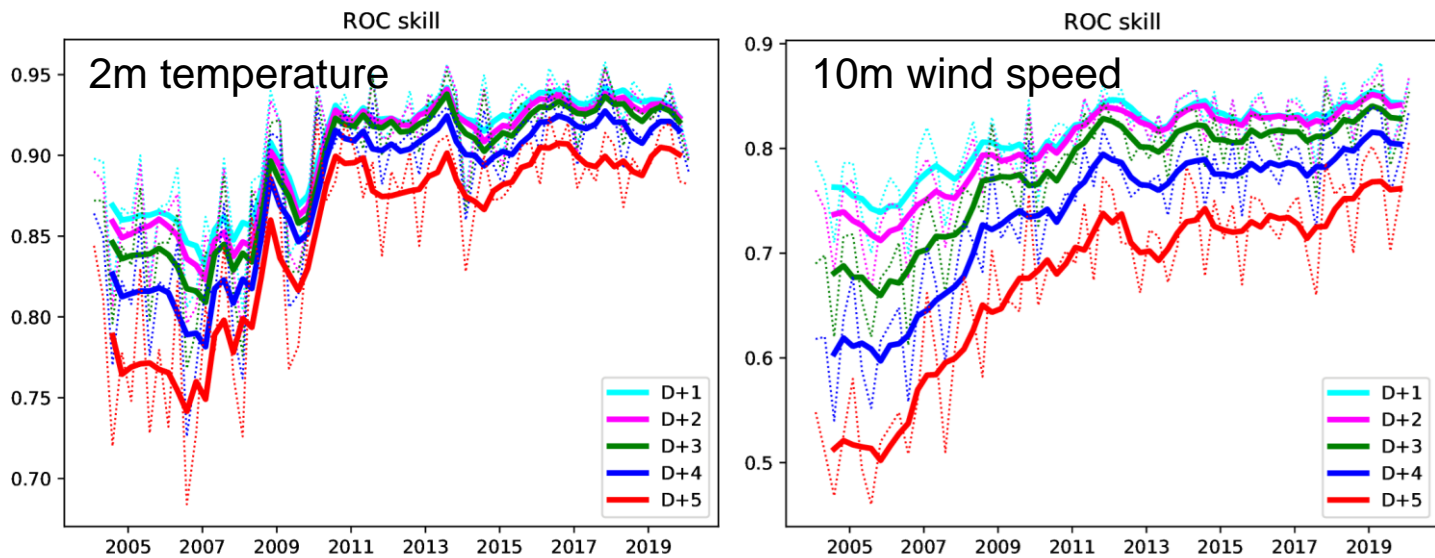
Position  
(spread/error)

# High-impact weather

## Tropical cyclones



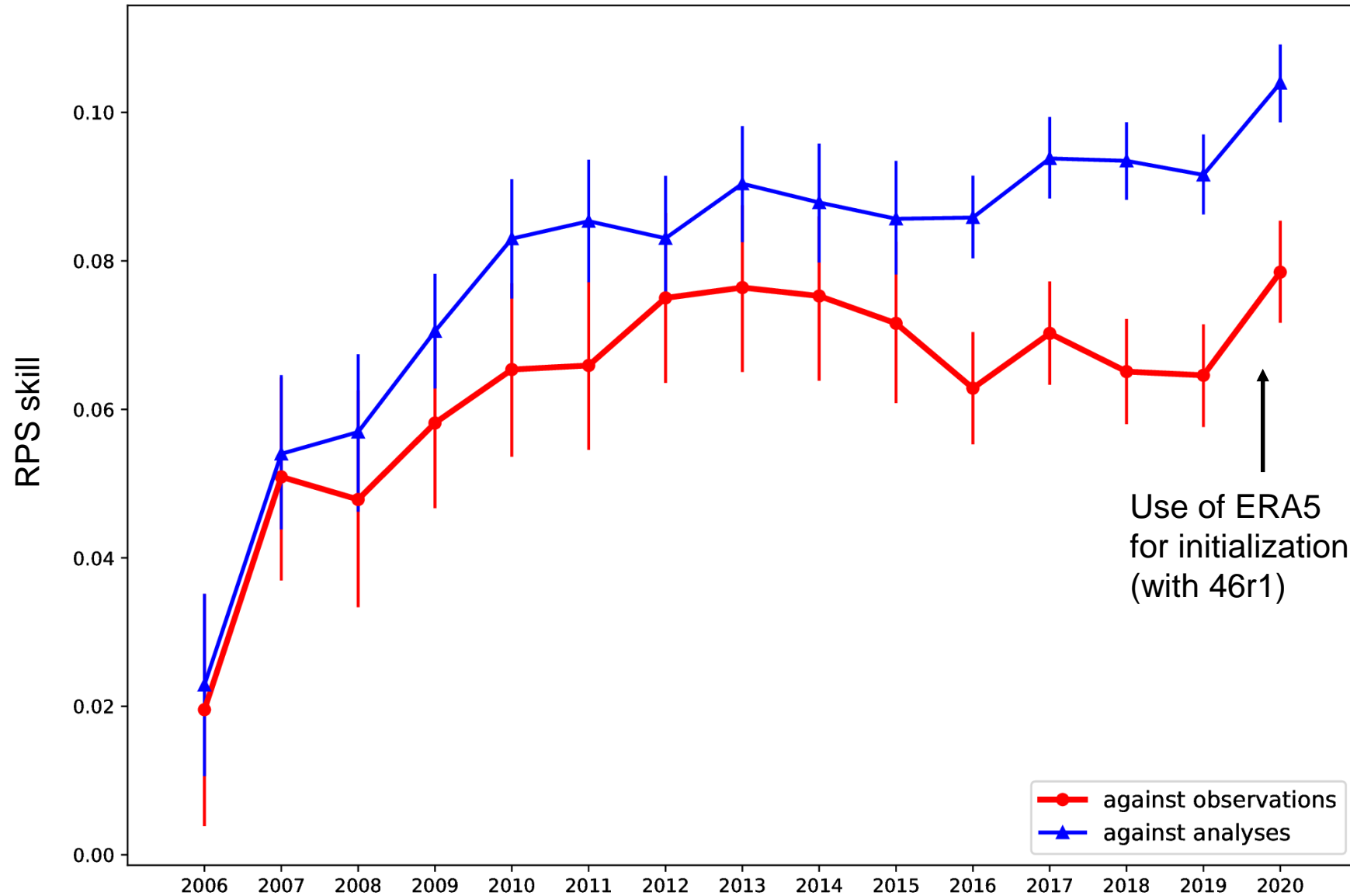
## Extreme forecast index (EFI)



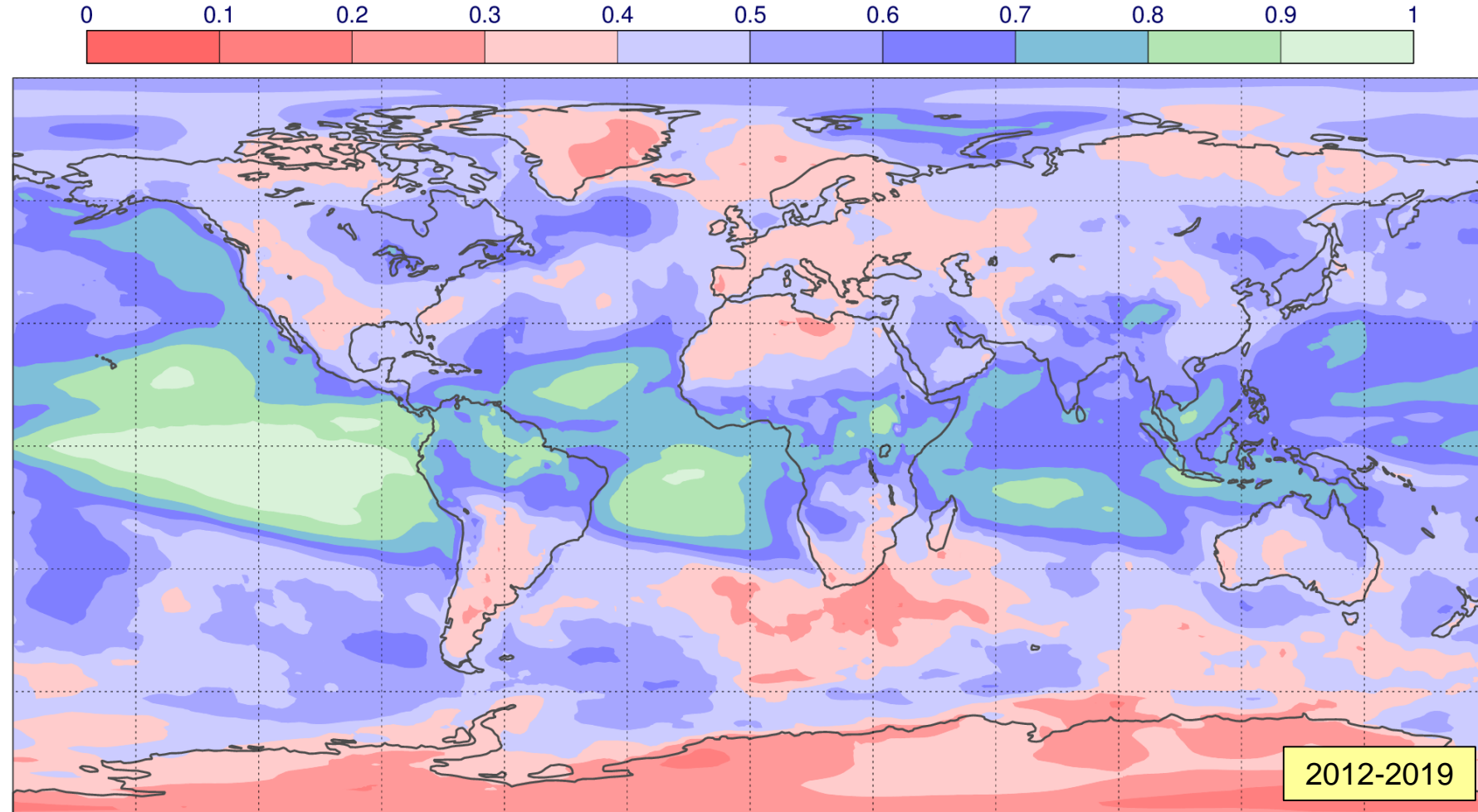
**Extended range**

# ENS 2m temperature in week 3: skill in predicting terciles

Reforecasts verification  
RPSS\_D, 2m temperature, NHem Extratrop (>30N)



# ENS-mean 2m temperature in week 3: anomaly correlation



- Large differences in week 3 predictability Tropics vs Extratropics
- Predictability higher over the ocean at all latitudes
- Longitudinal variations between continents (North America vs Europe)

# **Covid-19**



# Aircraft data availability and usage

## AIRCRAFT DATA COUNTS

LEVEL =0.00 - 1013.25 HPA, ALL DATA [ TIME STEP = 24 HOURS ]

Area (Globe) : lon\_w= 0.0, lon\_e= 360.0, lat\_s= -90.0, lat\_n= 90.0 (over All\_surfaces)

EXP = 0001

Global



## AIRCRAFT DATA COUNTS

LEVEL =0.00 - 1013.25 HPA, ALL DATA [ TIME STEP = 24 HOURS ]

Area ( Europe ) : lon\_w= 340.0, lon\_e= 60.0, lat\_s= 35.0, lat\_n= 77.5 (over All\_surfaces)

EXP = 0001

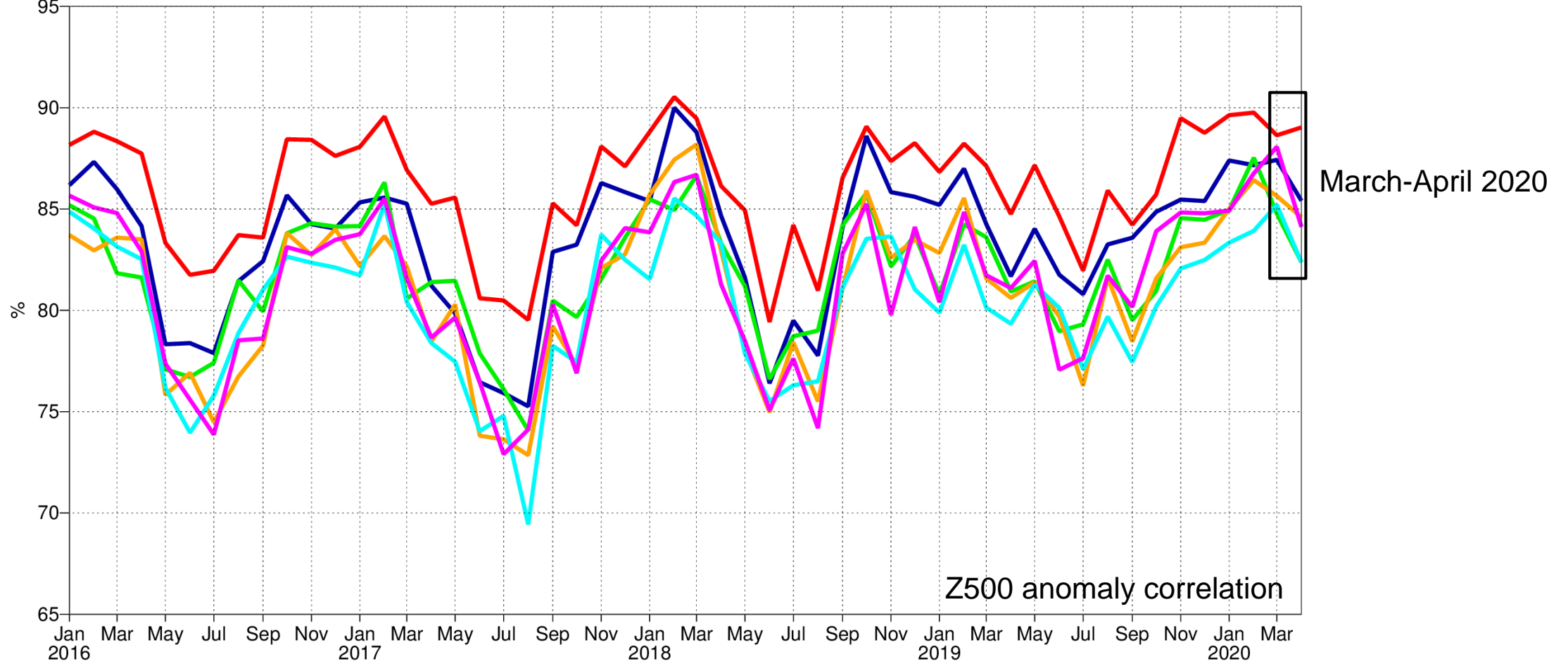
Europe



# HRES 500 hPa geopotential at day 6

500hPa geopotential  
Anomaly correlation  
NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)  
T+144  
od 0001 | 12UTC,verifying

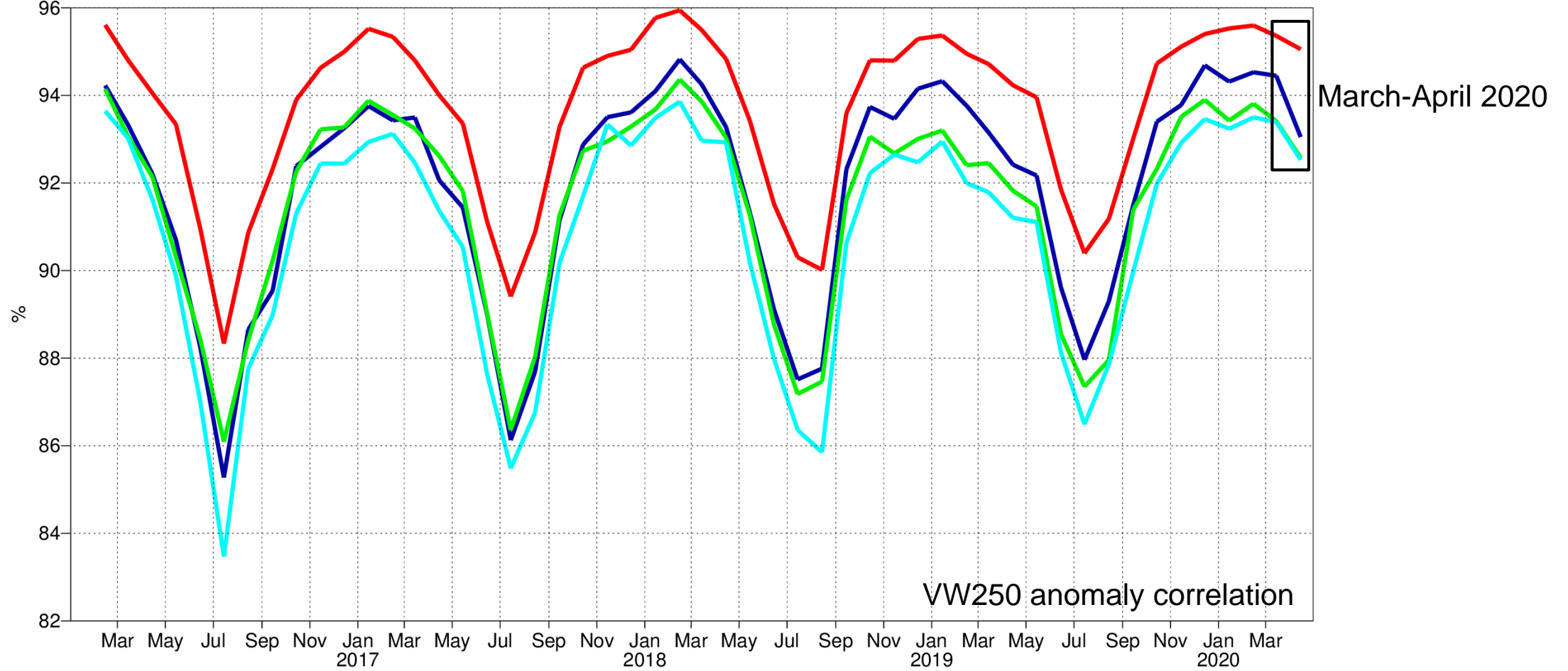
- NCEP
- UKMO
- ECMWF
- CMC
- JMA
- DWD



# HRES 250 hPa vector wind at day 3

250hPa vector wind  
Anomaly correlation  
NHem Extratropics (lat 20.0 to 90.0, lon -180.0 to 180.0)  
T+72  
oper\_an od 0001 | 12UTC

- JMA
- NCEP
- UKMO
- ECMWF



# Summary

- Substantial overall improvement due to model cycle 46r1
- Weather parameters: 2m temperature and precipitation most improved
- Week 3 forecasts and medium-range EFI: improving slowly
- Covid-19 effect not easily detectable in standard scores: robust DA systems

# More verification results: ECMWF webpage & Tech Memos

View all ENS Meteograms Cyclones More charts

## Charts

74 matching items

Type: Verification

### Filters

Filter

#### Range

- Extended (30 days) (11)
- Long (Months) (29)
- Medium (15 days) (34)

#### Type

- Forecasts (2)
- Verification (74)


#### Component

- Atmosphere (6)
- Surface (37)

#### Product type





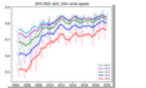
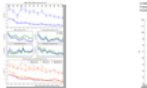
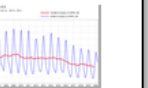
- Combined (1)
- ENS (15)
- HRES (1)


### Trajectories



Ensemble trajectories


### Headline scores

-  Lead time of ACC reaching a threshold
-  Lead time of CRPSS of T850
-  Lead time of CRPSS of 24h
-  Lead time of 1-SEEPS of 24-h
-  ROC skill score of Extreme Forecast
-  Errors of tropical cyclone forecasts
-  Fraction of large 2m temperature errors



RPS of 2m temperature of

## Technical Memo



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### Evaluation of ECMWF forecasts, including the 2019 upgrade

T. Haiden, M. Janousek, F. Vitart, L. Ferranti and F. Prates (Forecast Department)  
November 2019

**THANK YOU**