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Verification of Operational Weather Prediction Models March to May 2026

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Liverleaf flowers in Solør. Photo: Gunnar Noer

Contents

More information...

Verification results are also available on internal web pages

- https://metcoop-comm.smhi.se/ and https://metcoop.smhi.se/ - MetCoOp Web Tools - including verification and observation monitoring
- https://harp.smhi.se/ - MetCoOp verification visualized with harp
- http://verif/vmap/ - timeseries and windroses - on Google map

About this report

This verification report indicates the quality of the main operational weather forecasting models used at the Norwegian Meteorological Institute (MET Norway) for the period indicated. Another purpose of the verification report series is to provide a stable source of information suitable for monitoring longer trends in forecasting quality for interested readers. The report complements the verification and monitoring performed on individual models. Each model is monitored and developed according to the scientific method, where changes are only introduced when they can document a better likely prediction skill. Such documentation is available as research papers, consortium news, and presentations at team-, syndicate- and consortium- meetings. The skill of the forecasting service in severe weather situations is also documented with special emphasis on forecast failures, in order to learn from them and improve the system.

The report includes verification results for 3 Numerical Weather Prediction (NWP) models; MetCoOp ensemble prediction system (MEPS) covering Norway, Sweden, Finland, Denmark and the Baltic states, AROME-Arctic covering Svalbard, Novaja Semlja, Frans Josefs land and the Northern part of Scandinavia and the global Integrated Forecasting System (IFS). The models are further described in the Models section. The variables verified are mean sea level pressure, temperature, wind speed and precipitation. The results are grouped by variable. A short summary of the results and cases studies by forecasters are also included.

Verification results are shown for different groups of stations: Norwegian, Svalbard and North Scandinavian. For temperature there are additional groups with Norwegian coastal and Norwegian inland stations, for wind speed Norwegian coastal and Norwegian mountainous stations, and for precipitation coastal stations, stations more than 500 m above sea level, and stations with daily mean precipitation > 4 mm. For MEPSctrl statistics at the observing sites are also visualized on maps with model climatology. The text size of the statistics increases with the value. Time series with observations and available models are included for selected stations. Post processed variables are compared with MEPSctrl.

Models

The following Numerical Weather Prediction (NWP) models are verified in this report. The verification measures are plotted for each model with the colors indicated in the table below.

Integrated Forecasting System (IFS)	Operational forecasts from the European Centre for Medium-Range Weather Forecasts (ECMWF) are produced with the Integrated Forecasting System (IFS), which is a global model with horizontal resolution of about 9 km. Cycle 49r1 since 12 November 2024 and cycle 50r1 since 12 May 2026. MET Norway always uses the latest available operational cycle. IFS is available about 5 hours later than models run at MET Norway.
MetCoOp ensemble prediction system (MEPSctrl)	MEPS has 30 lagged ensemble members, constructed from 5 members updated hourly and run up to 66 hours. Only member 0, the control, is verified in this report. MEPS is based on HARMONIE with AROME physics and non-hydrostatic dynamics, horizontal resolution defined by a 2.5×2.5 km^2 grid. Cycle 43h2.1 since 23 March 2021. MEPS is run in cooperation with Swedish Meteorological and Hydrological Institute (SMHI), Finnish Meteorological Institute (FMI) and Estonian Environment Agency (ESTEA).
AROME-Arctic (AA25)	HARMONIE with AROME physics, horizontal resolution defined by a 2.5×2.5 km^2 grid. Cycle 46 since 23 September 2025.

Analysis and lead times of forecasts are denoted by e.g. 00+30 UTC which indicates forecast generated at 00 UTC and valid 30 hours later.

A change log for HARMONIE AROME (which MEPSctrl is based on) is available on internal webpages:
https://metcoop.smhi.se/dokuwiki/nwp/metcoop/changelog/start

A similar change log for AA25 is found on github:
https://github.com/metno/NWPdocs/wiki/AROME-Arctic-dataset#arome-arctic-changelog

Post processed forecasts

Most of the raw NWP model data are post processed before being published on Yr.

The met nordic temperature forecasts, YrPP in the plots, are post-processed forecasts based on the latest MEPS ensemble runs. The MEPS temperature forecasts are first downscaled to 1 km resolution using the model lapse rate in a neighbourhood. The forecasts are then bias corrected using a fine scale 1 km temperature analysis as reference. The temperature analysis is based on multiple data sources using both conventional and citizen observations.

The MEPS 10 m wind speed forecast is post-processed by downscaling to 1 km resolution to better represent local topography, and called YrPP.

YrPP is plotted with the color below.

The HARMONIE system

HARMONIE is the acronym for HIRLAM's meso-scale forecast system (Hirlam Aladin Regional/Meso-scale Operational NWP In Europe). For documentation see
- *The HARMONIE-AROME Model Configuration in the ALADIN-HIRLAM NWP System* by Bengtsson et al. 2017, available at https://doi.org/10.1175/MWR-D-16-0417.1
- *AROME-MetCoOp: A Nordic Convective-Scale Operational Weather Prediction Model* by Müller et al. 2017, available at https://doi.org/10.1175/WAF-D-16-0099.1

More documentation is also available on hirlam.github.io/HarmonieSystemDocumentation/dev/, www.accord-nwp.org and www.cnrm.meteo.fr/gmapdoc/.

This section presents some of the main components and setups that are used at MET.

AROME physics

AROME (Applications of Research to Operations at MEsoscale) is targeted for horizontal resolution 2.5 km or finer. It uses physical parameterizations based on the French academia model Meso-NH and the external surface model SURFEX. AROME has been operational at Météo-France since 18 December 2008 with a horizontal resolution of 2.5 km and 65 vertical layers, and from April 2015 1.3 km and 90 vertical layers.

SURFEX as surface model

SURFEX (Surface externalisée) is developed at Météo-France and academia for offline experiments and introduced in NWP models to ensure consistent treatment of processes related to surface. Météo-France uses SURFEX in all their configurations. Surface modelling and assimilation benefit from the possibility of running offline experiments. SURFEX is also used for offline applications in e.g. hydrology, vegetation monitoring and snow avalanche forecasts.

SURFEX includes routines to simulate the exchange of energy and water between the atmosphere and 4 surface types (tiles); land, sea (ocean), lake (inland water) and town. The land or nature tile can be divided further into 12 vegetation types (patches). ISBA (Interaction between Soil Biosphere and Atmosphere) is used for modelling the land surface processes. There are 3 ISBA options; 2- and 3-layer force restore and a diffusive approach, where the first one is used in HIRLAM. Towns may be treated by a separate TEB (Town Energy Balance) module. Seas and lakes are also treated separately. The lake model, FLAKE (Freshwater LAKE), has recently been introduced in SURFEX. A global ECOCLIMAP database which combines land cover maps and satellite information gives information about surface properties. The orography is taken from gtopo30.

SURFEX Scientific Documentation and *User's Guide* are available on http://www.cnrm.meteo.fr/surfex/

Data assimilation

NWP models are updated regularly using observations received in real-time from the global observing system. MEPS is updated each third hour; at 00, 03, 06, 09, 12, 15, 18 and 21 UTC.

Surface analysis

Surface analysis is performed by CANARI (Code d'Analyse Nécessaire à ARPEGE pour ses Rejets et son Initialisation) (Taillefer, 2002). The analysis method is Optimal Interpolation and only conventional synoptic observations are used. 2 meter temperature and relative humidity observations are used to update the surface and soil temperature and moisture.

The snow analysis is also performed with CANARI in analogy with the HIRLAM snow analysis. Snow depth observations are used to update Snow Water Equivalent. The snow fields are analysed only at 06 UTC as there are very few snow depth observations at 00, 03, 09, 12, 15, 18 and 21.

The Sea Surface Temperature (SST) and Sea Ice Concentration (SIC) is not analysed, but taken from the boundaries. IFS uses the OSTIA (Operational Sea Surface Temperature and Sea Ice Analysis) product, including SST from UK Met Office and SIC from MET. SST and SIC for the Baltic Sea have since 26 November 2015 been taken from ocean models run at SMHI; first HIROMB and since 26 April 2017 NEMO.

The surface temperature over sea ice was taken from the boundary model and remained unchanged through the forecast. A simple thermodynamical sea ice scheme (SICE) giving prognostic sea ice temperatures in 4 fixed layers was introduced 26 November 2015.

Upper air analysis

MEPS runs three dimensional variational (3D VAR) data assimilation using conventional observations from synop stations, ships, radiosondes and aircrafts and AMSU-A and AMSU-B/MHS data from polar orbiting NOAA and METOP satellites. GNSS were introduced 17 February 2015, radar reflectivities 16 June 2015, IASI 26 November 2015 and ASCAT 17 March 2016. Mode-S EHS, AMSU-A and MHS from METOP-C satellite were introduced June 2020, METOP-C IASI (deactivation of METOP-A IASI), June 2021, radar radial wind observations and German radars, June 2022.

Boundary fields

MEPS gets its boundary values (1-hourly) from the IFS model at approximately 9 km resolution, and has currently 65 vertical levels. None of the HARMONIE configurations at MET Norway have applied digital filter initialization (DFI).

Verification measures

All model forecasts in this report are verified against observations by interpolating (linear) the grid based forecasts to the observational sites. As a consequence, it should be noted that it is the models' abilities to forecast the observations that is being quantifed and assessed. Thus, there is no attempt in this report to verify area averaged precipitation for example.

Verification is carried out both for raw and categorized forecasts. In the following, let $f_1, ..., f_n$ denote the forecasts and $o_1, ..., o_n$ the corresponding observations.

Forecasts of continuous variables

The verification statistics applied to continuous variables are defined in the table below.

Statistic	Acronym	Formula	Range	Optimal score
Mean Error	ME	$\frac{1}{n}\ \sum_{i=1}^{n}(f_i - o_i)$	$-\infty$ to ∞	0
Mean Absolute Error	MAE	$\frac{1}{n}\ \sum_{i=1}^{n} \mid f_i - o_i \mid$	0 to ∞	0
Standard Deviation of Error	SDE	$\left(\frac{1}{n}\sum_{i=1}^{n}(f_i - o_i - \mathrm{M}E)^2\right)^{1/2}$	0 to ∞	0
Root Mean Square Error	RMSE	$\left(\frac{1}{n}\sum_{i=1}^{n}(f_i - o_i)^2\right)^{1/2}$	0 to ∞	0
Correlation	COR	$\frac{\frac{1}{n}\sum_{i=1}^{n}(f_i - \bar{f})(o_i - \bar{o})}{\mathrm{SD}(f)\mathrm{SD}(o)}$	-1 to 1	1

In the formula for COR the following definitions are used

$$\bar{f} \ = \ \frac{1}{n}\sum_{i=1}^{n} f_i, \qquad \bar{o} \ = \ \frac{1}{n}\sum_{i=1}^{n} o_i$$

$$\mathrm{S}D(f) \ = \ \Big(\frac{1}{n}\sum_{i=1}^{n}(f_i - \bar{f})^2\Big)^{1/2}, \qquad \mathrm{S}D(o) \ = \ \Big(\frac{1}{n}\sum_{i=1}^{n}(o_i - \bar{o})^2\Big)^{1/2}$$

for the means and standard deviations of the forecasts and observations.

For wind direction the probability density function (PDF) is used to show the distribution of observed and forecast wind directions. The PDF used here is a kernel density estimate, which is a smoothed version of the histogram.

Forecasts of categorical variables

All variables in this report are continuous in raw form, but it is possible to categorize them and verify these. For example, wind speed above a given threshold could be of interest which would result in two possible outcomes (yes and no). The verification is then completely summarized by a contingency table as the one shown below

		event observed	
		yes	no
event forecasted	yes	a	b
	no	c	d

Verification statistics for such forecasts are listed in the following table

Statistic	Acronym	Formula	Range	Optimal score
Hit rate	HR	$\frac{a}{a+c}$	0 to 1	1
False alarm rate	F	$\frac{b}{b+d}$	0 to 1	0
False alarm ratio	FAR	$\frac{b}{a+b}$	0 to 1	0
Equitable threat score	ETS	$\frac{a-ar}{a+b+c-ar}$	$-1/3$ to 1	1 (0 = no skill)
Hanssen-Kuipers skill score	KSS	HR - F	-1 to 1	1 (0 = no skill)
Heidke skill score	HSS	$\frac{(a+d)/n-ssf}{1-ssf}$	$-\infty$ to 1	1 (0 = no skill)

In the formula for ETS $ar=(a+b)(a+c)/n$.
In the formula for HSS the score for the standard forecast $ssf=[(a+b)(a+c)+(b+d)(c+d)]/n^2$.

Observations

All observations come from frost.met.no. Only synop stations are used. From June 1 2021, both the model wind speed and the post-processed wind speed are verified against mean wind observations, FF. The model wind gust is verified against the observed wind gust, FG. FF and FG are defined as follows:

- FF: Wind speed (10 meters above ground) - defined as the mean value for the last 10 minutes before the time of the observation.
- FG: Gust wind speed (10 m above ground) - defined as highest gust wind speed (3 second mean) the last 10 minutes before the time of the observation.

Summary of the results

Summarized statistics show that IFS in general forecasts sea level pressure better than MEPSctrl/AA25, but the errors are small for both.

Temperature is on average better forecast by MEPSctrl/AA25 than IFS. IFS underestimates the temperature for all the different groups of stations. MEPSctrl shows a small underestimation for the Norwegian stations, but to a lesser degree than IFS. AA25 shows a small underestimation for the Svalbard stations, about the same as IFS. For the North Norwegian stations there is a very slight underestimation for both MEPSctrl and AA25. Still, the errors are small, indicating that the timing of the temperature changes is generally good. The temperature forecast from MEPSctrl is further improved by post processing, particularly for the shortest lead times. The improvement is larger for inland stations than coastal stations, which have less variation in temperature and smaller errors than inland stations for both MEPSctrl and post processed forecasts.

For wind speed and precipitation, a larger number of verification scores is used to assess model quality, including threshold statistics.

Wind speed is challenging to evaluate. MEPSctrl performs better than IFS over land, and particularly in the mountains, where IFS underestimates the speed considerably as seen in the monthly mean error and mean absolute error. AA25 performs about as well as IFS for the Svalbard stations. While AA25 has a general tendency to overestimate the wind speed, IFS shows the opposite. For the North Norwegian stations MEPSctrl and AA25 show a slightly better skill than IFS, at least for shorter lead times. The threshold scores indicate that wind speed is better forecast for lower than for higher wind speeds for all models. The post-processing of wind speed shows a small effect in the mean error and mean absolute error, while the other scores show almost identical results for MEPSctrl and YrPP.

Precipitation also shows varying results, depending on the amount and location. On average IFS has slightly more precipitation than MEPSctrl. Both models have more errors for both very small and very high amounts, than for precipitation in the mid range.

For temperature and wind, the monthly scores for the last three years show that the models generally perform better during summer months than during winter. A possible cause is that storm activity is challenging to predict accurately, and that there are often more storms with high wind speeds during fall and winter than during summer. Precipitation does not have clear seasonal patterns. Convective cases that are challenging to predict may occur with different frequency for different months and years. A challenge with verification of precipitation that occurs during winter is the undercatchment of observed snow. This is the case when there is strong wind in combination with snow, which is often the case especially in Northern Norway and in the mountainous areas in Southern Norway. It is suspected that the models are too dry in the coastal and fjord areas, but the undercatchment leads to cases where the observations give an impression that there is better fit in the models with regards to precipitation than what is actually the case. AA25 and MEPSctrl show very similar results, which is expected since both are HARMONIE models with AROME physics and a horizontal resolution defined by a 2.5×2.5 km^2 grid.

Case studies by forecasters

Case 1. Easterly wind on Svalbard

This past winter and spring have featured several episodes of strong easterly winds on Svalbard. These events were driven by a synoptic situation dominated by a stationary high-pressure system located north to northeast of Svalbard, coupled with low-pressure activity farther south. This pressure pattern created a wind field with a pronounced easterly component, which led meteorologists to issue wind gust warnings for parts of Svalbard on two occasions.

On March 6th, a yellow warning for strong wind gusts was issued for Nordenskiöld Land, covering the most populated area of Svalbard. The criteria for issuing a yellow warning in this region are 10-meter (10m) wind gusts exceeding 35 m/s. Since the IFS model does not provide wind gust forecasts, AA25 serves as the primary model for predicting gusts in Arctic regions at MET Norway. Figure 1 shows the wind gust model field from AA25 over Svalbard at 12 UTC. In this forecast, certain areas of Nordenskiöld Land show gusts exceeding 45 m/s, while the rest of the area has values between 30 and 40 m/s.

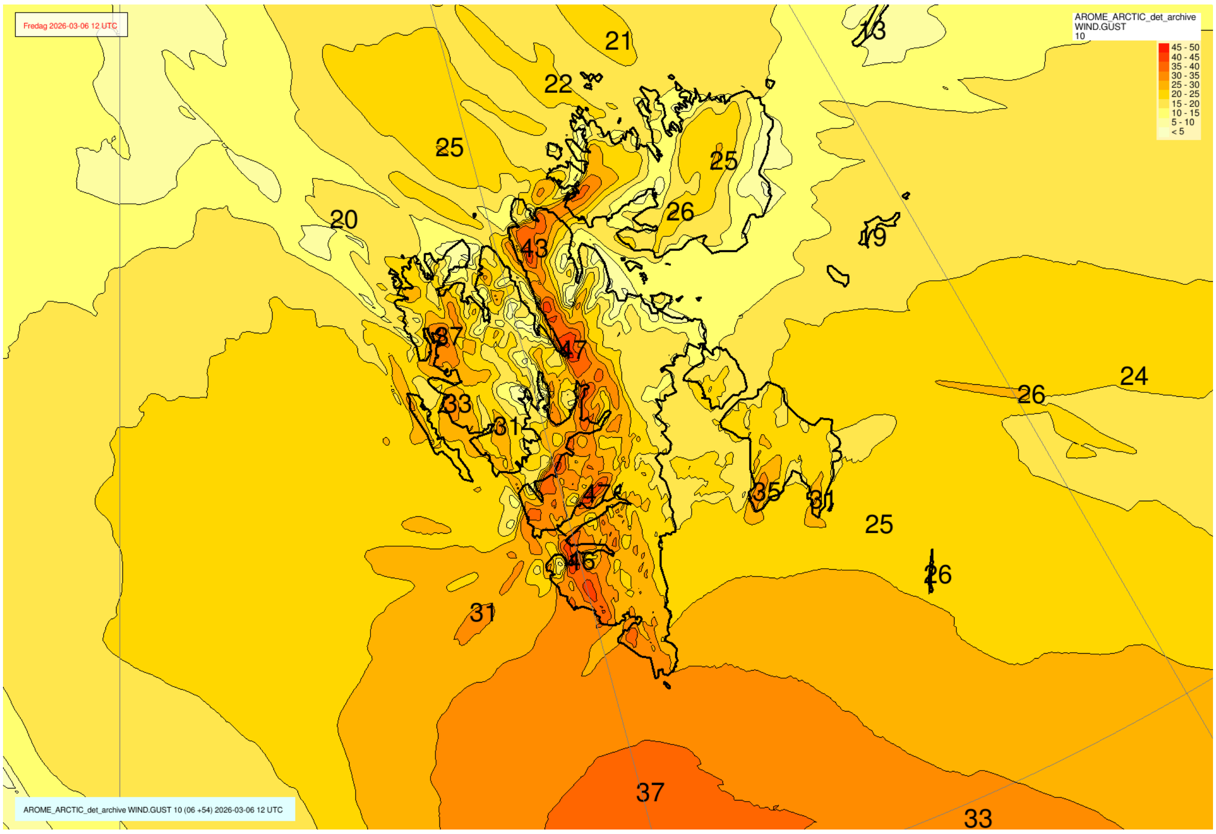


Figure 1: 10m wind gust (m/s) from AA25 at 12 UTC March 6th (+54 hours lead time). The black numbers represent local maximum values.

Although IFS does not forecast gusts, comparing its 10m wind speed forecast with that of AA25 during the same time period offers valuable information. Figure 2 presents this comparison (in knots) at the same timestamp as figure 1. It is evident that AA25 generally predicts higher wind speeds than IFS, particularly over land. A notable example of this discrepancy is found when examining model output of maximum 10m wind speed at Longyearbyen airport on March 6th. IFS forecasted 20 kt, while AA25 predicted a significantly higher value of 55 kt. The actual recorded maximum wind speed that day was 30 kt.

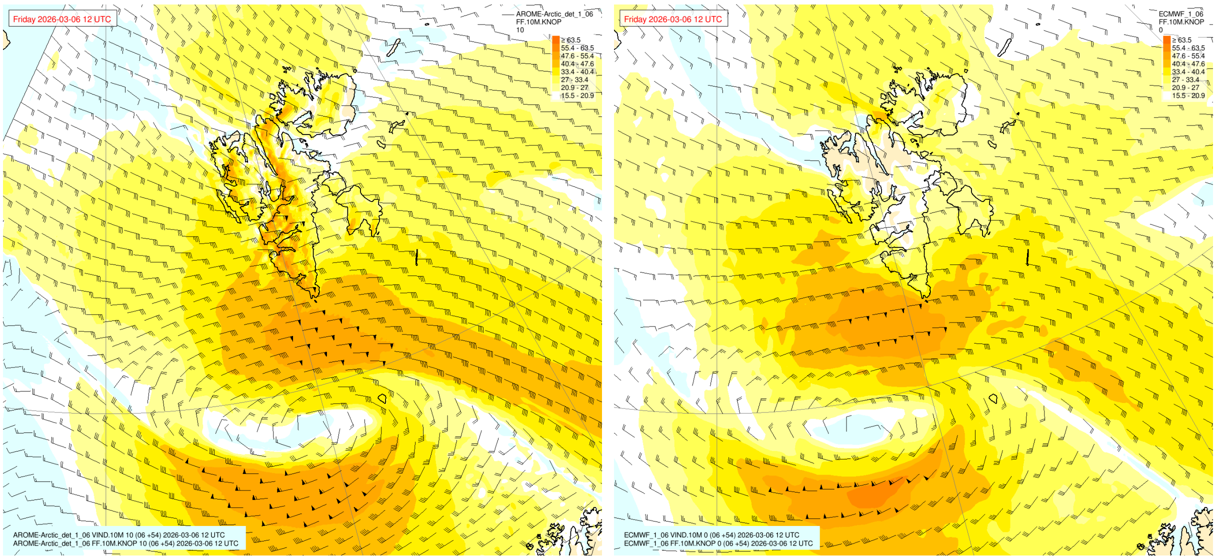


Figure 2: 10m wind speed fields and wind barbs from AA25 (left) and IFS (right) in knots at 12 UTC March 6th (+54 hours lead time).

After the event concluded, the highest recorded wind gusts on Nordenskiöld Land were 36.6 m/s at Platåberget (450 masl) and 26.2 m/s in Longyearbyen (52 masl). Other stations in the region measured gusts ranging from 20 to 23 m/s. This indicates that the yellow warning may not have been fully justified, particularly since wind gusts in the most populated areas did not exceed the 35 m/s threshold. As a result of the issued warning, avalanche danger levels were elevated, likely a prudent measure. However, the resulting cancellation of flights, in hindsight, appears to have been unnecessary.

Case 2. Spring temperatures in the mountains

This spring, several reports have highlighted a significant negative bias in nighttime and early morning temperatures on mountain tops in both southern and northern Norway. This issue is particularly relevant for avalanche forecasting during the winter and spring seasons.

The MEPSctrl model with cycle 43 has shown slightly lower temperatures at mountain tops compared to AA25, which now operates with cycle 46. The discrepancy arises because MEPSctrl allows for a positive Richardson number, leading to a decoupling between the surface and the lower model layers. In contrast, AA25 limits the Richardson number to zero, promoting greater exchange between the surface and the boundary layer. This decoupling in MEPSctrl often results in excessive cooling and unrealistically low 2-meter temperatures (T2m) compared to observations. For instance, at the Sjufjellet observation site (1074 masl) at 02 UTC on May 14th, a T2m of -1.3°C was recorded, whereas MEPSctrl forecasted -5.4°C (figure 3). In contrast, snow-free areas at lower altitudes show almost no bias in T2m.

Figure 3: The MEPSctrl T2m forecast from May 14, 2026, at 02 UTC (light blue lines with field minima labeled) is plotted against observations (T2m, elevation, and station names shown in white). Snow-covered mountain tops are evident as areas with locally lower temperatures. Sjufjellet, in Tamokdalen, Troms, is visible on the right side of the image.

Model resolution and terrain smoothing also significantly influence temperature and wind forecasts. In Norway's complex terrain, models with a 2.5 km resolution sometimes misrepresent altitudes by up to 500 meters, especially near the coast where the terrain rises steeply from the sea. Similarly, the model terrain is often higher than the actual terrain inland or on the Swedish side of the Scandinavian mountain range. This altitude discrepancy, combined with postprocessing on Yr.no that assumes a constant lapse rate of 0.6°C per 100 meters, results in substantial biases in public temperature forecasts. For avalanche forecasters, a simple workaround has been proposed: using model temperatures at a similar height to the mountain top (e.g., T at 800 hPa, approximately 2000 meters) instead of local T2m.

The spring snow cover significantly affects not only 2-meter temperatures but also broader weather patterns in northern Norway, including convective precipitation and thermally driven low-level winds. As shown in figure 4, the bias in T2m for MEPSctrl and AA25 is rather similar, suggesting that the mountain temperature bias is less related to differences in surface-to-lower-layer exchange and the Richardson number. Instead, since the bias is primarily observed at snow-covered mountain tops, it is more likely associated with issues related to snow cover and its cooling effects.

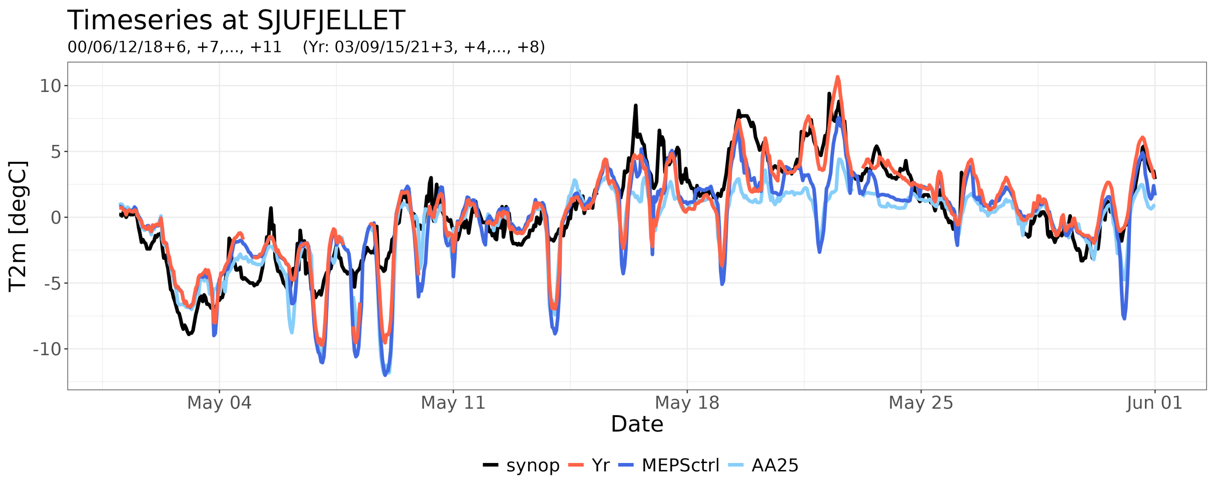


Figure 4: Time series data from Sjufjellet from May indicate that the T2m error is primarily associated with nighttime minimum temperatures. While the Yr postprocessing provides some improvement, it is insufficient to fully address the issue. AA25 with cycle 46 appears to exhibit a slightly less pronounced nighttime negative bias compared to MEPSctrl.

Case 3. Clouds on May 17th

The weather on Norway's constitutional day, May 17th, is always a topic of great interest across the country. This year, weather forecasts for the Tromsø area on yr.no predicted a sunny morning, perfect for parade celebrations. However, the actual weather deviated from expectations, with a cloudy and gray morning that was slightly colder than anticipated.

The observed weather conditions can be explained by a high-pressure system situated over the sea west of Northern Norway. This system caused onshore winds at low levels, which transported a layer of moisture inland. Despite the subsidence effect of the high-pressure system, the moisture layer persisted, resulting in a blanket of clouds.

Different weather models captured this situation with varying accuracy. When comparing the low-cloud forecasts from MEPSctrl, AA25 and IFS with satellite imagery at 06 UTC (figure 5), significant differences in predicted cloud cover are evident. Both MEPSctrl and AA25 showed no clouds over land near Tromsø, while the IFS model correctly forecasted widespread cloud cover in the region.

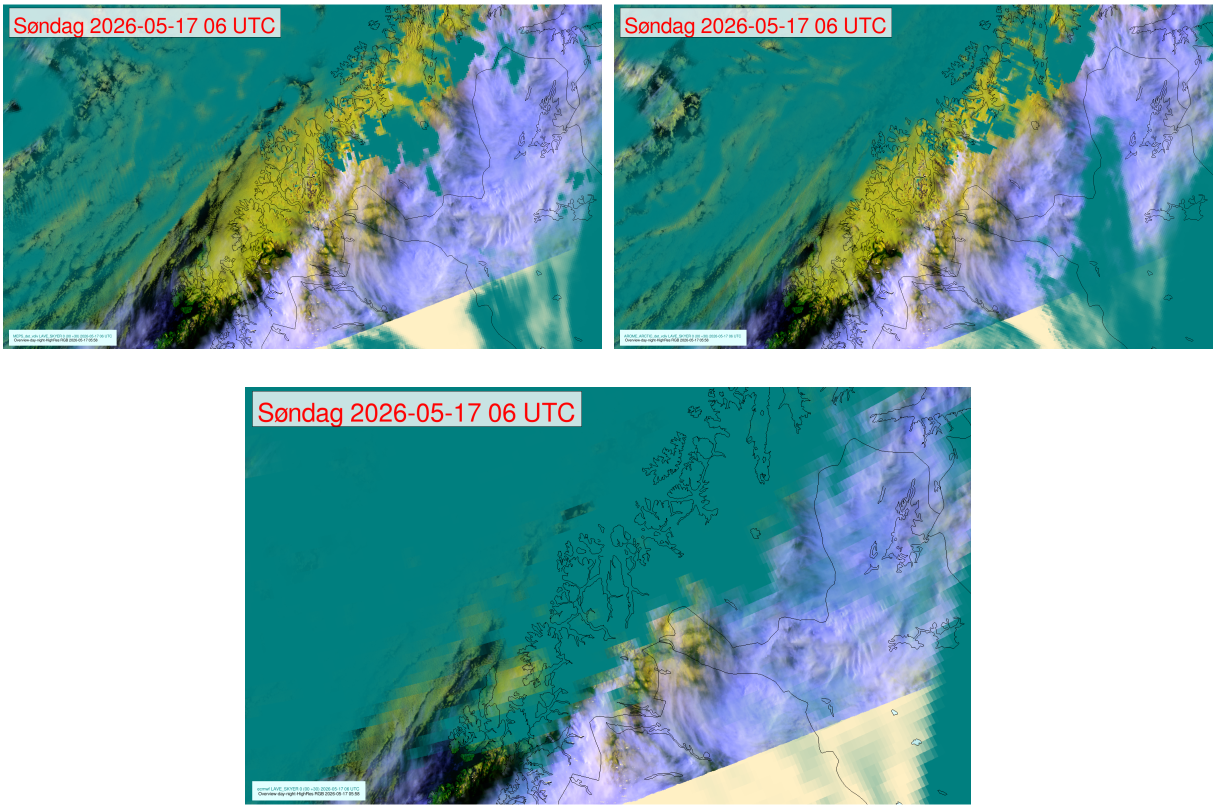


Figure 5: Model fields for low clouds (dark green) from MEPSctrl (top left), AA25 (top right) and IFS (bottom) laid over a satellite image at 06 UTC May 17th. The low cloud layer in the satellite image appears as yellow.

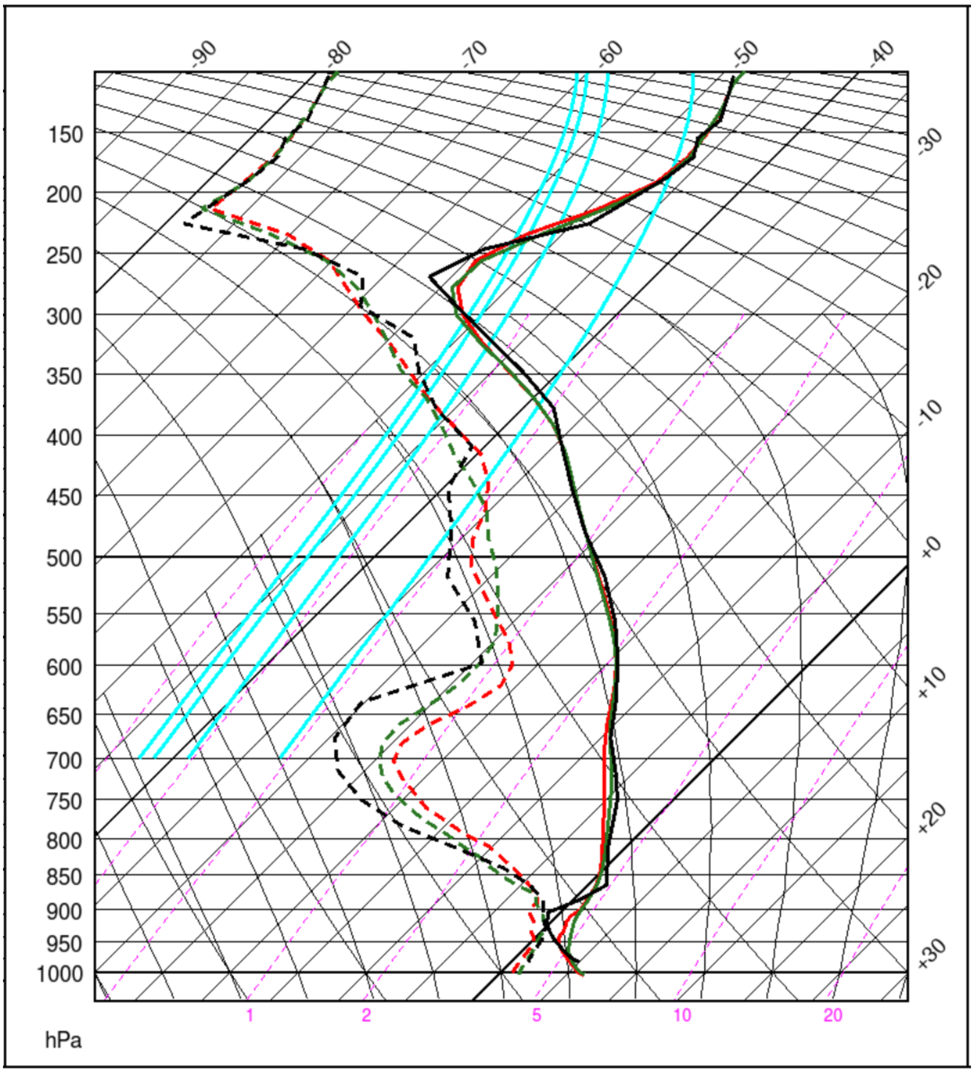


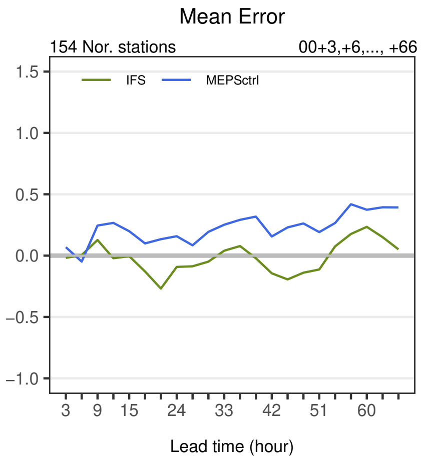
Figure 6: Prognostic sounding from Tromsø airport, Langnes at 06 UTC May 17th. MEPSctrl in red, AA25 in green and IFS in black.

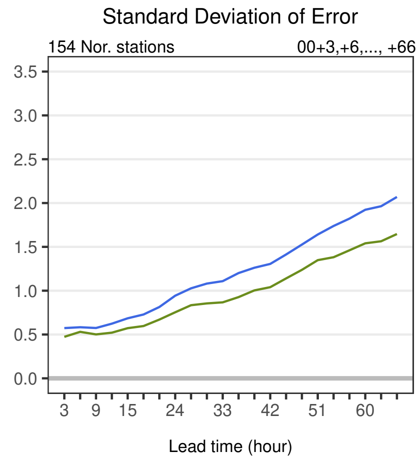
The prognostic soundings in figure 6 reveal notable differences in how the models represent the vertical profile of the atmosphere. In the IFS model, the layer between 950 and 900 hPa is saturated, indicating the presence of clouds. In contrast, MEPSctrl and AA25 show a clear separation between the temperature and dew point temperature, suggesting unsaturated conditions in that layer.

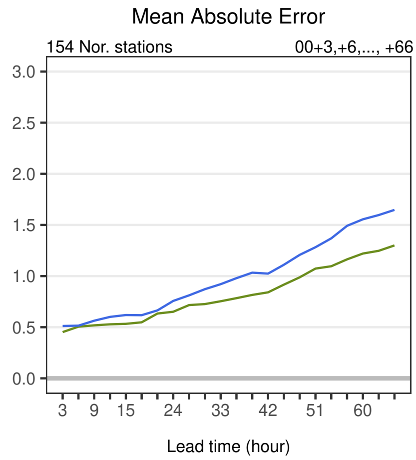
The reason why IFS captures the cloud layer more accurately remains uncertain. One possible explanation is that the turbulence schemes in MEPSctrl and AA25 may be overly active, leading to excessive mixing in the lower atmospheric layers and inhibiting the formation of a distinct cloud layer. Additionally, the vertical resolution of the models could play a significant role. The IFS model uses 137 vertical layers, offering higher resolution, while MEPSctrl and AA25 operate with 65 vertical layers, potentially missing finer-scale details in thin cloud layers.

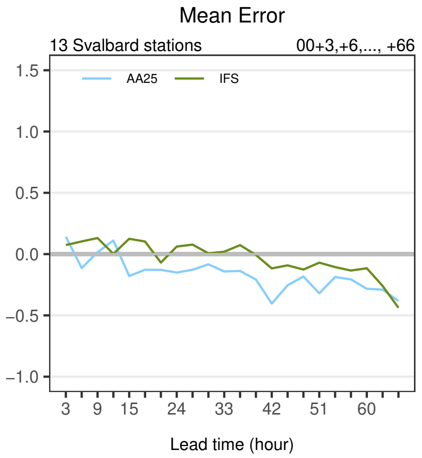
These differences underline the importance of model resolution and turbulence parameterization in accurately capturing thin cloud layers, particularly in complex weather scenarios.

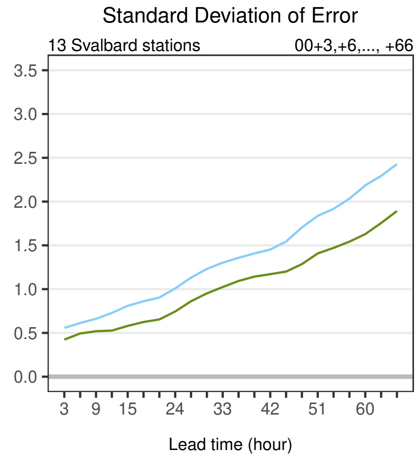
Summarized statistics

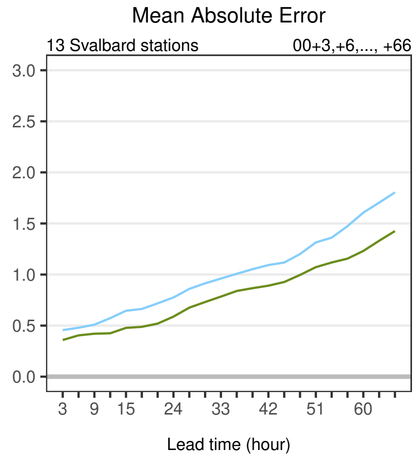

Mean Error
154 Nor. stations
00+3,+6,..., +66
IFS
MEPSctrl
Lead time (hour)

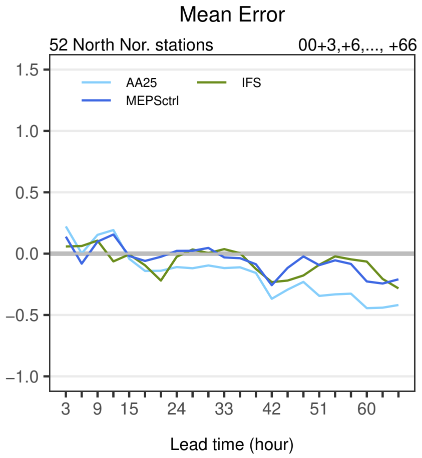

Standard Deviation of Error
154 Nor. stations
00+3,+6,..., +66
Lead time (hour)

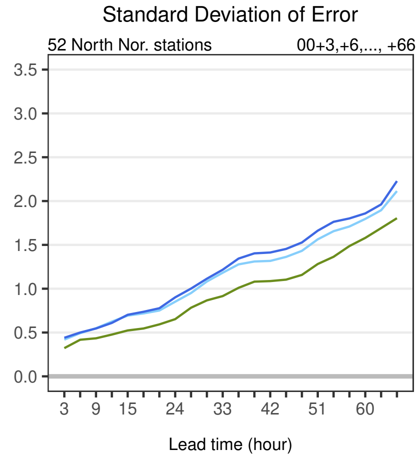

Mean Absolute Error
154 Nor. stations
00+3,+6,..., +66
Lead time (hour)

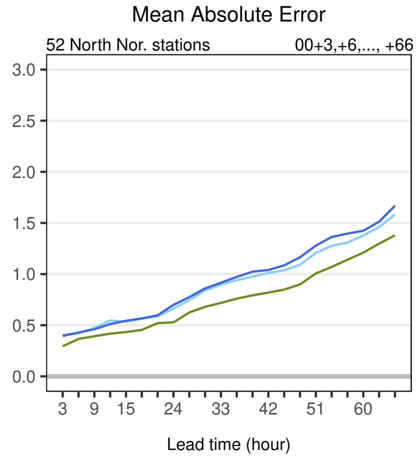

Mean Error
13 Svalbard stations
00+3,+6,..., +66
AA25
IFS
Lead time (hour)

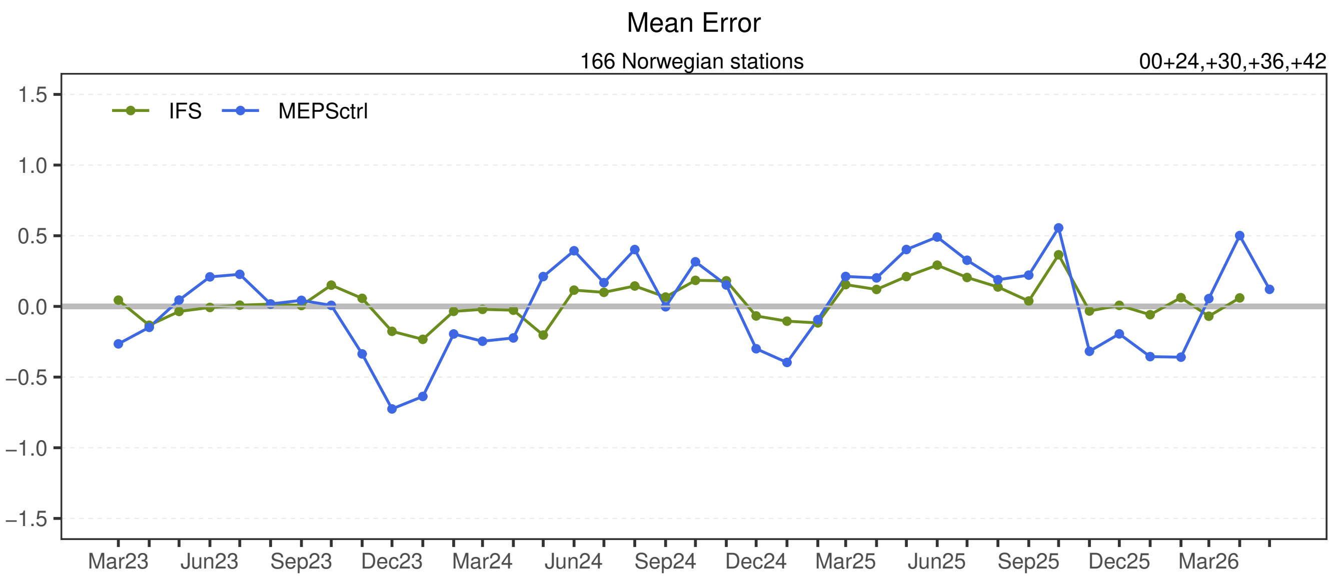

Standard Deviation of Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)

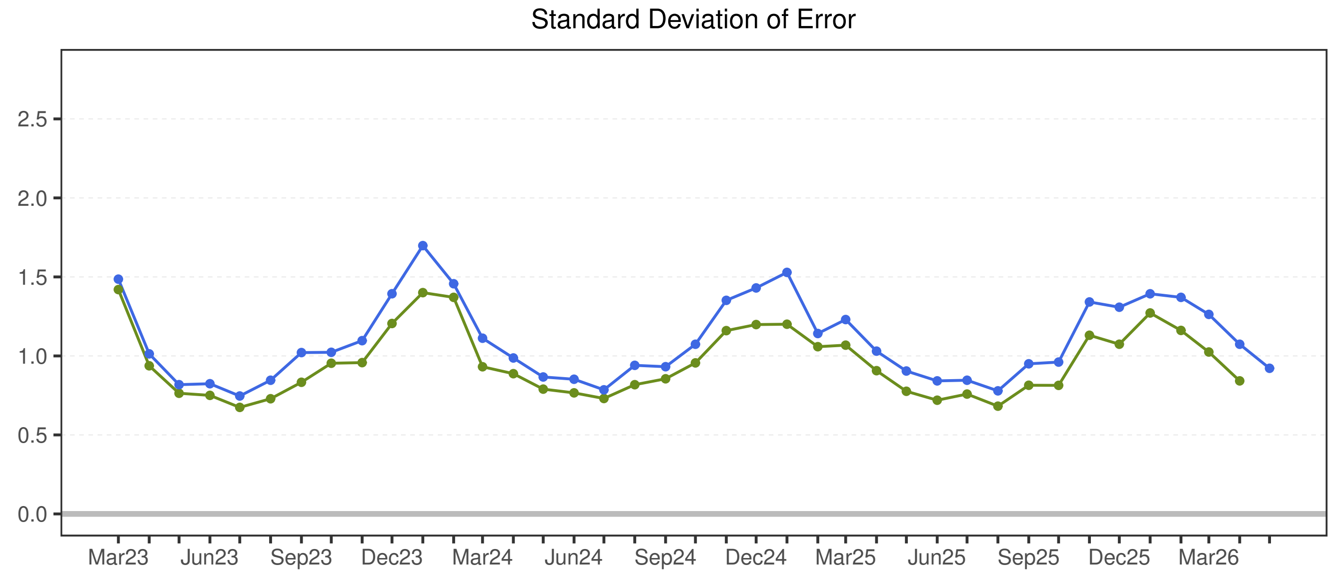

Mean Absolute Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)

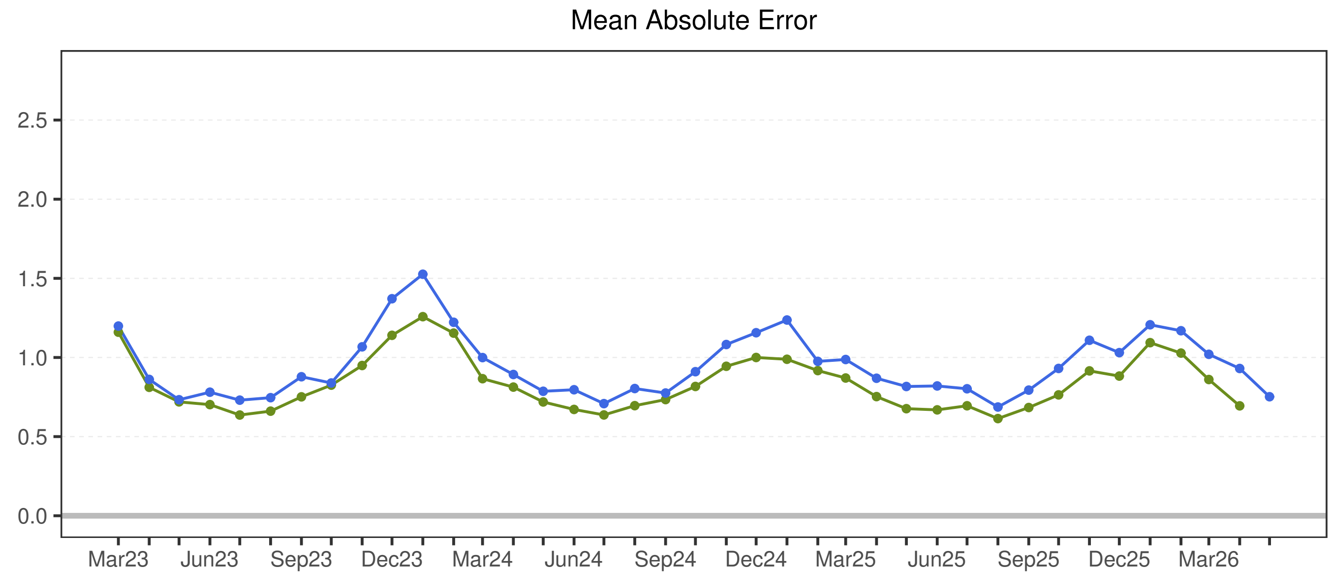

Mean Error
52 North Nor. stations
00+3,+6,..., +66
AA25
IFS
MEPSctrl
Lead time (hour)

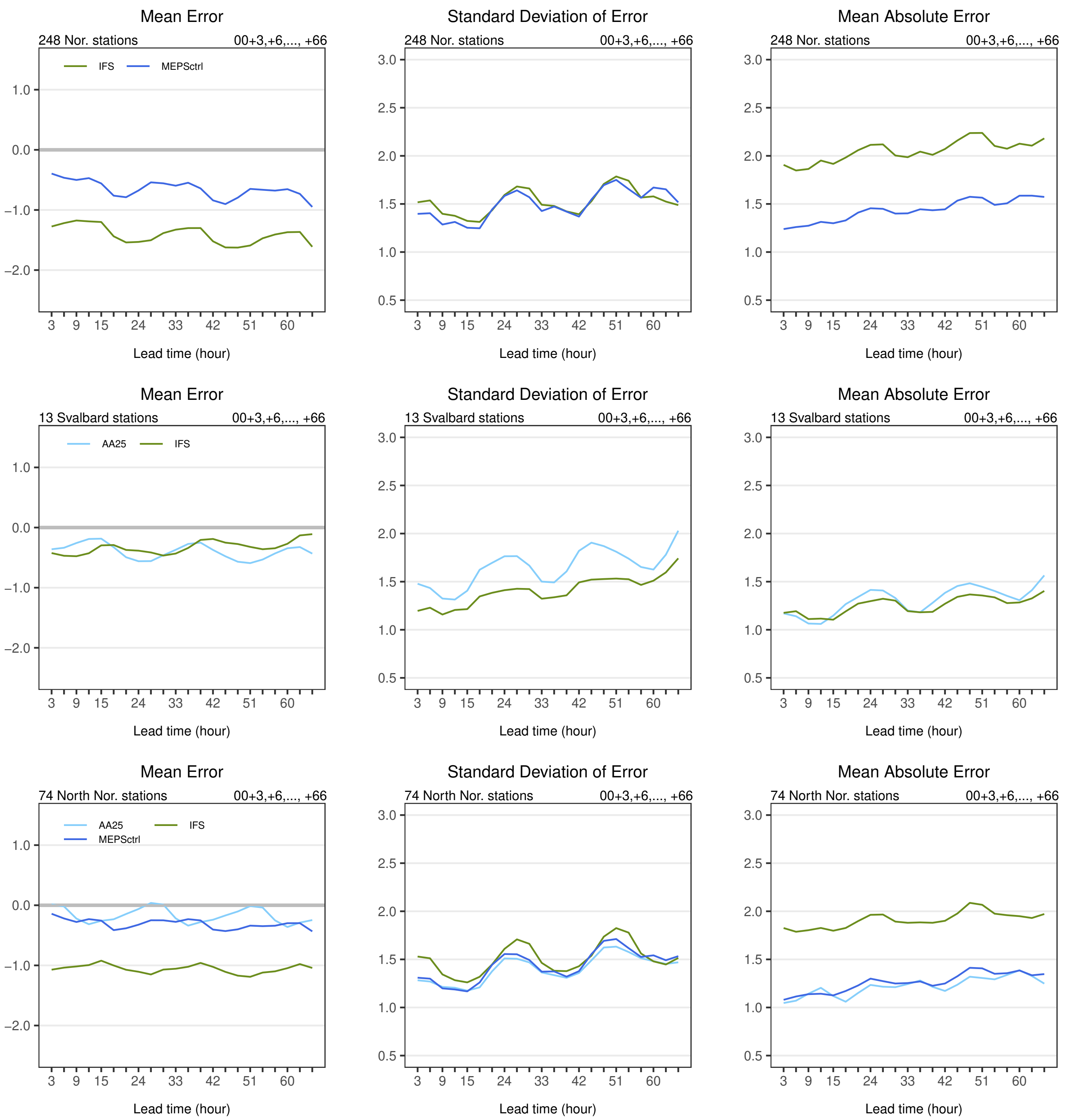

Standard Deviation of Error
52 North Nor. stations
00+3,+6,..., +66
Lead time (hour)

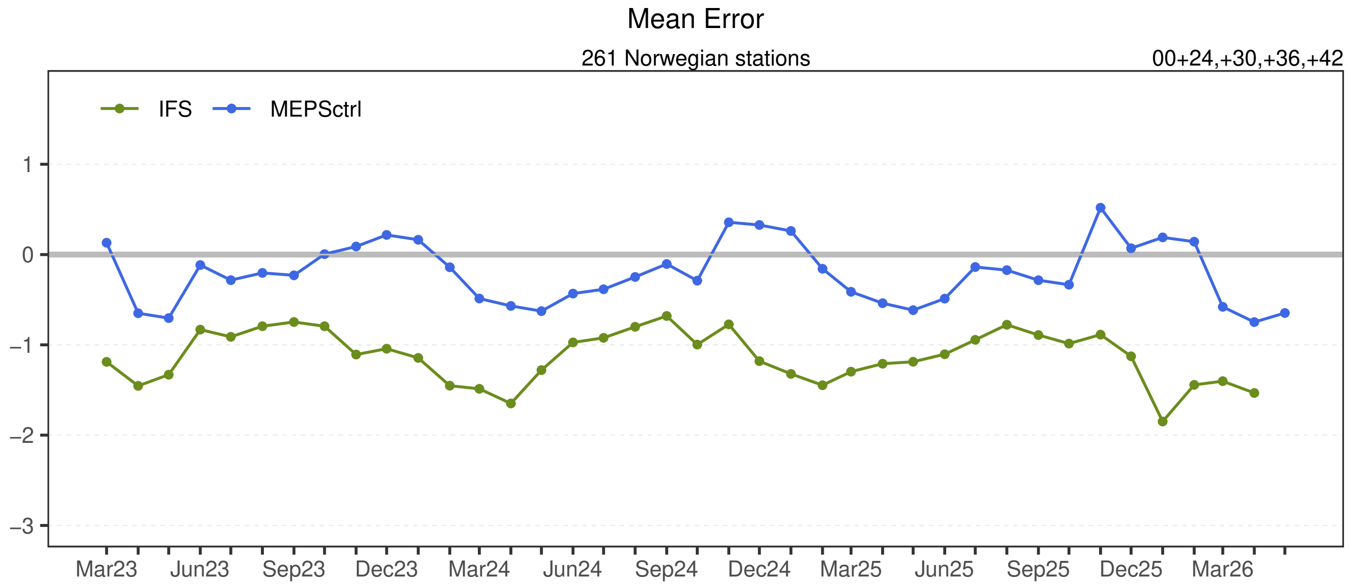

Mean Absolute Error
52 North Nor. stations
00+3,+6,..., +66
Lead time (hour)

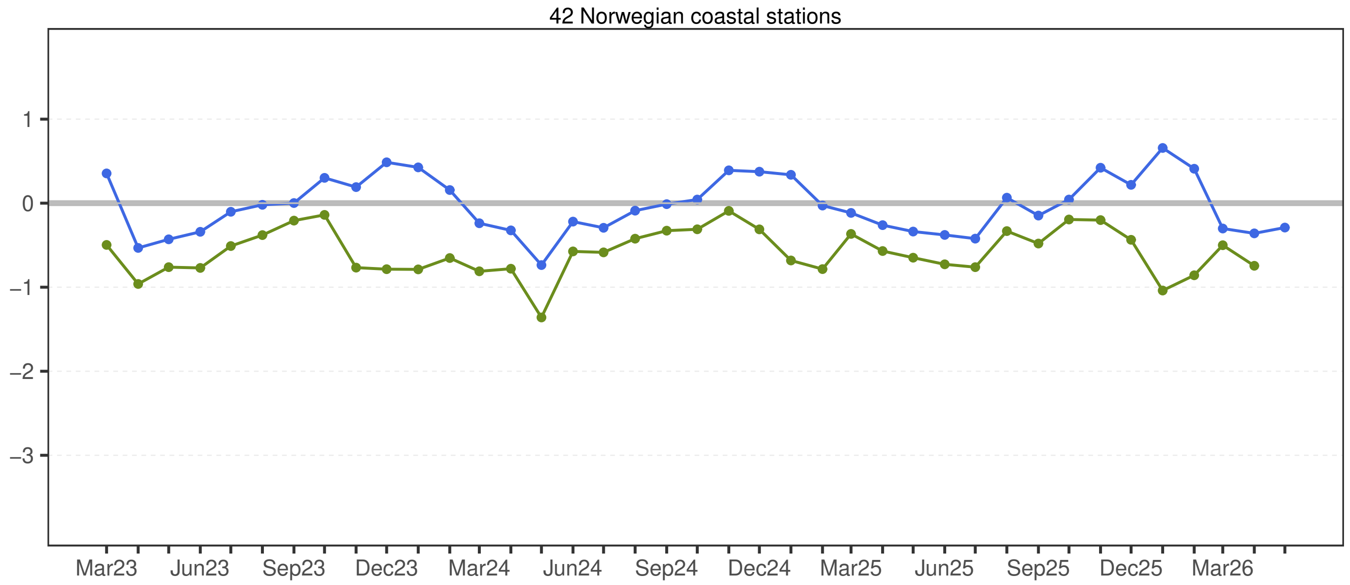

Mean Error
166 Norwegian stations
00+24,+30,+36,+42
IFS
MEPSctrl
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

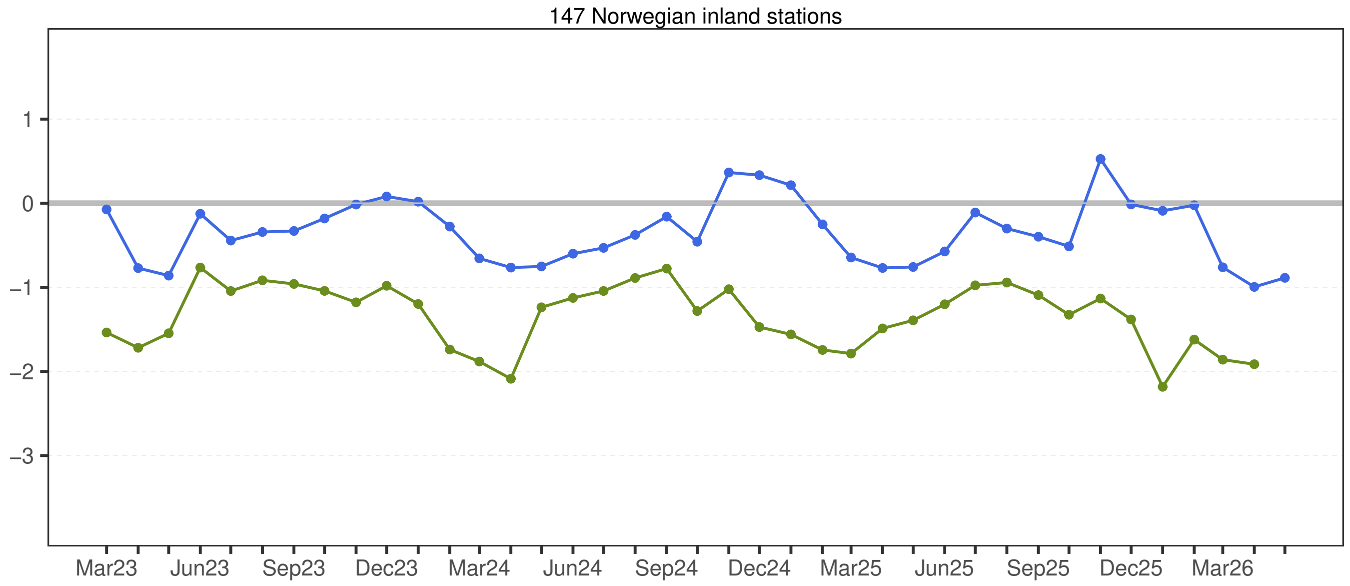

Standard Deviation of Error
2.5
2.0
1.5
1.0
0.5
0.0
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26


Mean Absolute Error
2.5
2.0
1.5
1.0
0.5
0.0
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

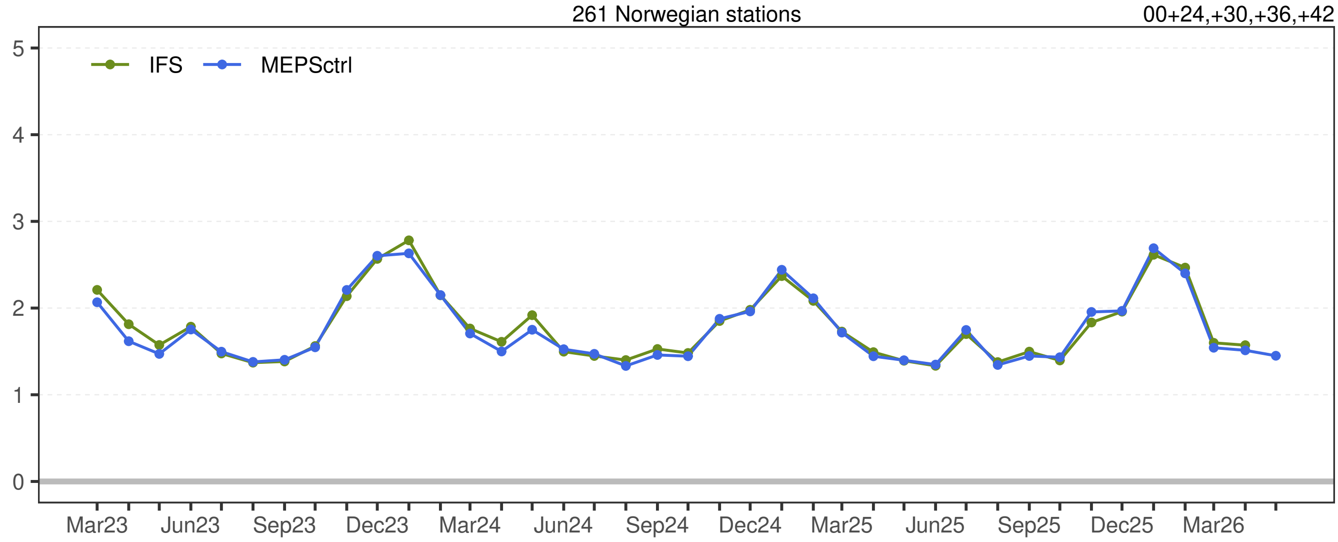

Mean Error
248 Nor. stations
00+3,+6,..., +66
IFS
MEPSctrl
Lead time (hour)
Standard Deviation of Error
248 Nor. stations
00+3,+6,..., +66
Lead time (hour)
Mean Absolute Error
248 Nor. stations
00+3,+6,..., +66
Lead time (hour)
Mean Error
13 Svalbard stations
00+3,+6,..., +66
AA25
IFS
Lead time (hour)
Standard Deviation of Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)
Mean Absolute Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)
Mean Error
74 North Nor. stations
00+3,+6,..., +66
AA25
IFS
MEPSctrl
Lead time (hour)
Standard Deviation of Error
74 North Nor. stations
00+3,+6,..., +66
Lead time (hour)
Mean Absolute Error
74 North Nor. stations
00+3,+6,..., +66
Lead time (hour)

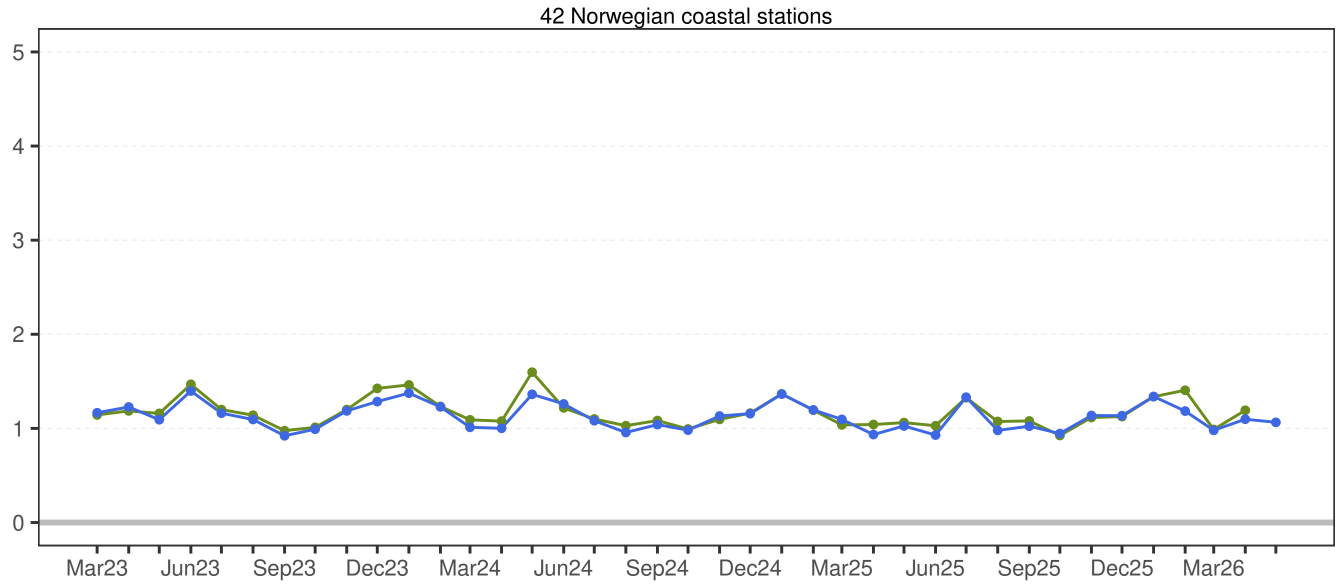

Mean Error
261 Norwegian stations
00+24,+30,+36,+42
IFS
MEPSctrl
1
0
−1
−2
−3
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

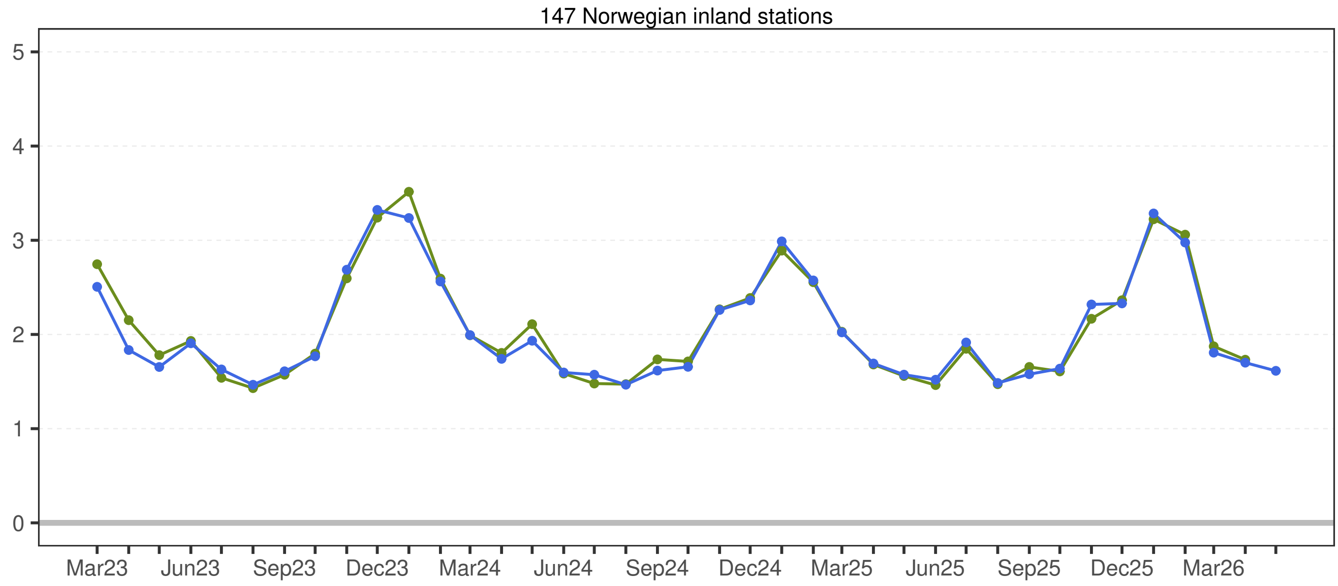

42 Norwegian coastal stations
1
0
−1
−2
−3
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26


147 Norwegian inland stations
1
0
−1
−2
−3
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

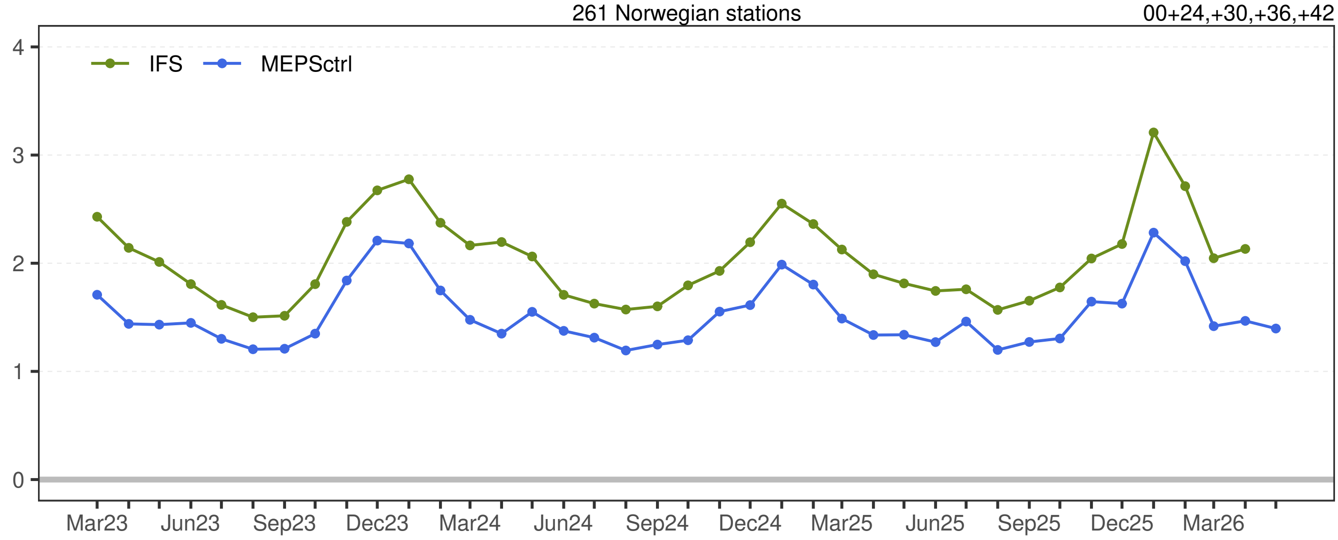
Standard Deviation of Error

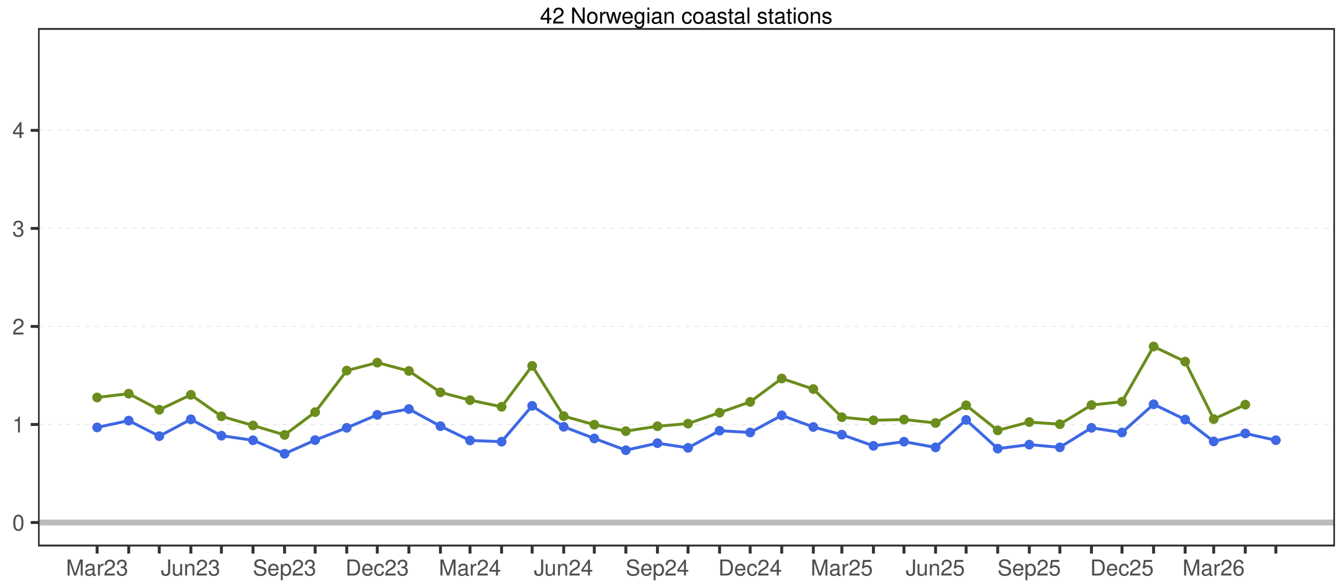


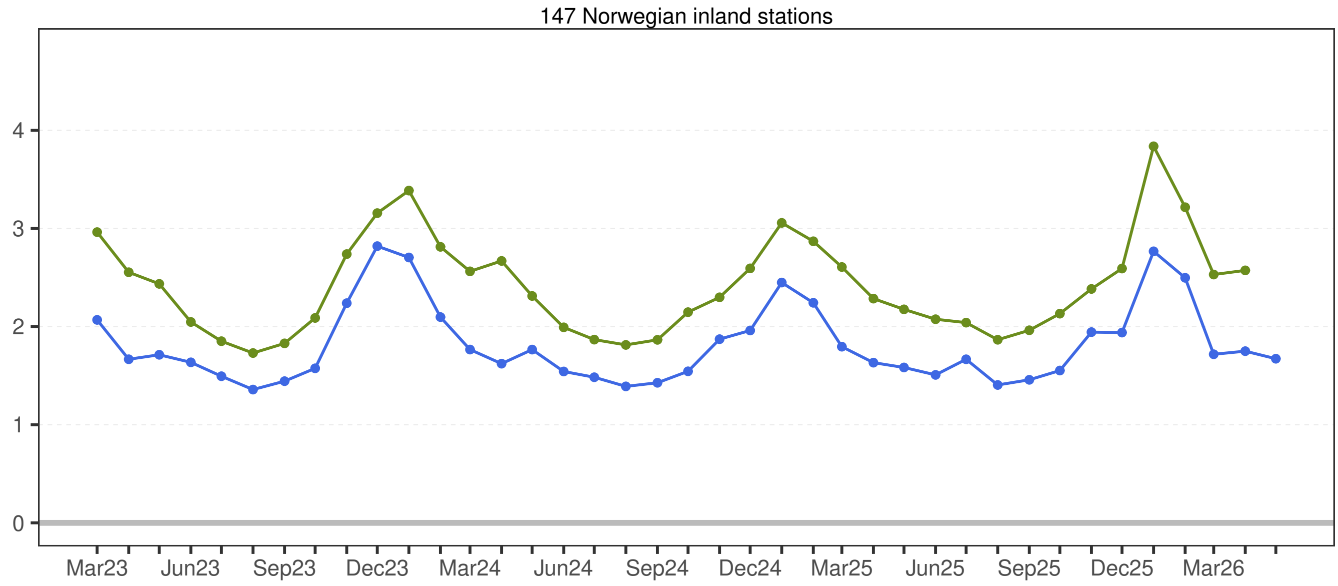




Mean Absolute Error

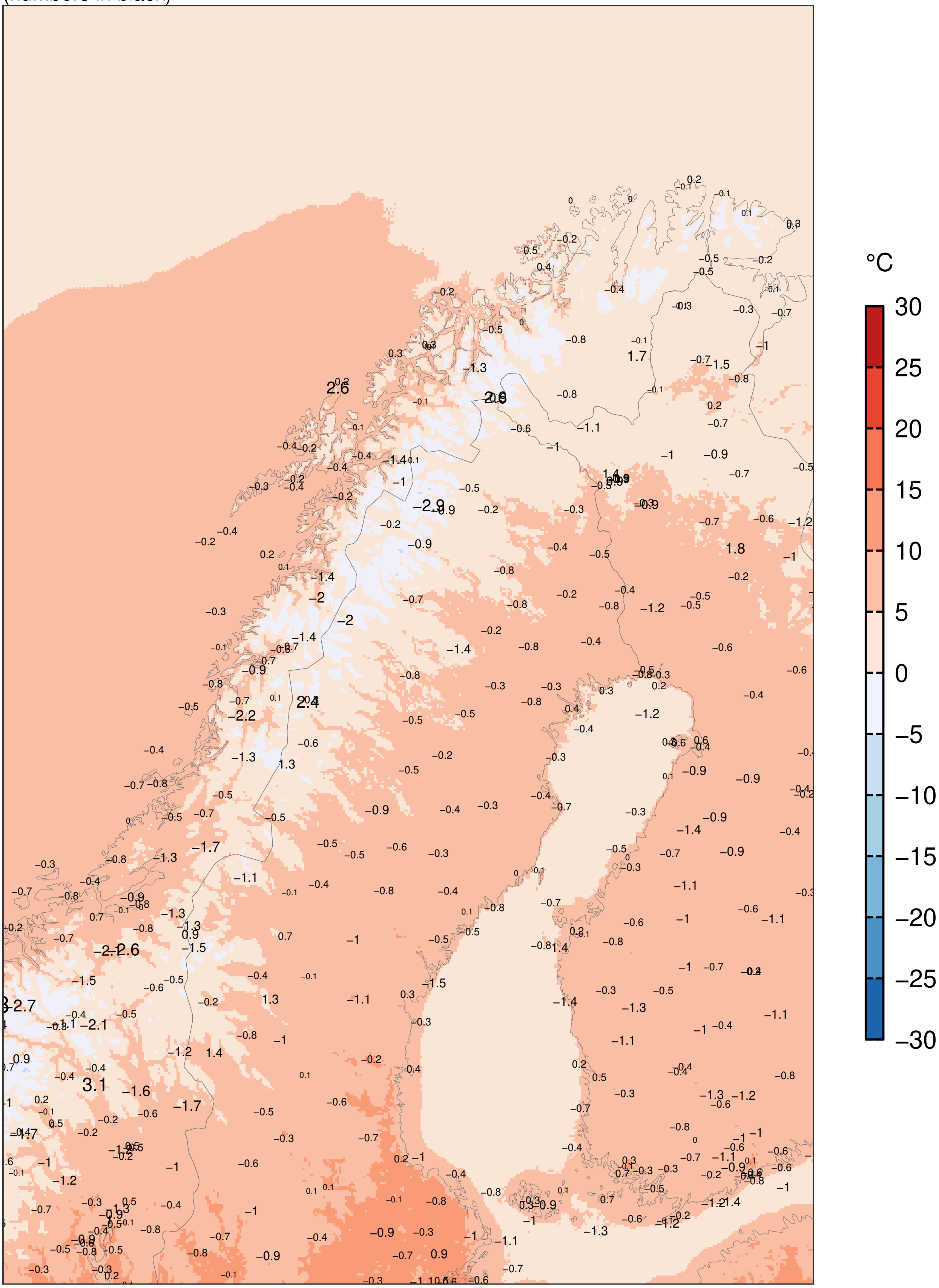




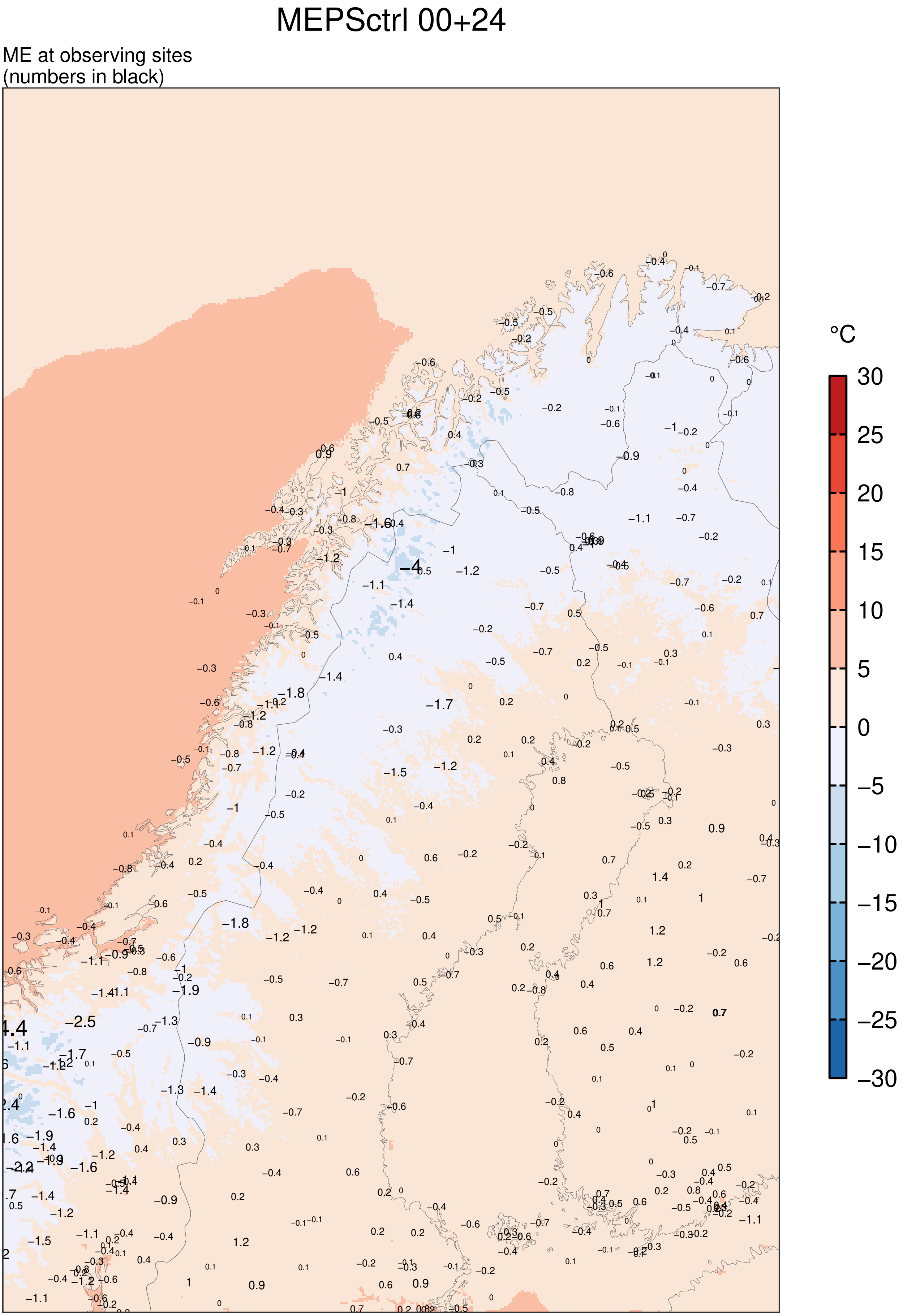


MEPSctrl 00+12

ME at observing sites
(numbers in black)



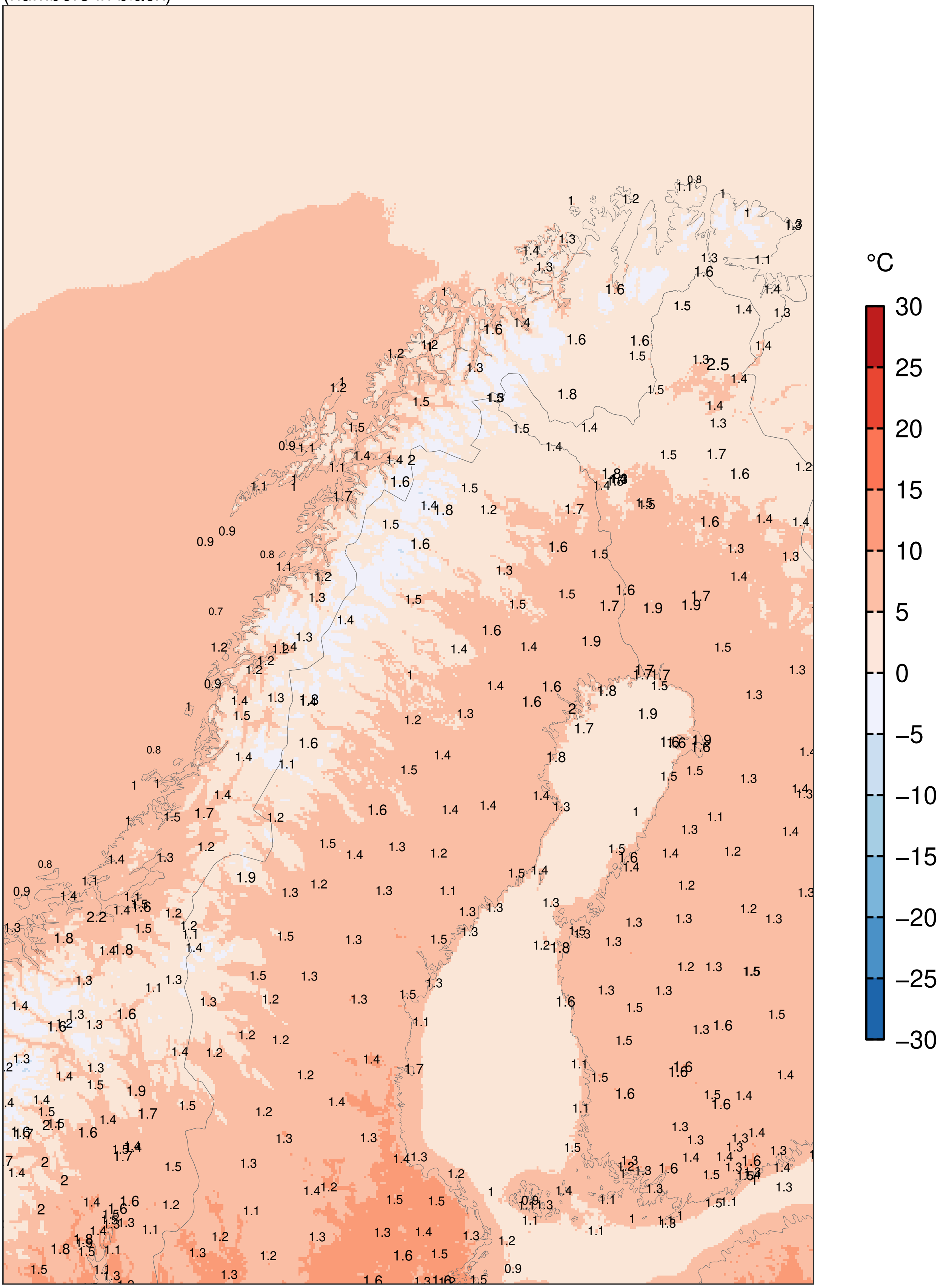
Model "climatology" 01.03.2026–31.05.2026



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

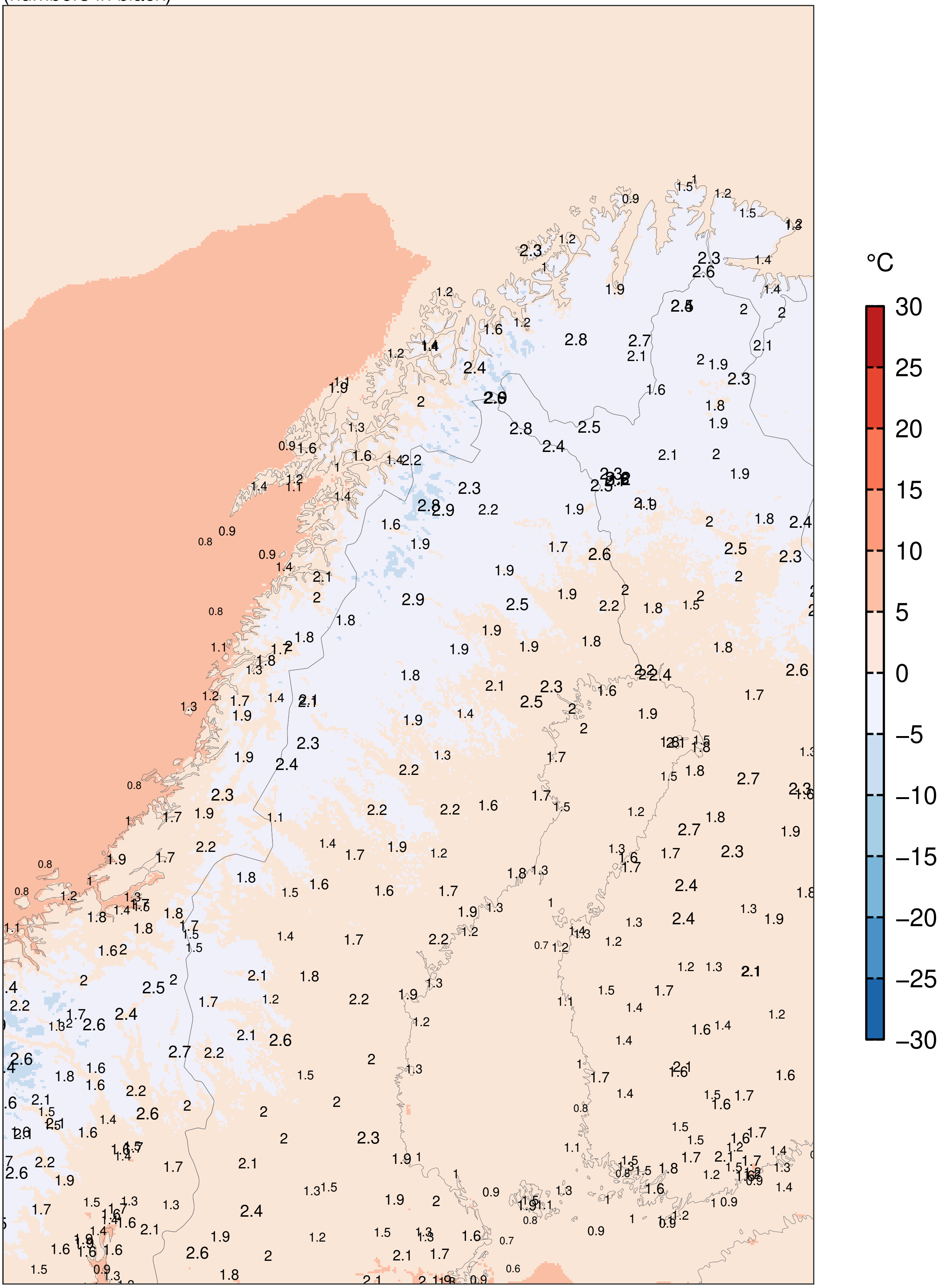
SDE at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+24

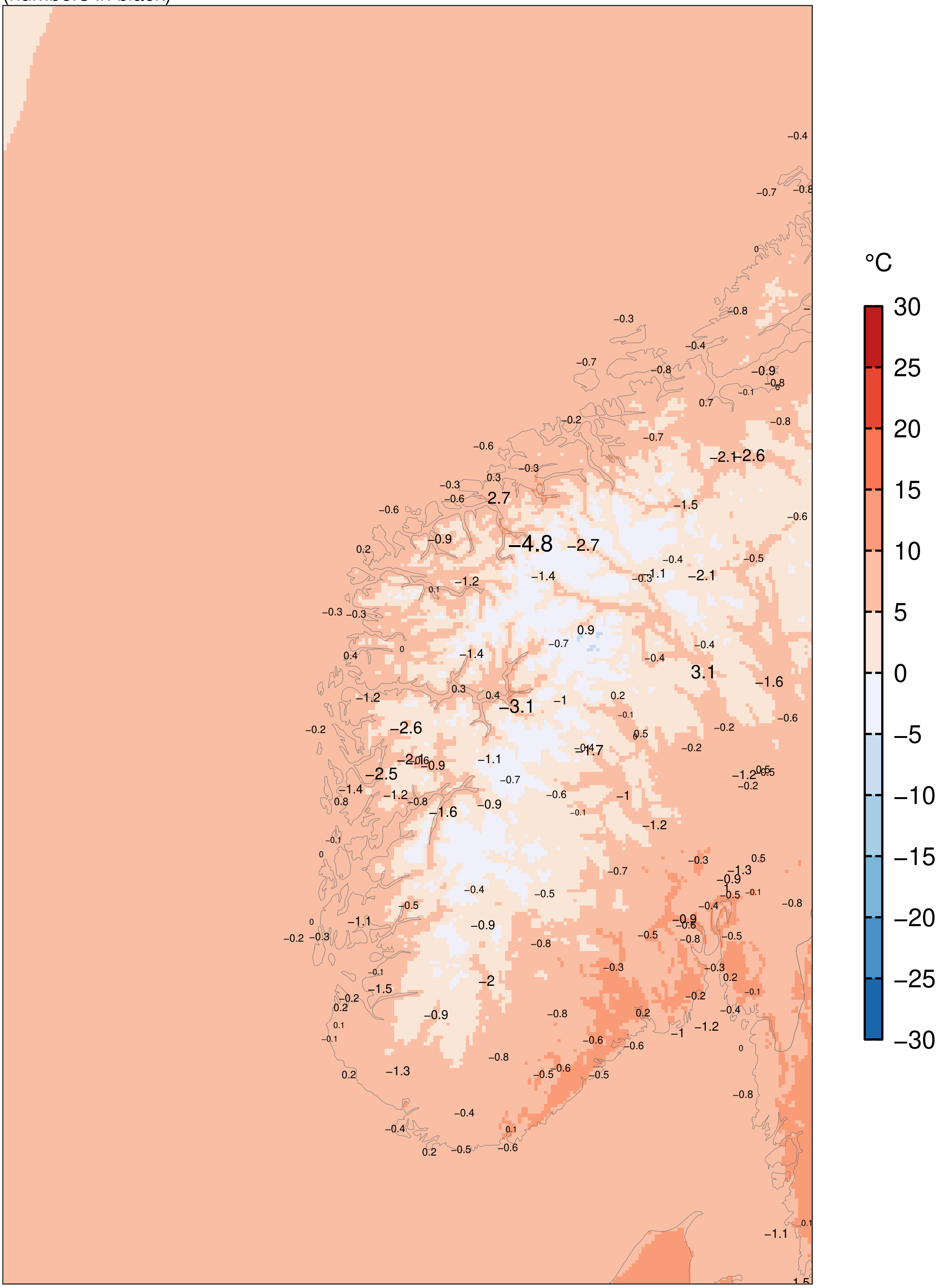
SDE at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

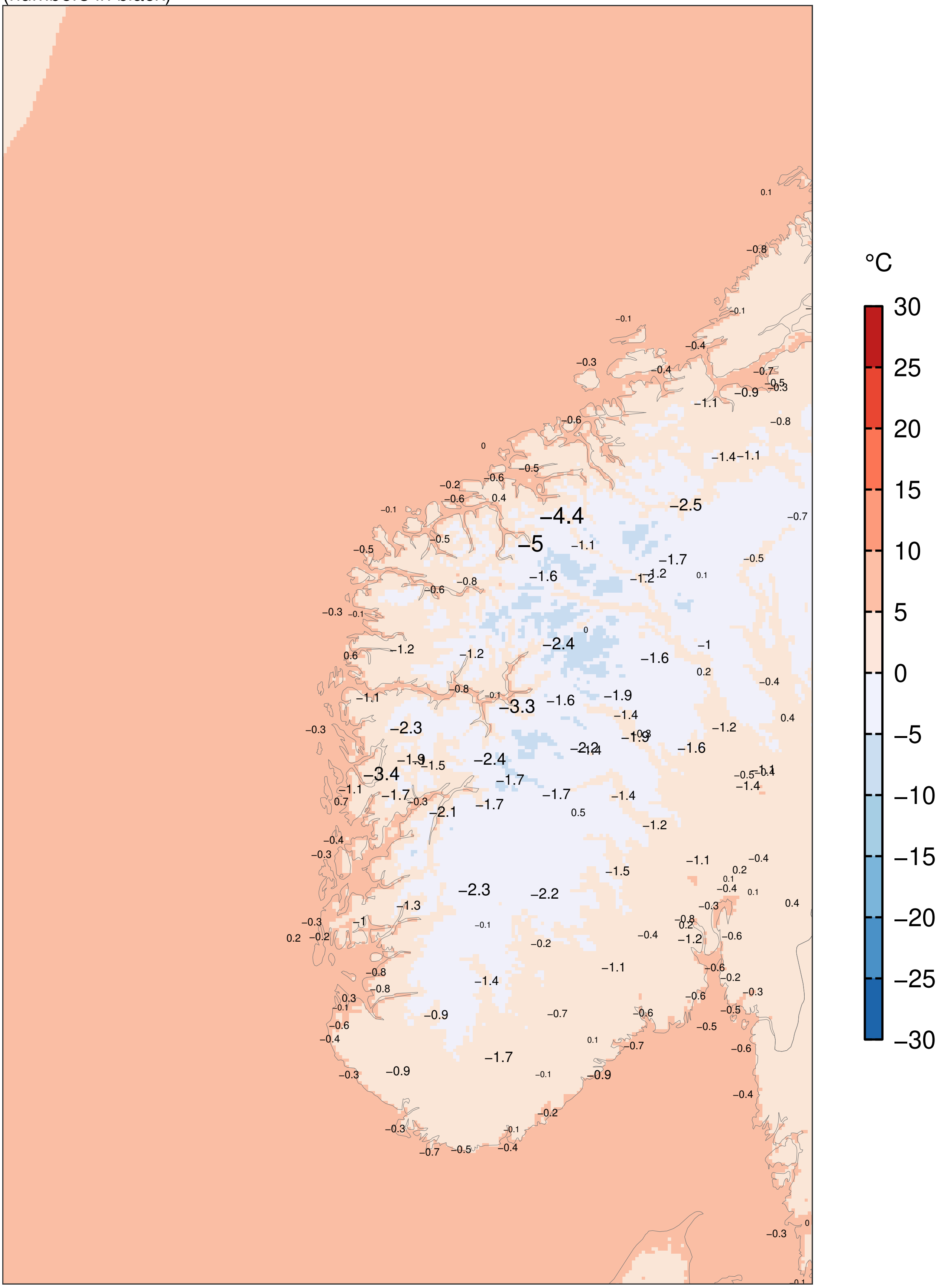
ME at observing sites
(numbers in black)



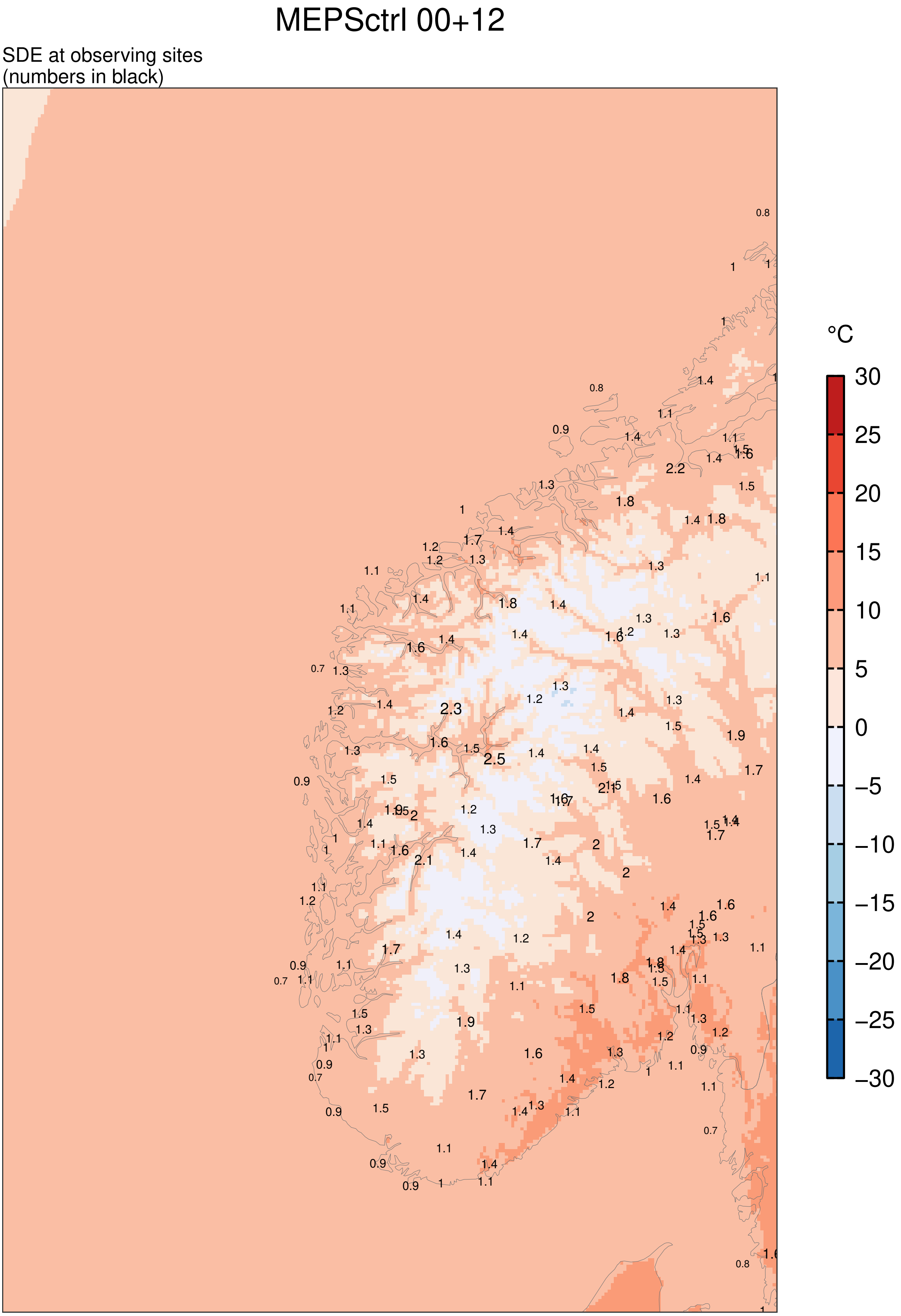
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+24

ME at observing sites
(numbers in black)



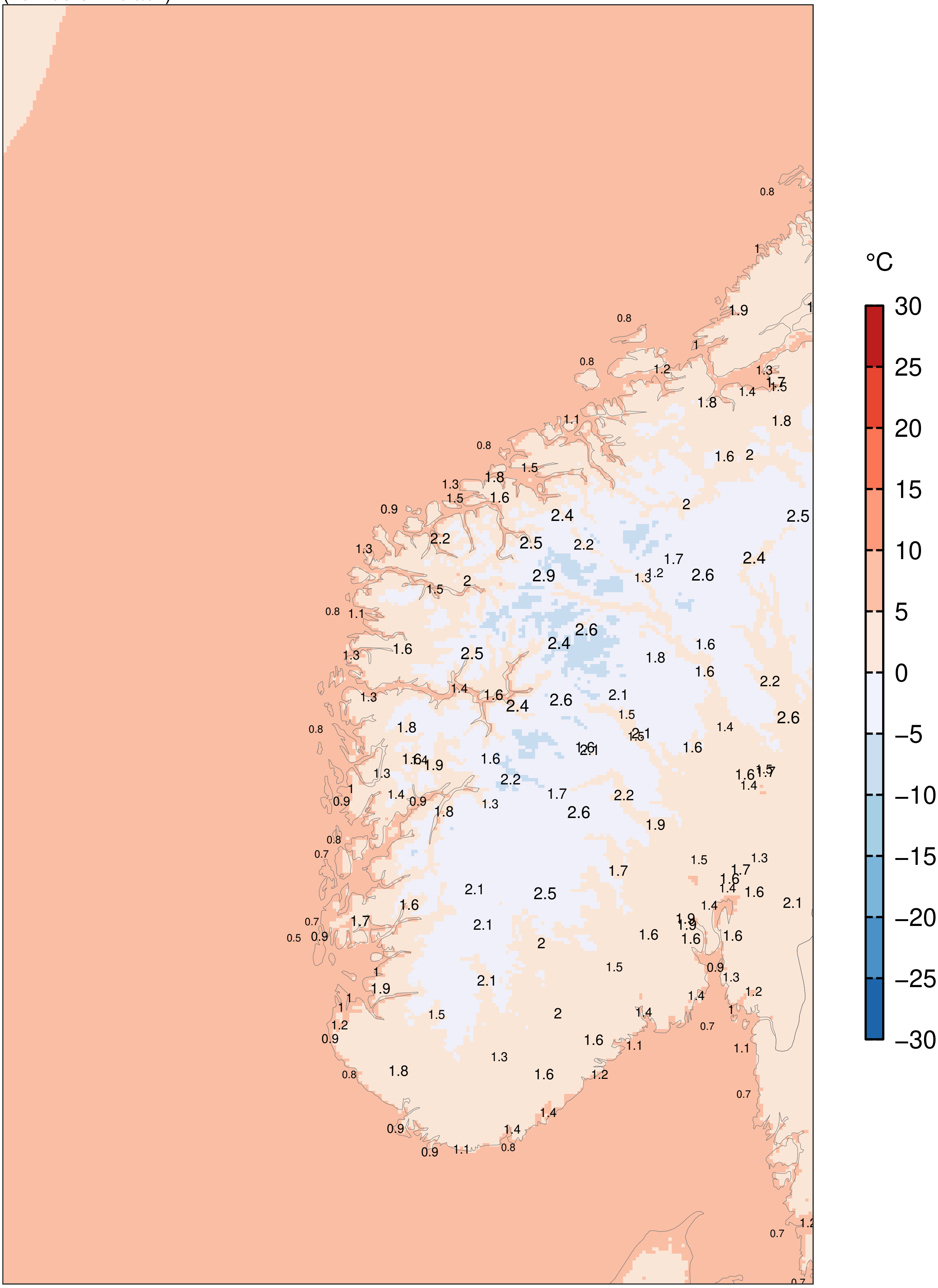
Model "climatology" 01.03.2026–31.05.2026



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+24

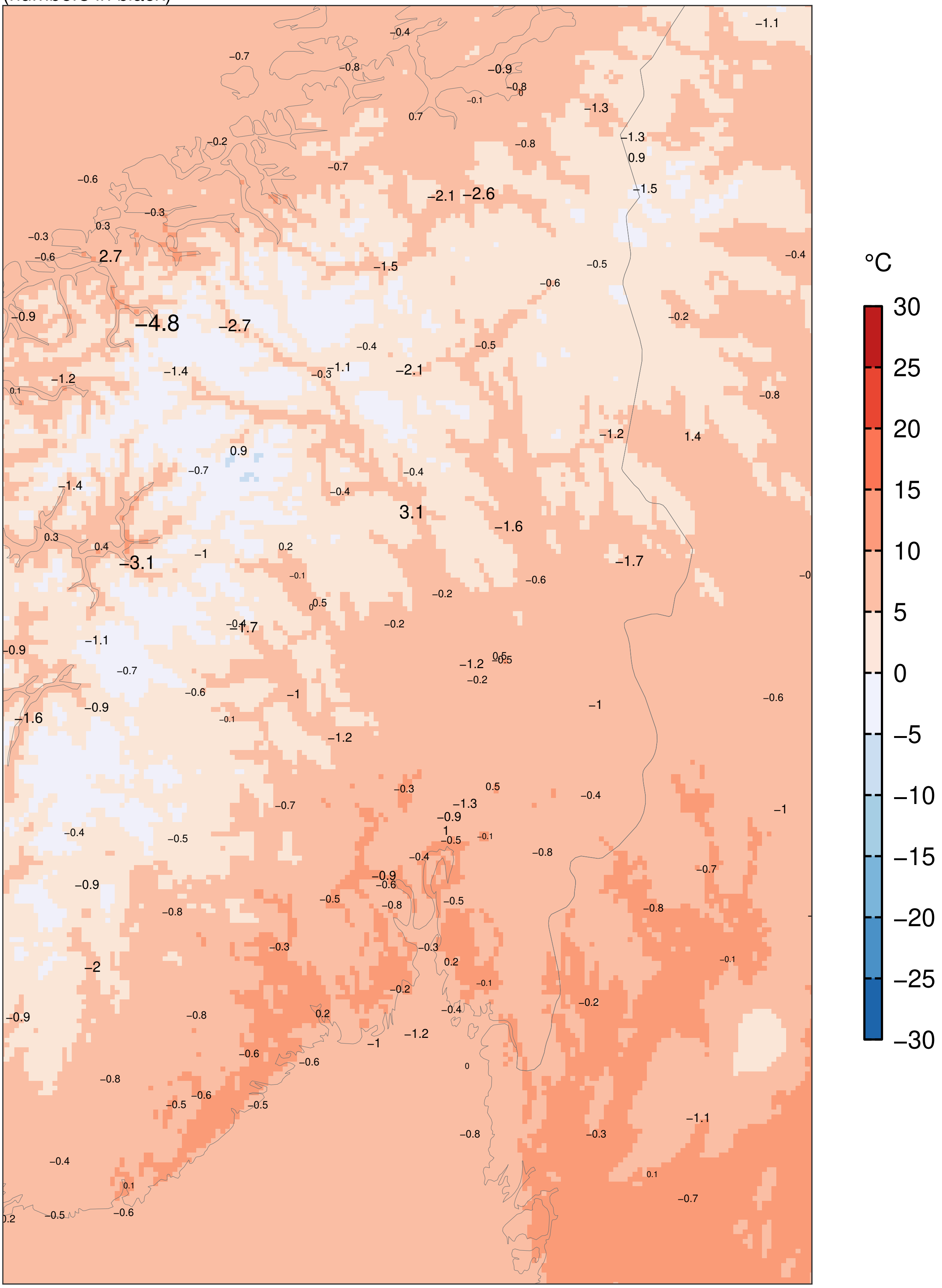
SDE at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

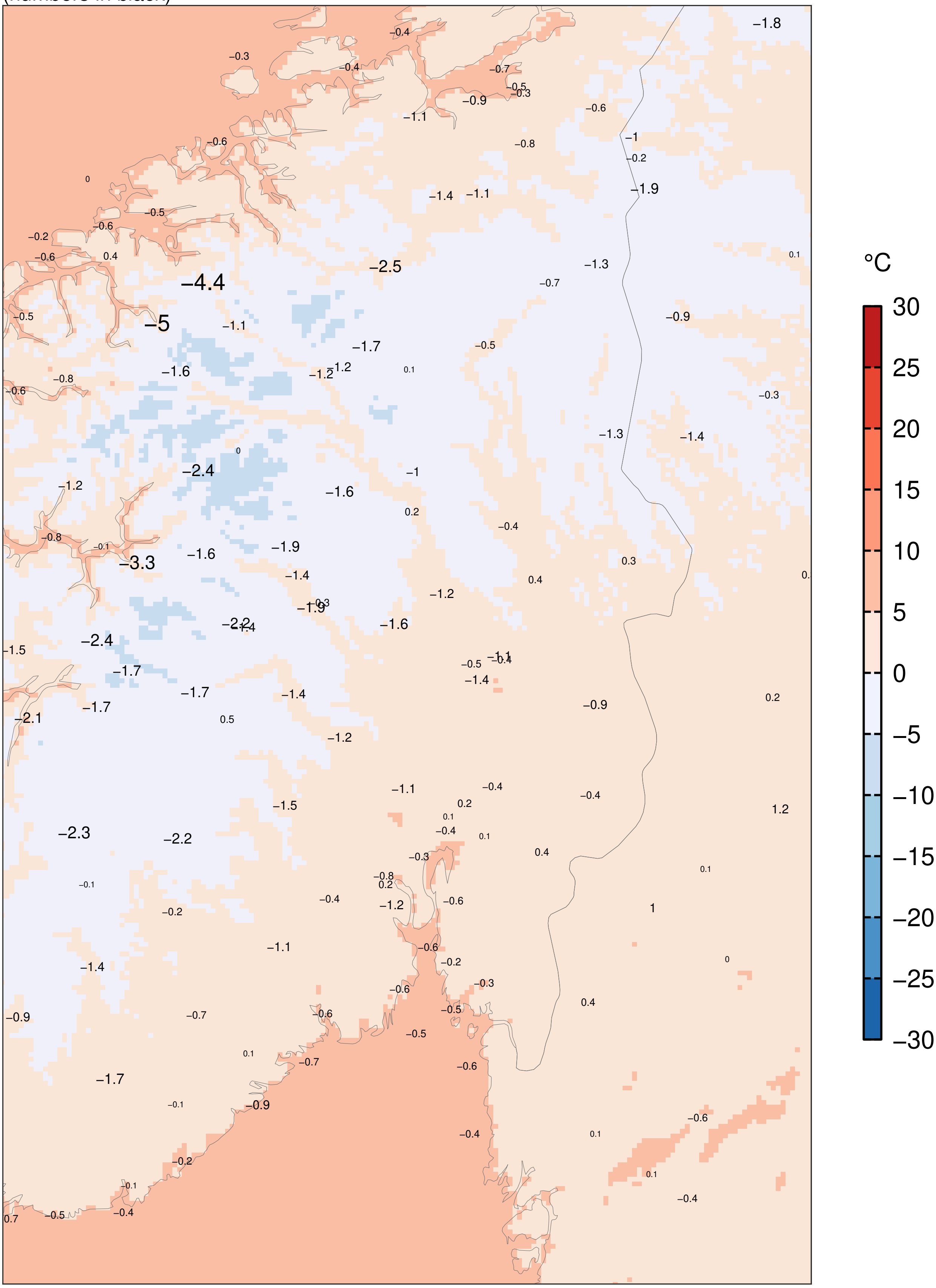
ME at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+24

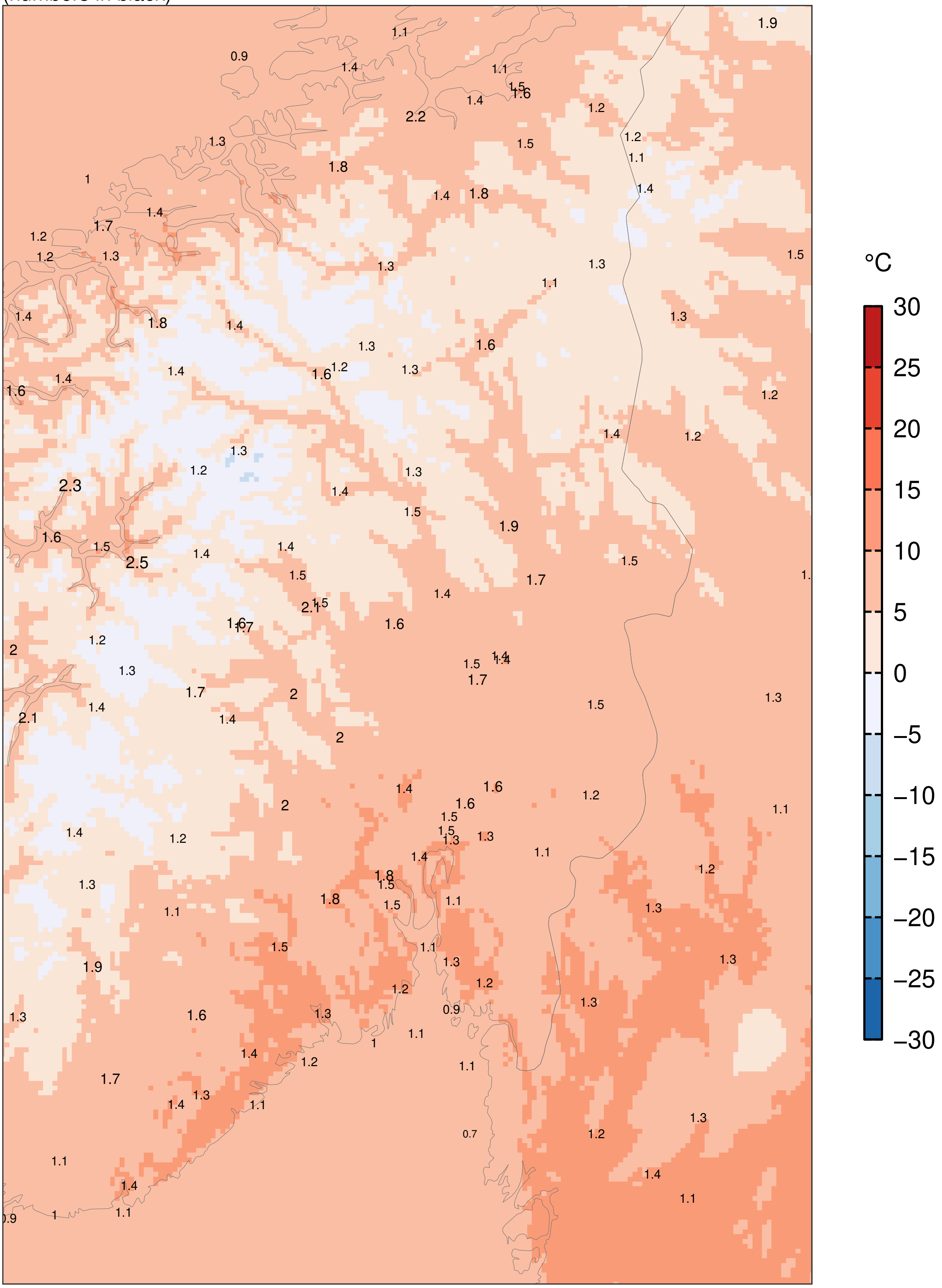
ME at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

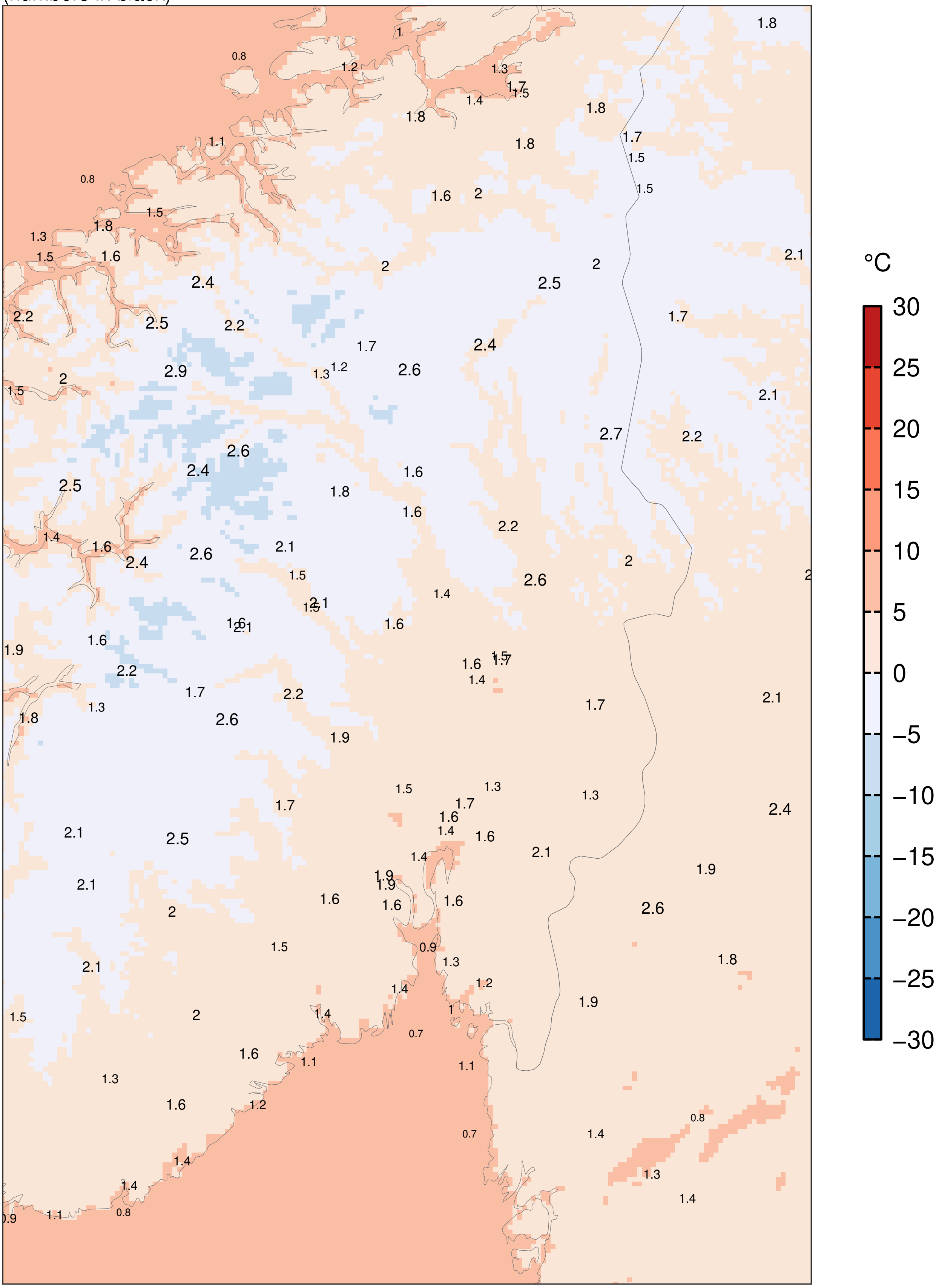
SDE at observing sites
(numbers in black)



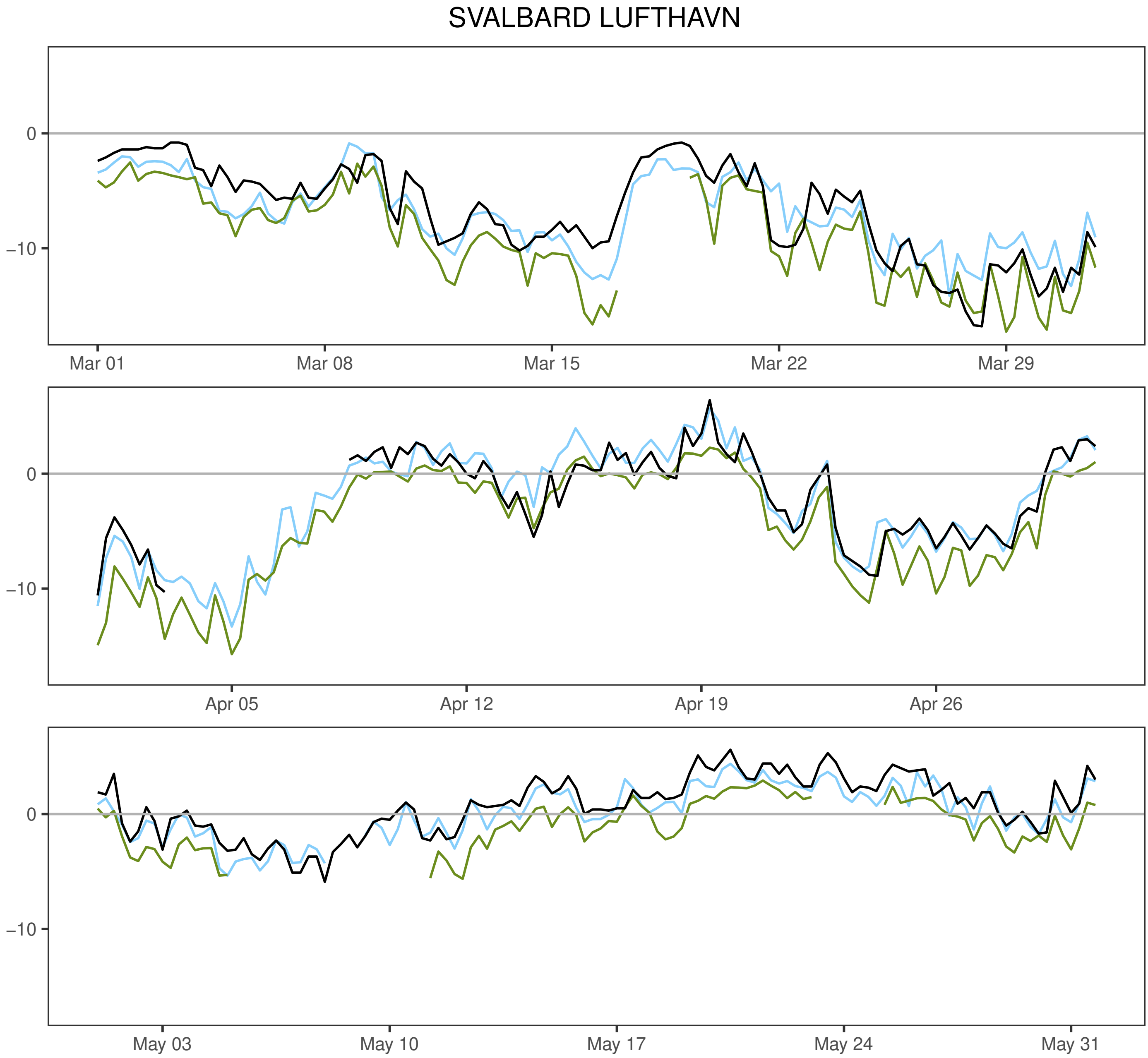
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+24

SDE at observing sites
(numbers in black)

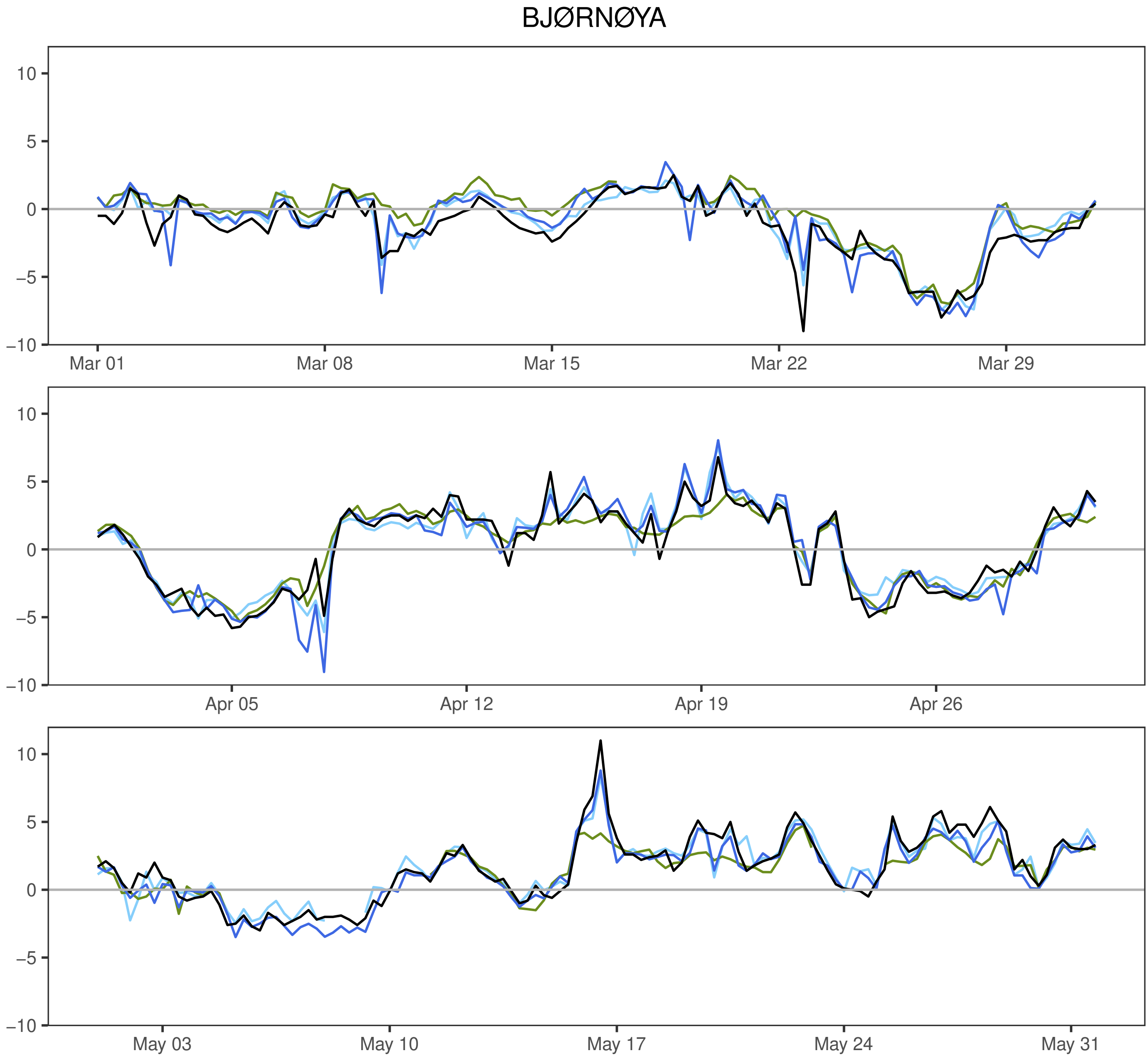


Model "climatology" 01.03.2026–31.05.2026



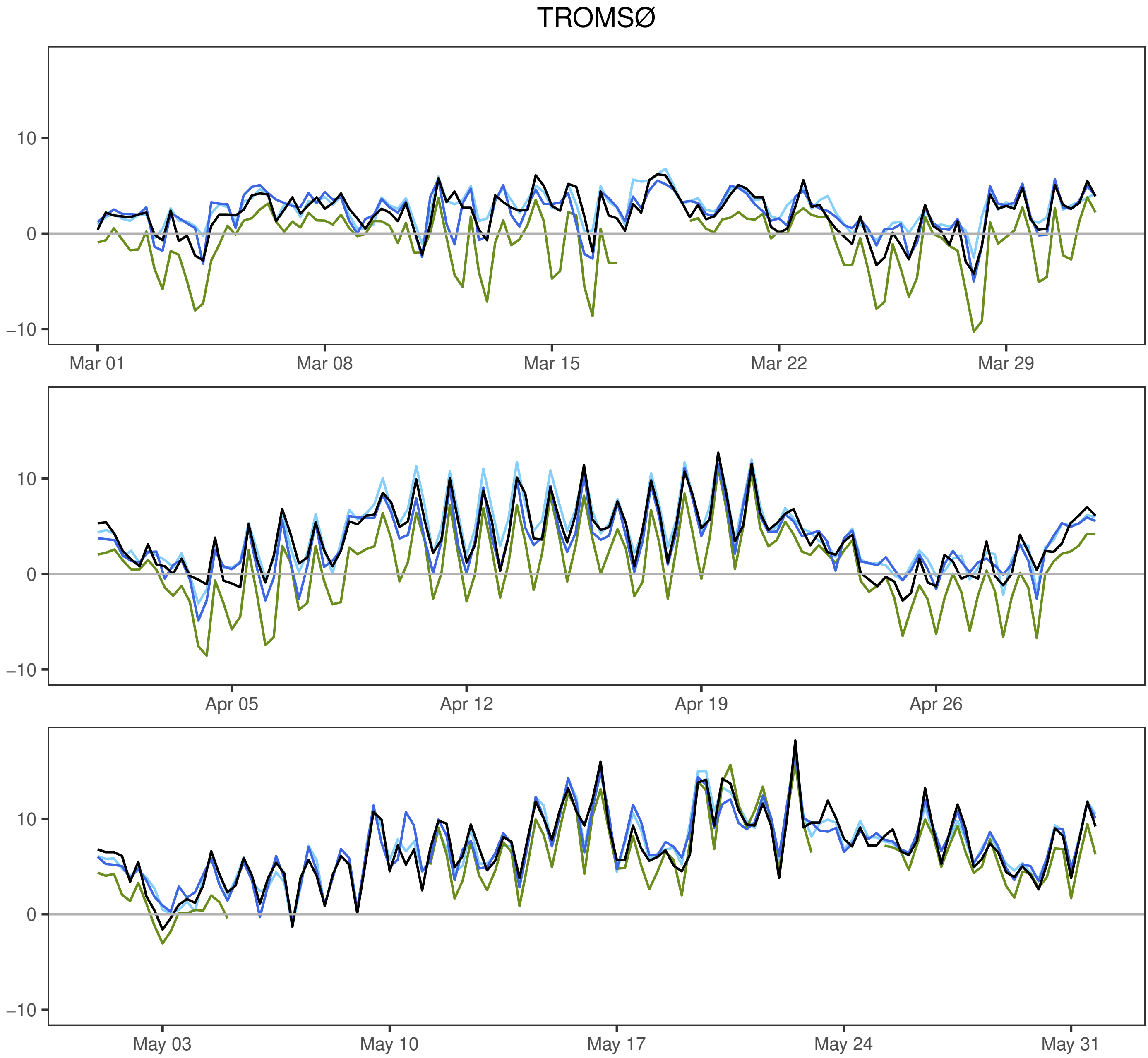
	Min	Mean	Max	Std	N
synop: 00,06,12,18	–16.8	–2.6	6.4	4.7	347
AA25: 12+18h,+24h,+30h,+36h	–14.1	–3.1	5.7	4.6	364
IFS: 12+18h,+24h,+30h,+36h	–17.3	–5.1	2.9	5.2	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
AA25 – synop	–0.2	1.6	1.6	1.2	5.4	307
IFS – synop	–2.0	1.5	2.5	2.2	7.4	307



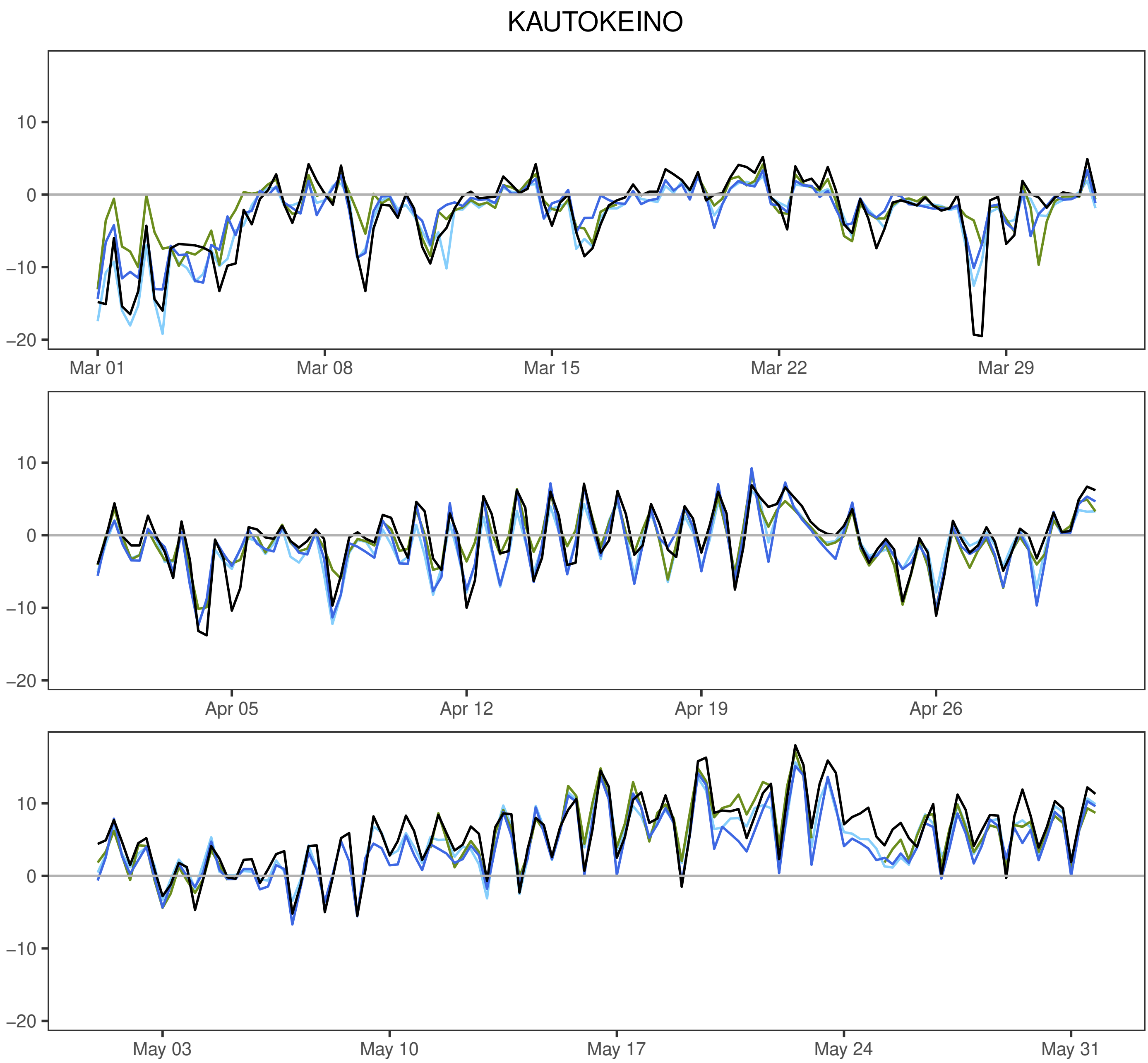
	Min	Mean	Max	Std	N
synop: 00,06,12,18	−9.0	0.1	11.0	2.9	368
MEPSctrl: 12+18h,+24h,+30h,+36l	−9.0	0.1	8.8	2.9	368
AA25: 12+18h,+24h,+30h,+36h	−7.4	0.4	8.3	2.7	364
IFS: 12+18h,+24h,+30h,+36h	−7.0	0.4	4.7	2.4	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.0	1.1	1.1	0.8	4.5	328
AA25 – synop	0.2	0.9	0.9	0.7	4.1	328
IFS – synop	0.2	1.3	1.4	1.0	8.9	328



	Min	Mean	Max	Std	N
synop: 00,06,12,18	−4.2	4.2	18.2	3.7	368
MEPSctrl: 12+18h,+24h,+30h,+36l	−5.0	4.2	17.0	3.6	368
AA25: 12+18h,+24h,+30h,+36h	−3.1	4.6	16.8	3.5	364
IFS: 12+18h,+24h,+30h,+36h	−10.3	1.6	15.9	4.6	328

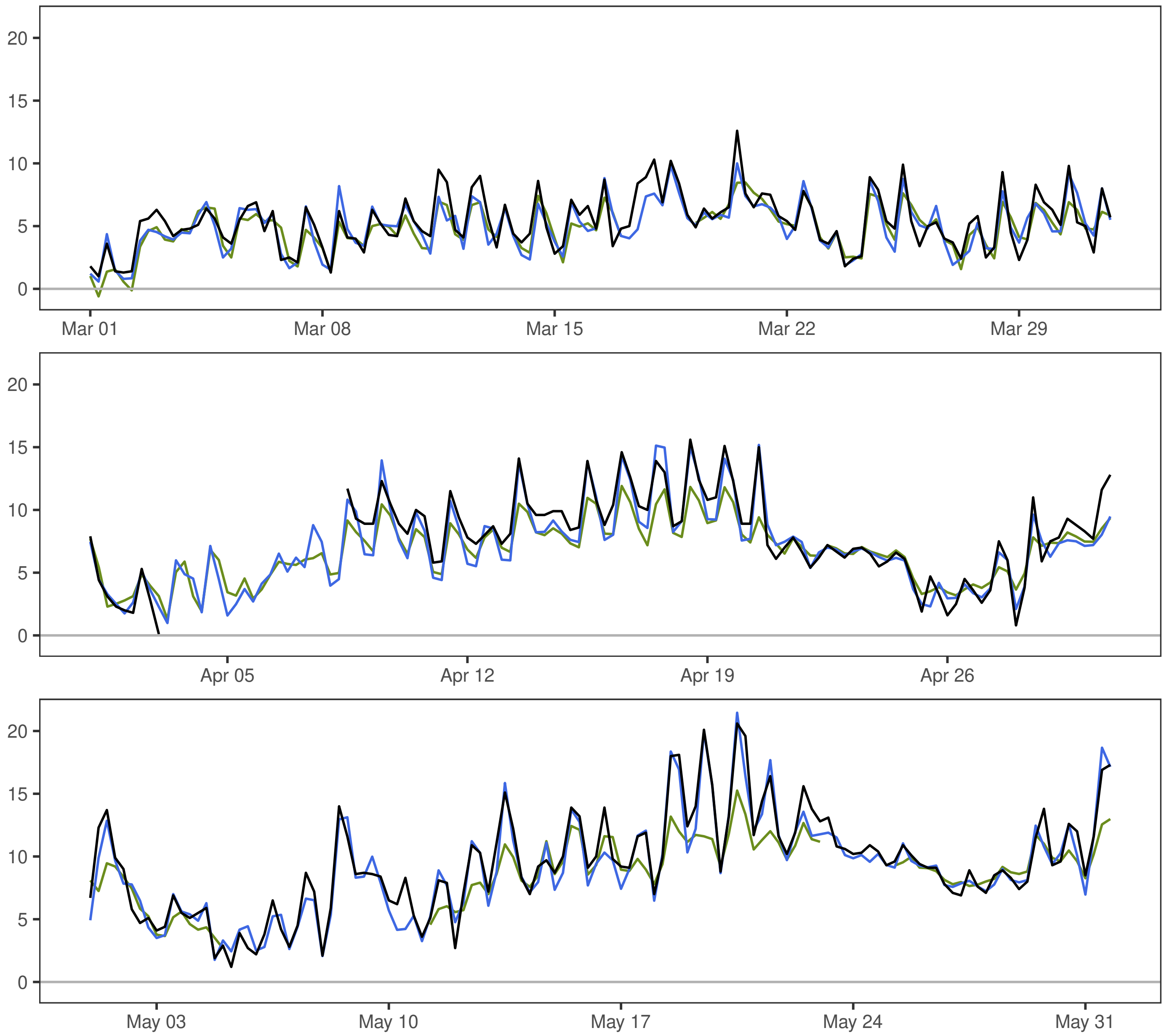
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.0	1.3	1.3	1.0	5.5	328
AA25 – synop	0.4	1.1	1.2	0.9	3.3	328
IFS – synop	−2.4	1.8	3.0	2.5	8.8	328



	Min	Mean	Max	Std	N
synop: 00,06,12,18	−19.5	0.9	18.0	6.0	368
MEPSctrl: 12+18h,+24h,+30h,+36l	−14.4	0.2	15.1	4.9	368
AA25: 12+18h,+24h,+30h,+36h	−19.2	0.2	15.7	5.4	364
IFS: 12+18h,+24h,+30h,+36h	−13.1	0.7	17.1	5.0	328

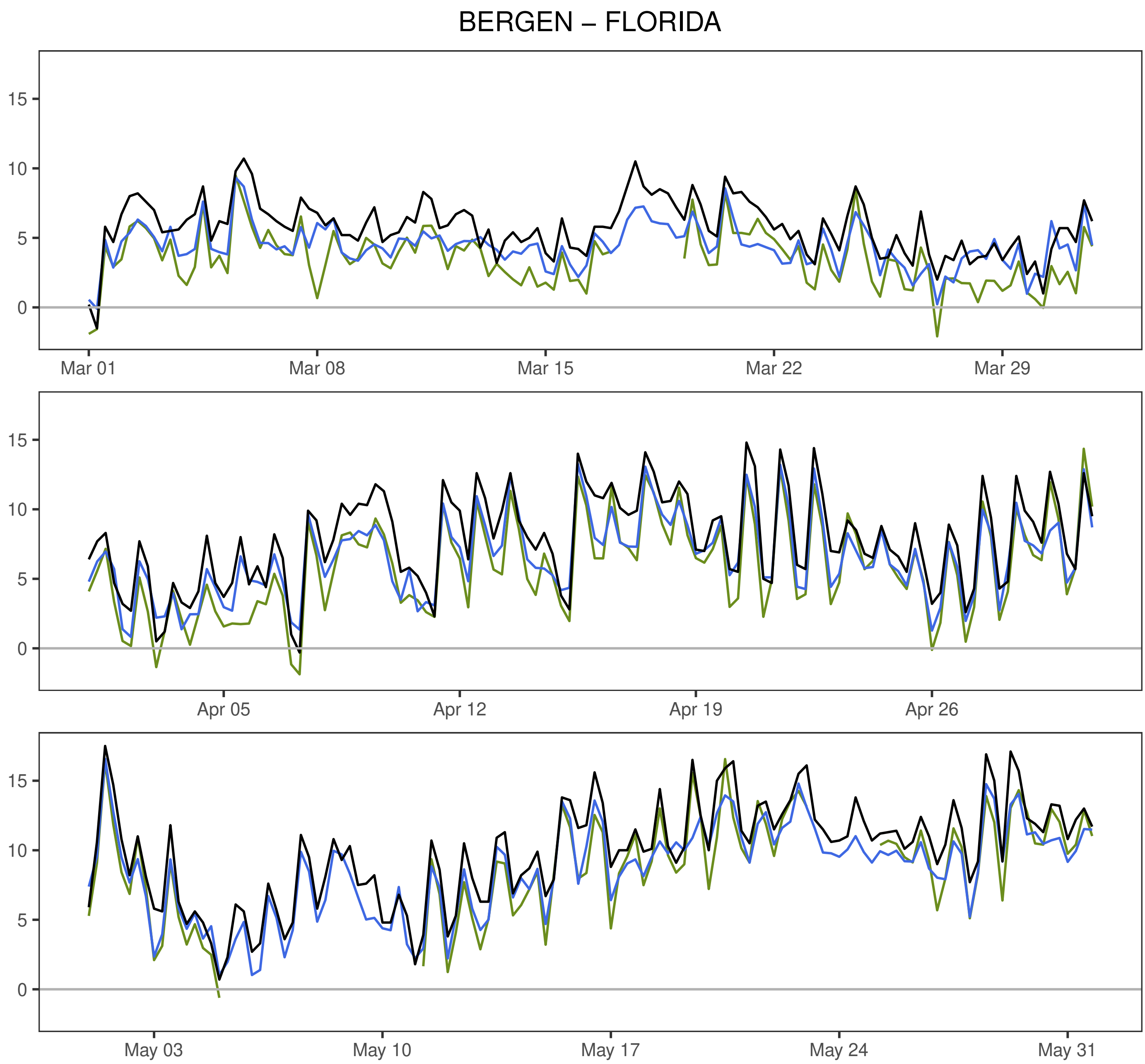
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	−0.6	2.4	2.5	1.8	12.7	328
AA25 – synop	−0.7	2.1	2.2	1.8	10.4	328
IFS – synop	0.1	2.6	2.6	1.7	15.7	328

ØRLAND III



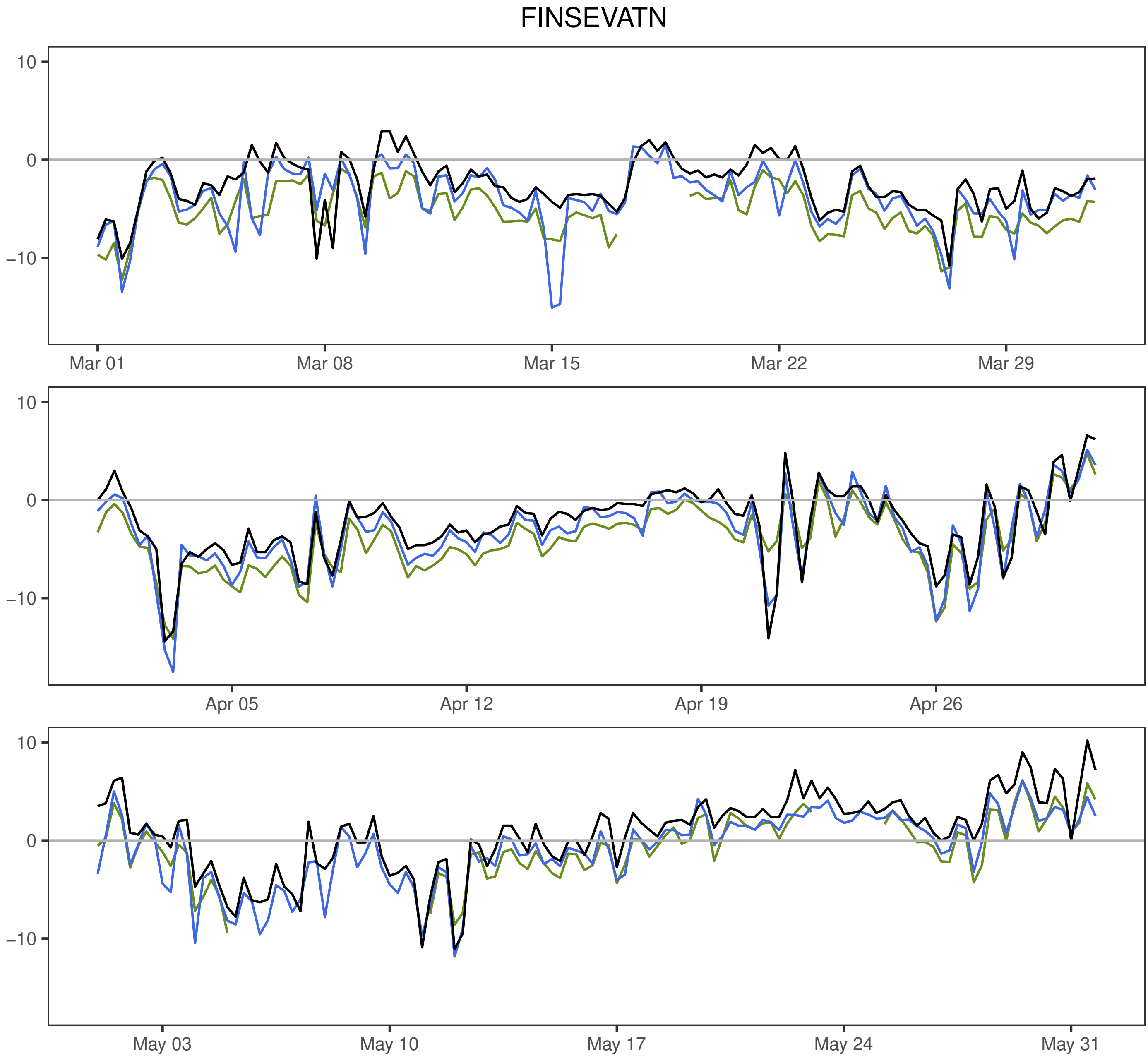
	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.1	7.6	20.6	3.7	347
MEPSctrl: 12+18h,+24h,+30h,+36l	0.6	7.0	21.5	3.6	368
IFS: 12+18h,+24h,+30h,+36h	–0.6	6.7	15.3	2.8	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.4	1.1	1.1	0.8	3.6	307
IFS – synop	–0.8	1.6	1.7	1.3	8.5	307



	Min	Mean	Max	Std	N
synop: 00,06,12,18	–1.5	7.8	17.5	3.5	368
MEPSctrl: 12+18h,+24h,+30h,+36l	–0.1	6.5	16.6	3.2	368
IFS: 12+18h,+24h,+30h,+36h	–2.1	5.9	16.6	3.8	328

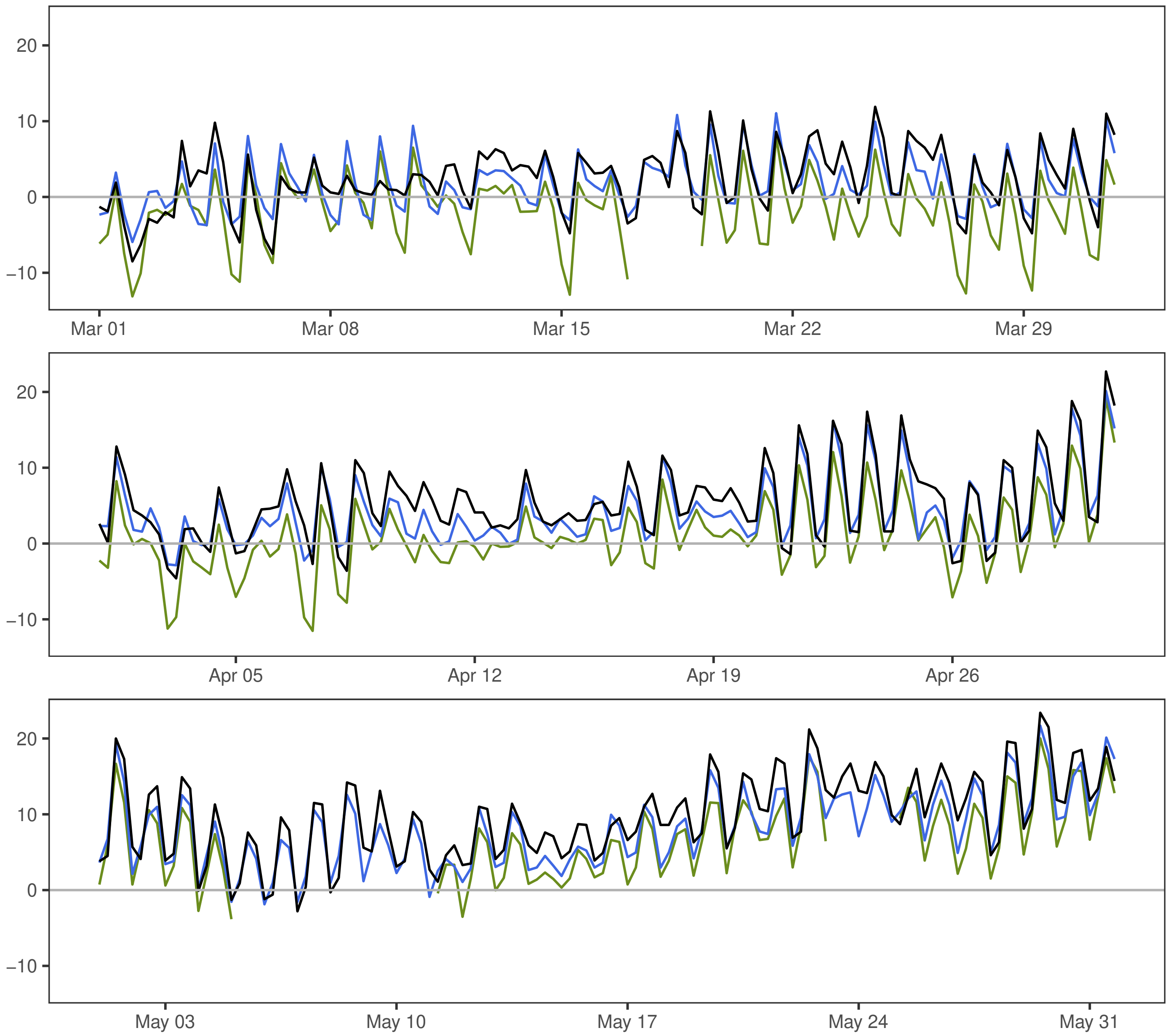
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–1.3	1.1	1.7	1.5	5.6	328
IFS – synop	–1.9	1.1	2.2	2.0	6.3	328



	Min	Mean	Max	Std	N
synop: 00,06,12,18	−14.4	−1.4	10.2	3.8	368
MEPSctrl: 12+18h,+24h,+30h,+36l	−17.5	−2.7	6.1	3.8	368
IFS: 12+18h,+24h,+30h,+36h	−14.1	−3.5	6.1	3.5	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	−1.3	1.7	2.2	1.6	10.8	328
IFS – synop	−2.0	1.6	2.6	2.3	8.9	328

NESBYEN – TODOKK

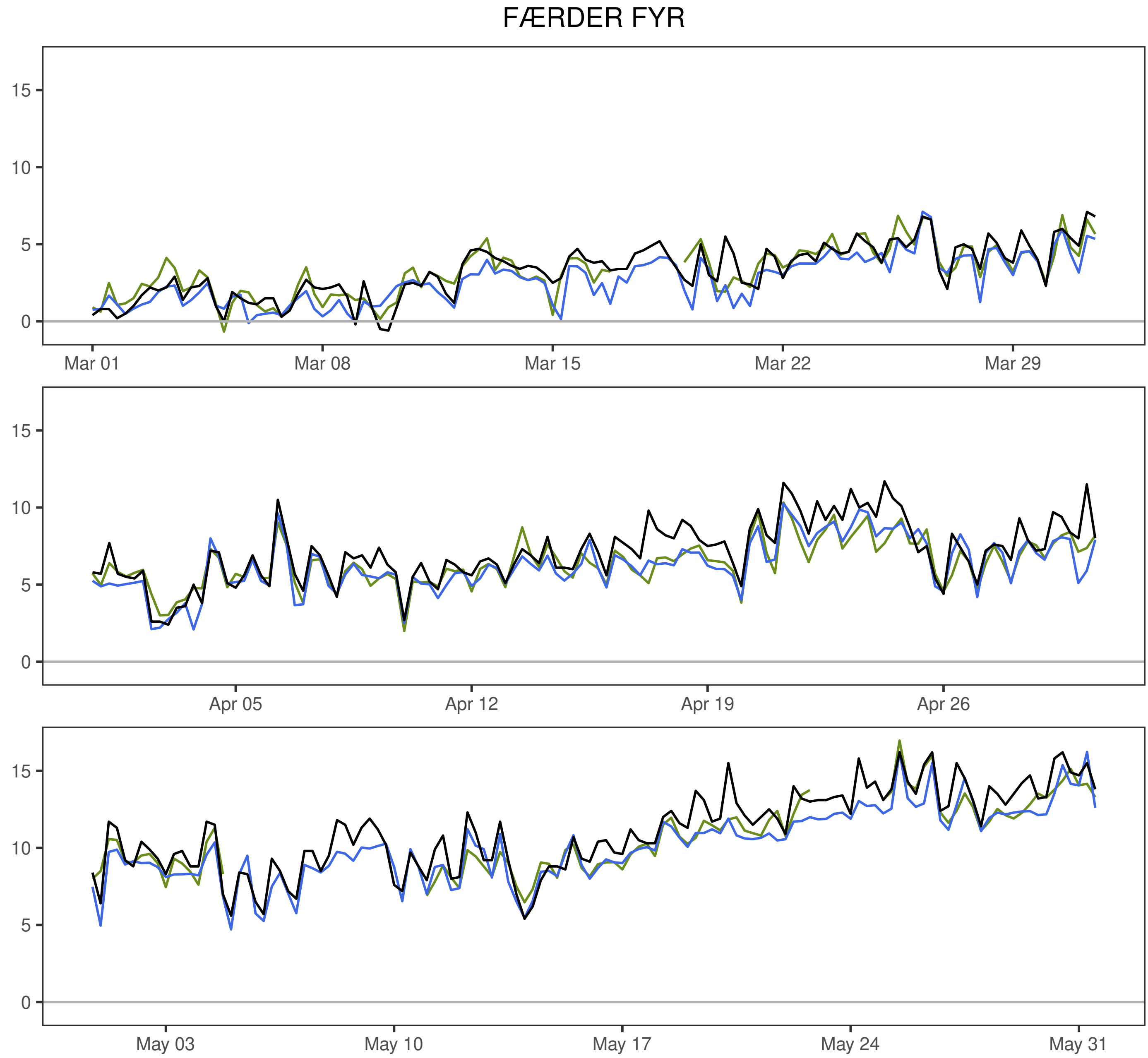


	Min	Mean	Max	Std	N
synop: 00,06,12,18	−8.5	5.8	23.4	5.9	368
MEPSctrl: 12+18h,+24h,+30h,+36l	−5.9	4.7	21.7	5.2	368
IFS: 12+18h,+24h,+30h,+36h	−13.1	1.6	20.0	6.0	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	−1.1	2.2	2.4	2.0	7.7	328
IFS – synop	−4.1	2.3	4.7	4.2	12.1	328

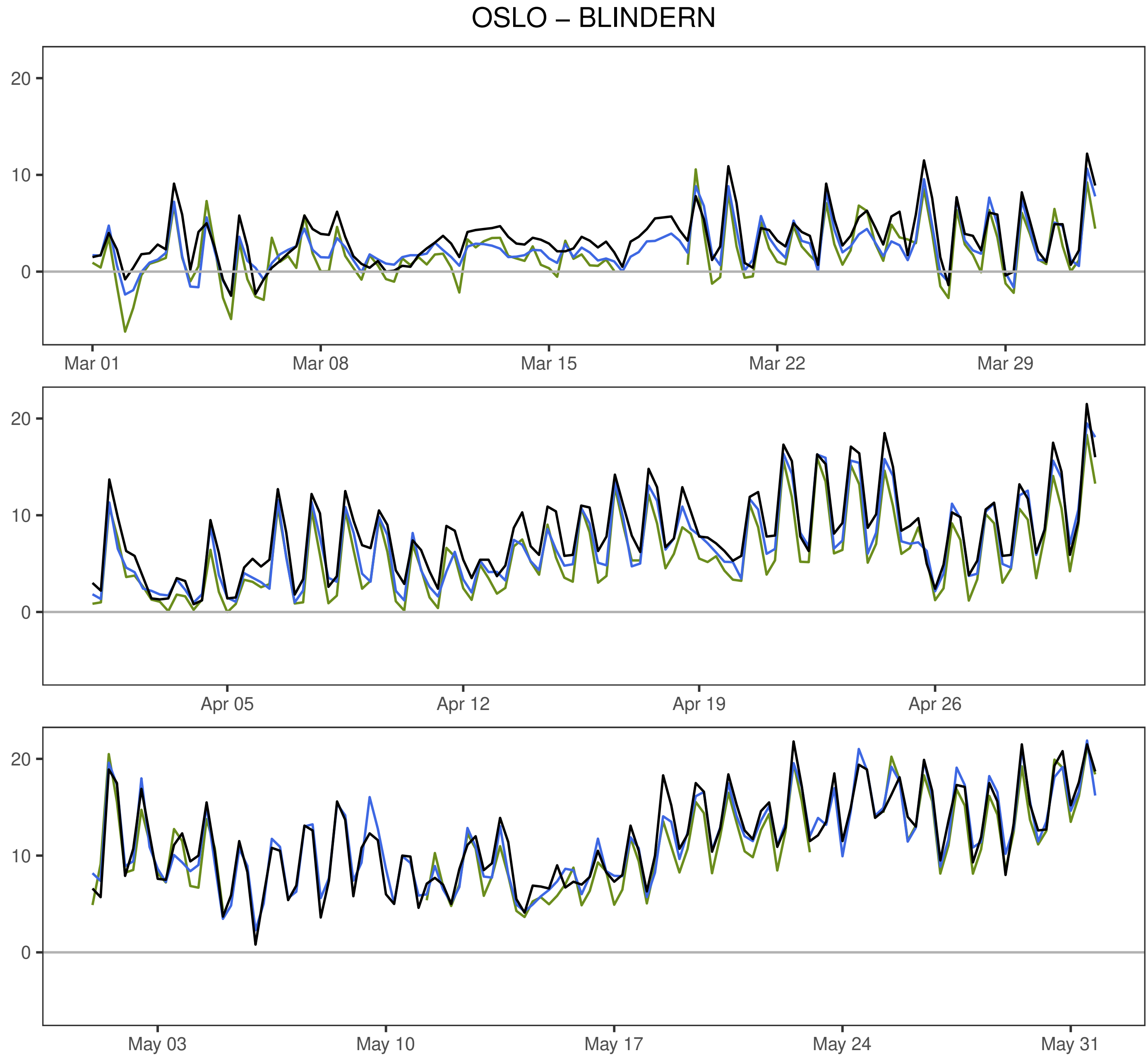
	Min	Mean	Max	Std	N
synop: 00,06,12,18	1.0	7.5	17.8	3.1	368
MEPSctrl: 12+18h,+24h,+30h,+36l	1.2	7.4	18.3	3.2	368
IFS: 12+18h,+24h,+30h,+36h	1.1	7.0	16.0	3.1	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.1	1.0	1.0	0.8	3.6	328
IFS – synop	–0.5	1.0	1.1	0.8	4.0	328



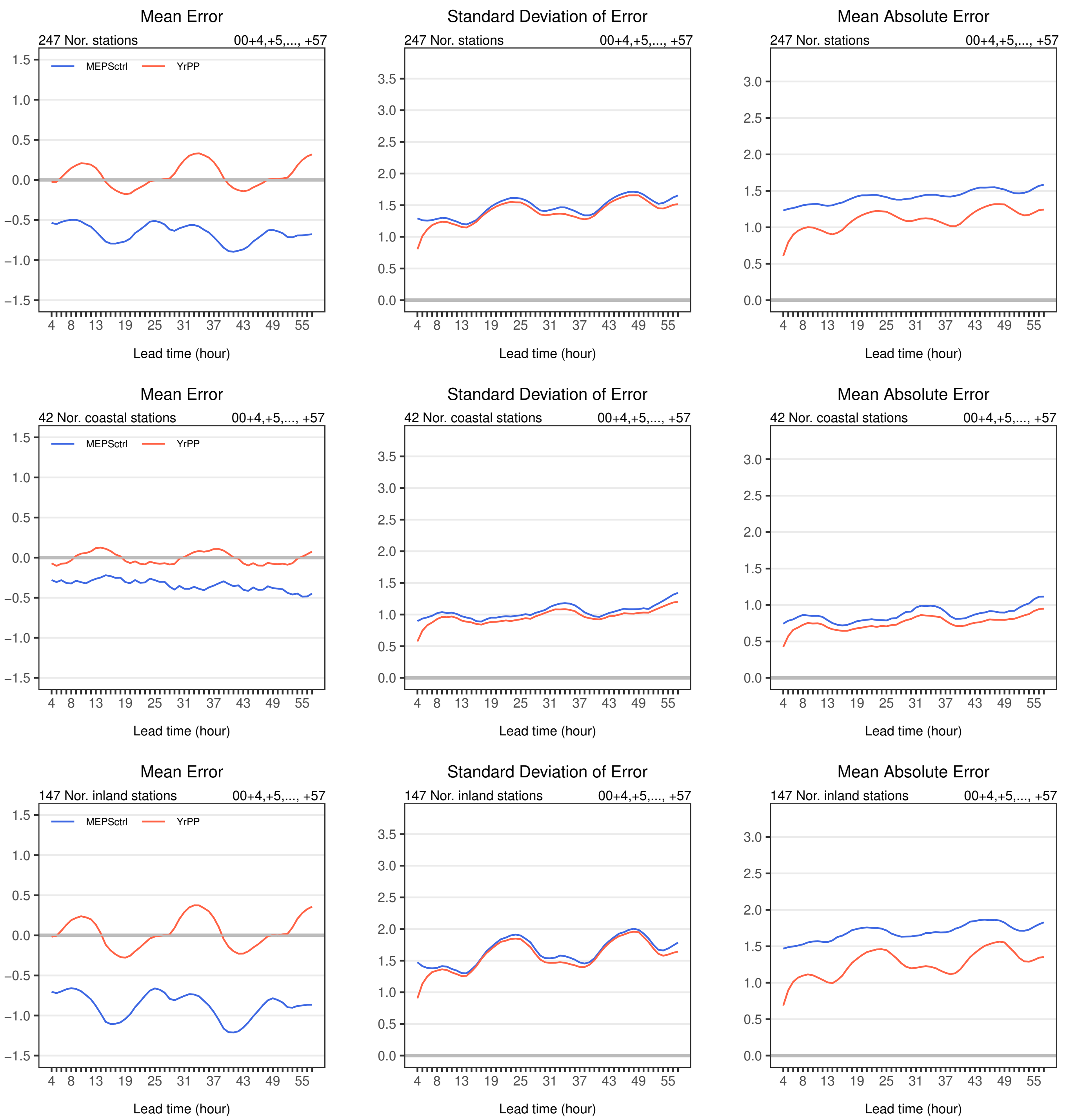
	Min	Mean	Max	Std	N
synop: 00,06,12,18	–0.6	7.2	16.2	3.9	367
MEPSctrl: 12+18h,+24h,+30h,+36l	–0.1	6.4	16.2	3.6	367
IFS: 12+18h,+24h,+30h,+36h	–0.7	6.5	17.0	3.5	327

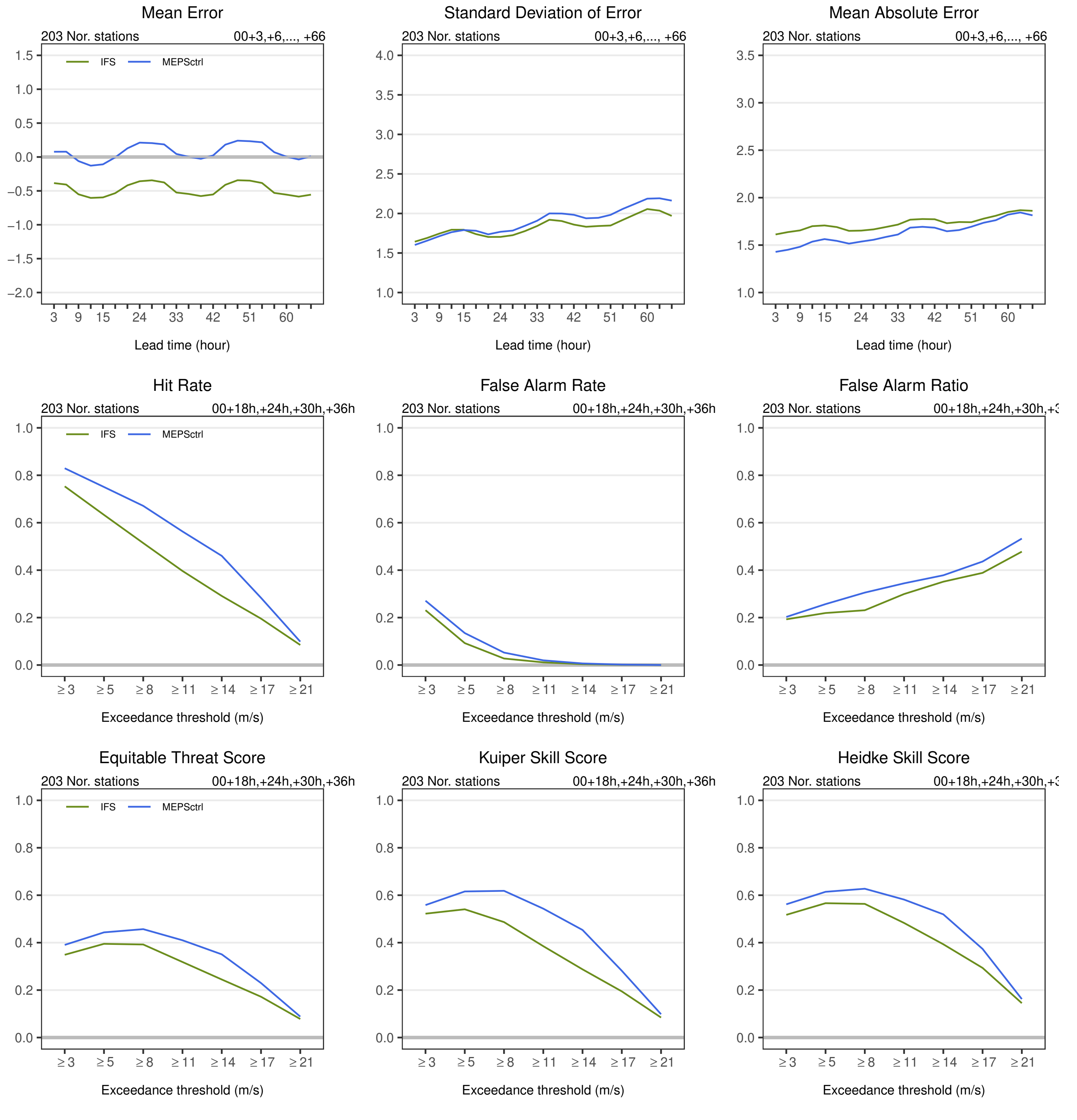
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.8	0.9	1.2	0.9	5.6	327
IFS – synop	–0.4	1.0	1.1	0.8	4.7	327

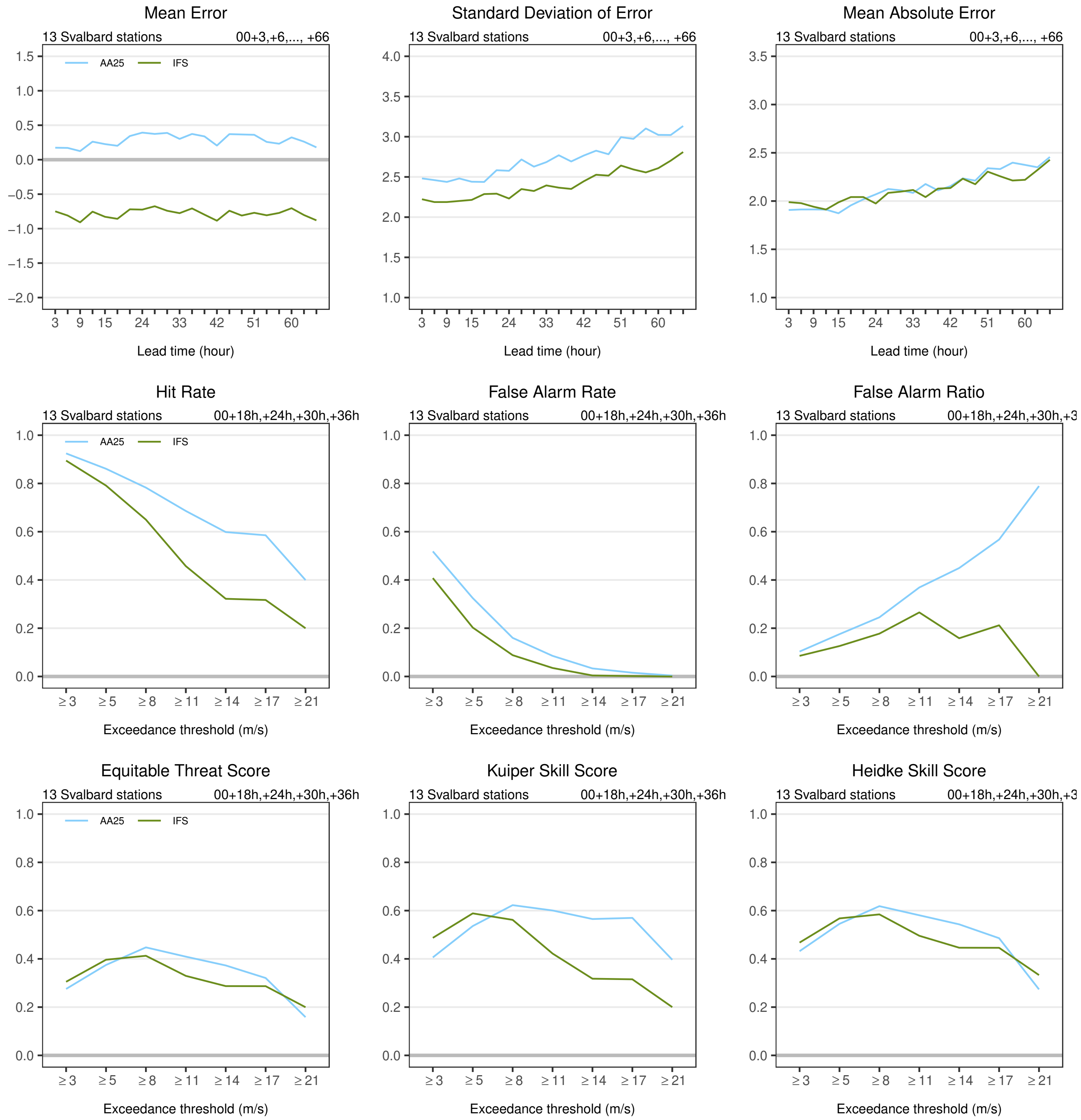


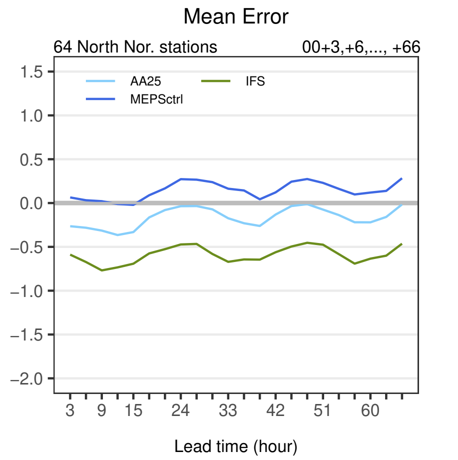
	Min	Mean	Max	Std	N
synop: 00,06,12,18	–2.5	7.7	21.8	5.2	368
MEPSctrl: 12+18h,+24h,+30h,+36l	–2.4	7.0	21.9	5.4	368
IFS: 12+18h,+24h,+30h,+36h	–6.2	5.9	21.2	5.3	328

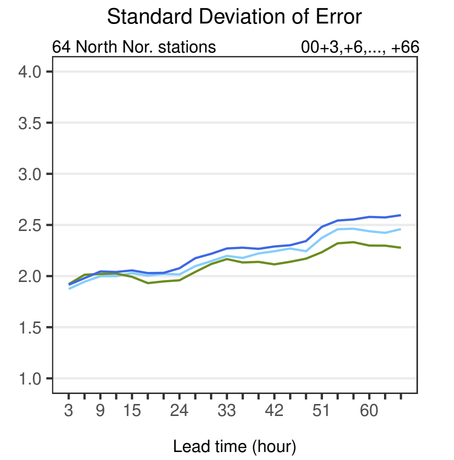
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.8	1.3	1.5	1.2	5.7	328
IFS – synop	–1.7	1.4	2.2	1.9	5.4	328

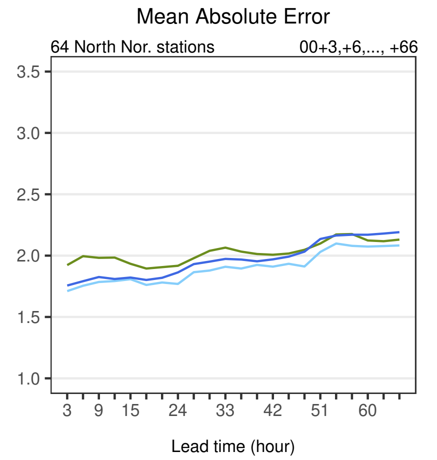

Mean Error
247 Nor. stations
00+4,+5,..., +57
MEPSctrl
YrPP
Lead time (hour)
Standard Deviation of Error
247 Nor. stations
00+4,+5,..., +57
Lead time (hour)
Mean Absolute Error
247 Nor. stations
00+4,+5,..., +57
Lead time (hour)
Mean Error
42 Nor. coastal stations
00+4,+5,..., +57
MEPSctrl
YrPP
Lead time (hour)
Standard Deviation of Error
42 Nor. coastal stations
00+4,+5,..., +57
Lead time (hour)
Mean Absolute Error
42 Nor. coastal stations
00+4,+5,..., +57
Lead time (hour)
Mean Error
147 Nor. inland stations
00+4,+5,..., +57
MEPSctrl
YrPP
Lead time (hour)
Standard Deviation of Error
147 Nor. inland stations
00+4,+5,..., +57
Lead time (hour)
Mean Absolute Error
147 Nor. inland stations
00+4,+5,..., +57
Lead time (hour)

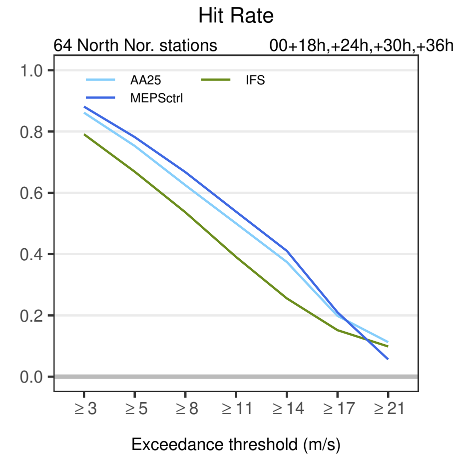

Mean Error
203 Nor. stations
00+3,+6,..., +66
IFS
MEPSctrl
Lead time (hour)
Standard Deviation of Error
203 Nor. stations
00+3,+6,..., +66
Lead time (hour)
Mean Absolute Error
203 Nor. stations
00+3,+6,..., +66
Lead time (hour)
Hit Rate
203 Nor. stations
00+18h,+24h,+30h,+36h
IFS
MEPSctrl
Exceedance threshold (m/s)
False Alarm Rate
203 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
False Alarm Ratio
203 Nor. stations
Exceedance threshold (m/s)
Equitable Threat Score
203 Nor. stations
00+18h,+24h,+30h,+36h
IFS
MEPSctrl
Exceedance threshold (m/s)
Kuiper Skill Score
203 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
Heidke Skill Score
203 Nor. stations
Exceedance threshold (m/s)

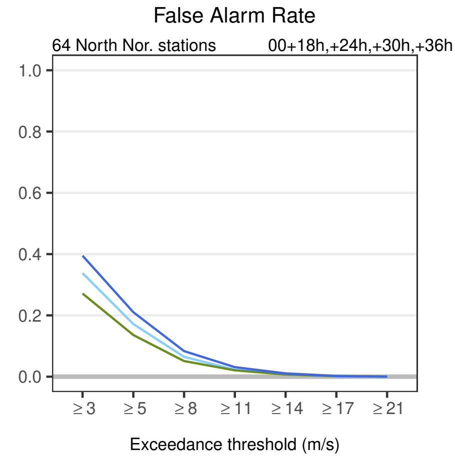

Mean Error
13 Svalbard stations
00+3,+6,..., +66
AA25
IFS
Lead time (hour)
Standard Deviation of Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)
Mean Absolute Error
13 Svalbard stations
00+3,+6,..., +66
Lead time (hour)
Hit Rate
13 Svalbard stations
00+18h,+24h,+30h,+36h
AA25
IFS
Exceedance threshold (m/s)
False Alarm Rate
13 Svalbard stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
False Alarm Ratio
13 Svalbard stations
Exceedance threshold (m/s)
Equitable Threat Score
13 Svalbard stations
00+18h,+24h,+30h,+36h
AA25
IFS
Exceedance threshold (m/s)
Kuiper Skill Score
13 Svalbard stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
Heidke Skill Score
13 Svalbard stations
Exceedance threshold (m/s)

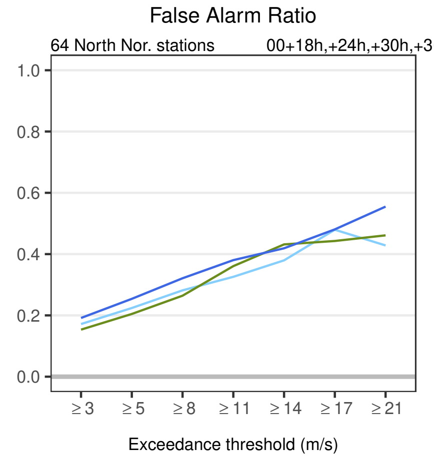

Mean Error
64 North Nor. stations
00+3,+6,..., +66
AA25
MEPSctrl
IFS
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
3 9 15 24 33 42 51 60
Lead time (hour)

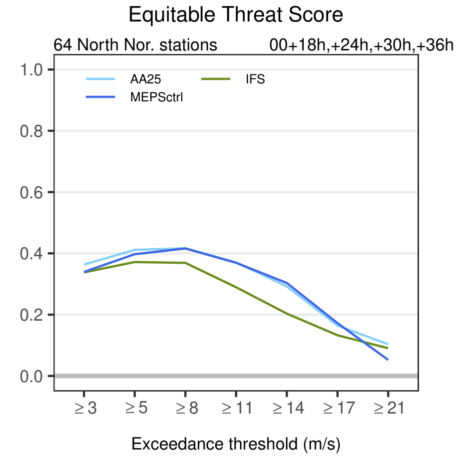

Standard Deviation of Error
64 North Nor. stations
00+3,+6,..., +66
4.0
3.5
3.0
2.5
2.0
1.5
1.0
3 9 15 24 33 42 51 60
Lead time (hour)

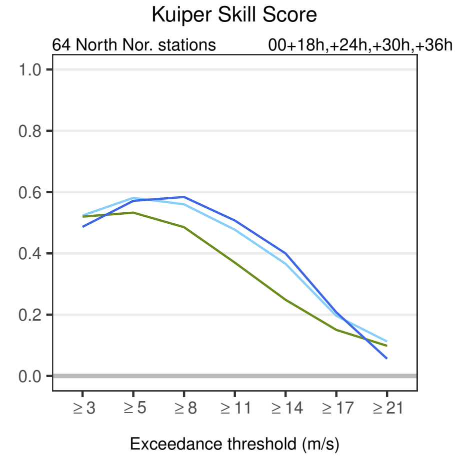

Mean Absolute Error
64 North Nor. stations
00+3,+6,..., +66
3.5
3.0
2.5
2.0
1.5
1.0
3 9 15 24 33 42 51 60
Lead time (hour)

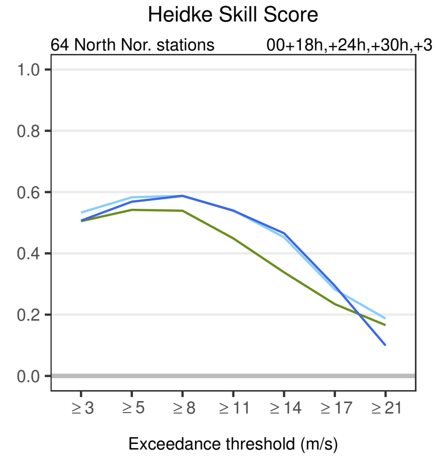

Hit Rate
64 North Nor. stations
00+18h,+24h,+30h,+36h
AA25
MEPSctrl
IFS
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)

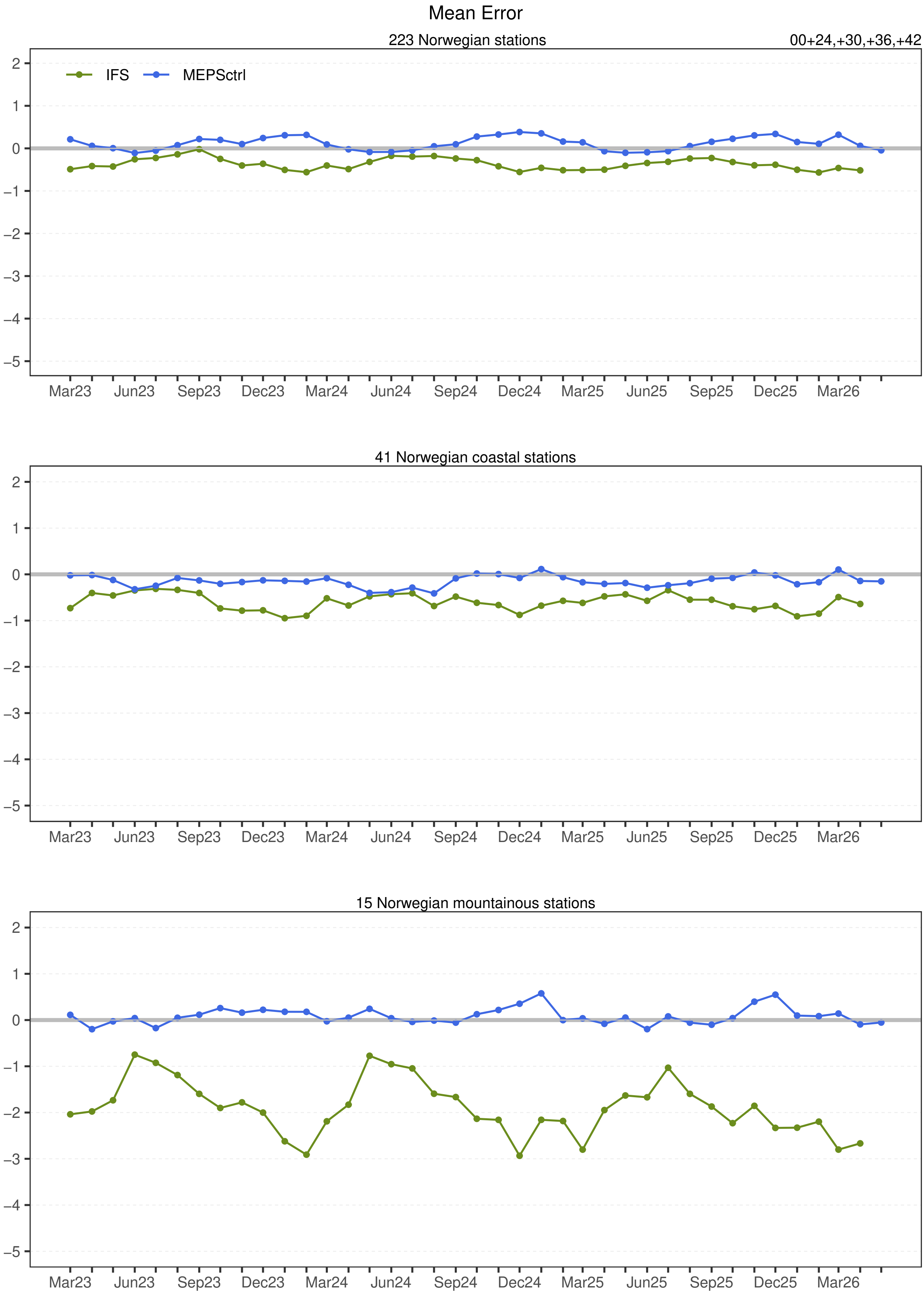

False Alarm Rate
64 North Nor. stations
00+18h,+24h,+30h,+36h
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)

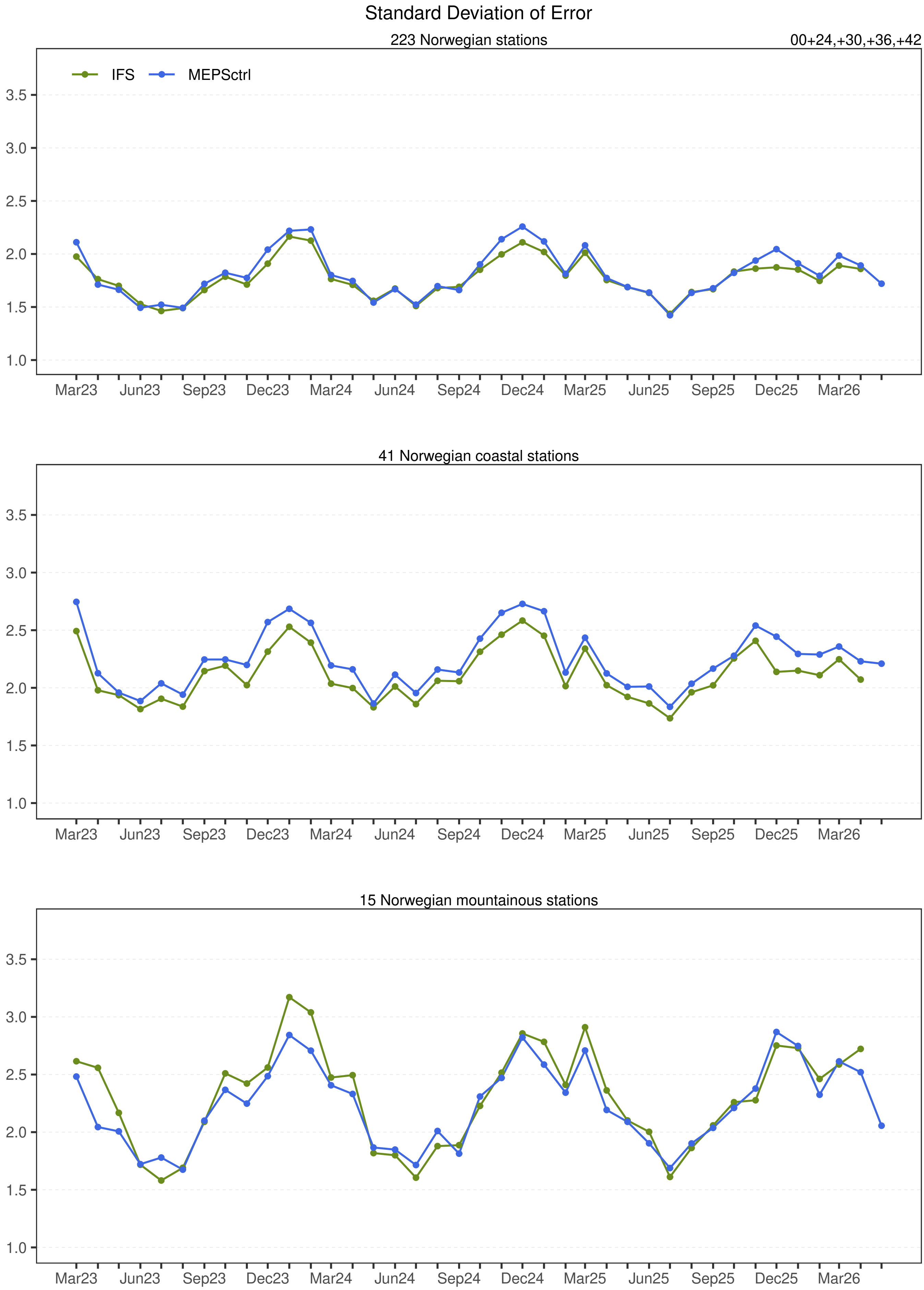

False Alarm Ratio
64 North Nor. stations
00+18h,+24h,+30h,+3
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)

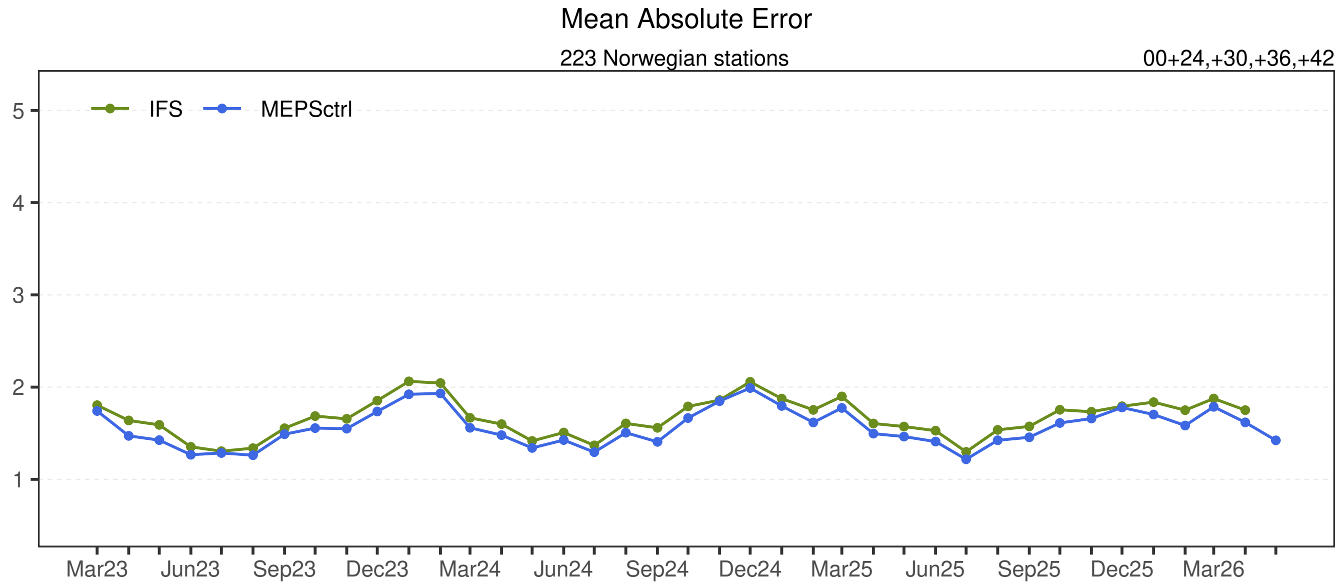

Equitable Threat Score
64 North Nor. stations
00+18h,+24h,+30h,+36h
AA25
MEPSctrl
IFS
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)

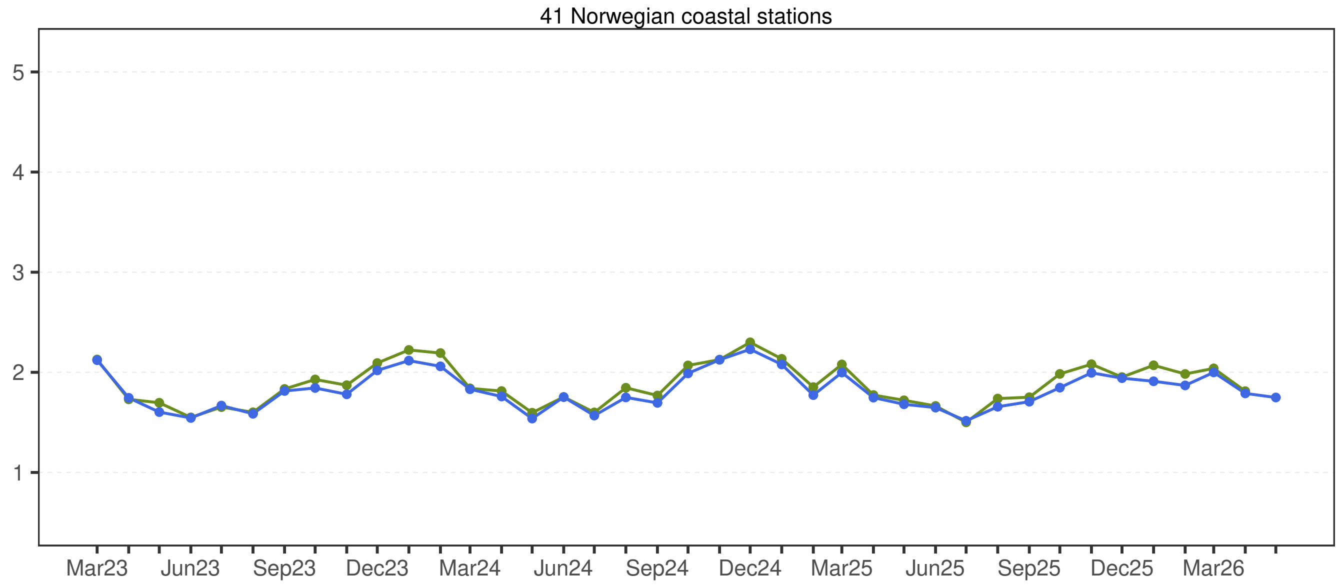

Kuiper Skill Score
64 North Nor. stations
00+18h,+24h,+30h,+36h
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)

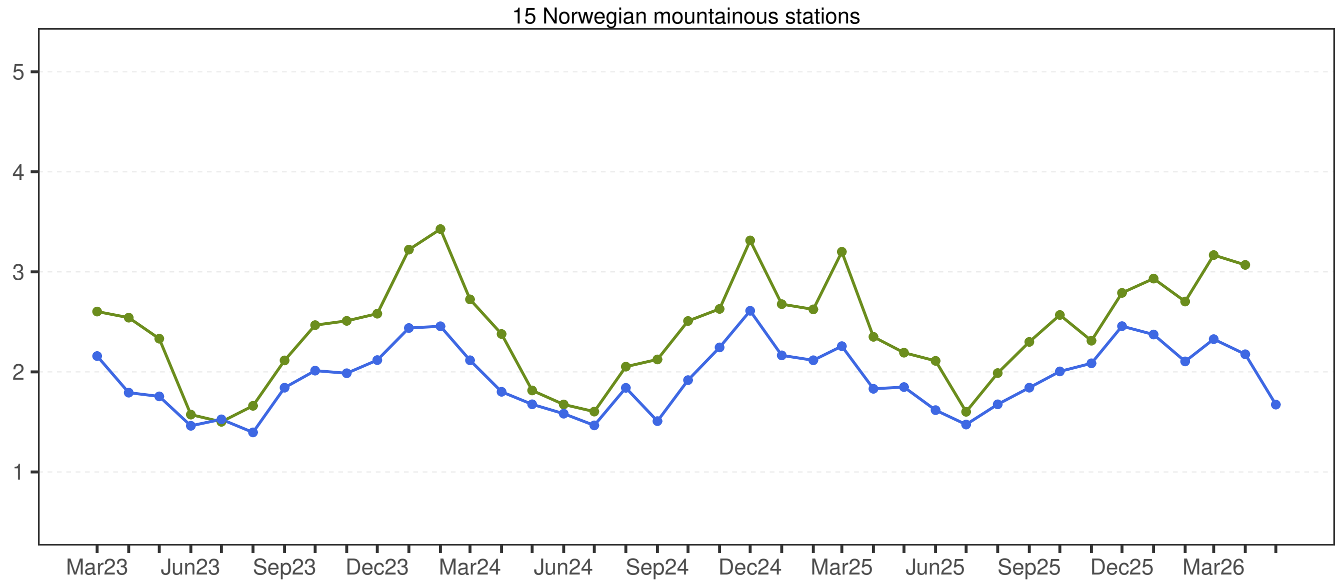

Heidke Skill Score
64 North Nor. stations
00+18h,+24h,+30h,+3
1.0
0.8
0.6
0.4
0.2
0.0
≥3 ≥5 ≥8 ≥11 ≥14 ≥17 ≥21
Exceedance threshold (m/s)


Mean Error
223 Norwegian stations
00+24,+30,+36,+42
IFS
MEPSctrl
2
1
0
−1
−2
−3
−4
−5
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26
41 Norwegian coastal stations
15 Norwegian mountainous stations


Standard Deviation of Error
223 Norwegian stations
00+24,+30,+36,+42
IFS
MEPSctrl
3.5
3.0
2.5
2.0
1.5
1.0
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26
41 Norwegian coastal stations
15 Norwegian mountainous stations

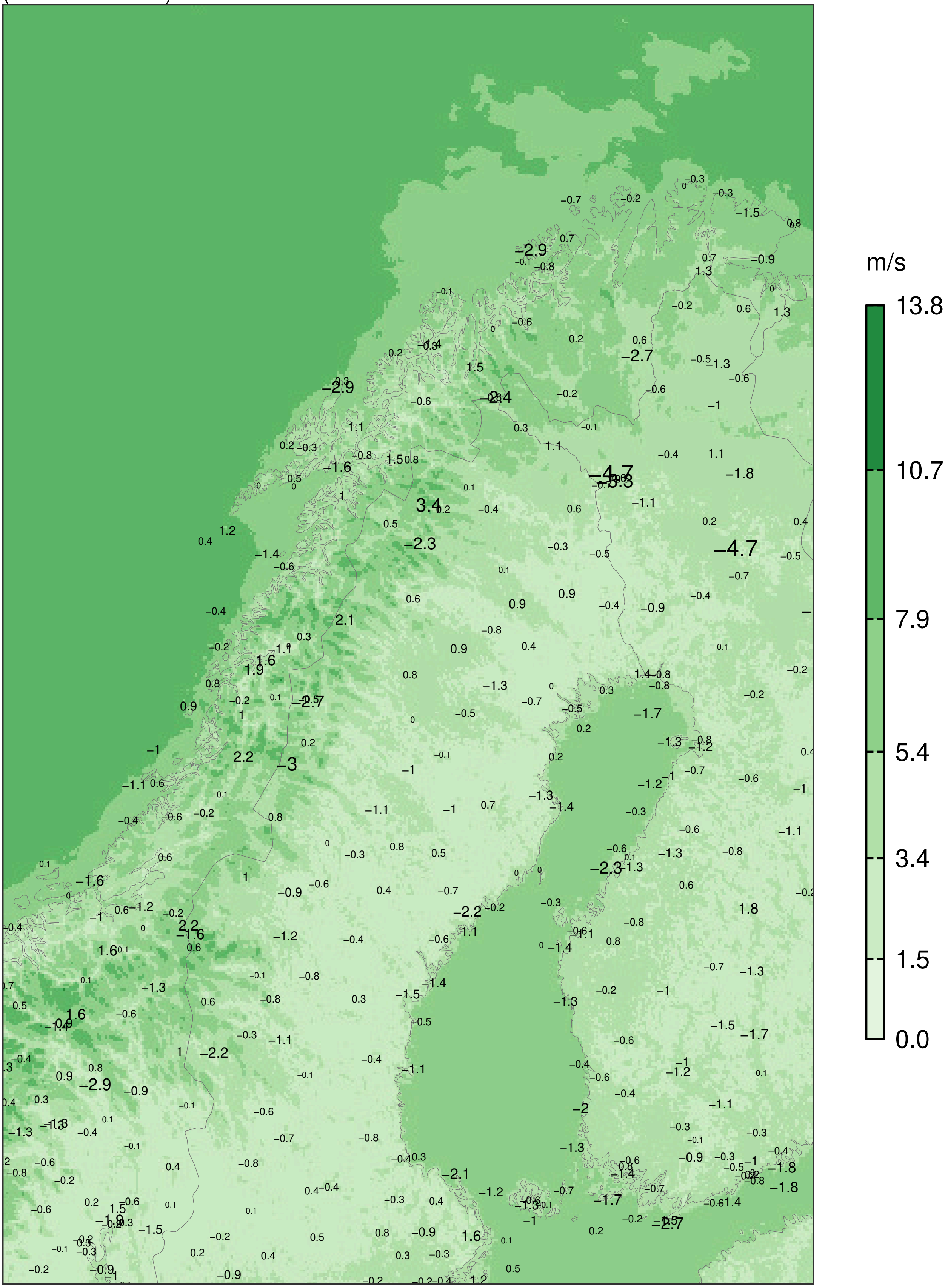

Mean Absolute Error
223 Norwegian stations
00+24,+30,+36,+42
IFS
MEPSctrl
1
2
3
4
5
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26


41 Norwegian coastal stations
1
2
3
4
5
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26


15 Norwegian mountainous stations
1
2
3
4
5
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

MEPSctrl 00+12

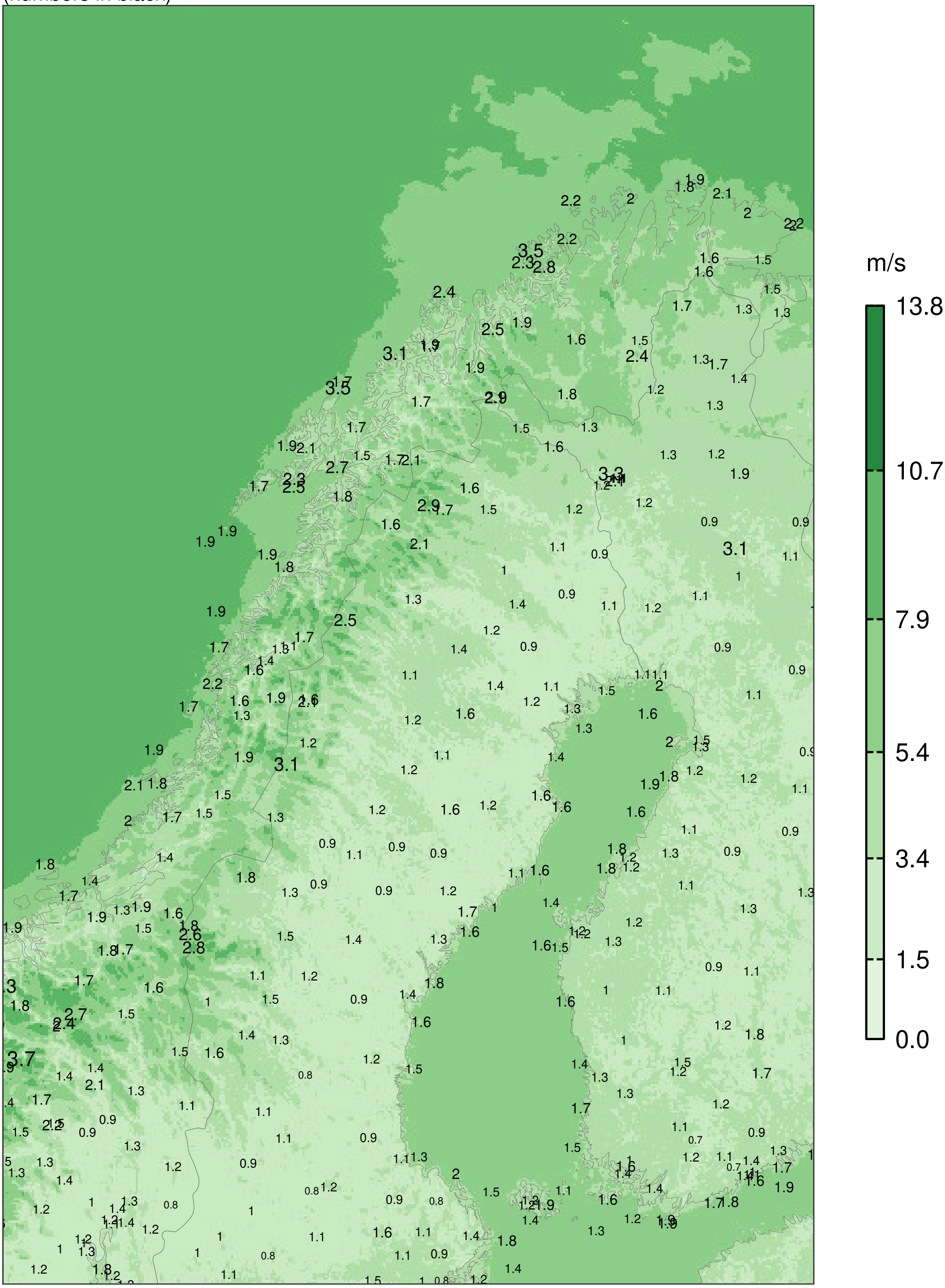
ME at observing sites
(numbers in black)



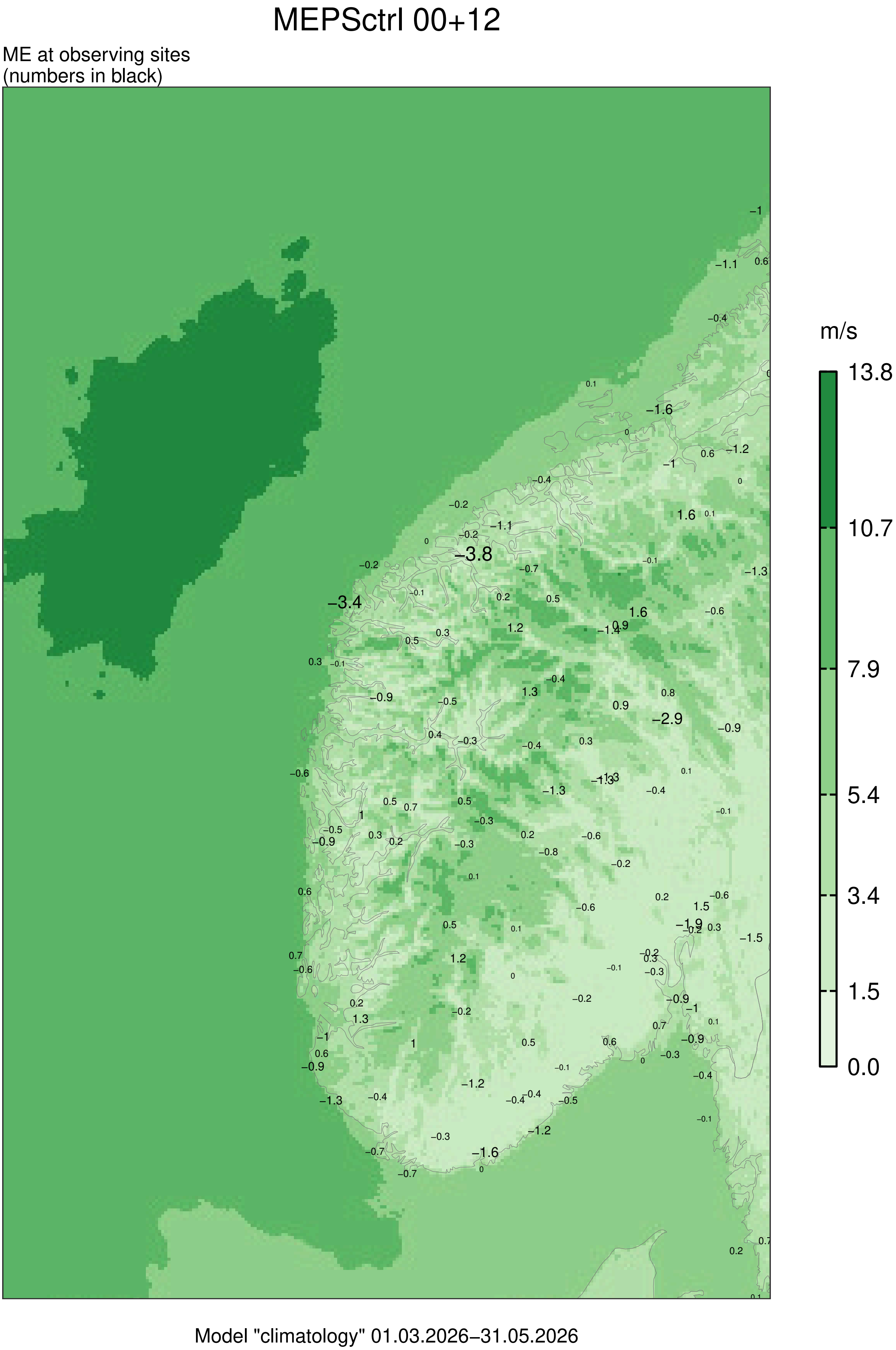
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

SDE at observing sites
(numbers in black)

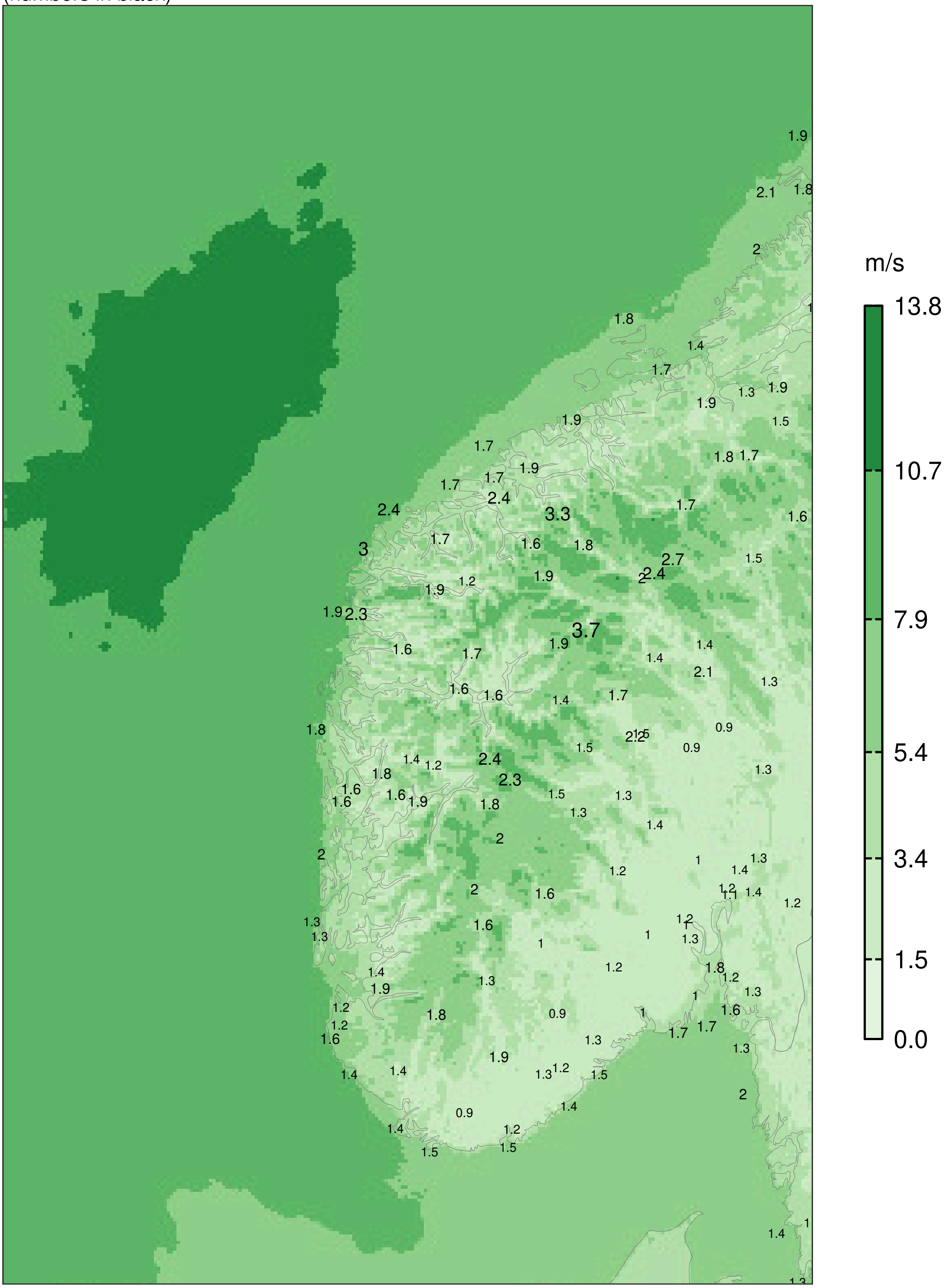


Model "climatology" 01.03.2026–31.05.2026

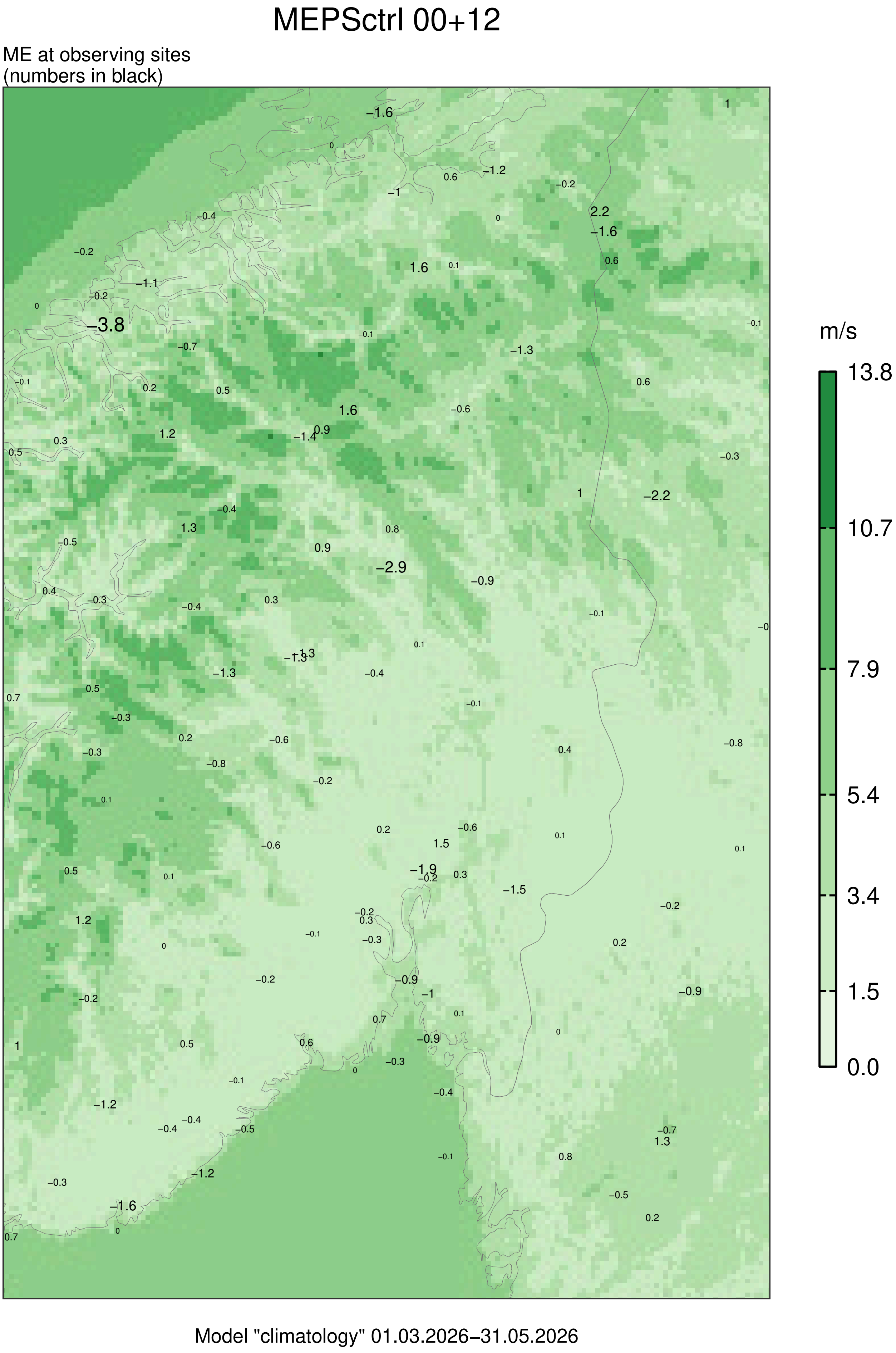

MEPSctrl 00+12
ME at observing sites
(numbers in black)
m/s
13.8
10.7
7.9
5.4
3.4
1.5
0.0
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

SDE at observing sites
(numbers in black)

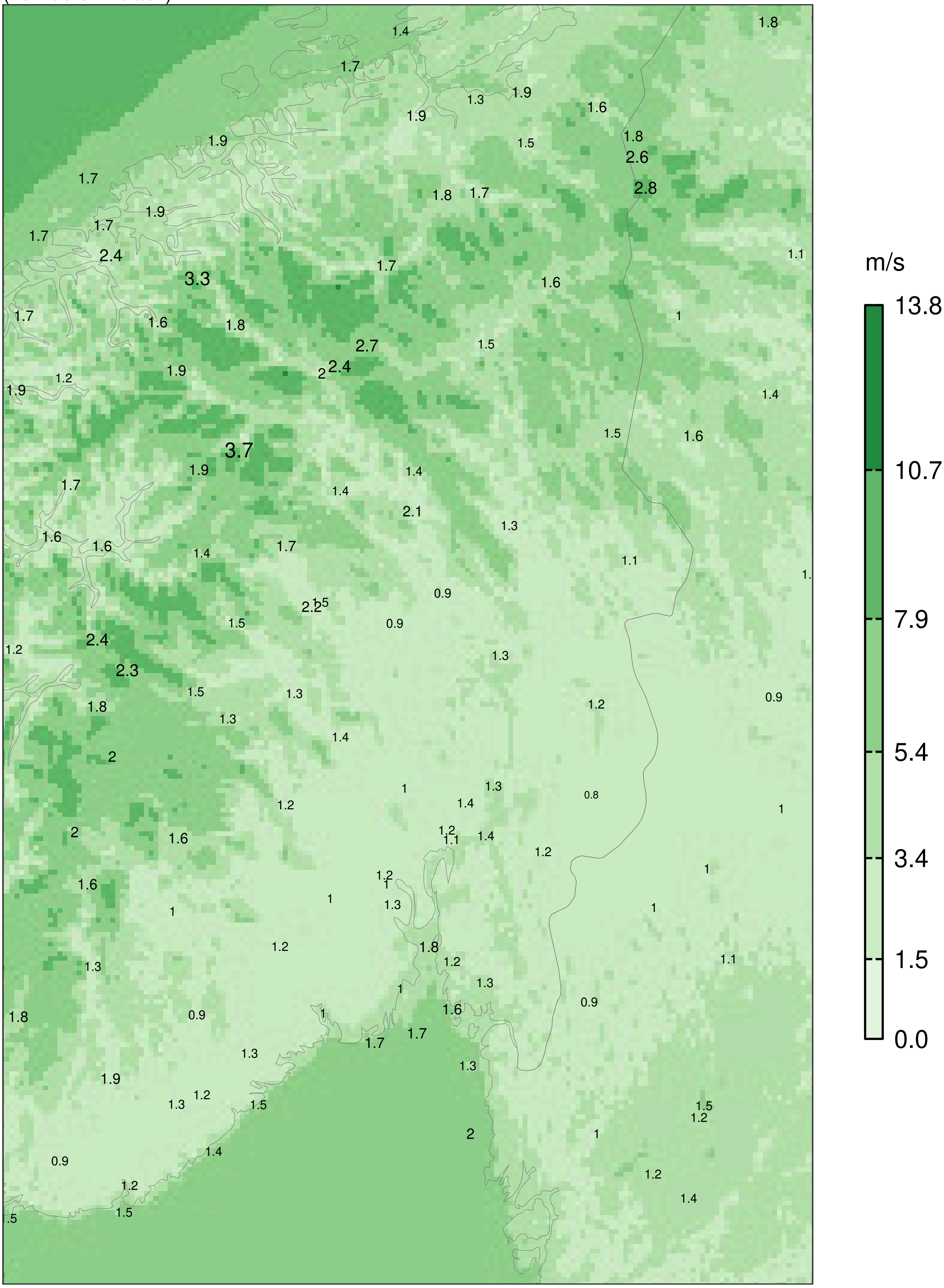


Model "climatology" 01.03.2026–31.05.2026

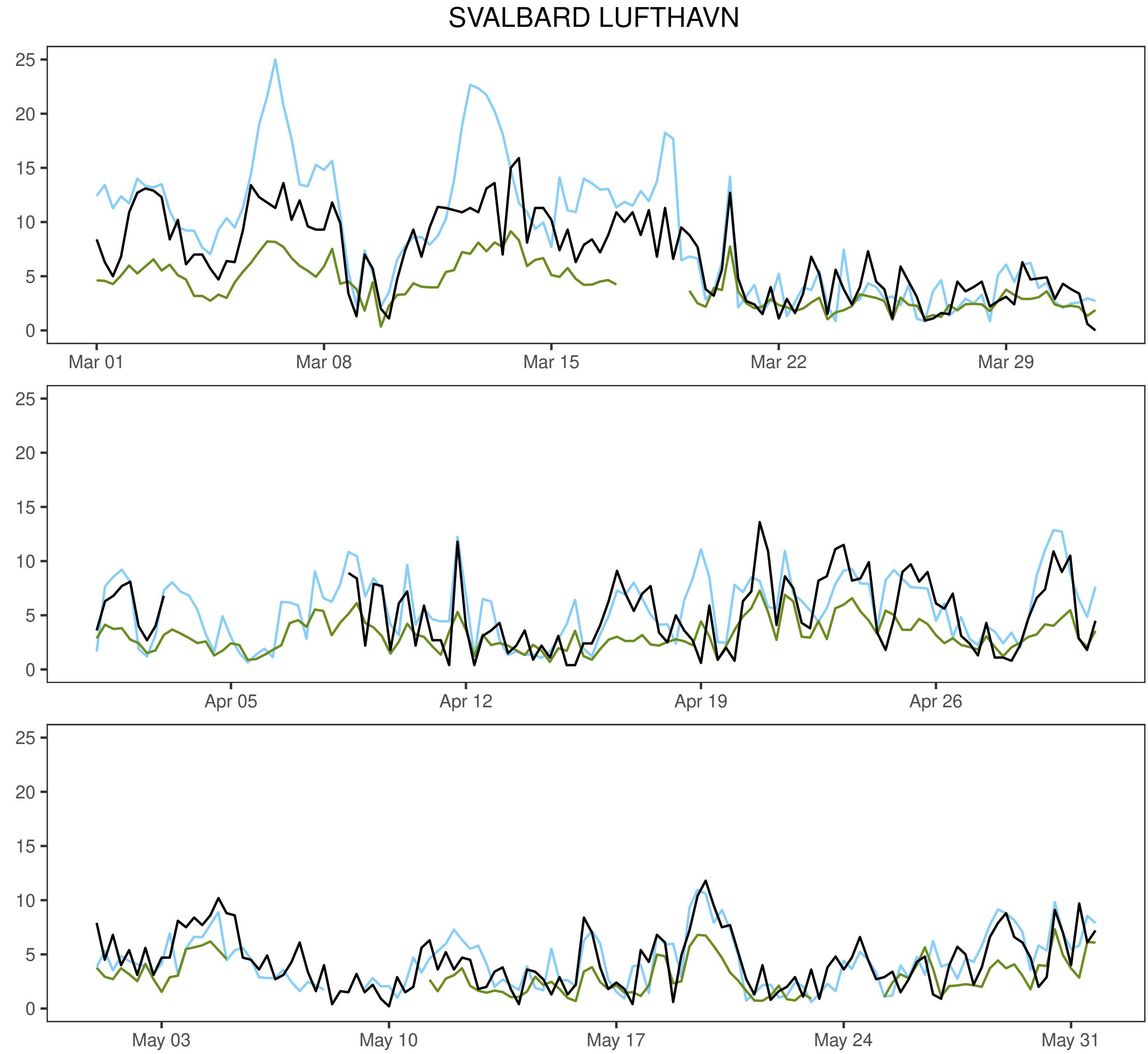

MEPSctrl 00+12
ME at observing sites
(numbers in black)
m/s
13.8
10.7
7.9
5.4
3.4
1.5
0.0
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+12

SDE at observing sites
(numbers in black)

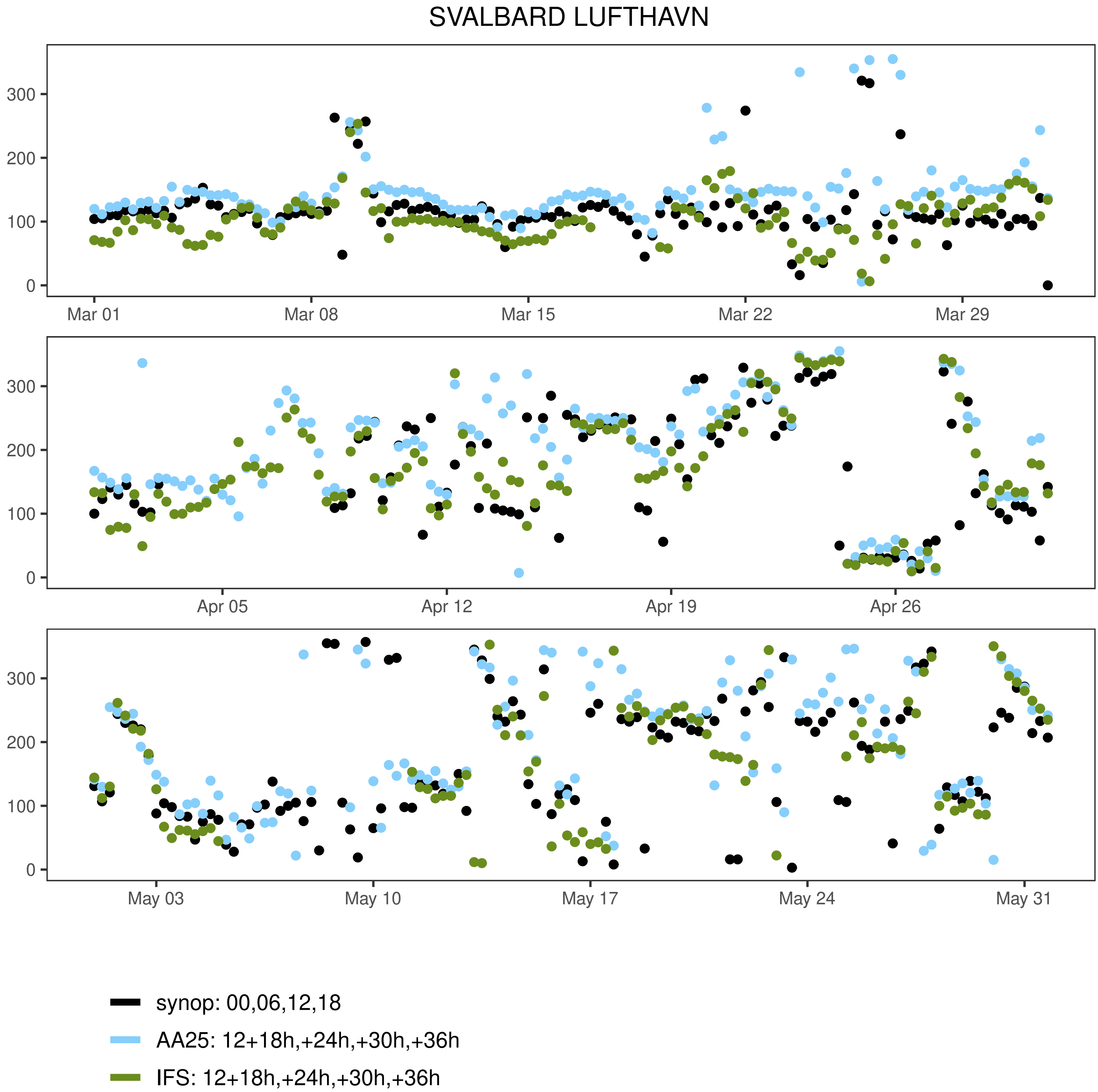


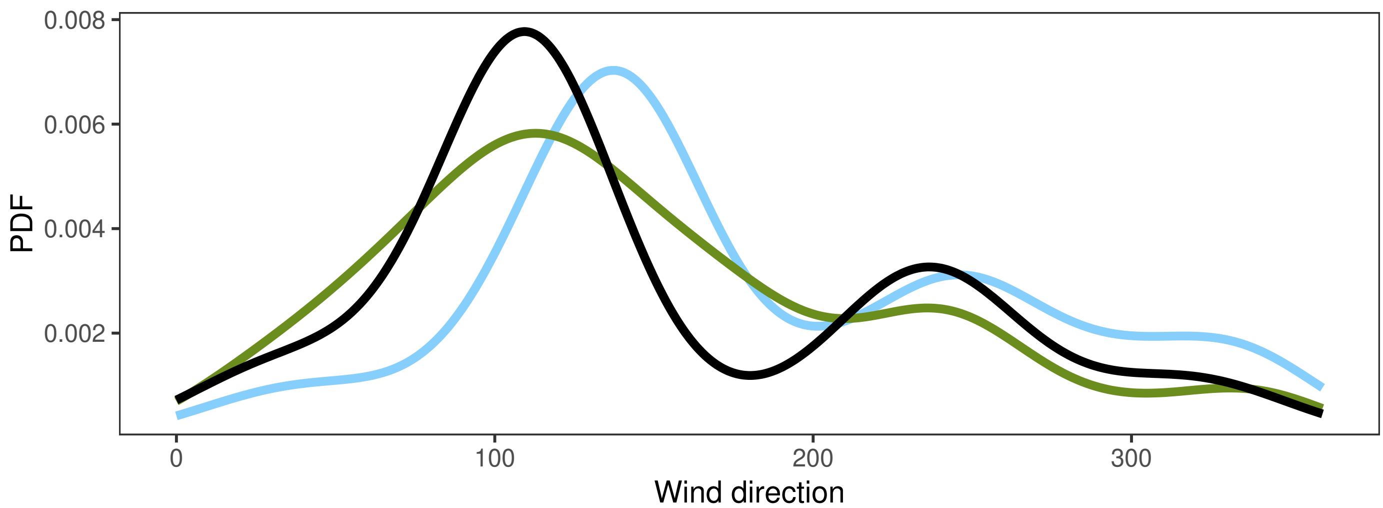
Model "climatology" 01.03.2026–31.05.2026

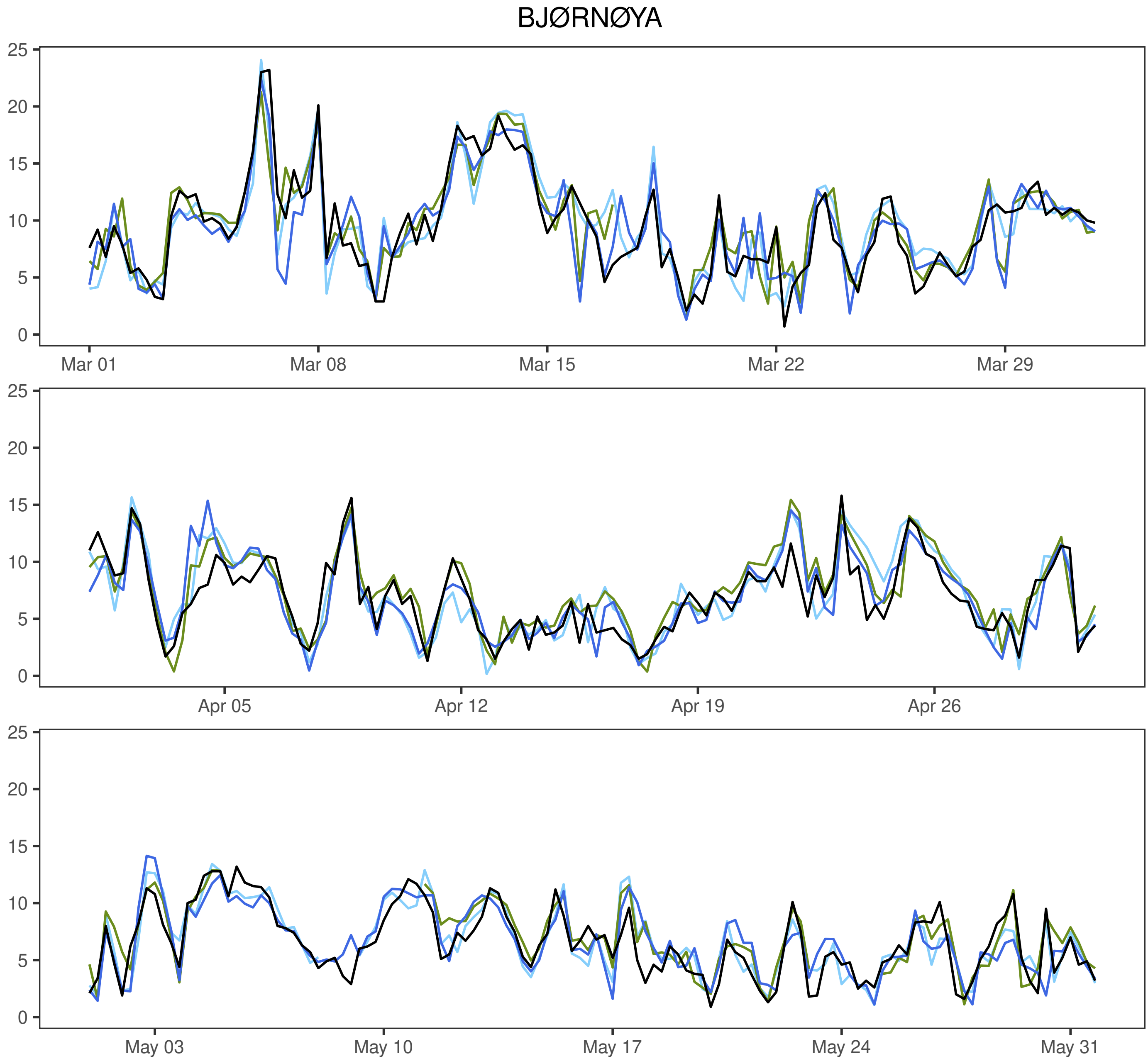


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.0	5.5	15.9	3.4	347
AA25: 12+18h,+24h,+30h,+36h	0.6	6.3	25.0	4.4	364
IFS: 12+18h,+24h,+30h,+36h	0.4	3.5	9.2	1.8	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
AA25 – synop	0.9	2.9	3.1	2.2	13.7	307
IFS – synop	−2.1	2.3	3.1	2.5	7.6	307

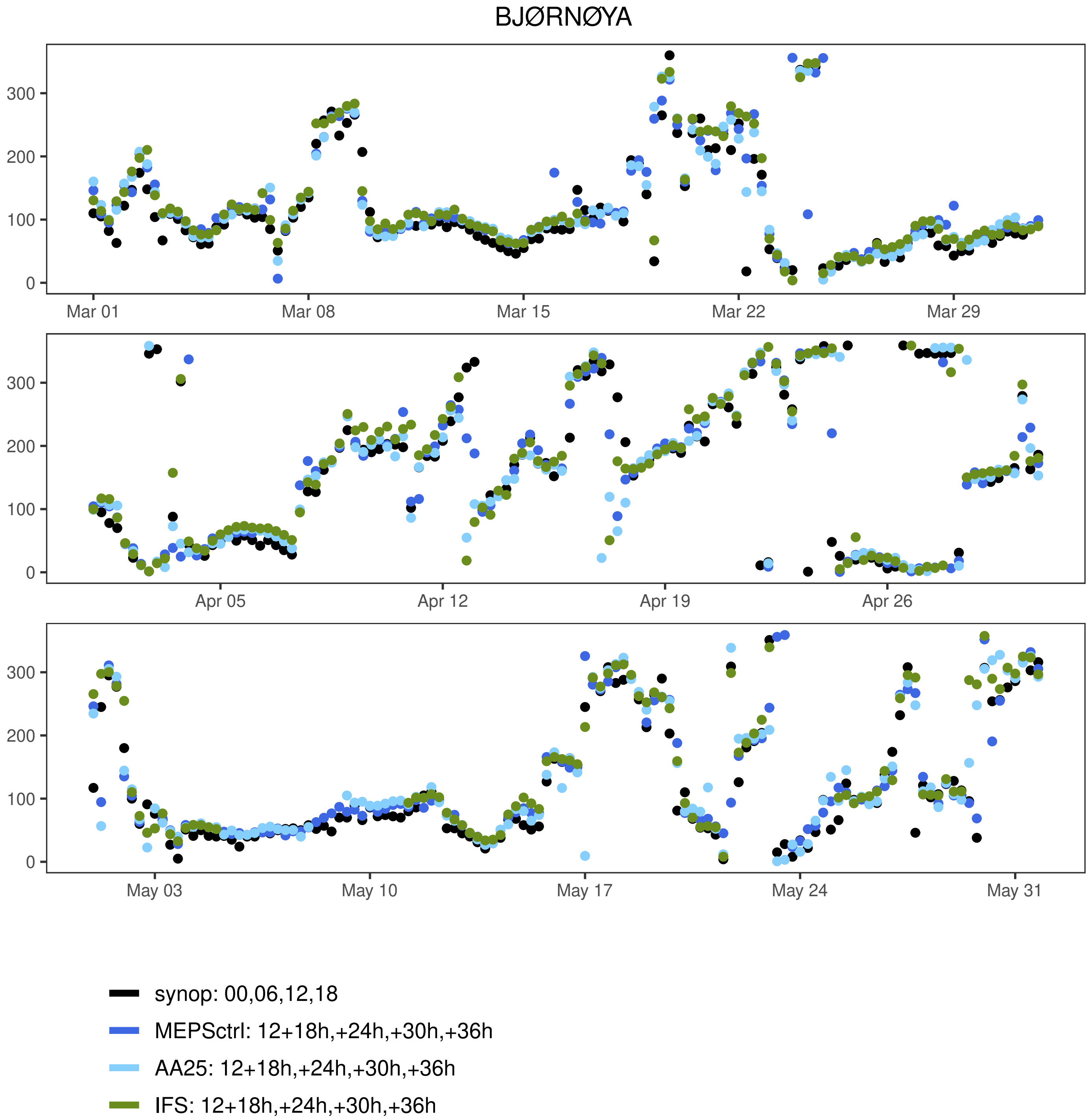

SVALBARD LUFTHAVN
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
AA25: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

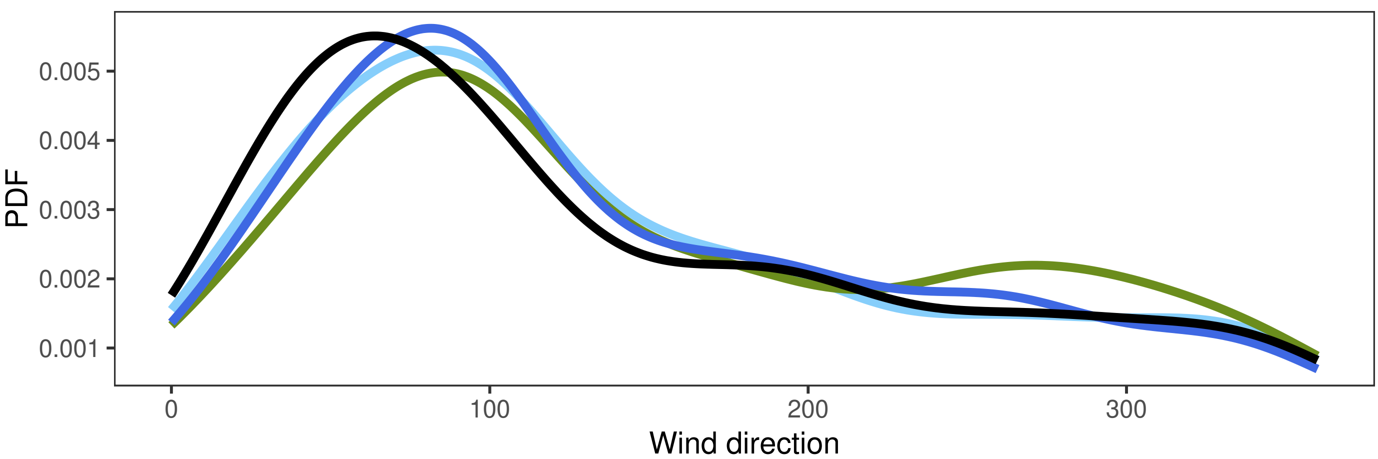

PDF
0.008
0.006
0.004
0.002
0
100
200
300
Wind direction

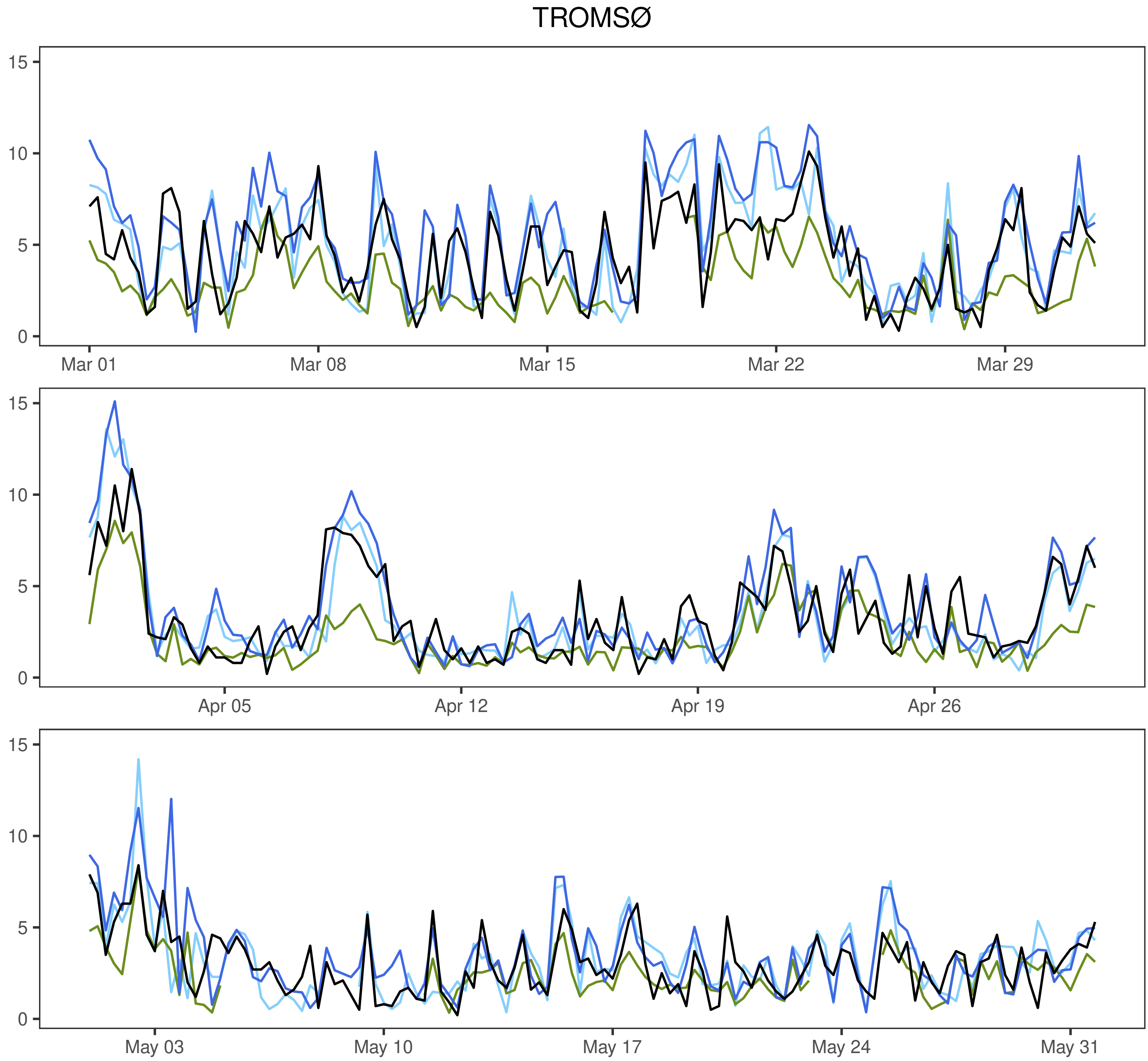


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.7	7.6	23.2	3.8	368
MEPSctrl: 12+18h,+24h,+30h,+36l	0.5	7.7	22.4	3.7	368
AA25: 12+18h,+24h,+30h,+36h	0.2	7.9	24.1	3.9	364
IFS: 12+18h,+24h,+30h,+36h	0.4	8.2	21.2	3.7	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.0	2.1	2.1	1.5	8.6	328
AA25 – synop	0.2	2.0	2.1	1.6	7.3	328
IFS – synop	0.5	1.9	1.9	1.5	8.5	328

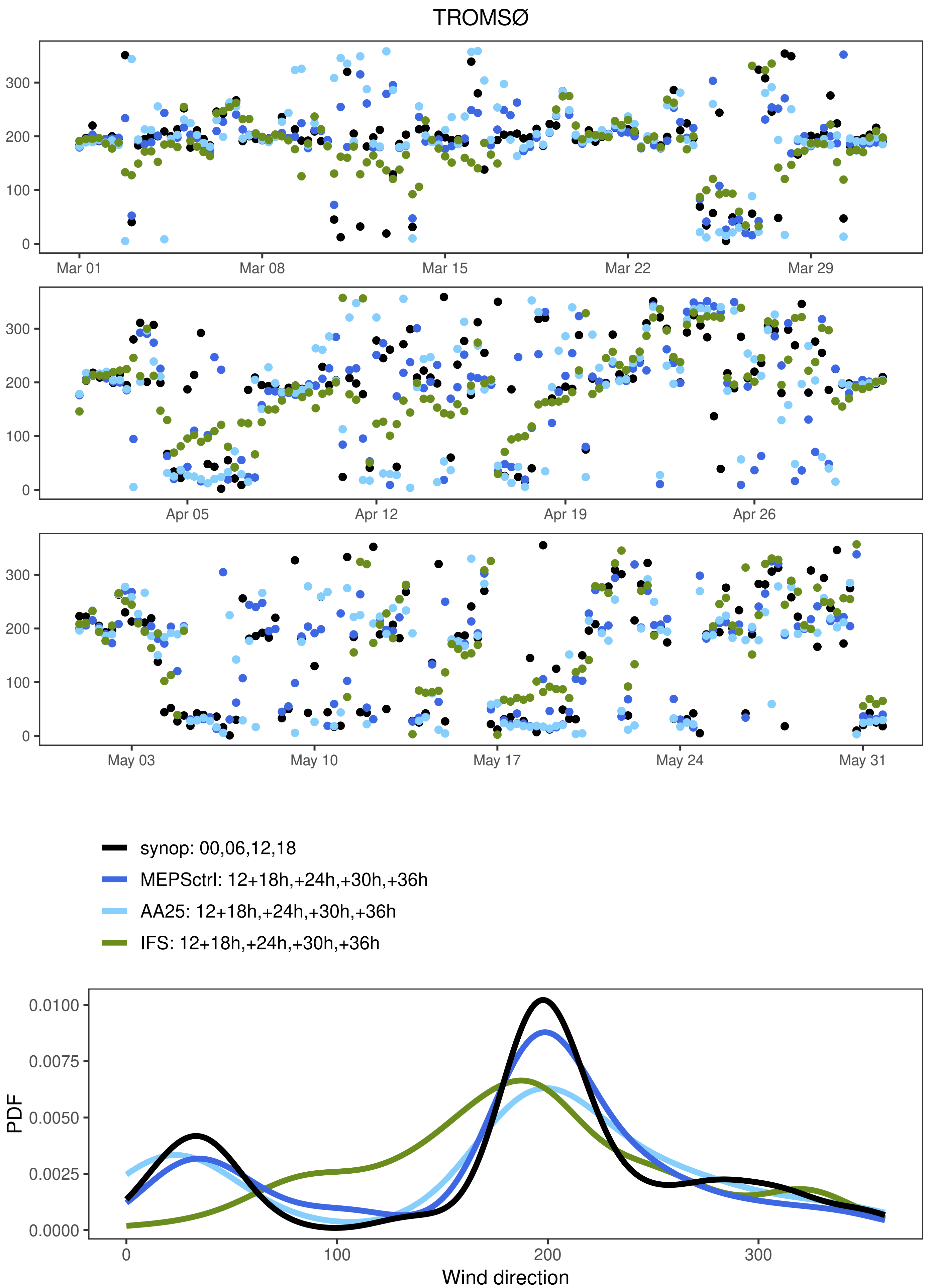

BJØRNØYA
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
AA25: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

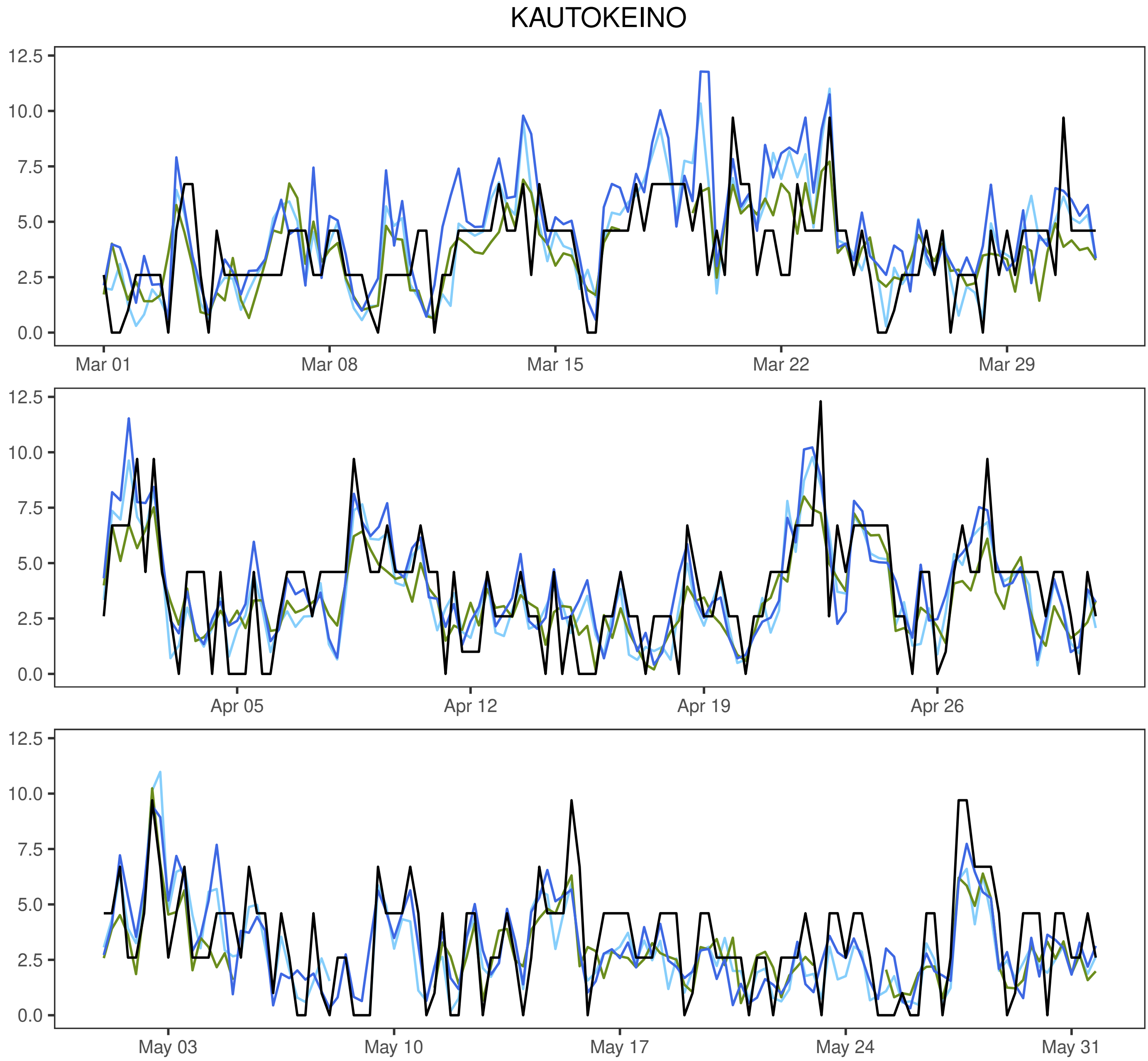

PDF
0.005
0.004
0.003
0.002
0.001
0
100
200
300
Wind direction



	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.2	3.6	11.4	2.3	368
MEPSctrl: 12+18h,+24h,+30h,+36h	0.2	4.3	15.1	2.9	368
AA25: 12+18h,+24h,+30h,+36h	0.4	3.9	14.2	2.6	364
IFS: 12+18h,+24h,+30h,+36h	0.2	2.5	8.6	1.6	328

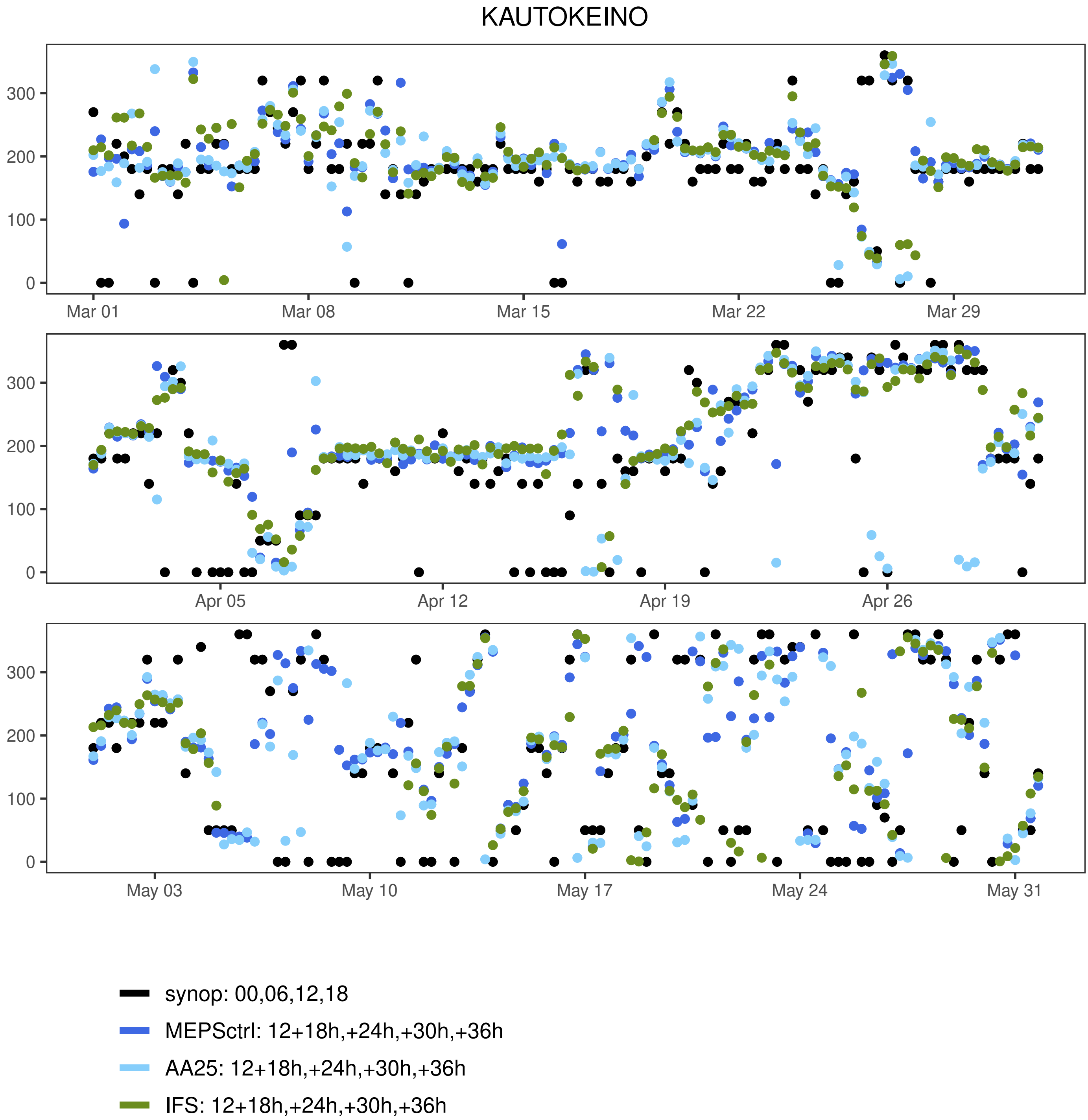
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.7	1.7	1.8	1.4	7.8	328
AA25 – synop	0.3	1.7	1.7	1.3	7.2	328
IFS – synop	−1.1	1.6	1.9	1.5	5.5	328

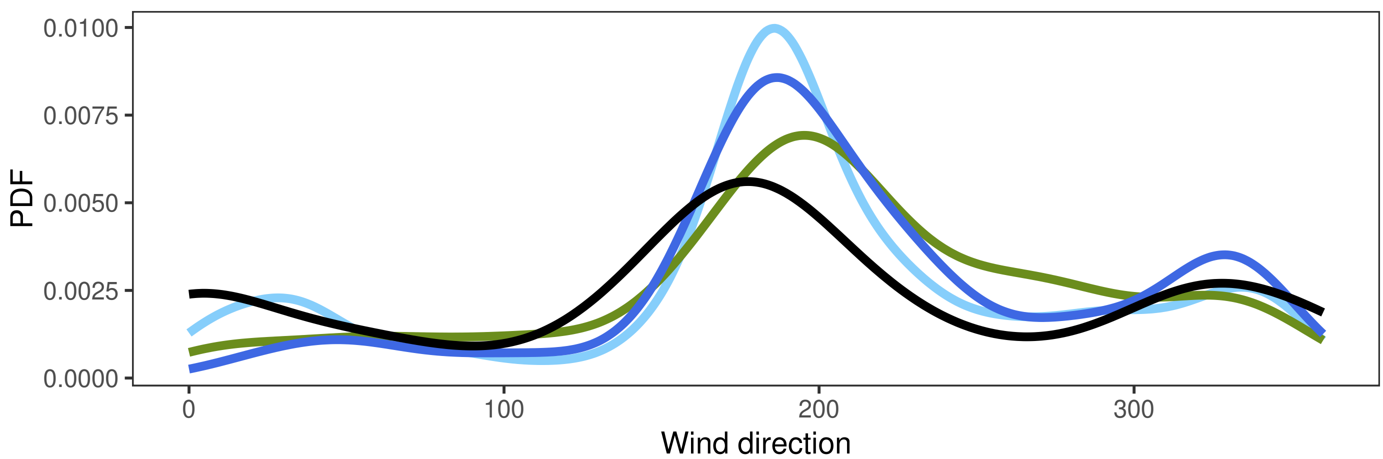

TROMSØ
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
AA25: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h
PDF
0.0100
0.0075
0.0050
0.0025
0.0000
0
100
200
300
Wind direction



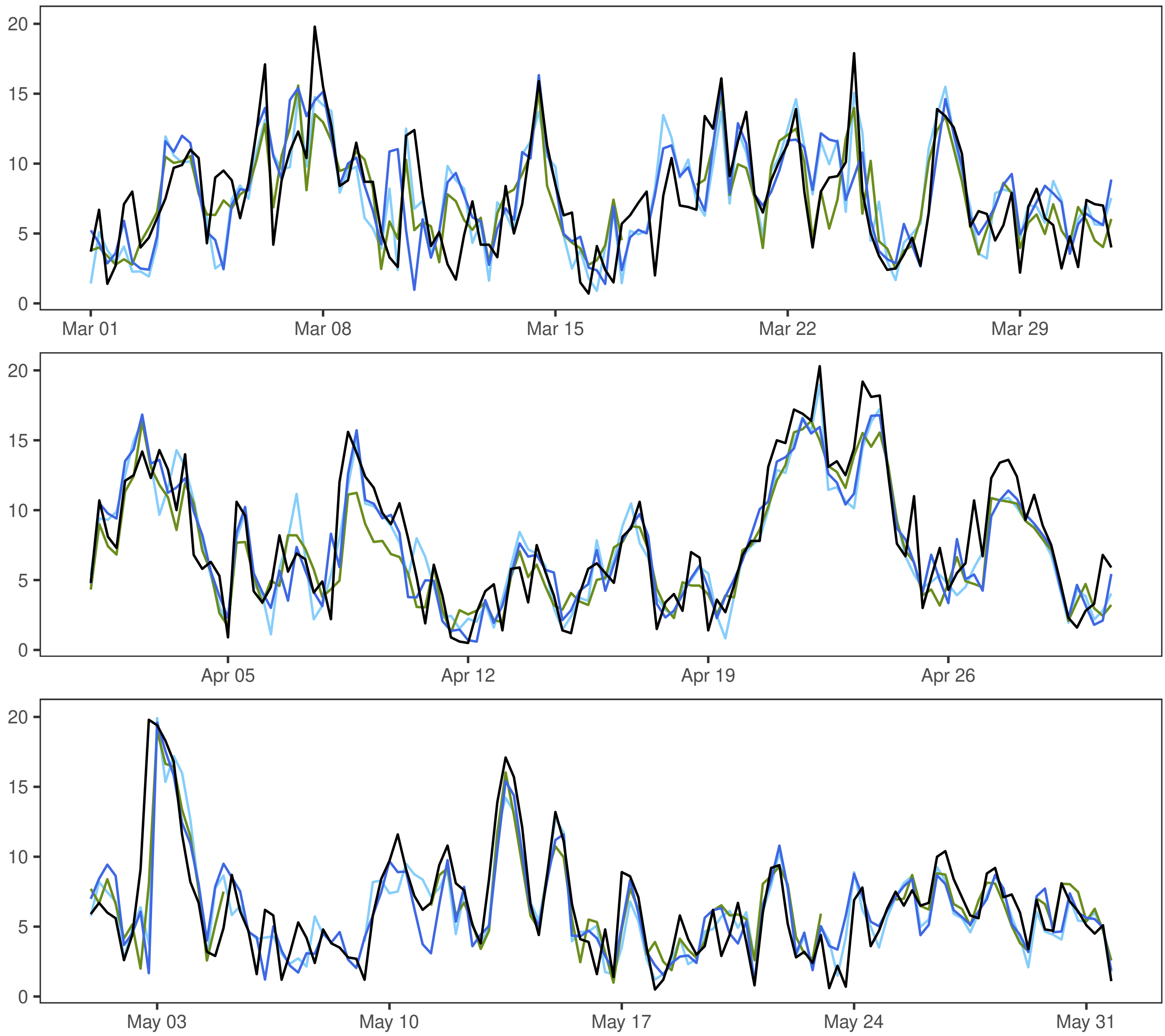
	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.0	3.6	12.3	2.3	368
MEPSctrl: 12+18h,+24h,+30h,+36l	0.3	3.9	11.8	2.3	368
AA25: 12+18h,+24h,+30h,+36h	0.2	3.6	11.0	2.2	364
IFS: 12+18h,+24h,+30h,+36h	0.2	3.4	10.2	1.7	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.4	2.0	2.1	1.6	9.2	328
AA25 – synop	−0.1	1.8	1.8	1.4	5.6	328
IFS – synop	−0.3	1.7	1.7	1.4	5.8	328


KAUTOKEINO
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
AA25: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

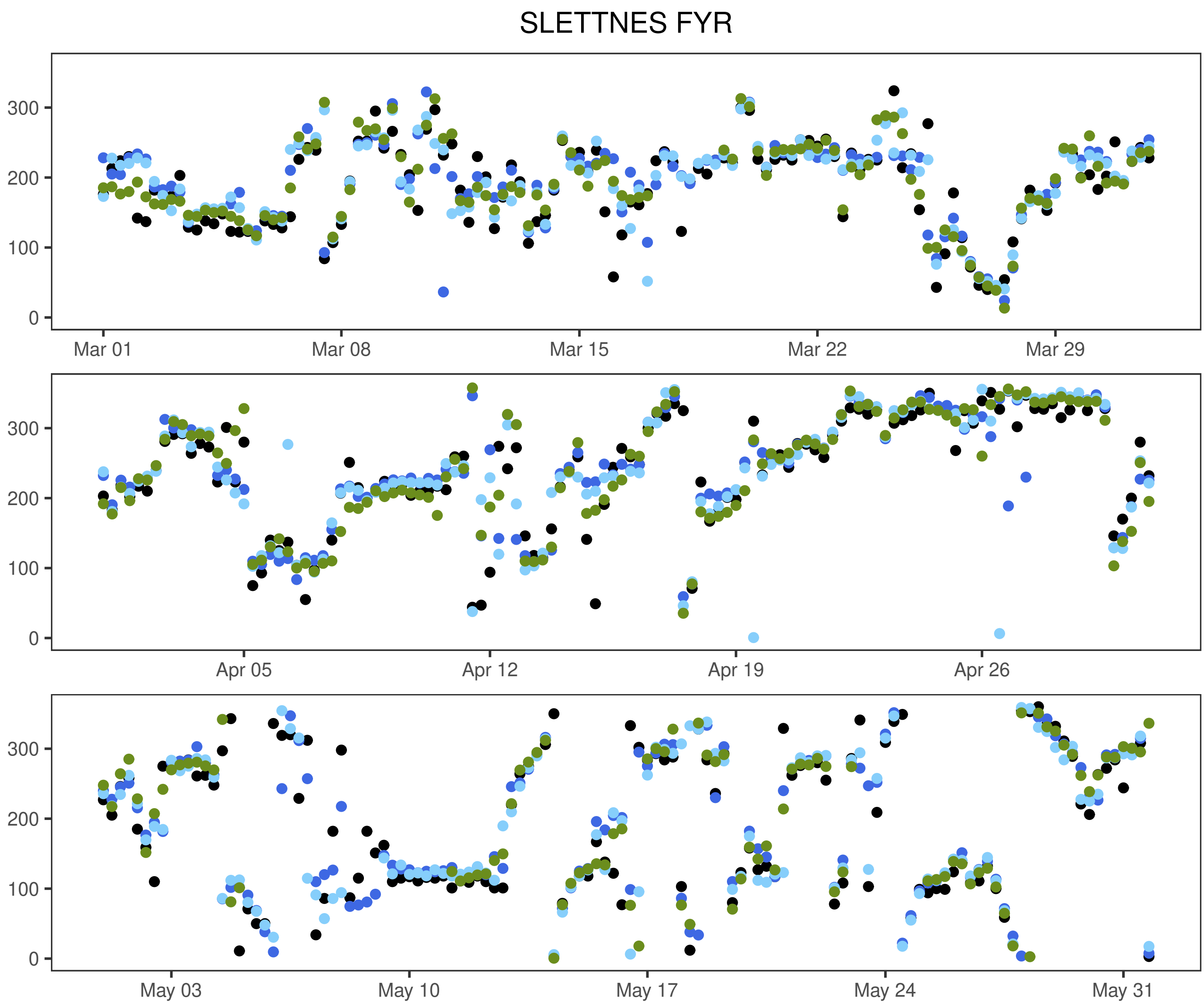

PDF
0.0100
0.0075
0.0050
0.0025
0.0000
0
100
200
300
Wind direction

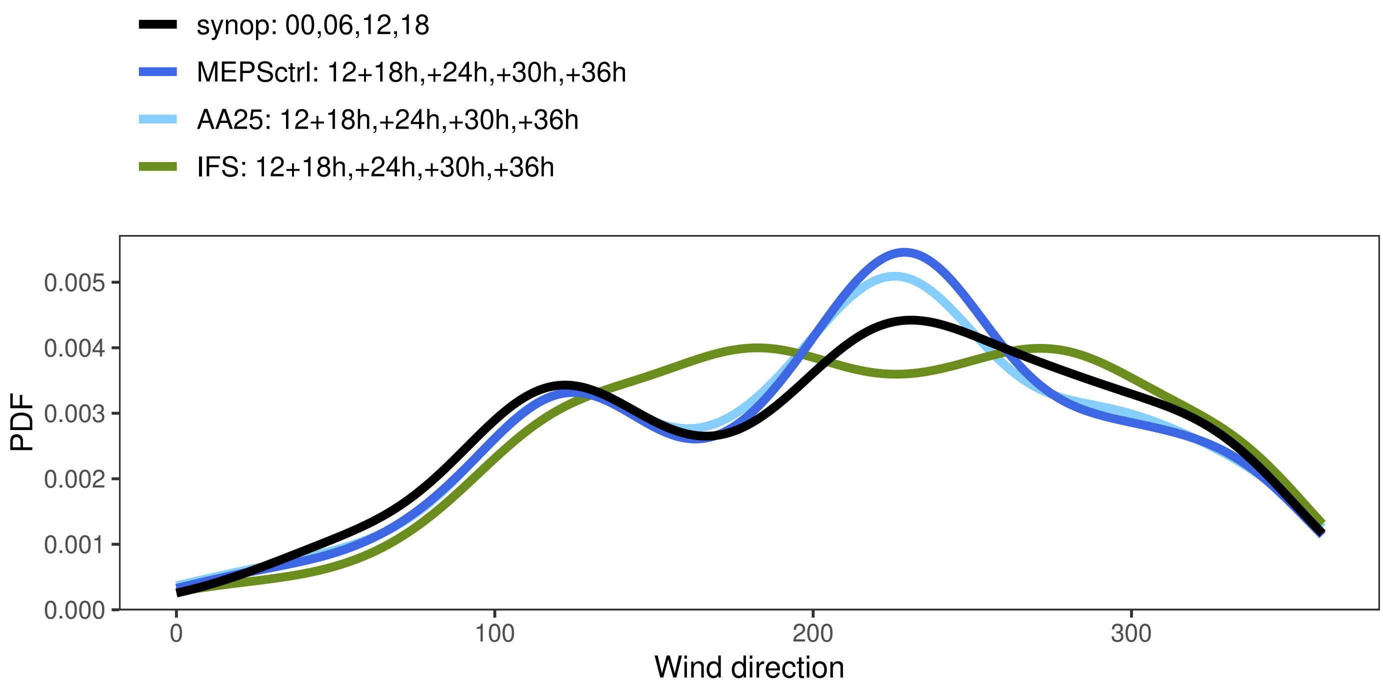
SLETTNES FYR

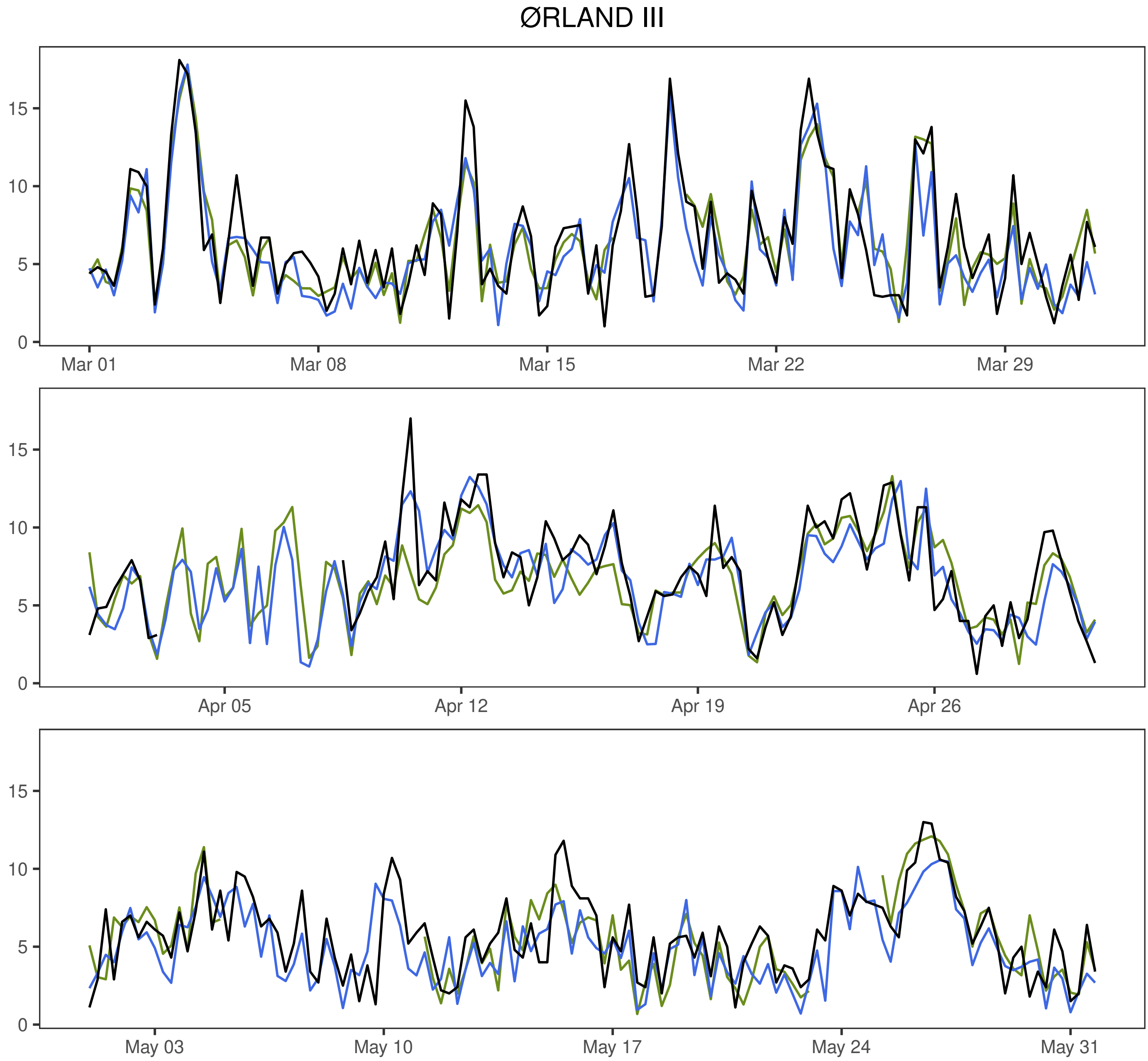


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.5	7.3	20.3	4.2	368
MEPSctrl: 12+18h,+24h,+30h,+36h	0.6	7.1	19.6	3.7	368
AA25: 12+18h,+24h,+30h,+36h	0.8	7.1	19.9	3.8	364
IFS: 12+18h,+24h,+30h,+36h	1.0	7.1	19.0	3.5	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.2	2.6	2.6	1.8	18.1	328
AA25 – synop	–0.3	2.5	2.5	1.9	16.1	328
IFS – synop	–0.4	2.2	2.3	1.7	11.8	328

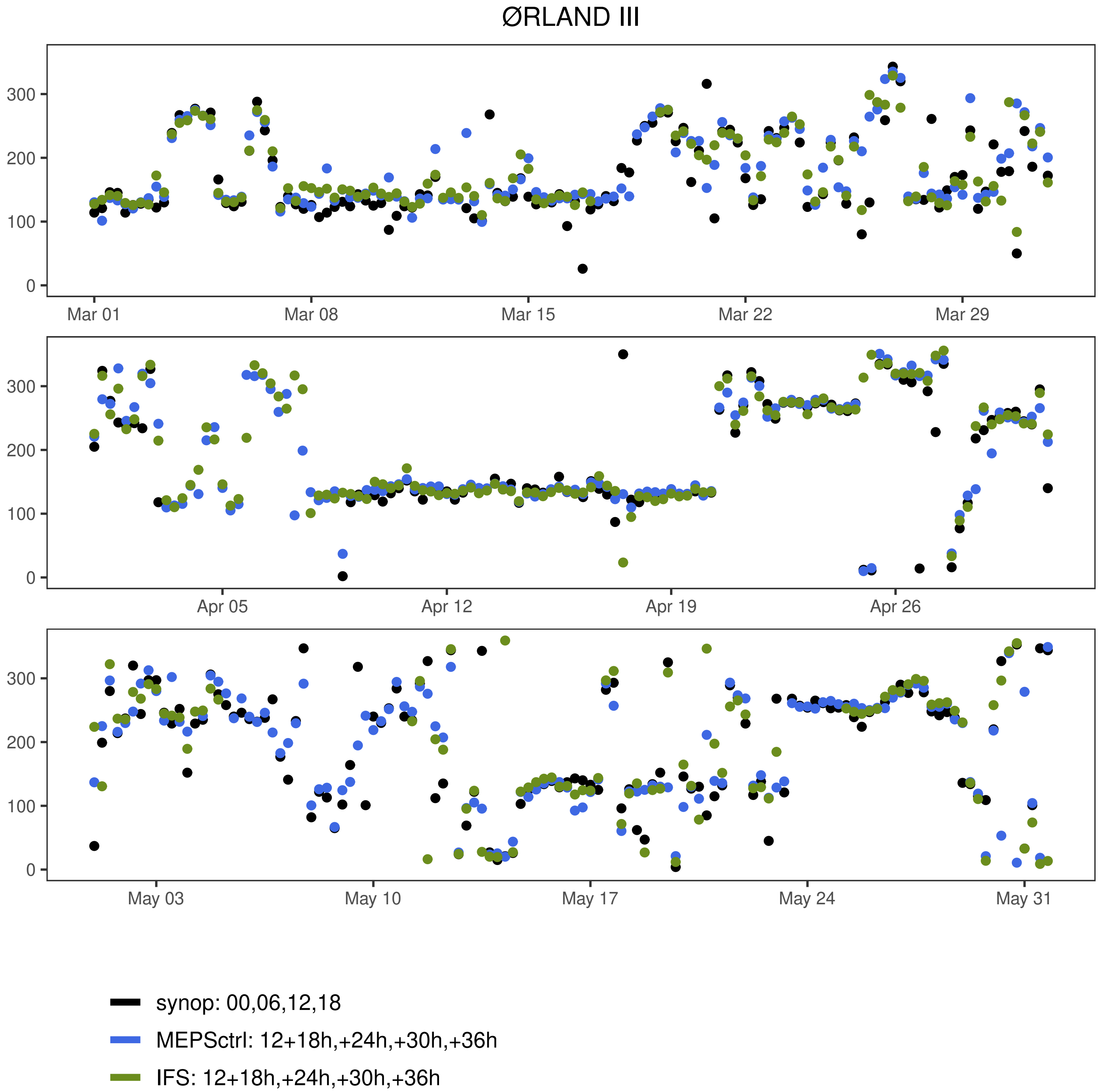

SLETTNES FYR
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31

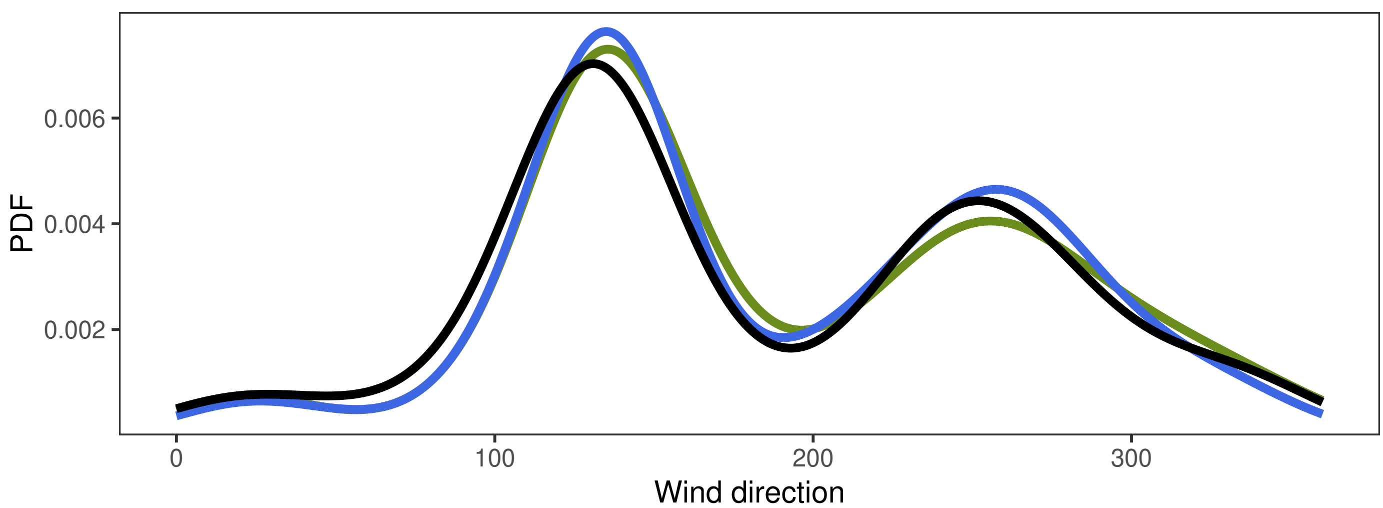

synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
AA25: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h
PDF
0.005
0.004
0.003
0.002
0.001
0.000
0
100
200
300
Wind direction

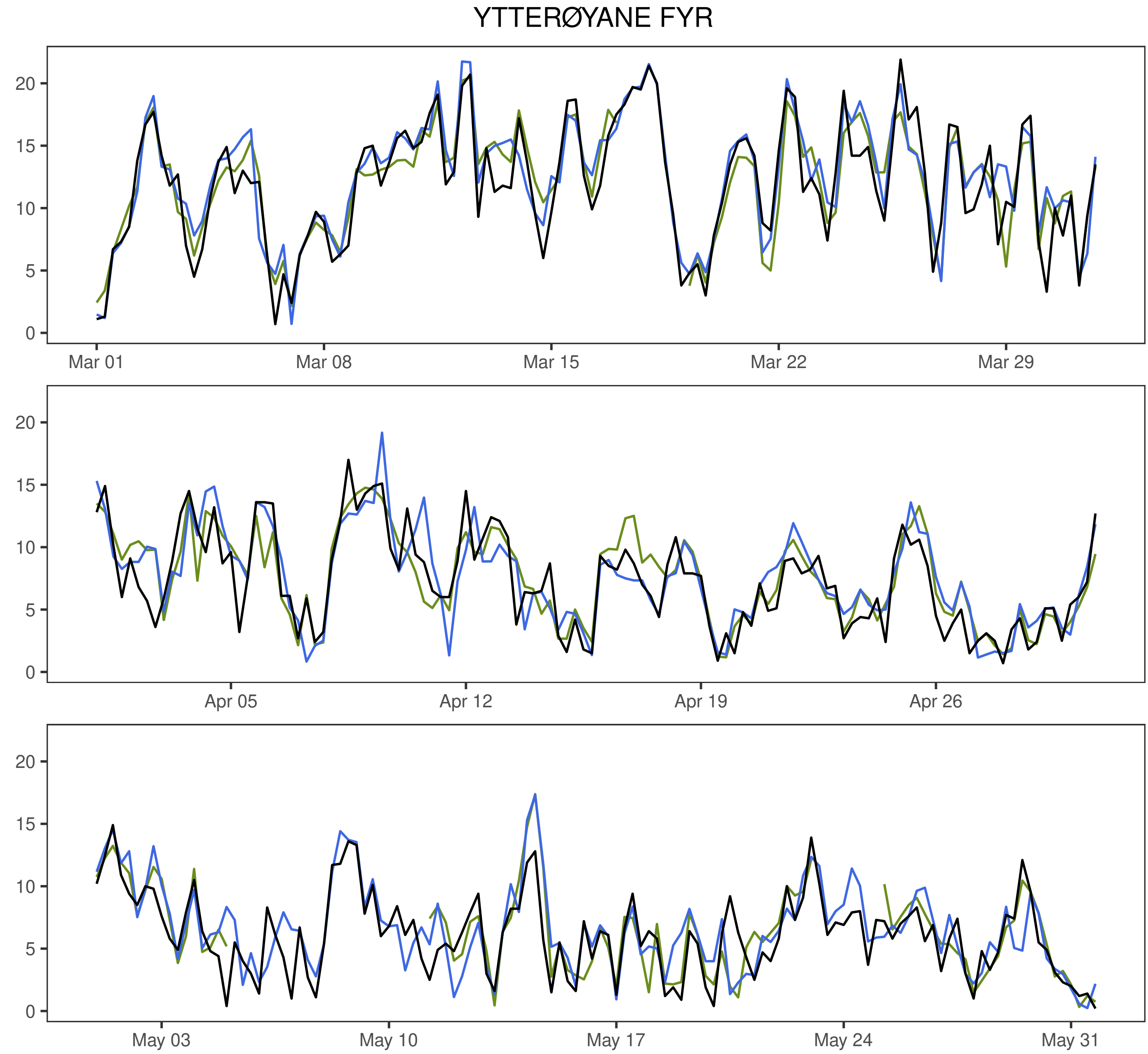


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.6	6.5	18.1	3.3	347
MEPSctrl: 12+18h,+24h,+30h,+36h	0.7	5.9	17.8	3.0	368
IFS: 12+18h,+24h,+30h,+36h	0.7	6.2	17.7	2.9	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.6	1.8	1.9	1.5	5.4	307
IFS – synop	–0.3	1.8	1.8	1.4	9.9	307

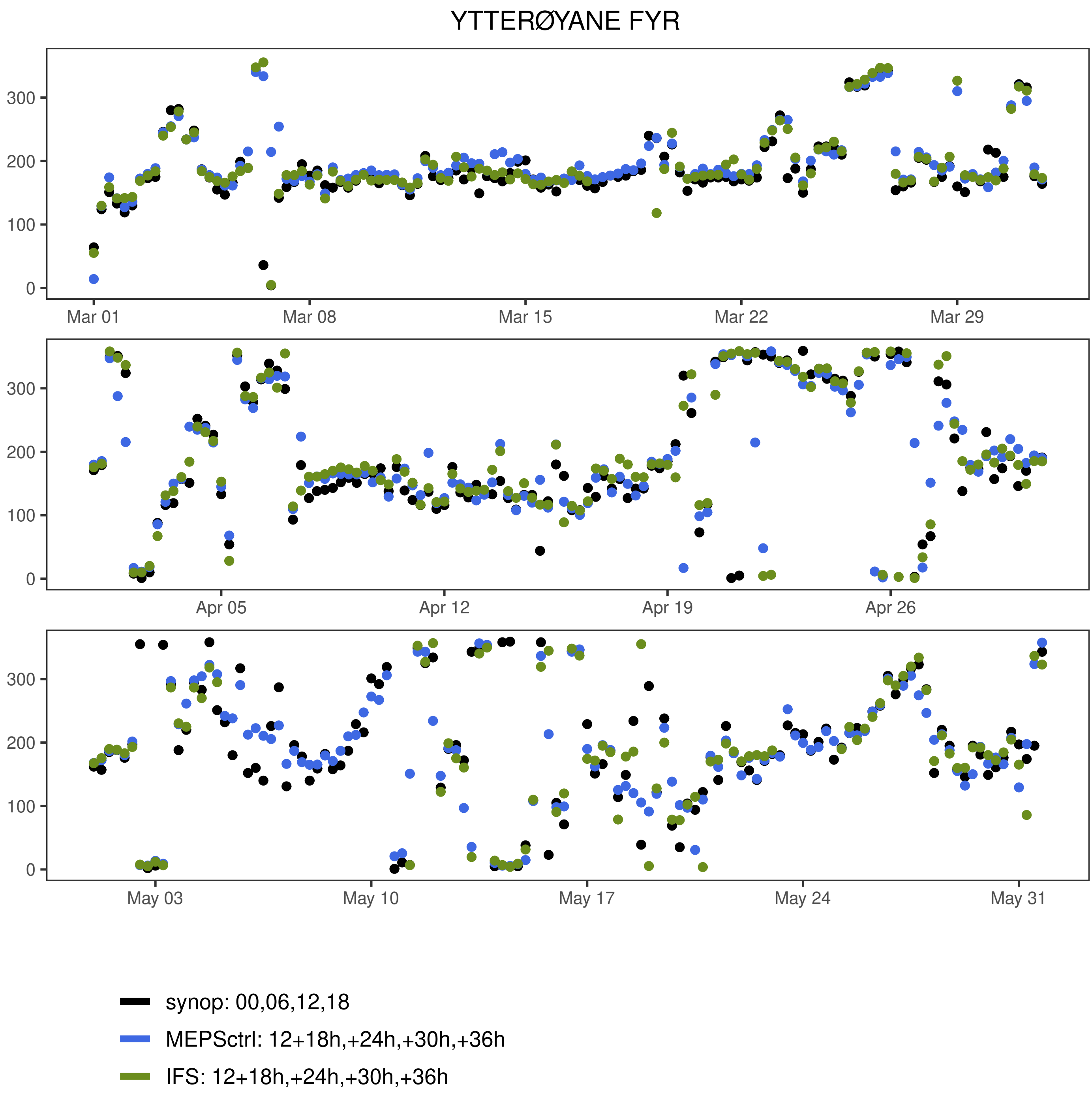

ØRLAND III
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h


PDF
0.006
0.004
0.002
0
100
200
300
Wind direction

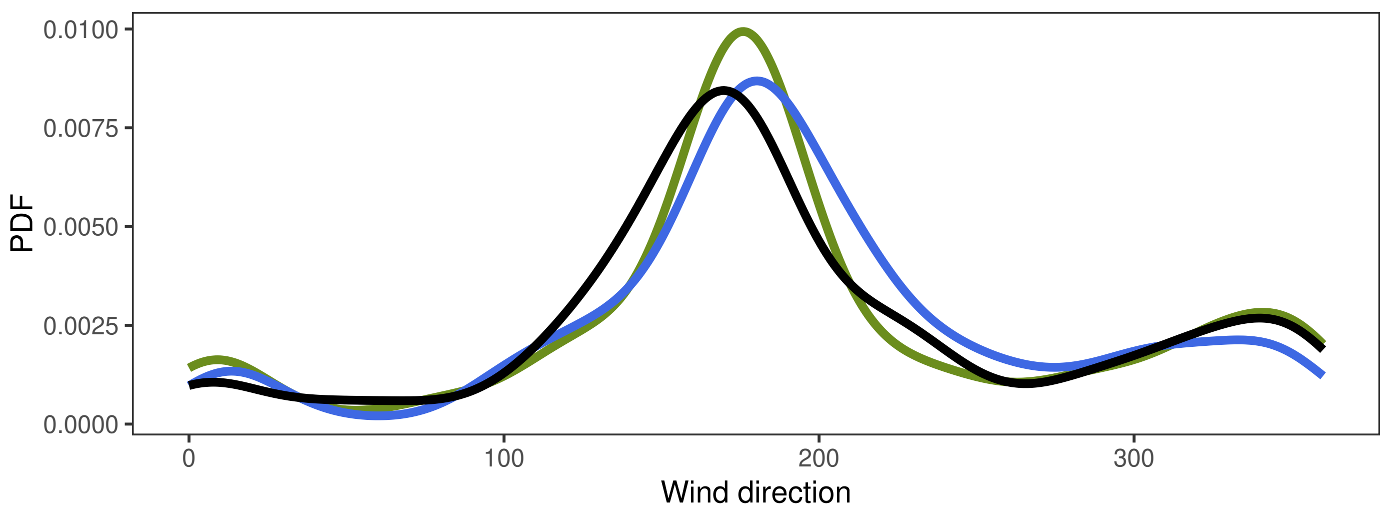


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.2	8.5	21.9	4.8	368
MEPSctrl: 12+18h,+24h,+30h,+36h	0.2	9.0	21.7	4.7	368
IFS: 12+18h,+24h,+30h,+36h	0.3	8.8	20.5	4.4	328

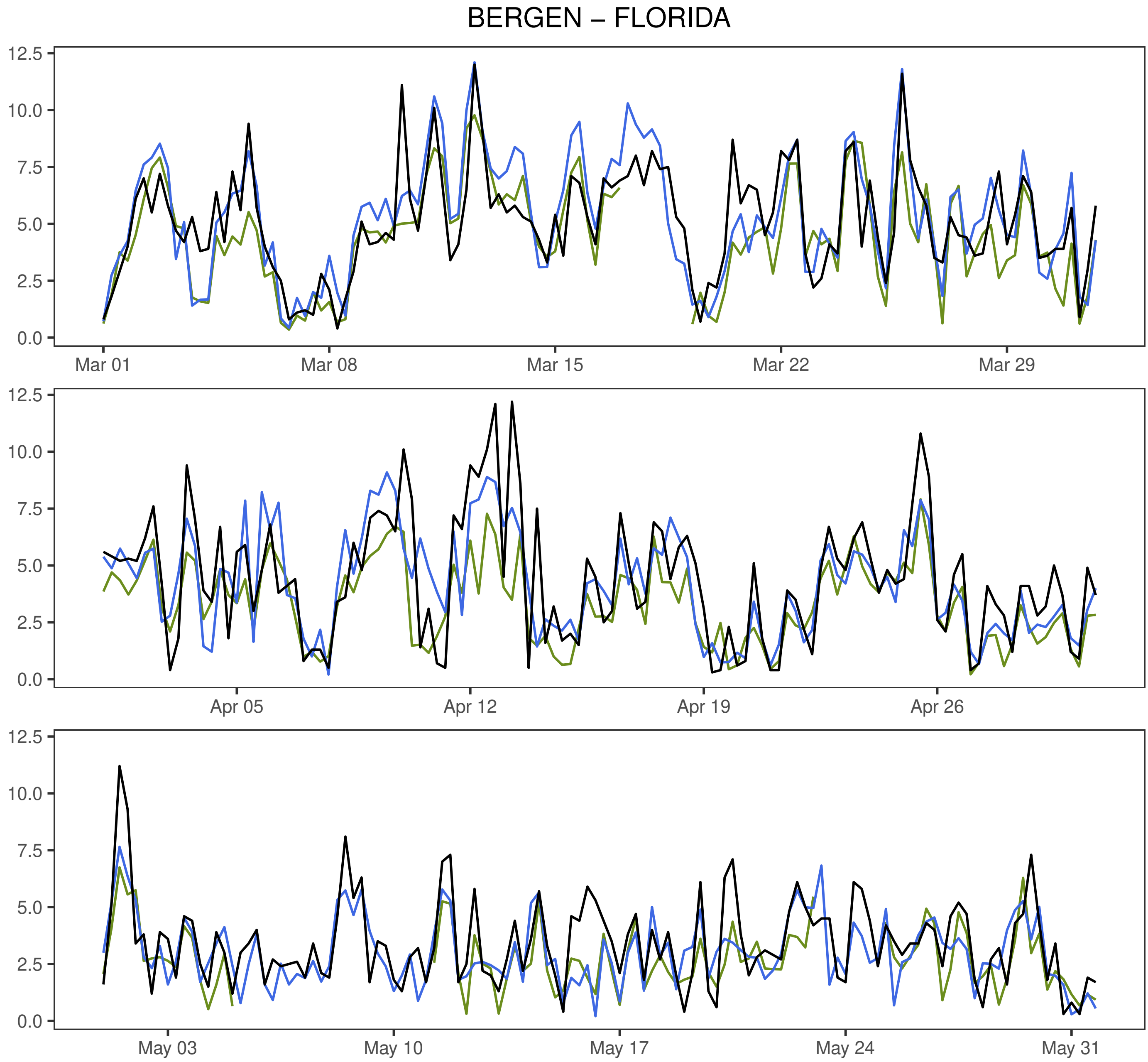
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.5	2.3	2.3	1.7	8.4	328
IFS – synop	0.3	2.1	2.1	1.6	7.5	328



YTTERØYANE FYR
0
100
200
300
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

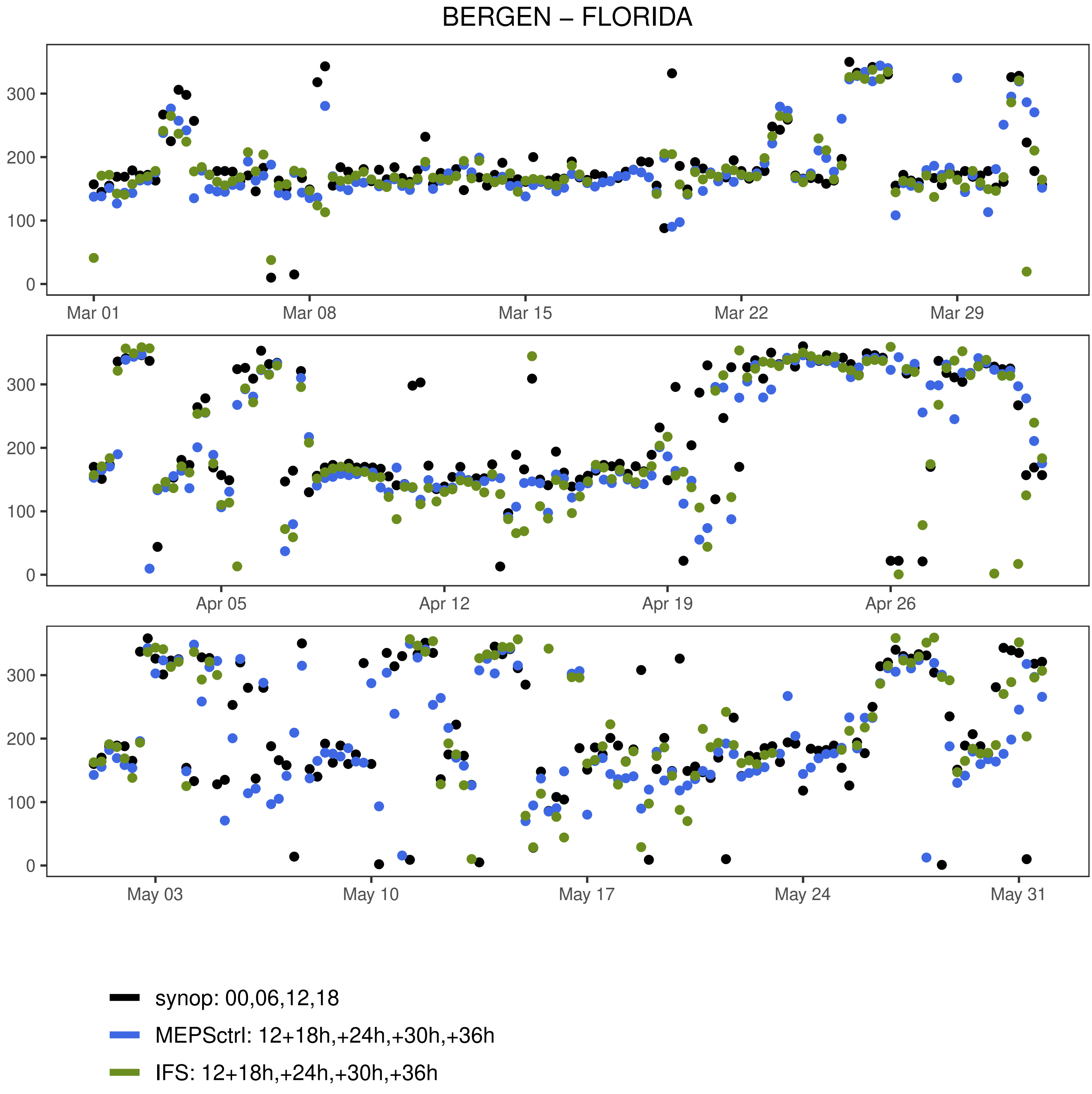


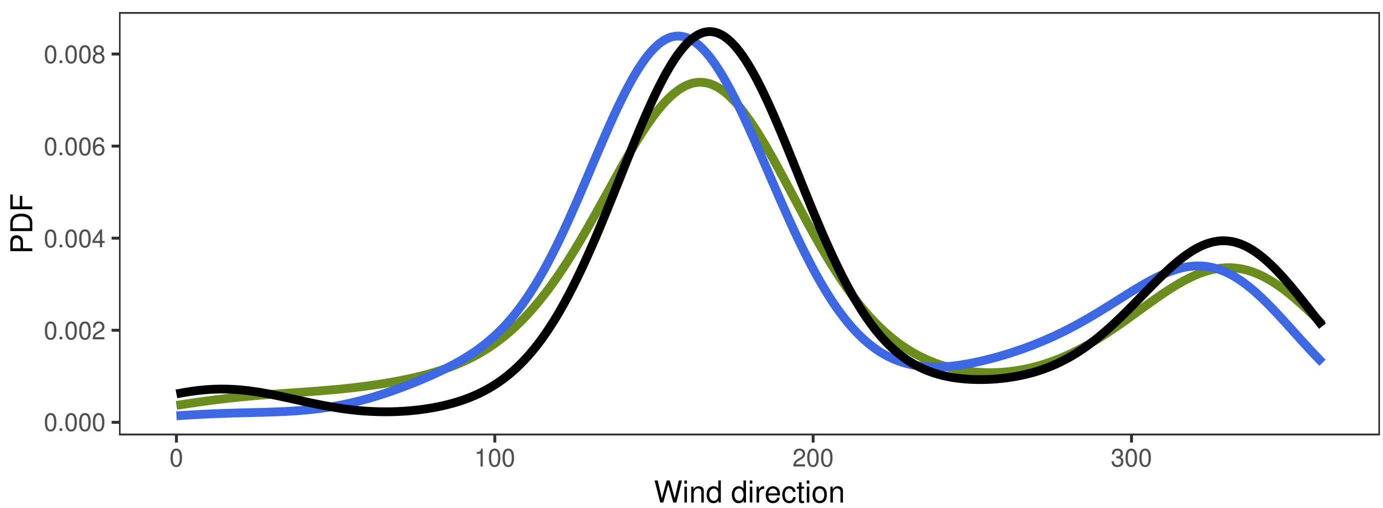
PDF
0.0000
0.0025
0.0050
0.0075
0.0100
0
100
200
300
Wind direction

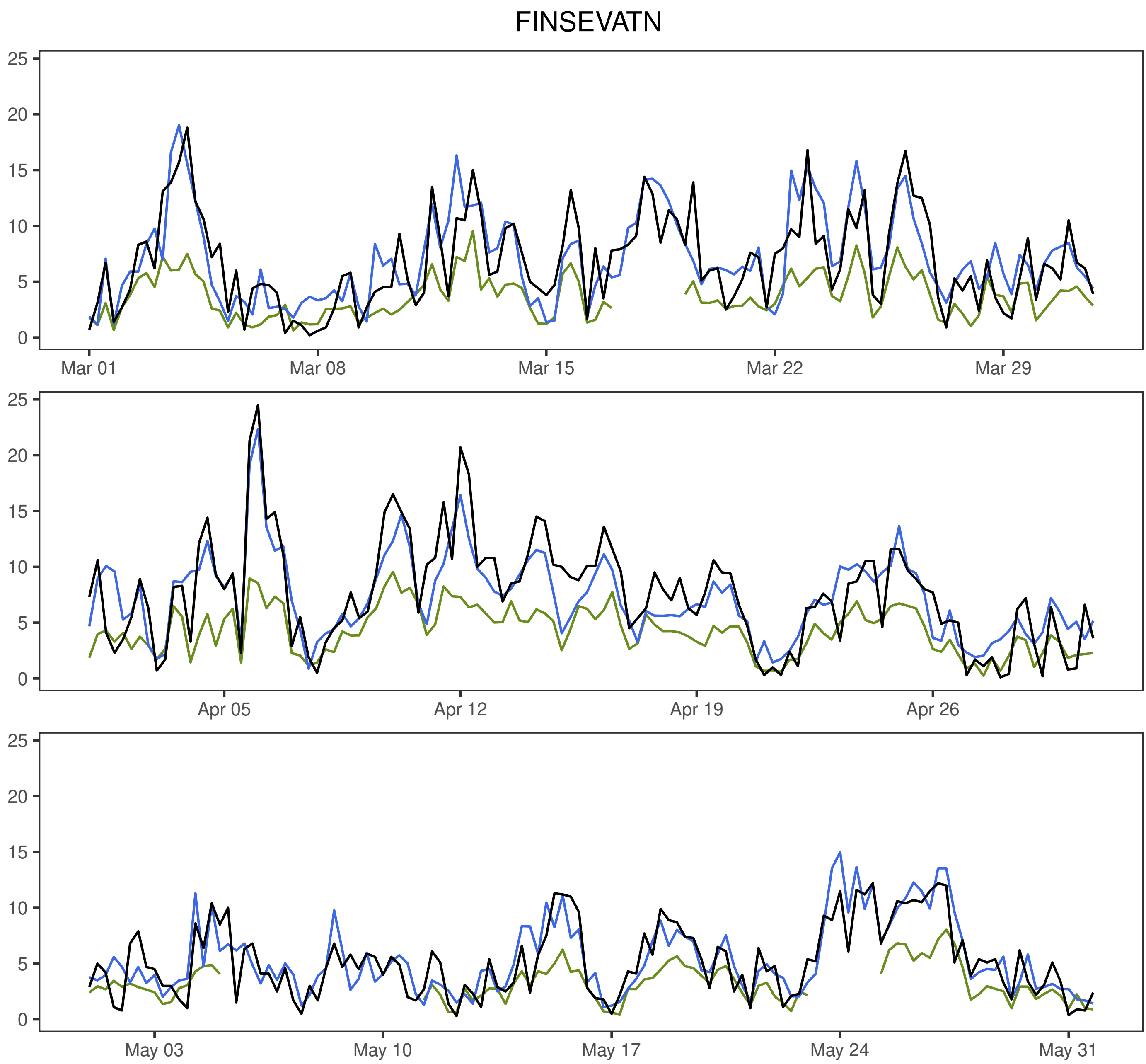


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.3	4.3	12.2	2.4	368
MEPSctrl: 12+18h,+24h,+30h,+36l	0.2	4.2	12.1	2.4	368
IFS: 12+18h,+24h,+30h,+36h	0.2	3.6	9.8	2.0	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.1	1.6	1.6	1.3	6.1	328
IFS – synop	–0.8	1.6	1.8	1.3	8.7	328

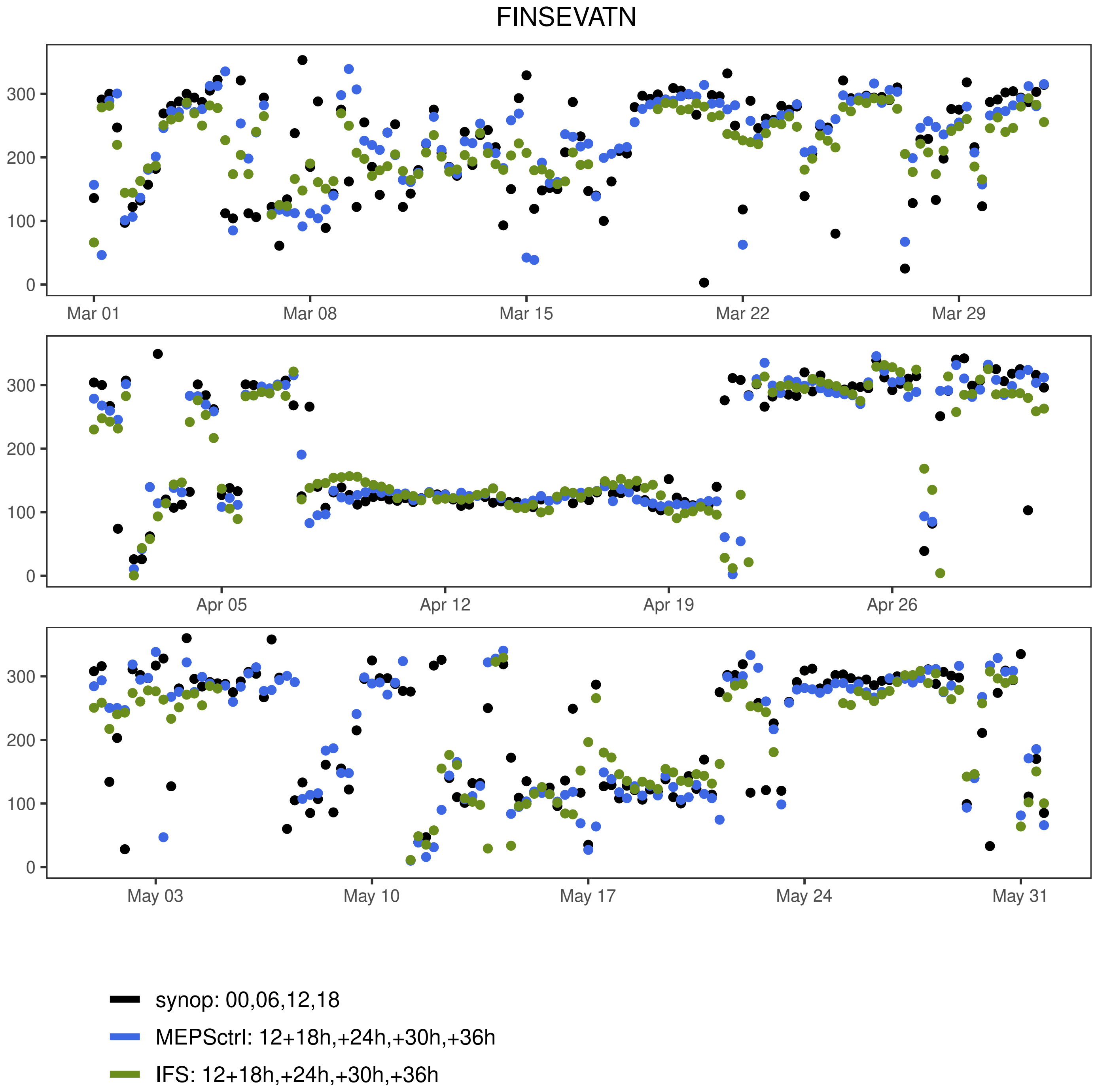

BERGEN – FLORIDA
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

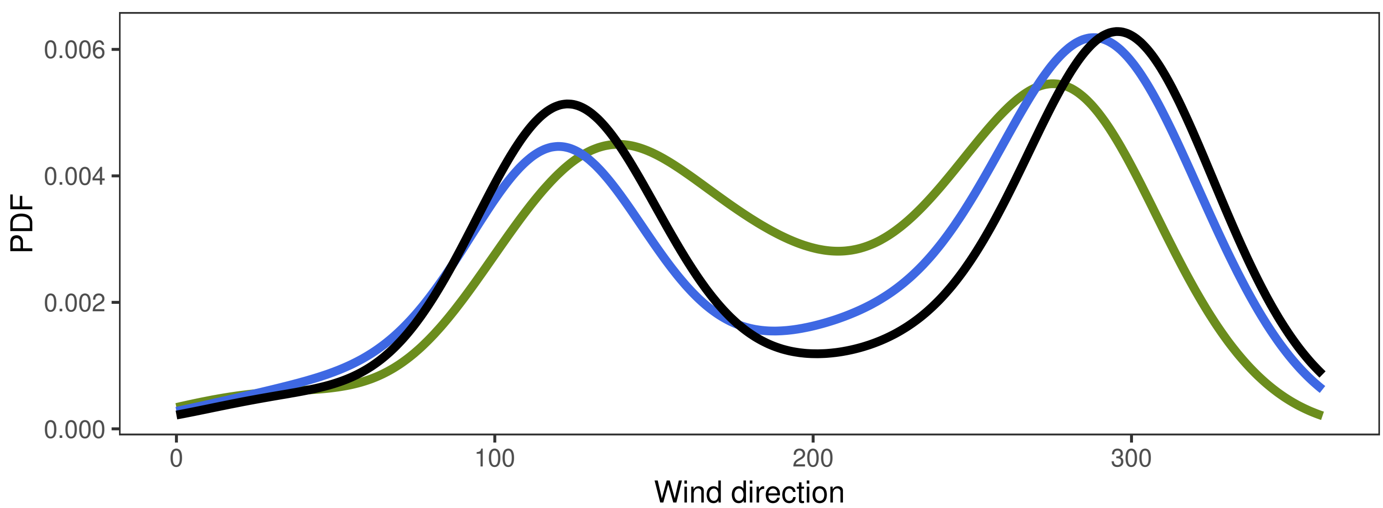

PDF
0.008
0.006
0.004
0.002
0.000
0
100
200
300
Wind direction

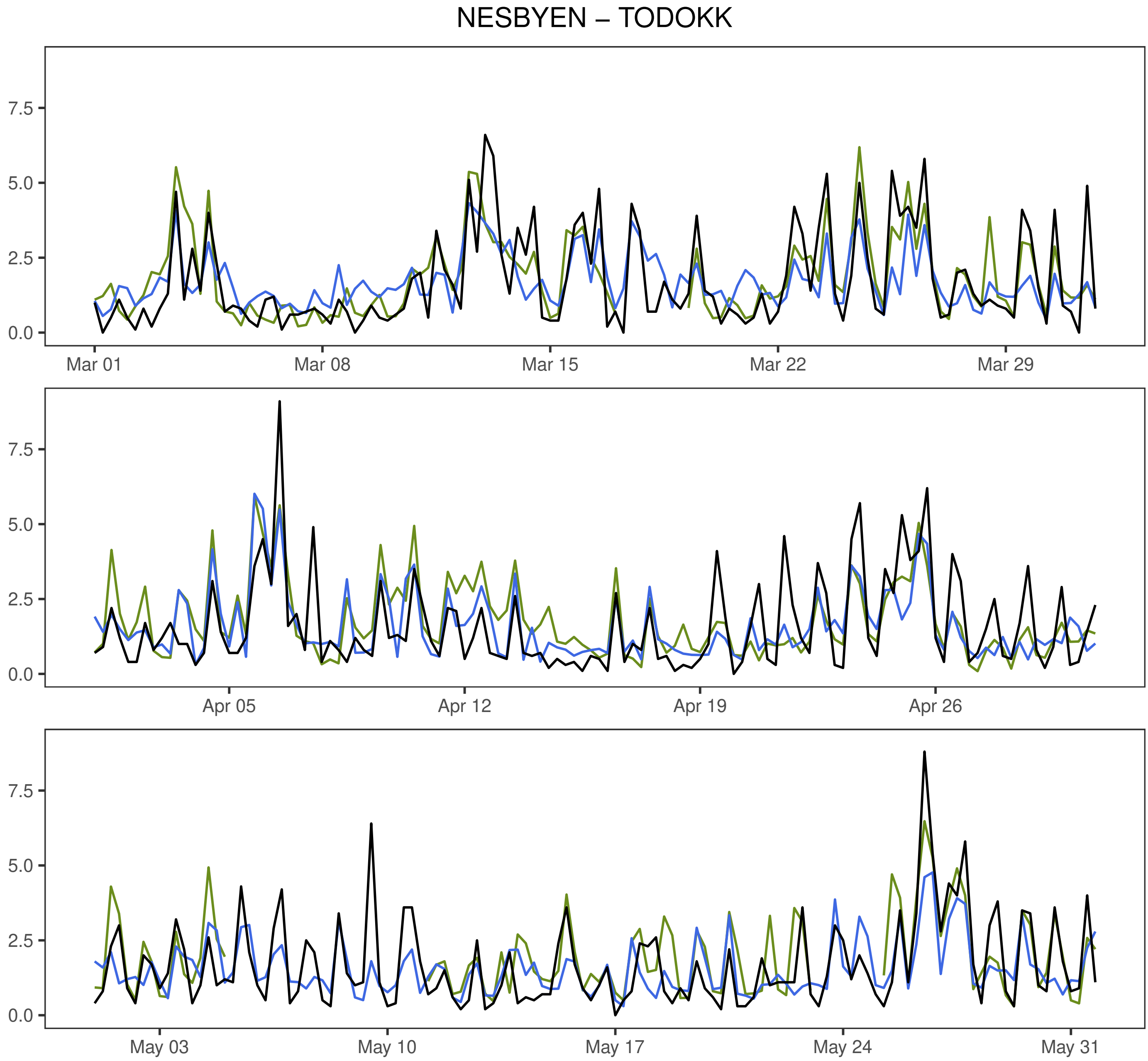


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.1	6.6	24.5	4.2	368
MEPSctrl: 12+18h,+24h,+30h,+36h	0.9	6.6	22.4	3.7	368
IFS: 12+18h,+24h,+30h,+36h	0.2	3.8	9.6	2.0	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.0	2.4	2.4	1.9	7.3	328
IFS – synop	−2.8	2.8	4.0	3.1	16.0	328

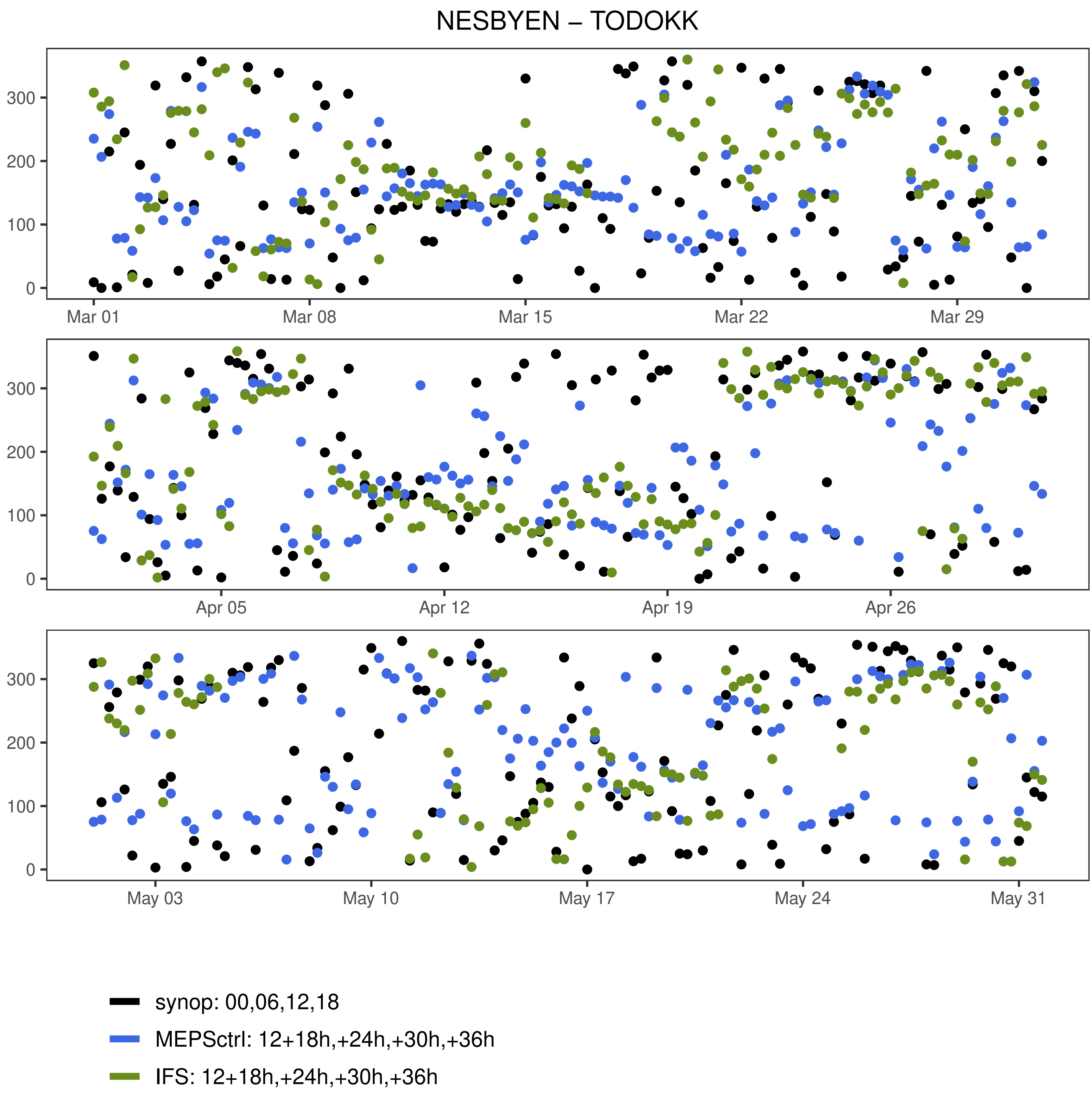

FINSEVATN
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

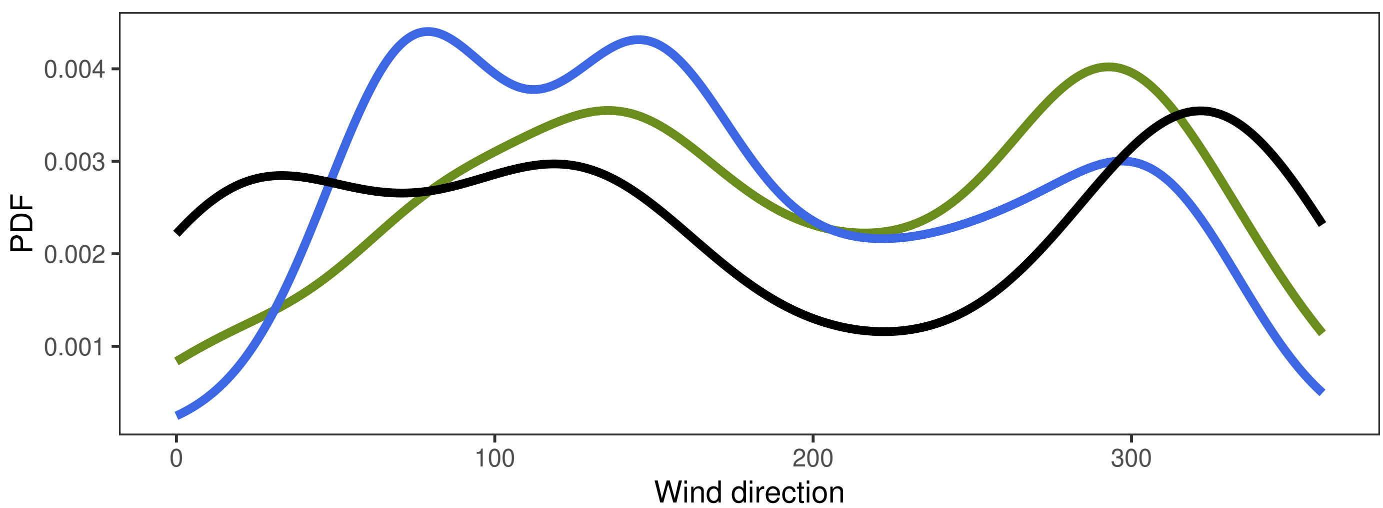

PDF
0.006
0.004
0.002
0.000
0
100
200
300
Wind direction

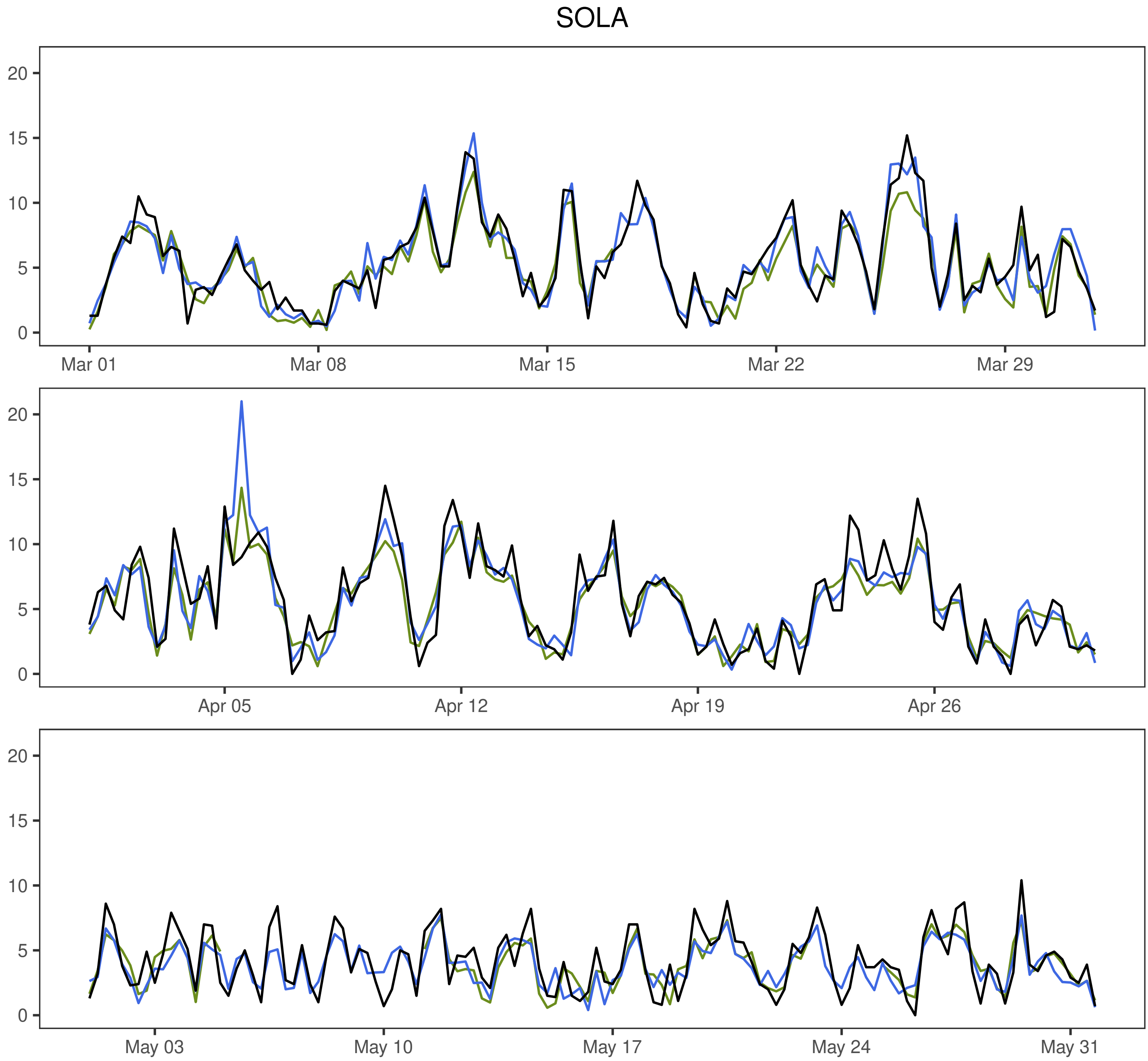


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.0	1.7	9.1	1.5	368
MEPSctrl: 12+18h,+24h,+30h,+36l	0.3	1.6	6.0	1.0	368
IFS: 12+18h,+24h,+30h,+36h	0.1	1.8	6.5	1.3	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	−0.1	1.1	1.1	0.8	4.2	328
IFS – synop	0.2	1.1	1.1	0.8	3.9	328

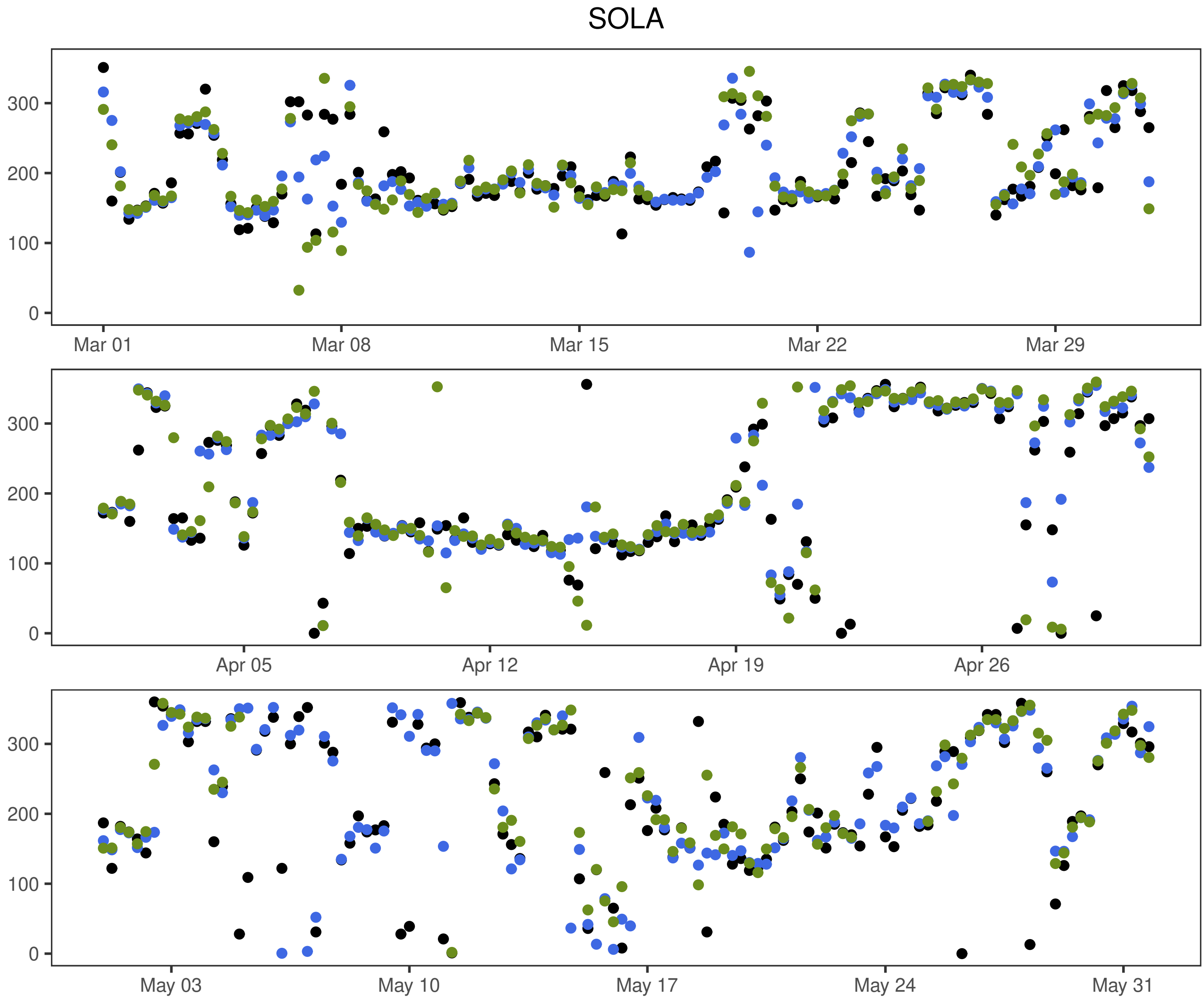

NESBYEN – TODOKK
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

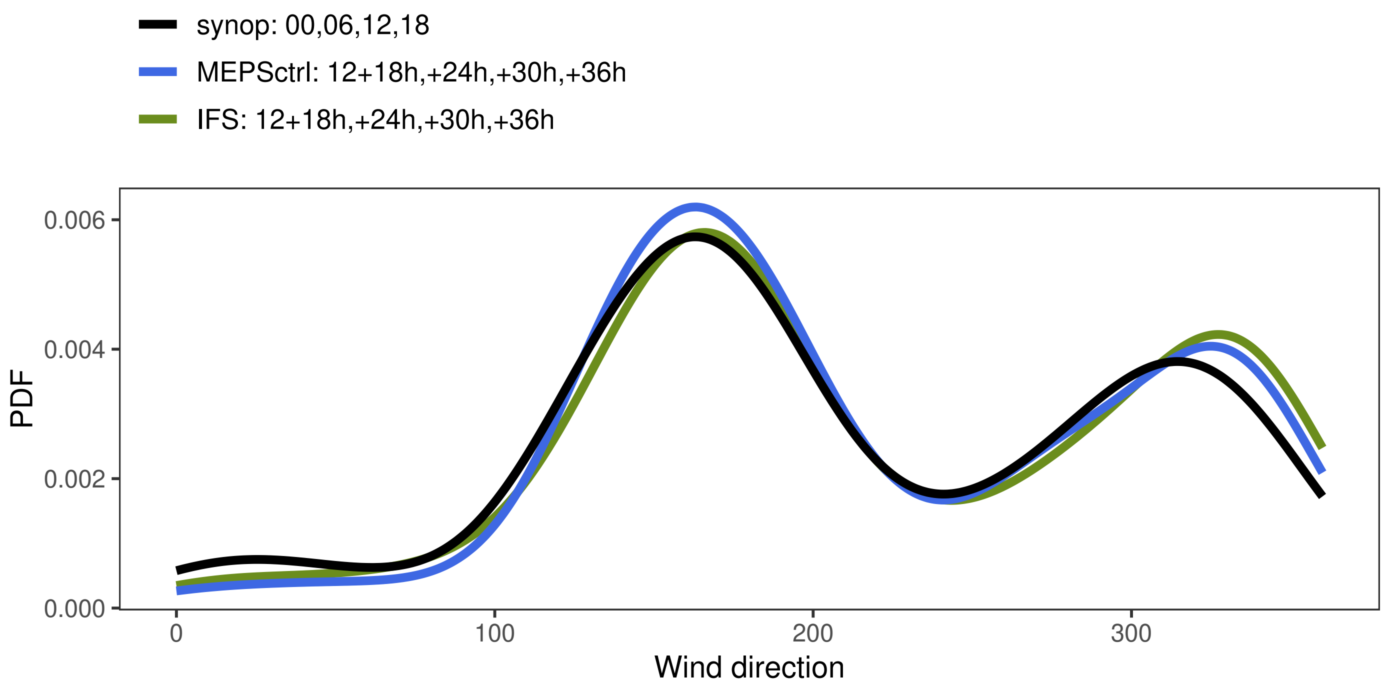

0.004
0.003
0.002
0.001
PDF
0
100
200
300
Wind direction

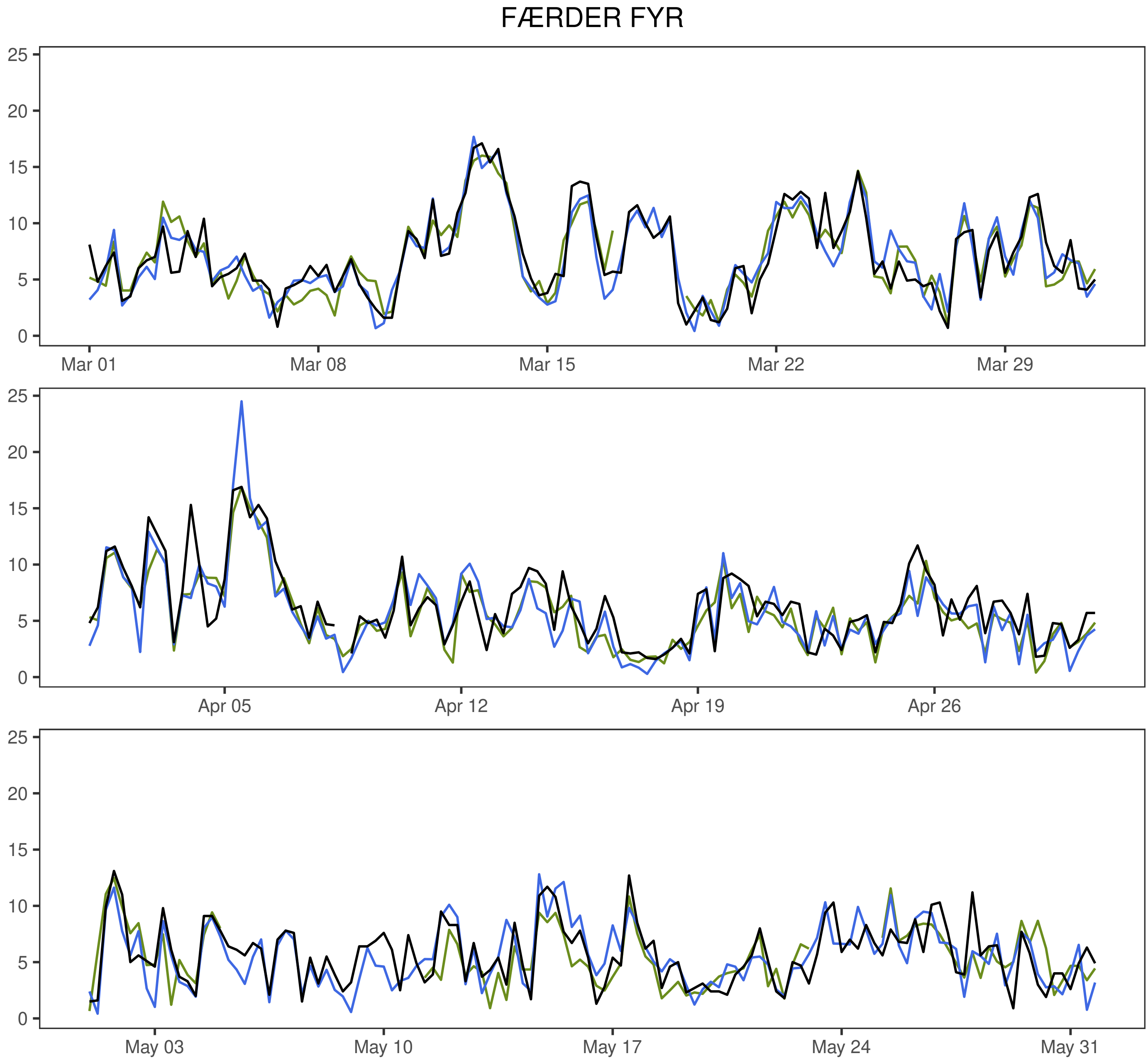


	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.0	5.1	15.2	3.1	368
MEPSctrl: 12+18h,+24h,+30h,+36l	0.2	4.9	21.0	2.9	368
IFS: 12+18h,+24h,+30h,+36h	0.2	4.8	14.3	2.6	328

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.2	1.5	1.5	1.1	12.0	328
IFS – synop	–0.4	1.4	1.5	1.1	5.3	328

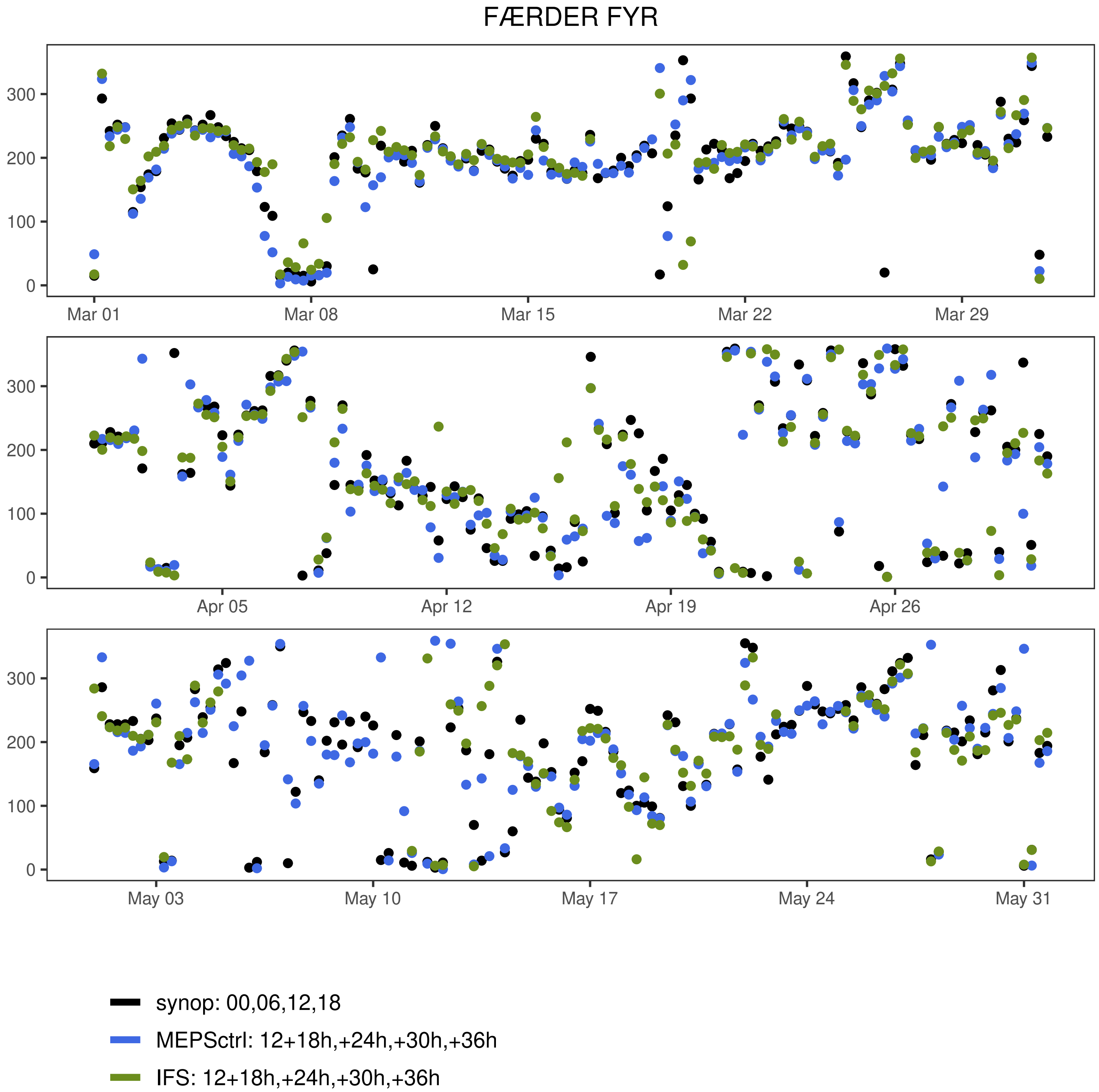

SOLA
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31

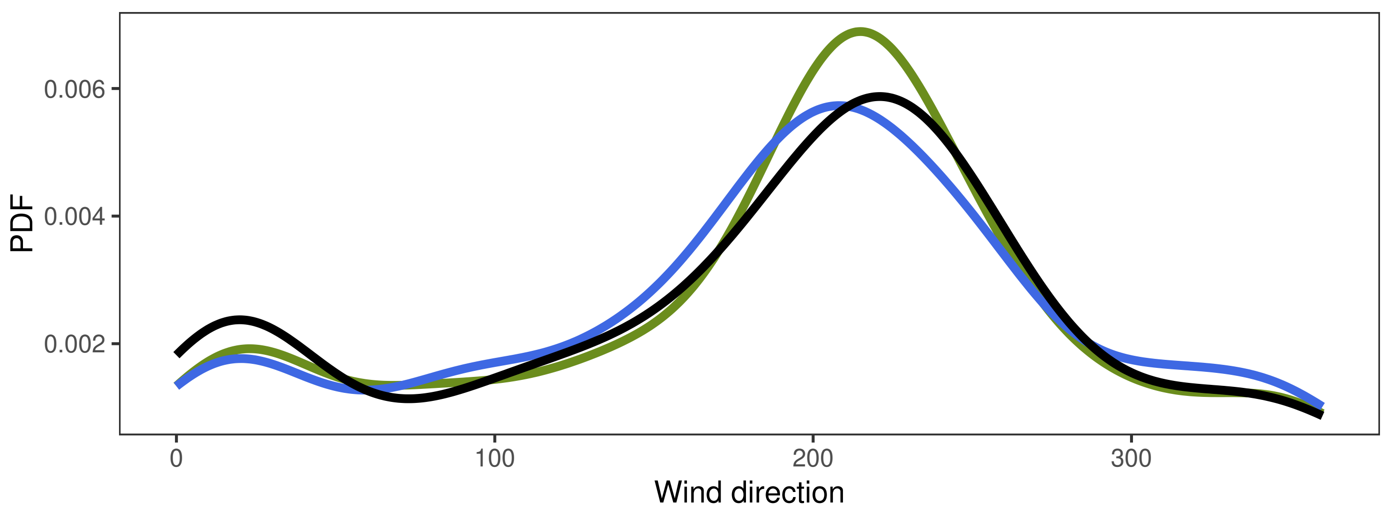

synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h
PDF
0.006
0.004
0.002
0.000
0
100
200
300
Wind direction

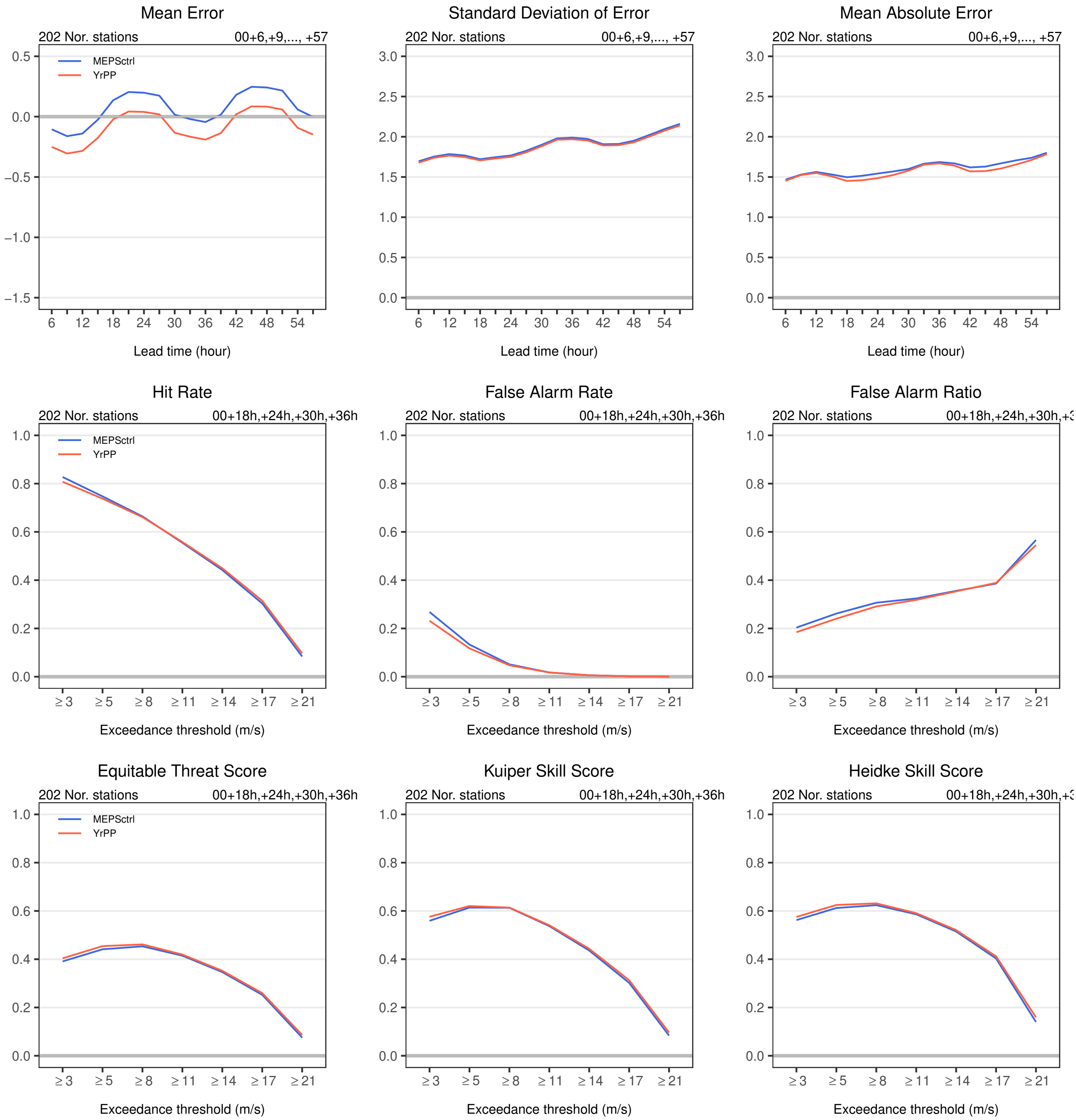


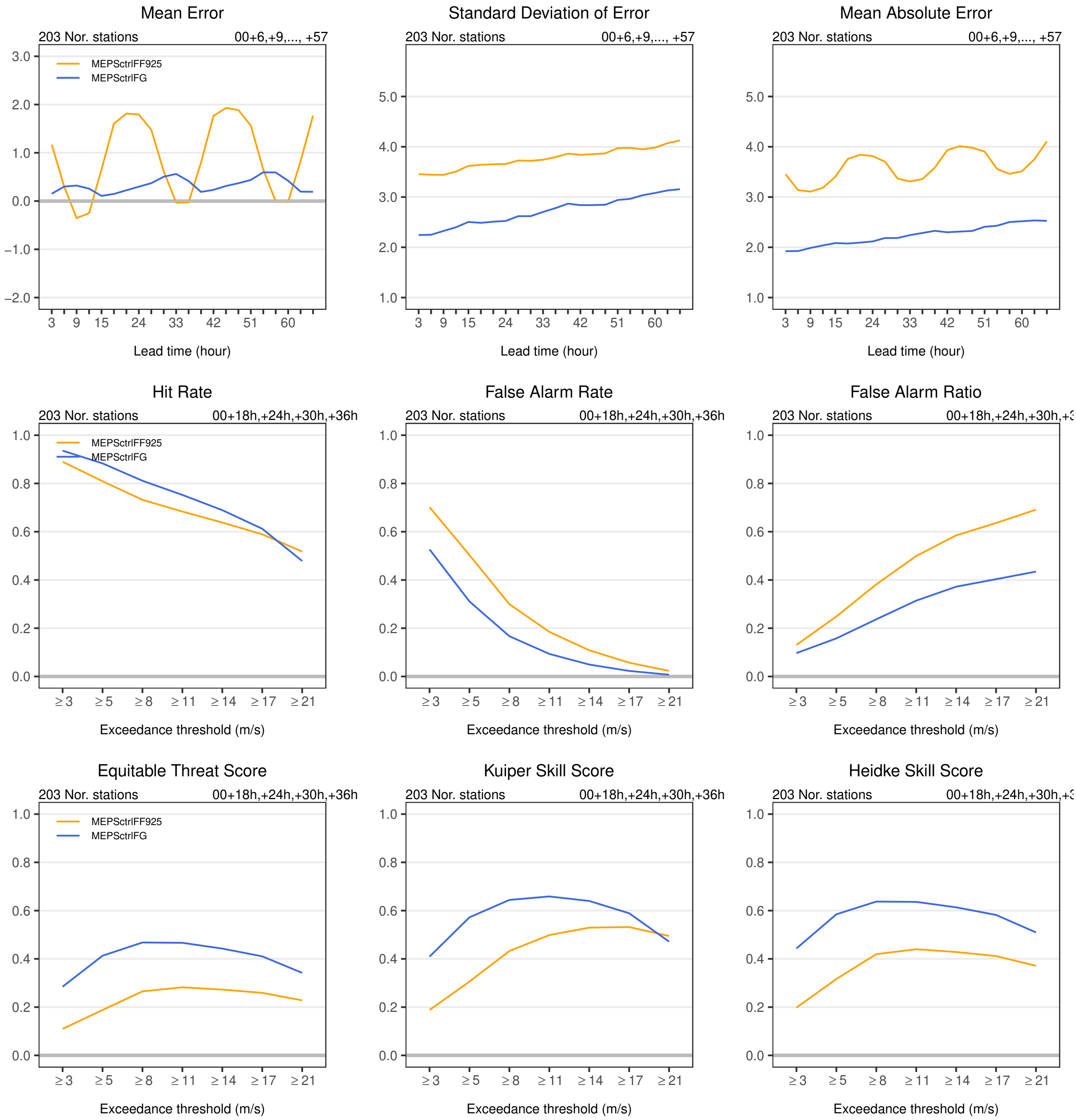
	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.7	6.4	17.1	3.3	367
MEPSctrl: 12+18h,+24h,+30h,+36h	0.3	6.1	24.5	3.4	368
IFS: 12+18h,+24h,+30h,+36h	0.4	6.1	16.9	3.2	328

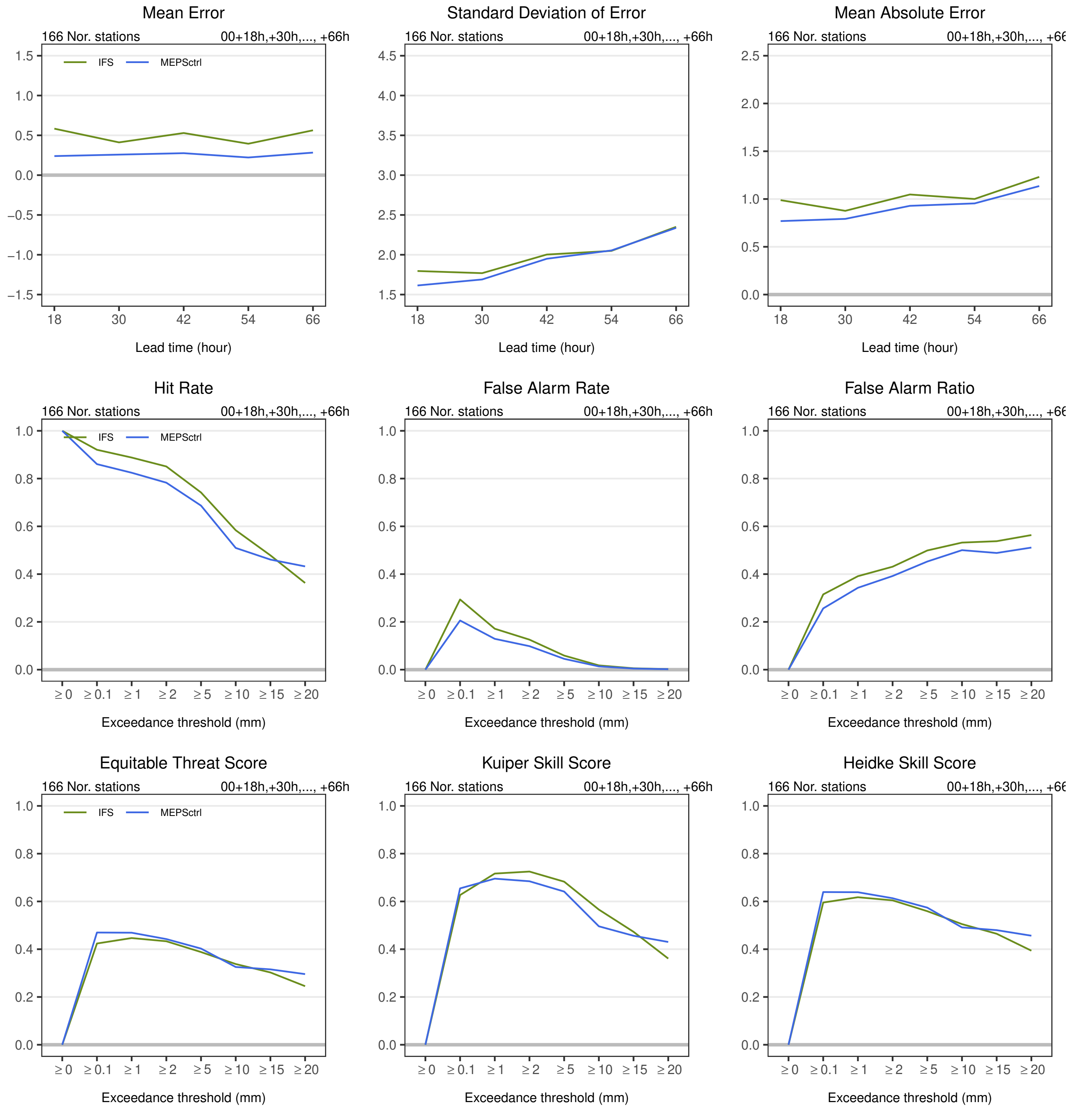
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	–0.2	1.8	1.9	1.4	8.3	327
IFS – synop	–0.3	1.8	1.9	1.4	7.9	327


FÆRDER FYR
300
200
100
0
Mar 01
Mar 08
Mar 15
Mar 22
Mar 29
Apr 05
Apr 12
Apr 19
Apr 26
May 03
May 10
May 17
May 24
May 31
synop: 00,06,12,18
MEPSctrl: 12+18h,+24h,+30h,+36h
IFS: 12+18h,+24h,+30h,+36h

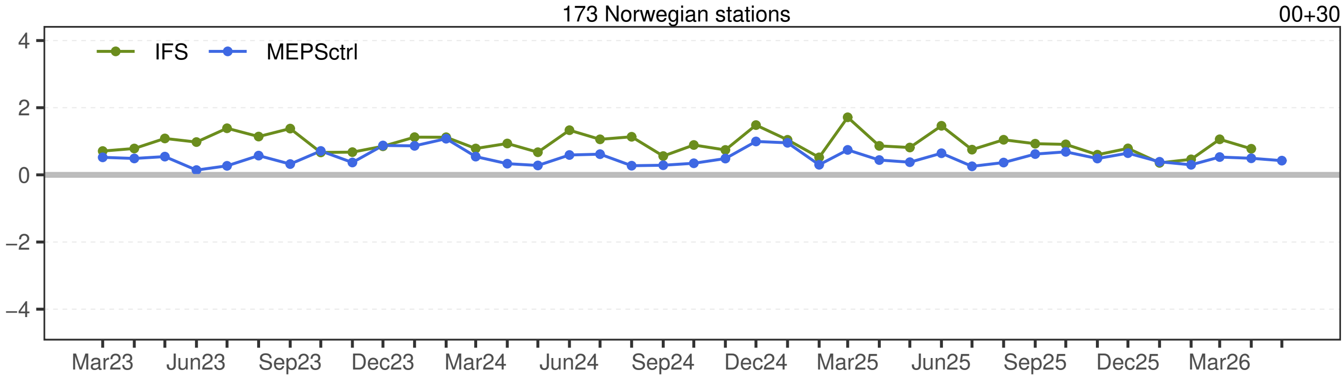

PDF
0.006
0.004
0.002
0
100
200
300
Wind direction

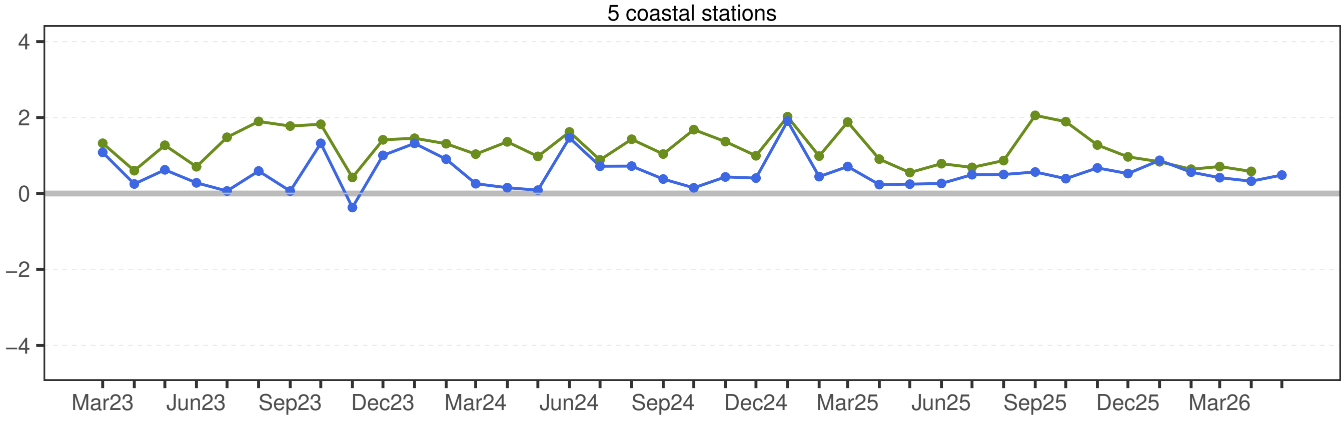

Mean Error
202 Nor. stations
00+6,+9,..., +57
MEPSctrl
YrPP
Lead time (hour)
Standard Deviation of Error
202 Nor. stations
00+6,+9,..., +57
Lead time (hour)
Mean Absolute Error
202 Nor. stations
00+6,+9,..., +57
Lead time (hour)
Hit Rate
202 Nor. stations
00+18h,+24h,+30h,+36h
MEPSctrl
YrPP
Exceedance threshold (m/s)
False Alarm Rate
202 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
False Alarm Ratio
202 Nor. stations
Exceedance threshold (m/s)
Equitable Threat Score
202 Nor. stations
00+18h,+24h,+30h,+36h
MEPSctrl
YrPP
Exceedance threshold (m/s)
Kuiper Skill Score
202 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
Heidke Skill Score
202 Nor. stations
Exceedance threshold (m/s)

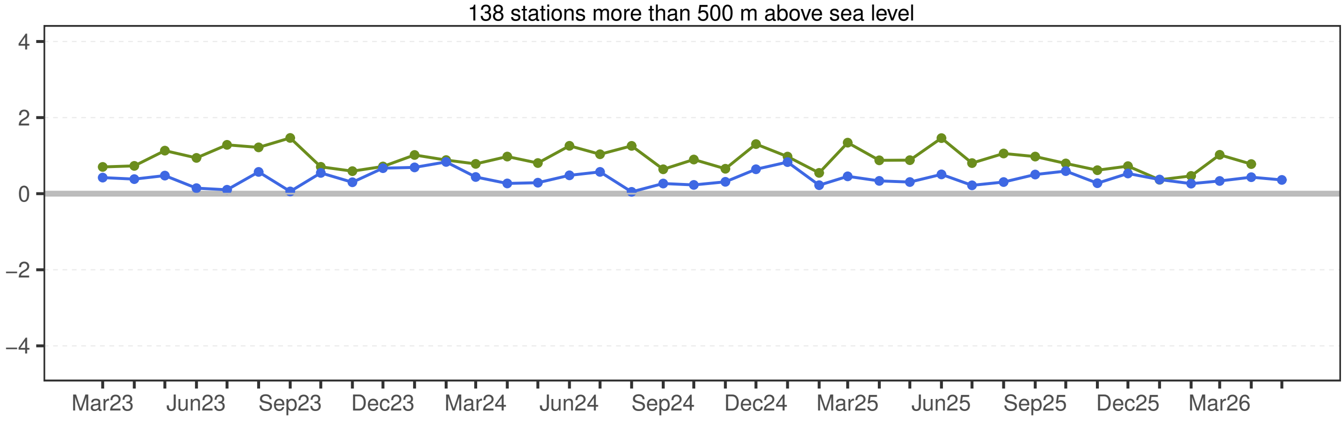

Mean Error
203 Nor. stations
00+6,+9,..., +57
MEPSctrlFF925
MEPSctrlFG
Lead time (hour)
Standard Deviation of Error
203 Nor. stations
00+6,+9,..., +57
Lead time (hour)
Mean Absolute Error
203 Nor. stations
00+6,+9,..., +57
Lead time (hour)
Hit Rate
203 Nor. stations
00+18h,+24h,+30h,+36h
MEPSctrlFF925
MEPSctrlFG
Exceedance threshold (m/s)
False Alarm Rate
203 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
False Alarm Ratio
203 Nor. stations
Exceedance threshold (m/s)
Equitable Threat Score
203 Nor. stations
00+18h,+24h,+30h,+36h
MEPSctrlFF925
MEPSctrlFG
Exceedance threshold (m/s)
Kuiper Skill Score
203 Nor. stations
00+18h,+24h,+30h,+36h
Exceedance threshold (m/s)
Heidke Skill Score
203 Nor. stations
Exceedance threshold (m/s)

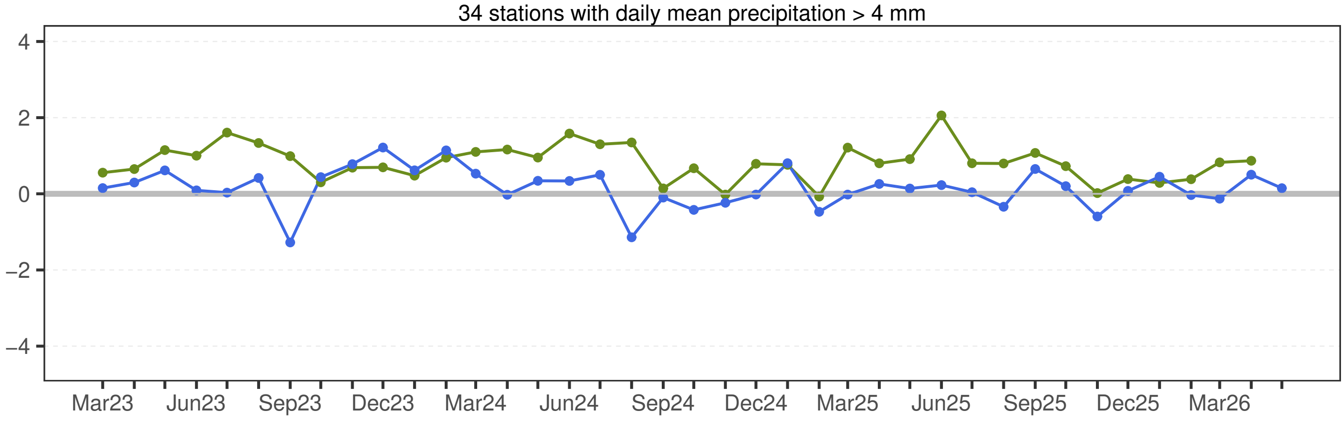

Mean Error
166 Nor. stations
00+18h,+30h,..., +66h
IFS
MEPSctrl
Lead time (hour)
Standard Deviation of Error
166 Nor. stations
00+18h,+30h,..., +66h
Lead time (hour)
Mean Absolute Error
166 Nor. stations
Lead time (hour)
Hit Rate
166 Nor. stations
00+18h,+30h,..., +66h
IFS
MEPSctrl
Exceedance threshold (mm)
False Alarm Rate
166 Nor. stations
00+18h,+30h,..., +66h
Exceedance threshold (mm)
False Alarm Ratio
166 Nor. stations
Exceedance threshold (mm)
Equitable Threat Score
166 Nor. stations
00+18h,+30h,..., +66h
IFS
MEPSctrl
Exceedance threshold (mm)
Kuiper Skill Score
166 Nor. stations
00+18h,+30h,..., +66h
Exceedance threshold (mm)
Heidke Skill Score
166 Nor. stations
Exceedance threshold (mm)

Mean Error

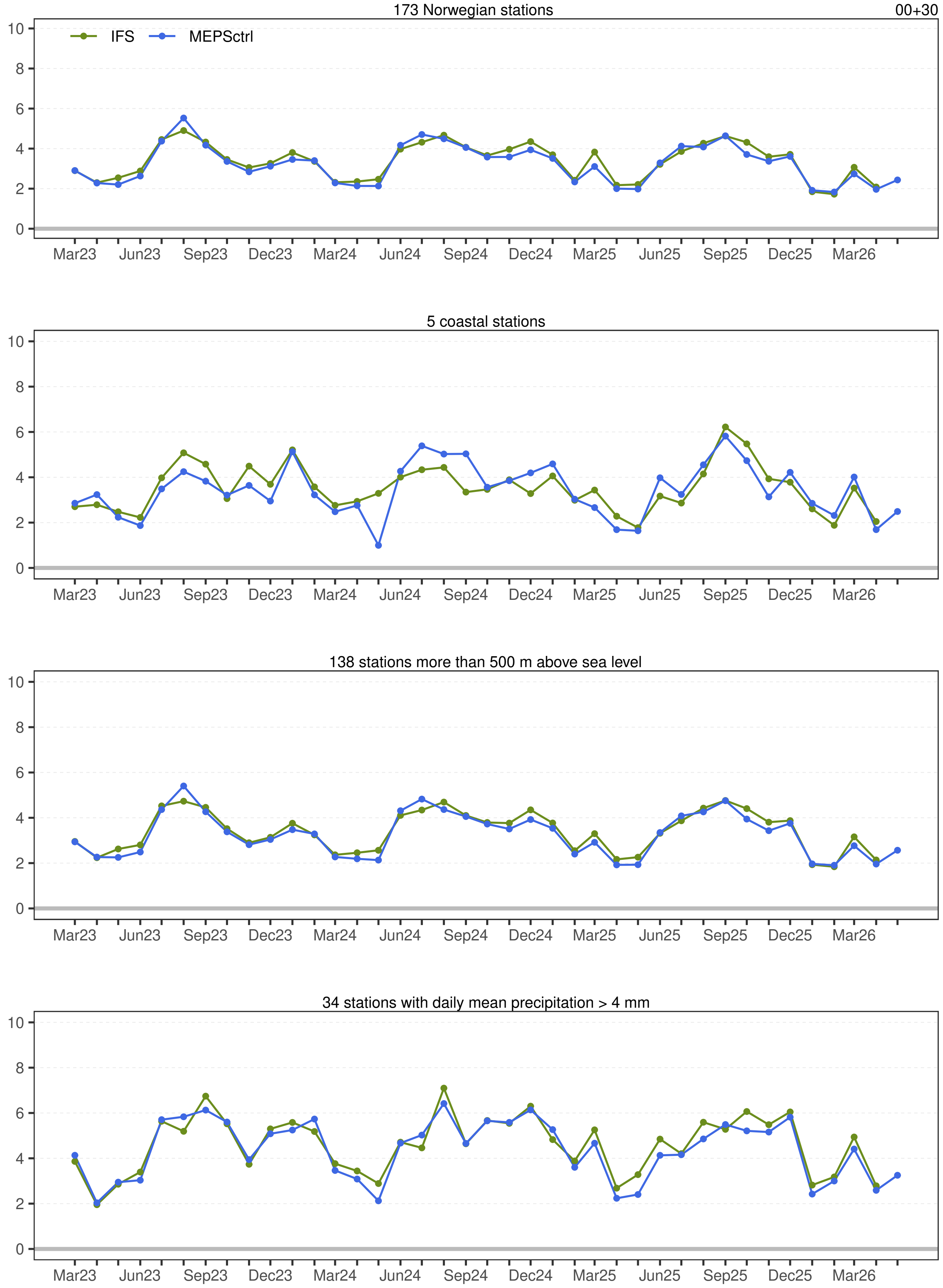

173 Norwegian stations
00+30
IFS
MEPSctrl
4
2
0
−2
−4
Mar23 Jun23 Sep23 Dec23 Mar24 Jun24 Sep24 Dec24 Mar25 Jun25 Sep25 Dec25 Mar26

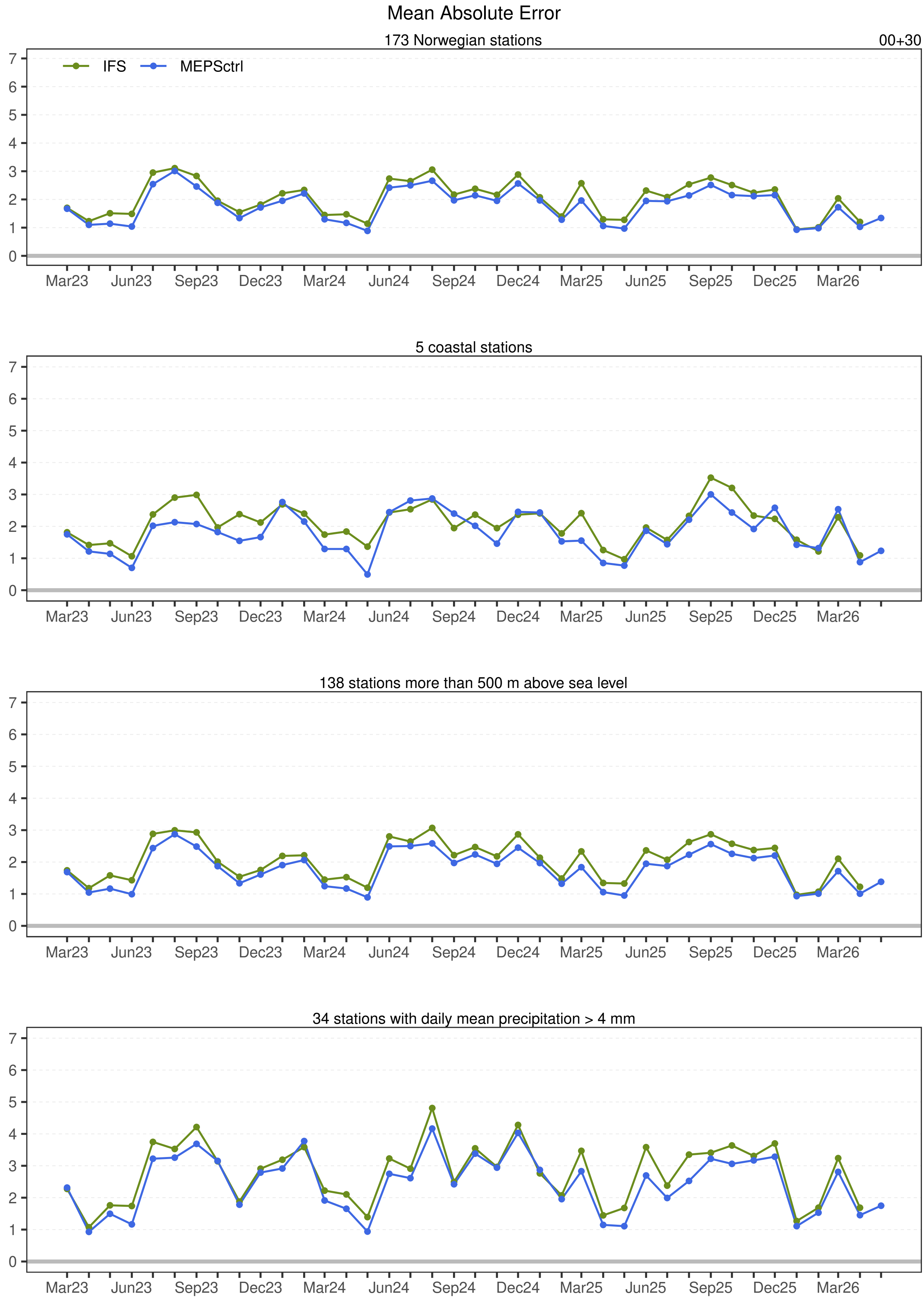

5 coastal stations
4
2
0
−2
−4
Mar23 Jun23 Sep23 Dec23 Mar24 Jun24 Sep24 Dec24 Mar25 Jun25 Sep25 Dec25 Mar26

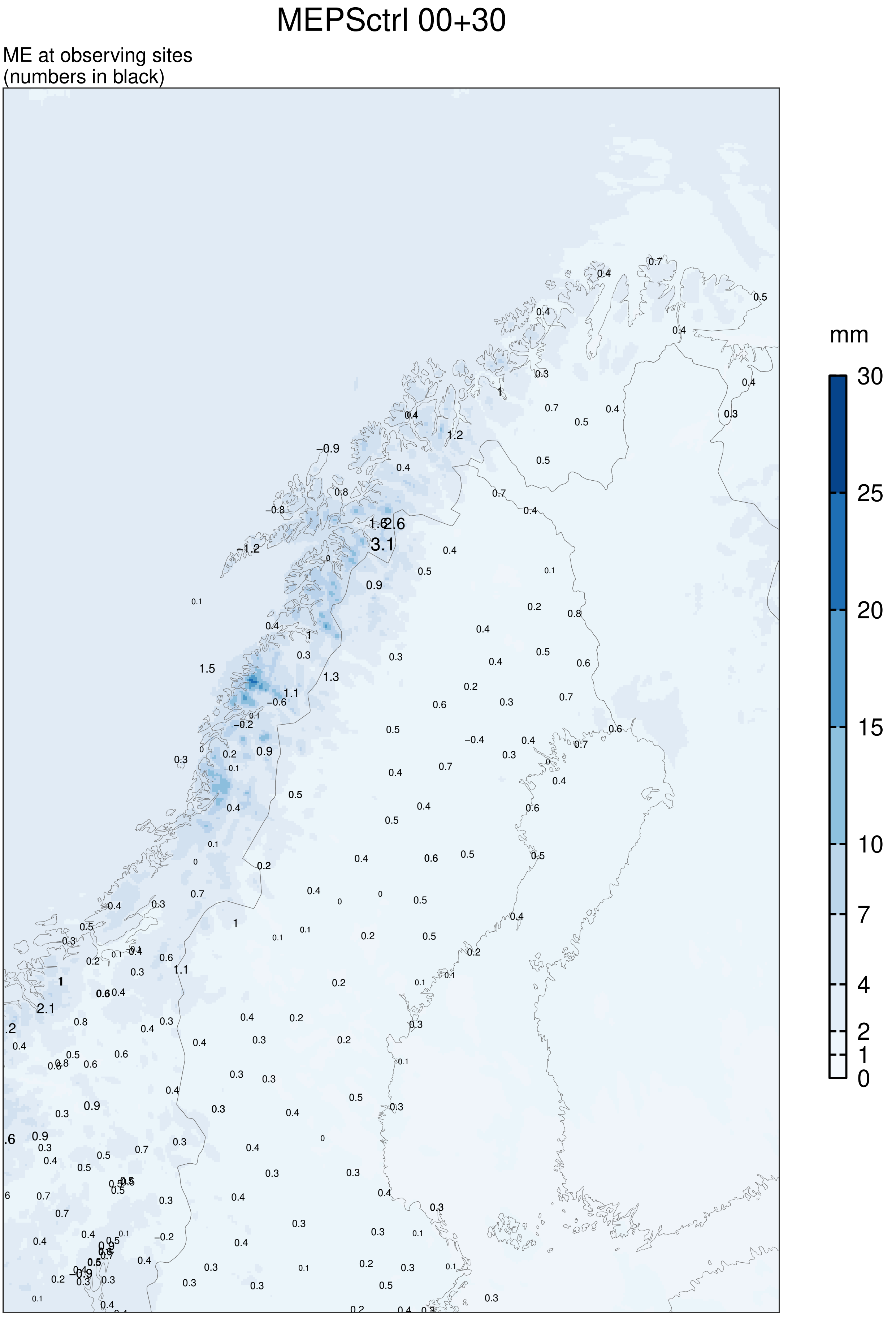

138 stations more than 500 m above sea level
4
2
0
−2
−4
Mar23 Jun23 Sep23 Dec23 Mar24 Jun24 Sep24 Dec24 Mar25 Jun25 Sep25 Dec25 Mar26


34 stations with daily mean precipitation > 4 mm
4
2
0
−2
−4
Mar23 Jun23 Sep23 Dec23 Mar24 Jun24 Sep24 Dec24 Mar25 Jun25 Sep25 Dec25 Mar26

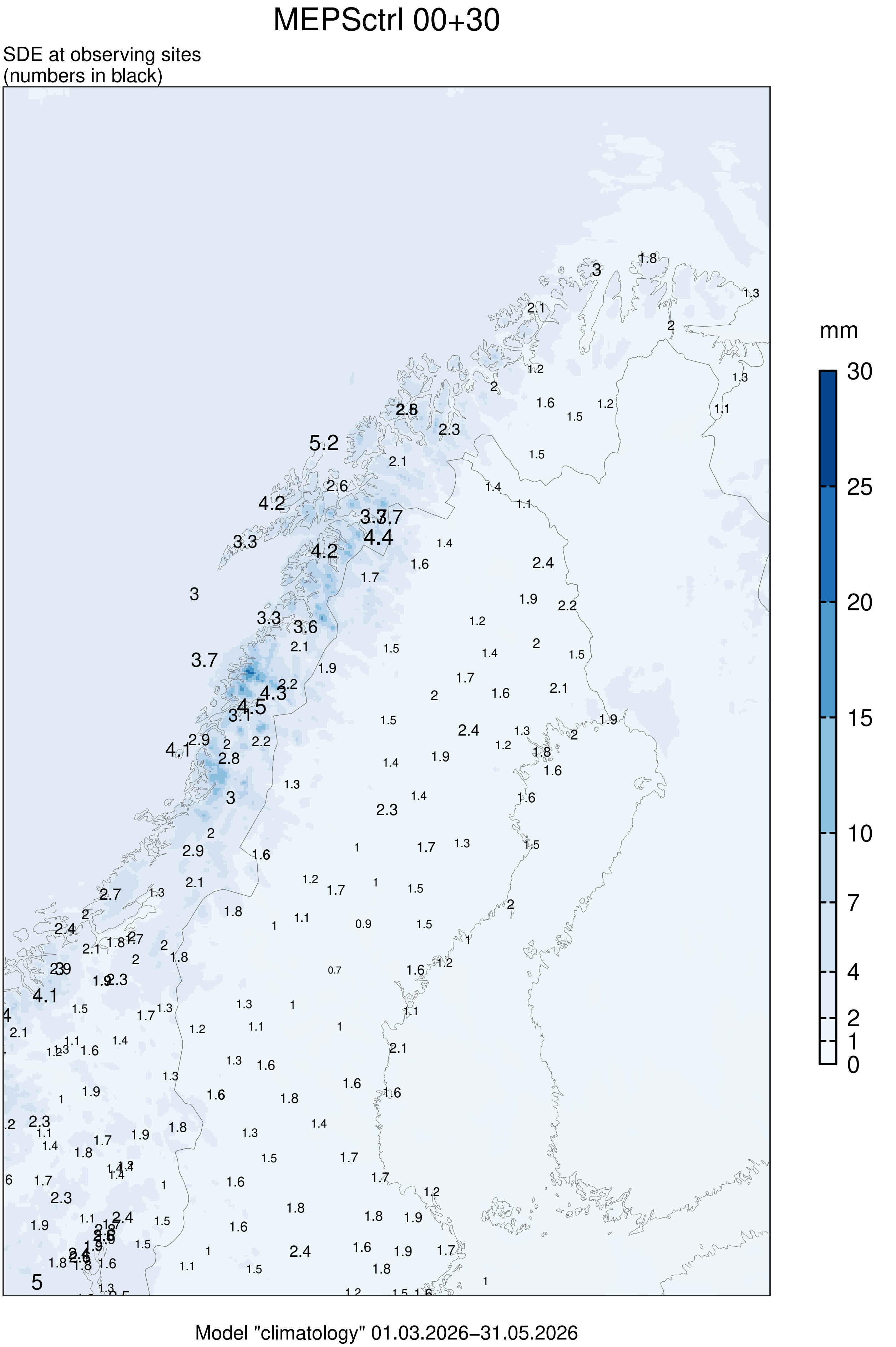
Standard Deviation of Error




Mean Absolute Error
173 Norwegian stations
00+30
IFS
MEPSctrl
5 coastal stations
138 stations more than 500 m above sea level
34 stations with daily mean precipitation > 4 mm
0
1
2
3
4
5
6
7
Mar23
Jun23
Sep23
Dec23
Mar24
Jun24
Sep24
Dec24
Mar25
Jun25
Sep25
Dec25
Mar26

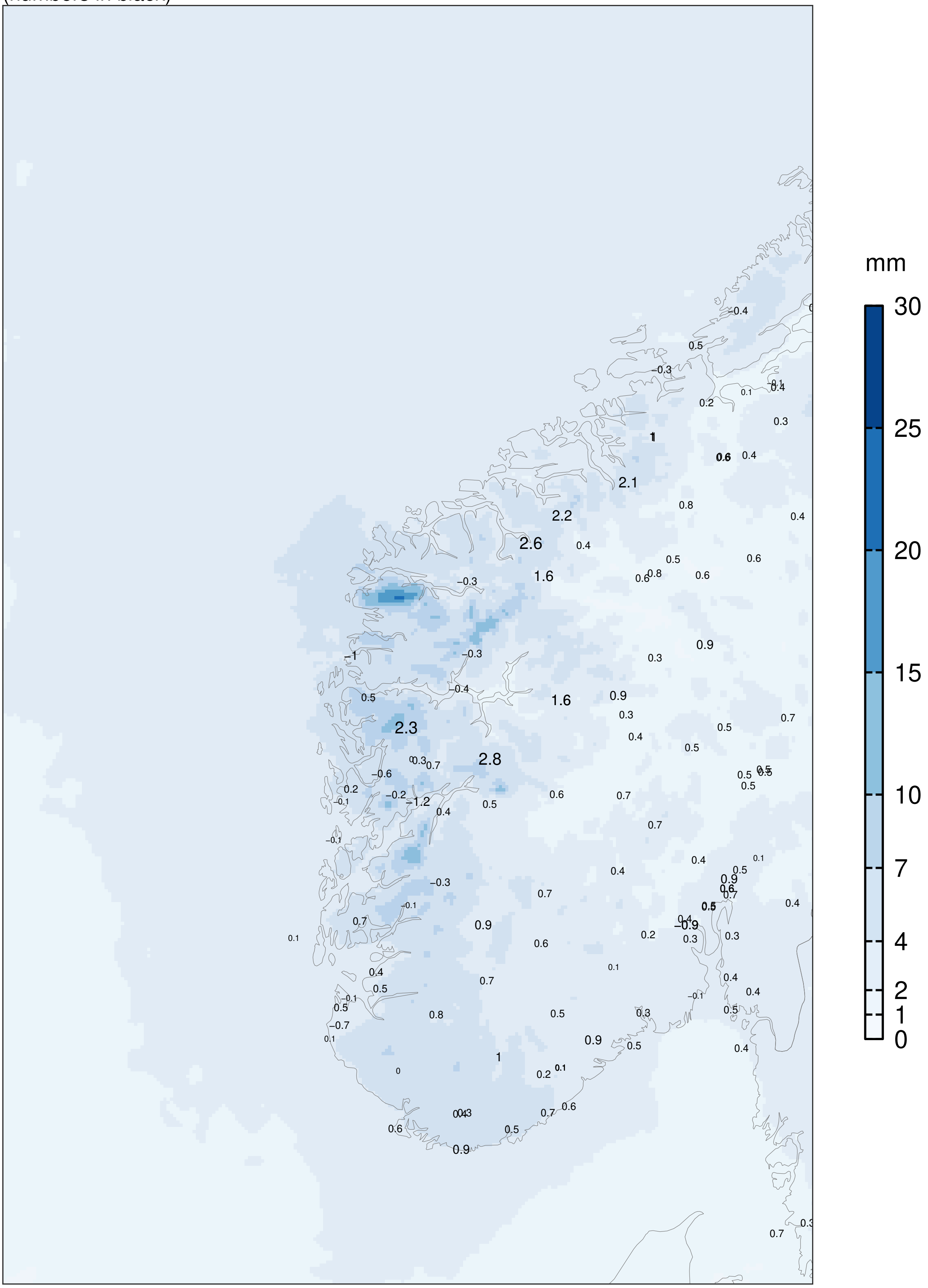


Model "climatology" 01.03.2026–31.05.2026


MEPSctrl 00+30
SDE at observing sites
(numbers in black)
mm
30
25
20
15
10
7
4
2
1
0
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+30

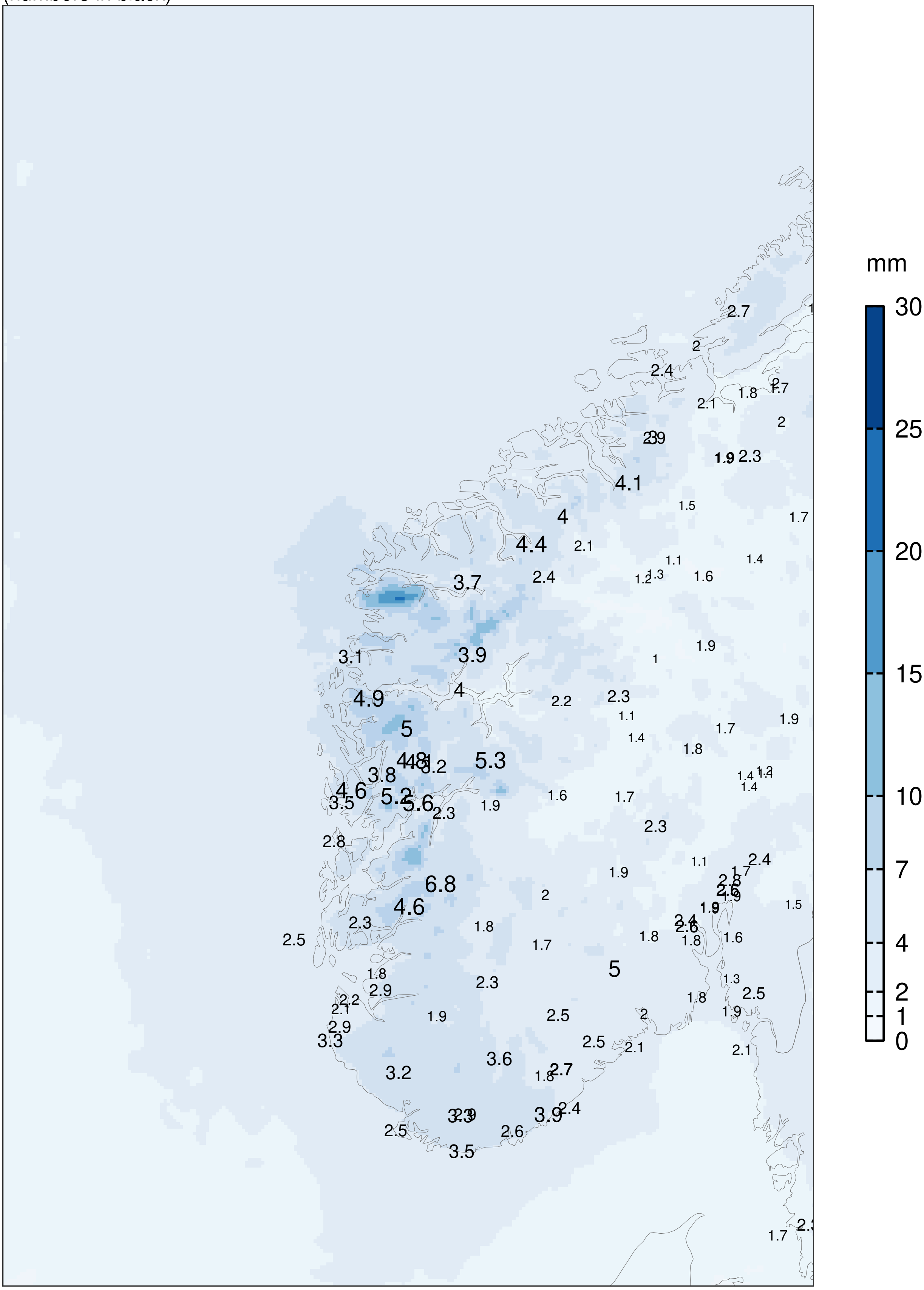
ME at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+30

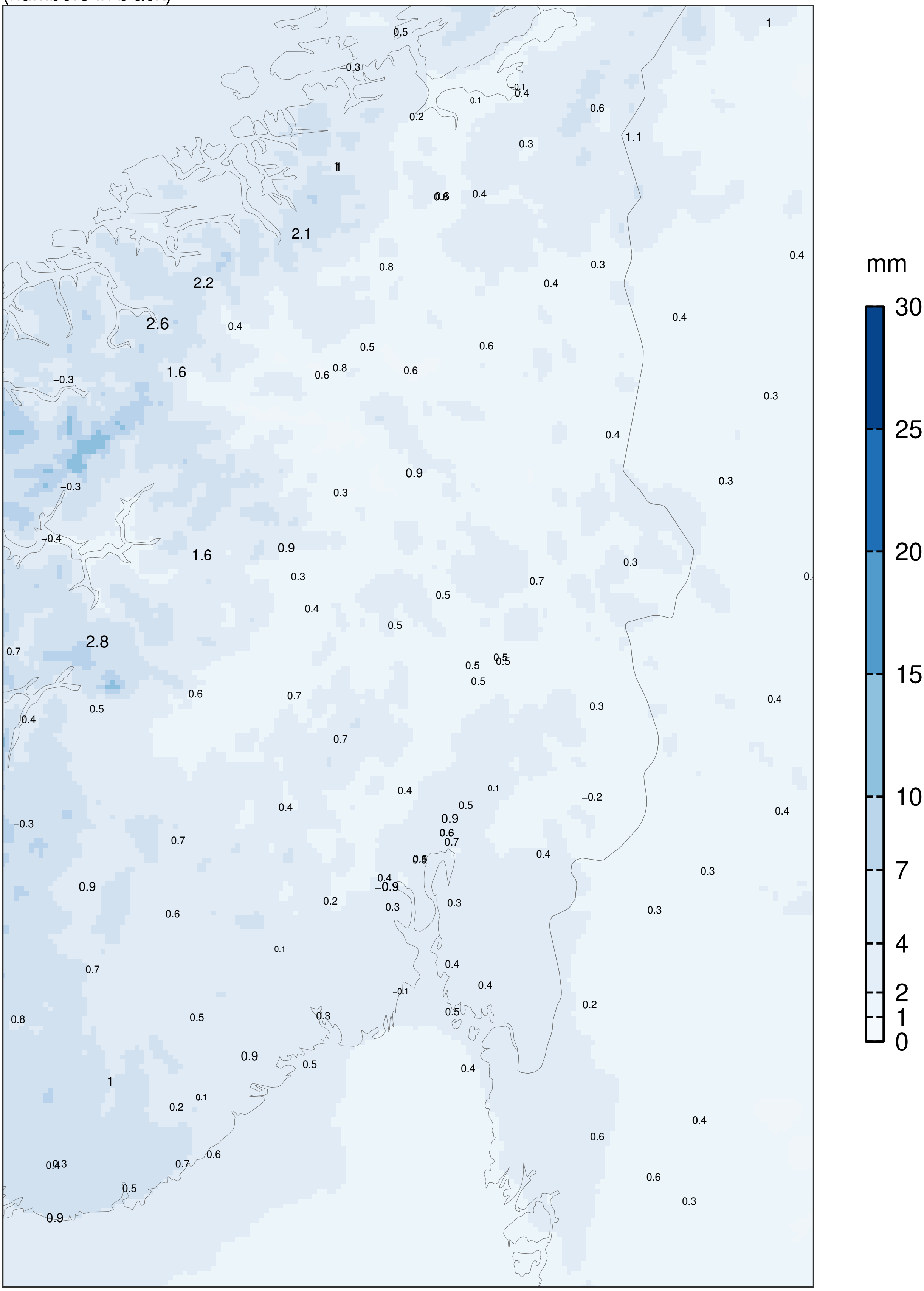
SDE at observing sites
(numbers in black)



Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+30

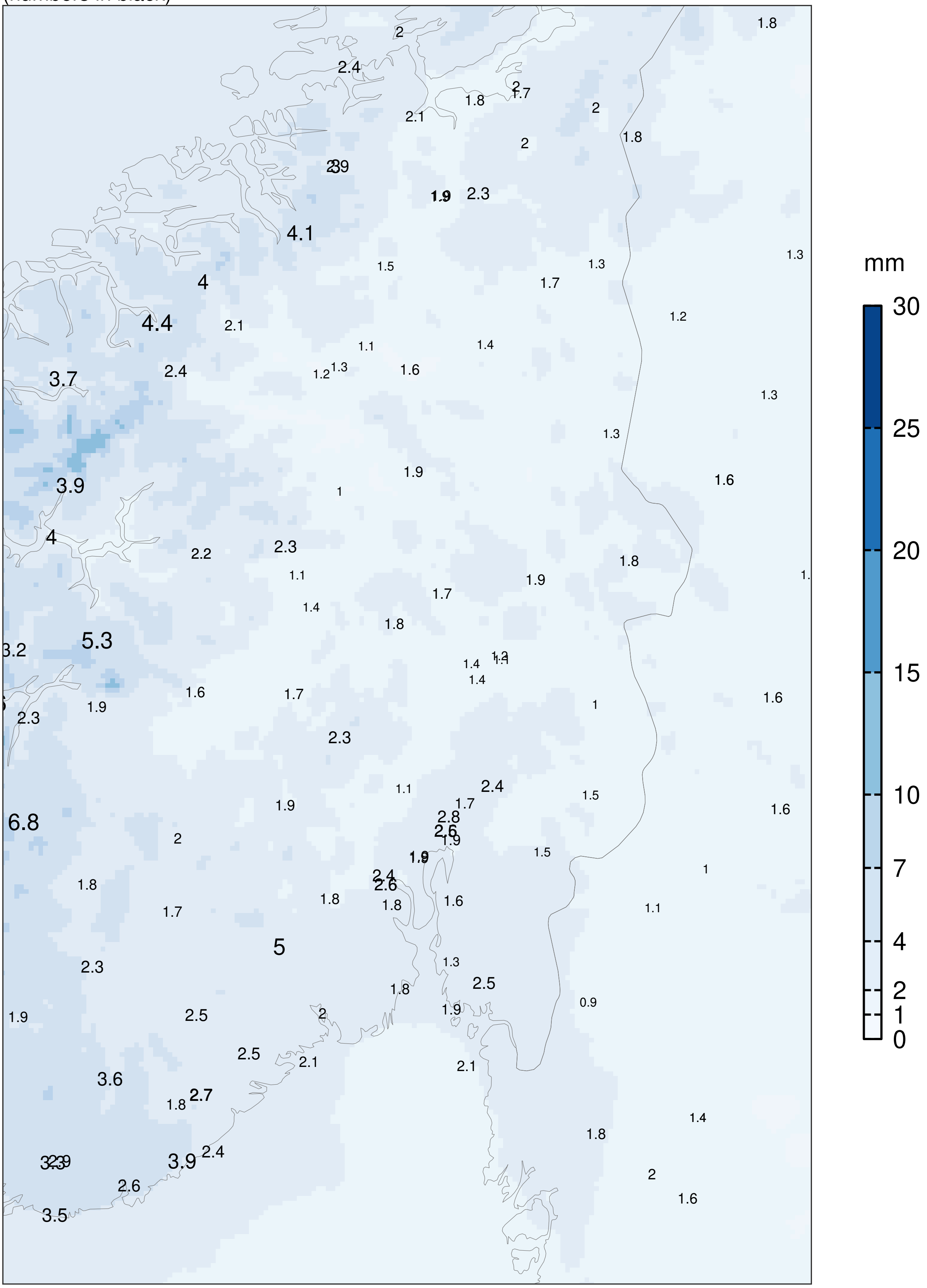
ME at observing sites
(numbers in black)



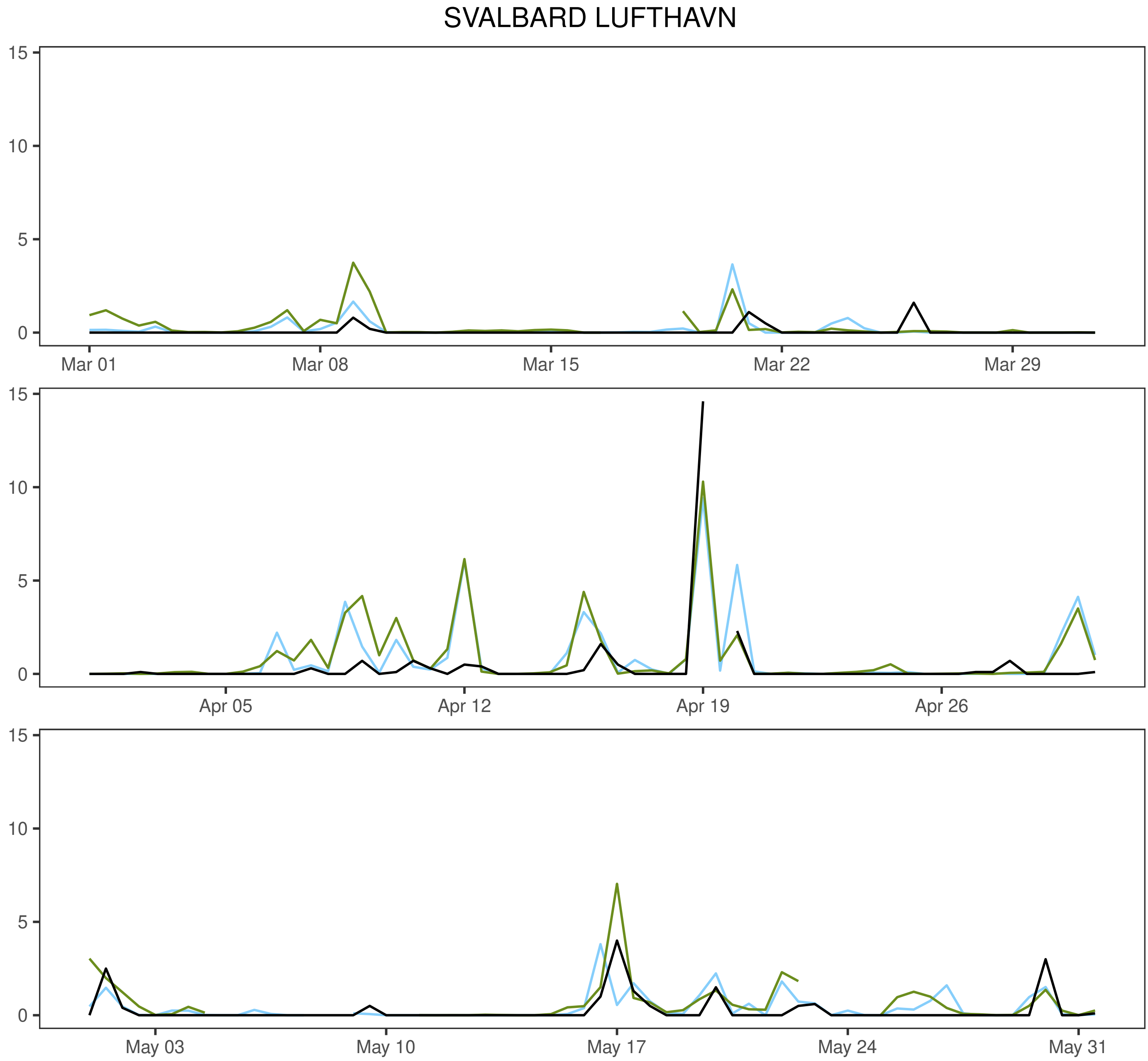
Model "climatology" 01.03.2026–31.05.2026

MEPSctrl 00+30

SDE at observing sites
(numbers in black)

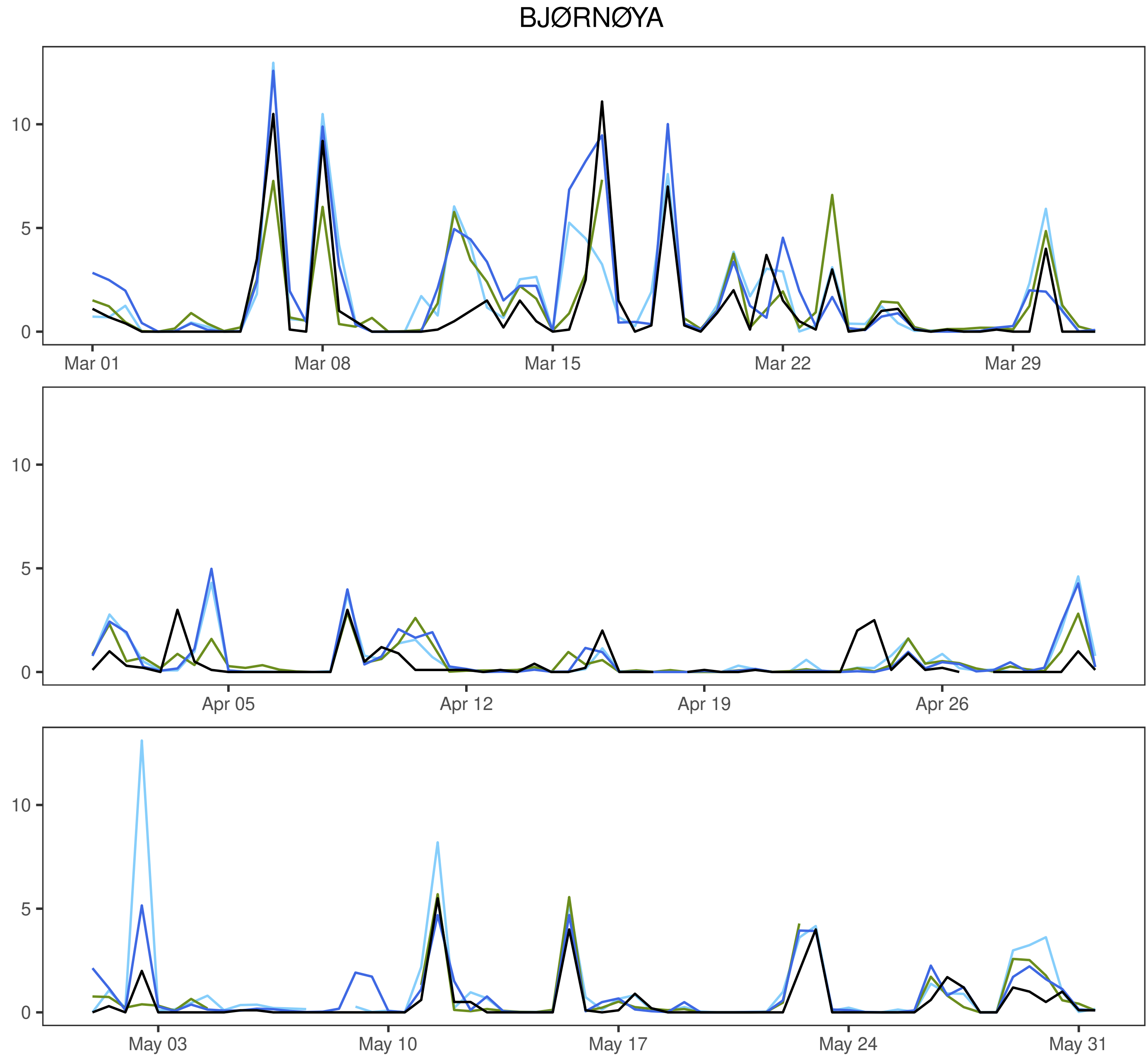


Model "climatology" 01.03.2026–31.05.2026



	Min	Mean	Max	Std	N
synop: 06,18	0.0	0.2	14.6	1.2	183
AA25: 12+18h,+30h	0.0	0.5	9.4	1.2	182
IFS: 12+18h,+30h	0.0	0.6	10.3	1.3	164

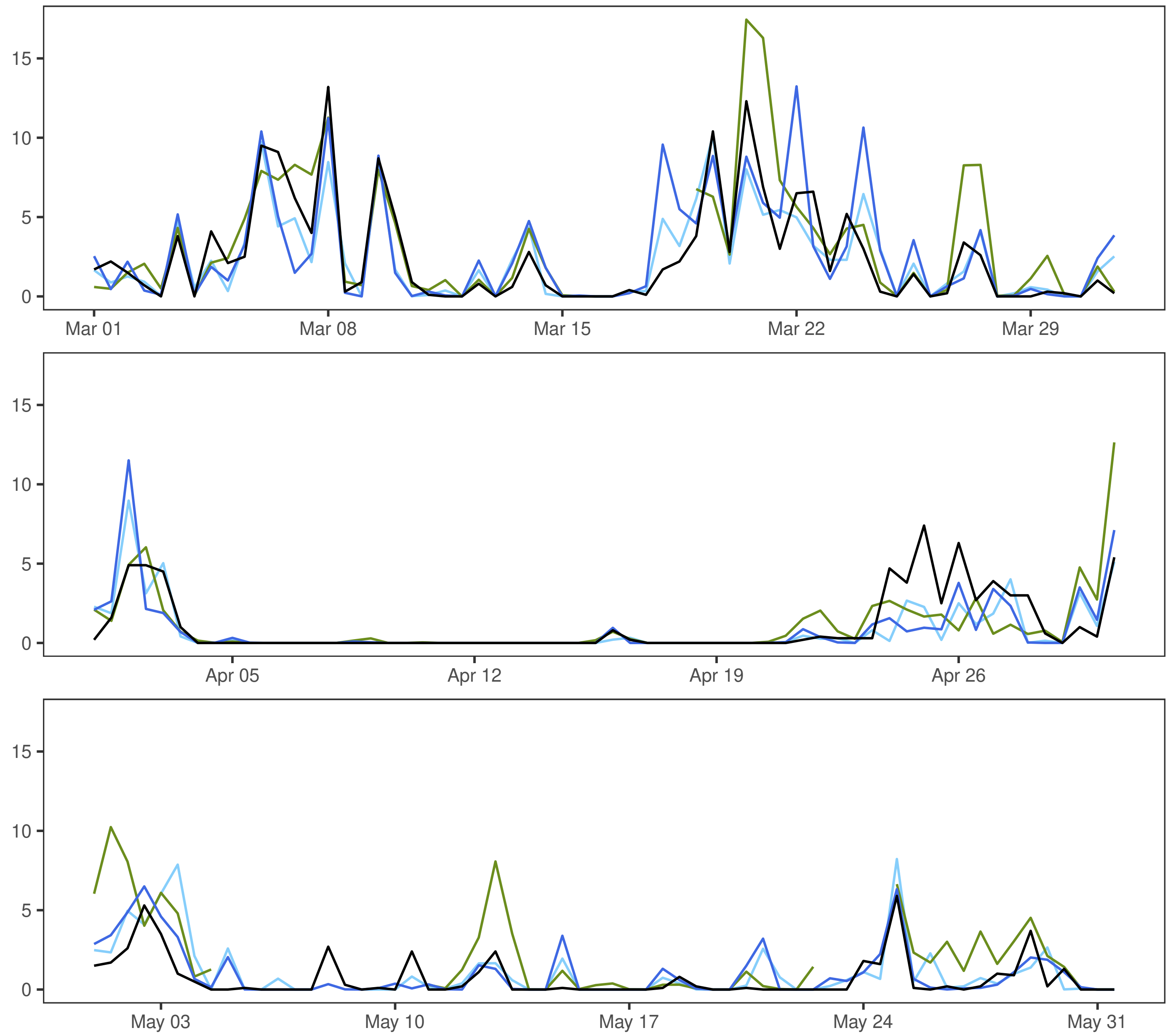
	ME	SDE	RMSE	MAE	Max.abs.err	N
AA25 – synop	0.3	1.0	1.1	0.4	5.6	163
IFS – synop	0.4	1.0	1.1	0.5	5.6	163



	Min	Mean	Max	Std	N
synop: 06,18	0.0	0.7	11.1	1.6	182
MEPSctrl: 12+18h,+30h	0.0	1.1	12.6	2.0	184
AA25: 12+18h,+30h	0.0	1.1	13.1	2.1	182
IFS: 12+18h,+30h	0.0	0.9	7.3	1.5	164

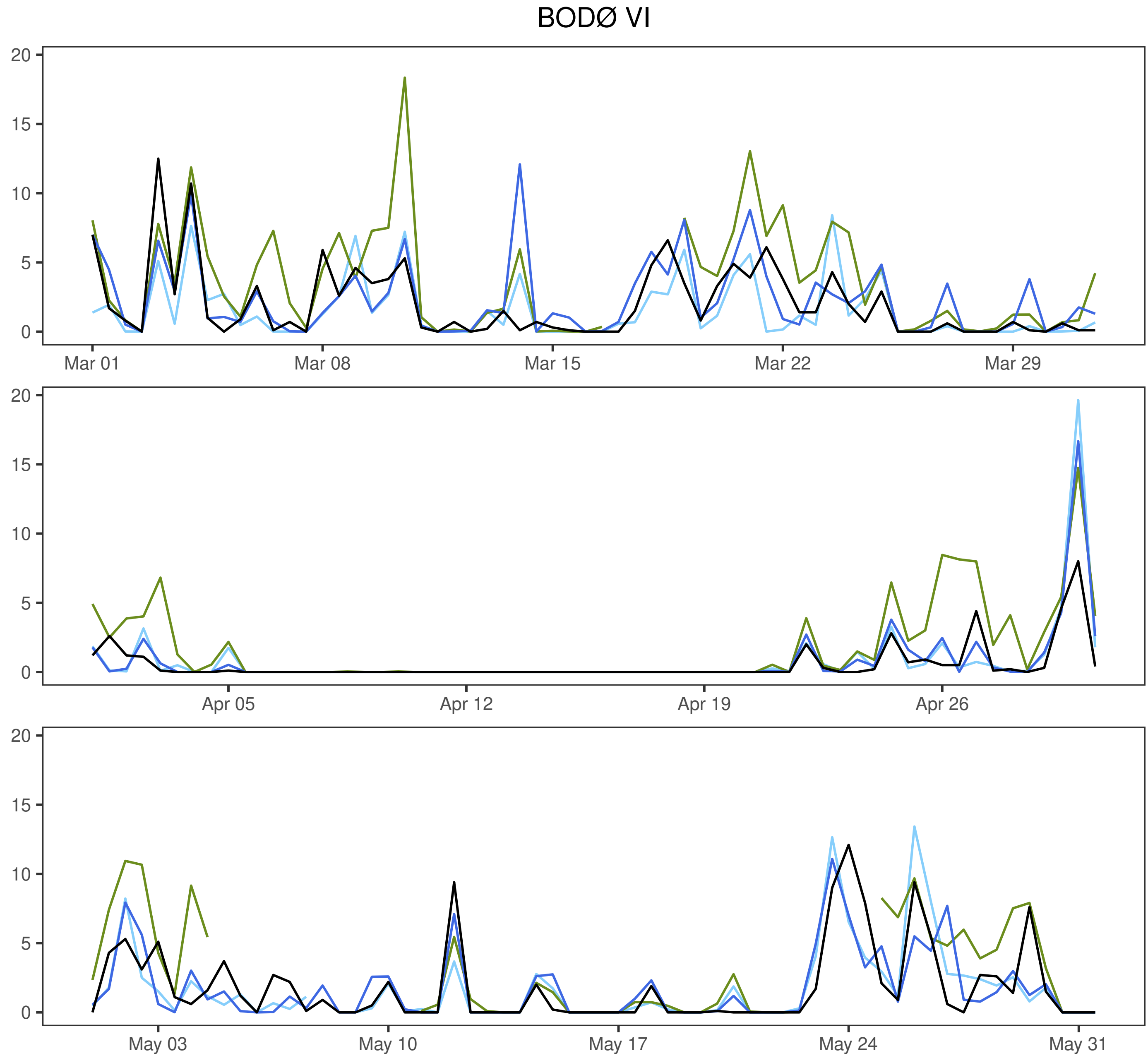
	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.5	1.3	1.3	0.7	6.7	162
AA25 – synop	0.5	1.5	1.6	0.8	11.1	162
IFS – synop	0.2	1.0	1.0	0.6	5.3	162

TROMSØ



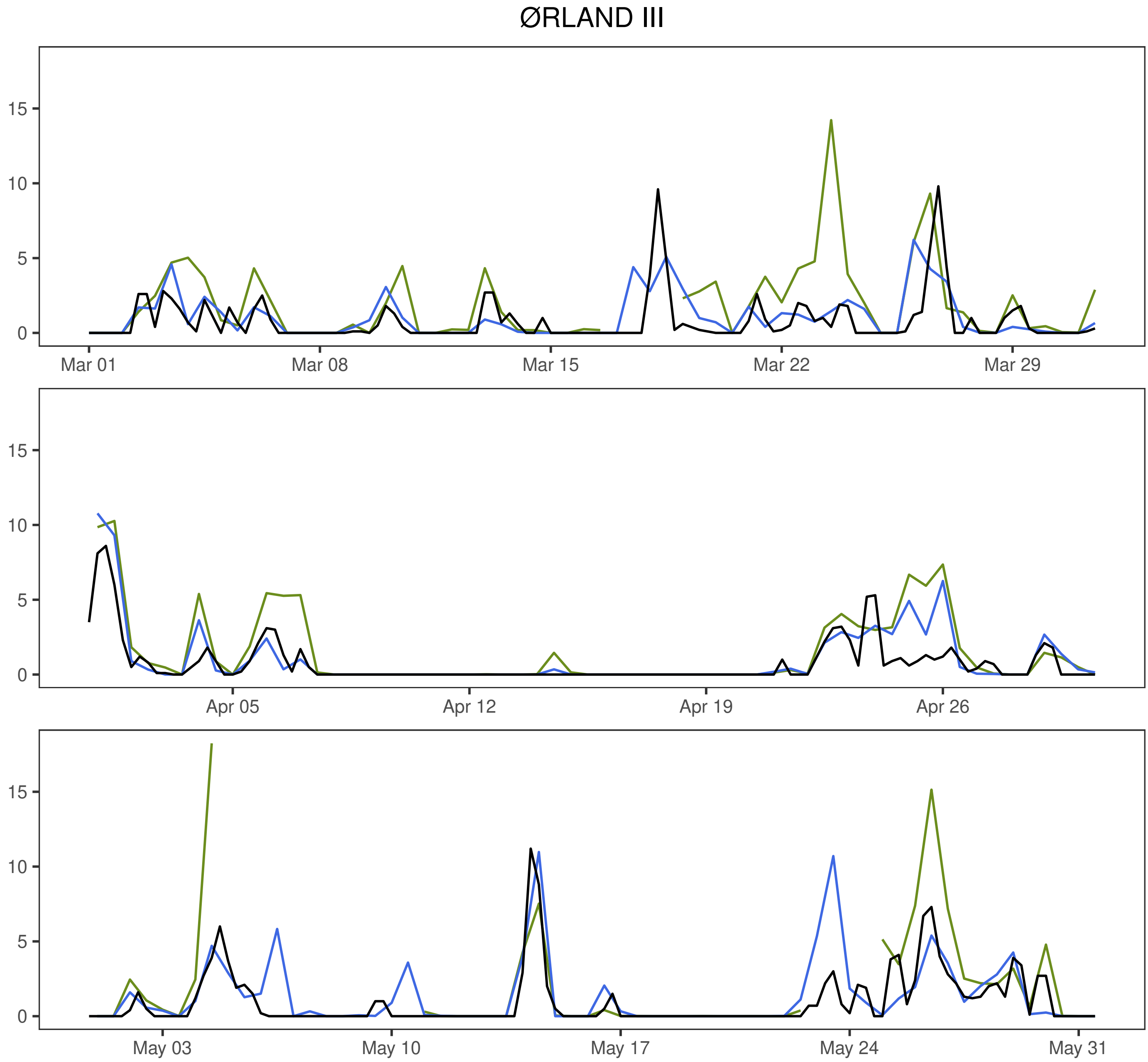
	Min	Mean	Max	Std	N
synop: 06,18	0.0	1.4	13.2	2.4	184
MEPSctrl: 12+18h,+30h	0.0	1.5	13.2	2.6	184
AA25: 12+18h,+30h	0.0	1.4	10.1	2.2	182
IFS: 12+18h,+30h	0.0	2.1	17.4	3.1	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.1	1.7	1.7	0.9	7.6	164
AA25 – synop	0.0	1.5	1.5	0.9	6.9	164
IFS – synop	0.6	2.0	2.1	1.2	9.4	164



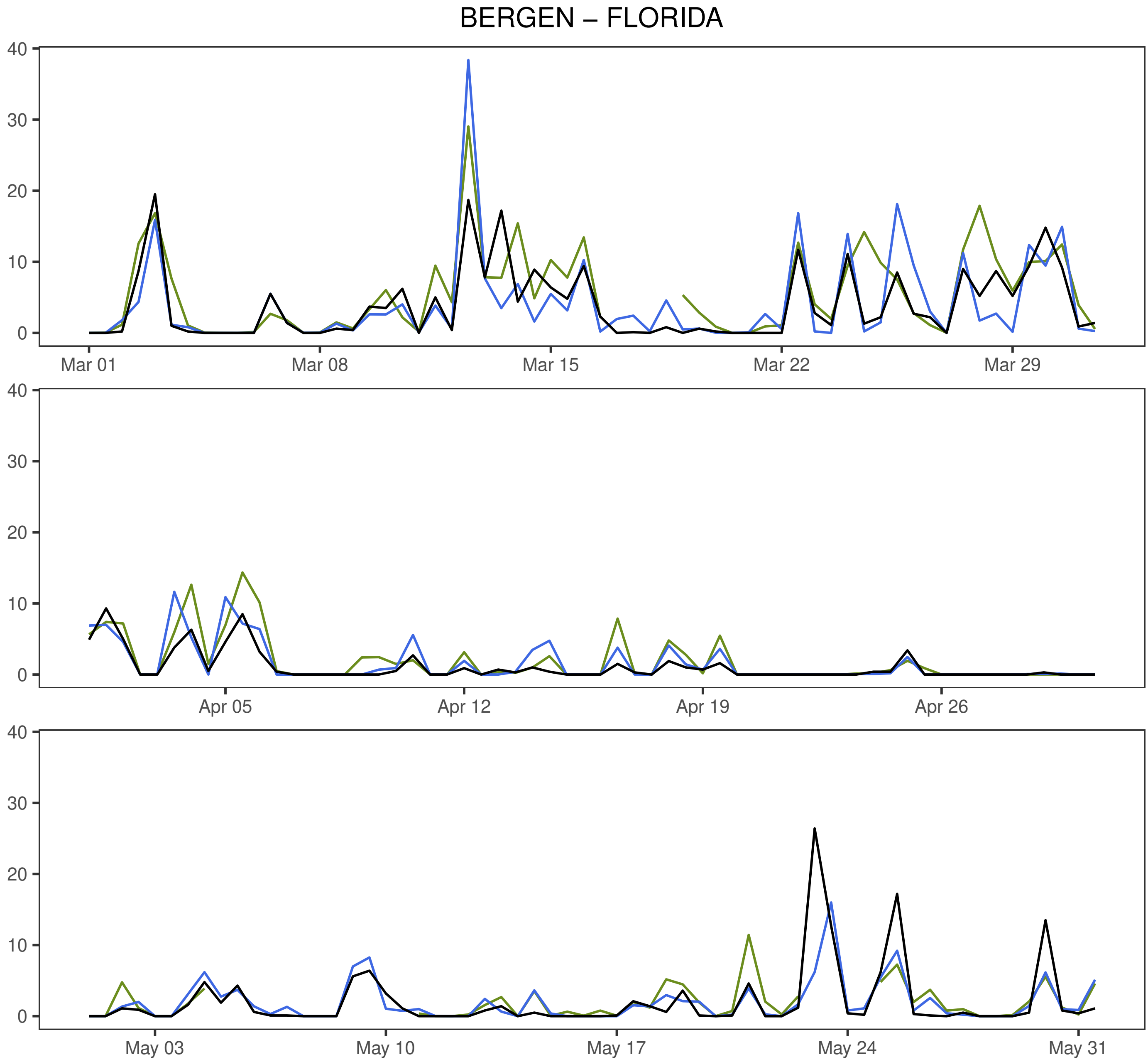
	Min	Mean	Max	Std	N
synop: 06,18	0.0	1.5	12.5	2.5	184
MEPSctrl: 12+18h,+30h	0.0	1.6	16.7	2.6	184
AA25: 12+18h,+30h	0.0	1.4	19.6	2.6	182
IFS: 12+18h,+30h	0.0	2.7	18.3	3.5	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.2	1.9	1.9	0.9	12.0	164
AA25 – synop	0.0	1.9	1.9	0.9	11.6	164
IFS – synop	1.4	2.5	2.8	1.6	13.0	164



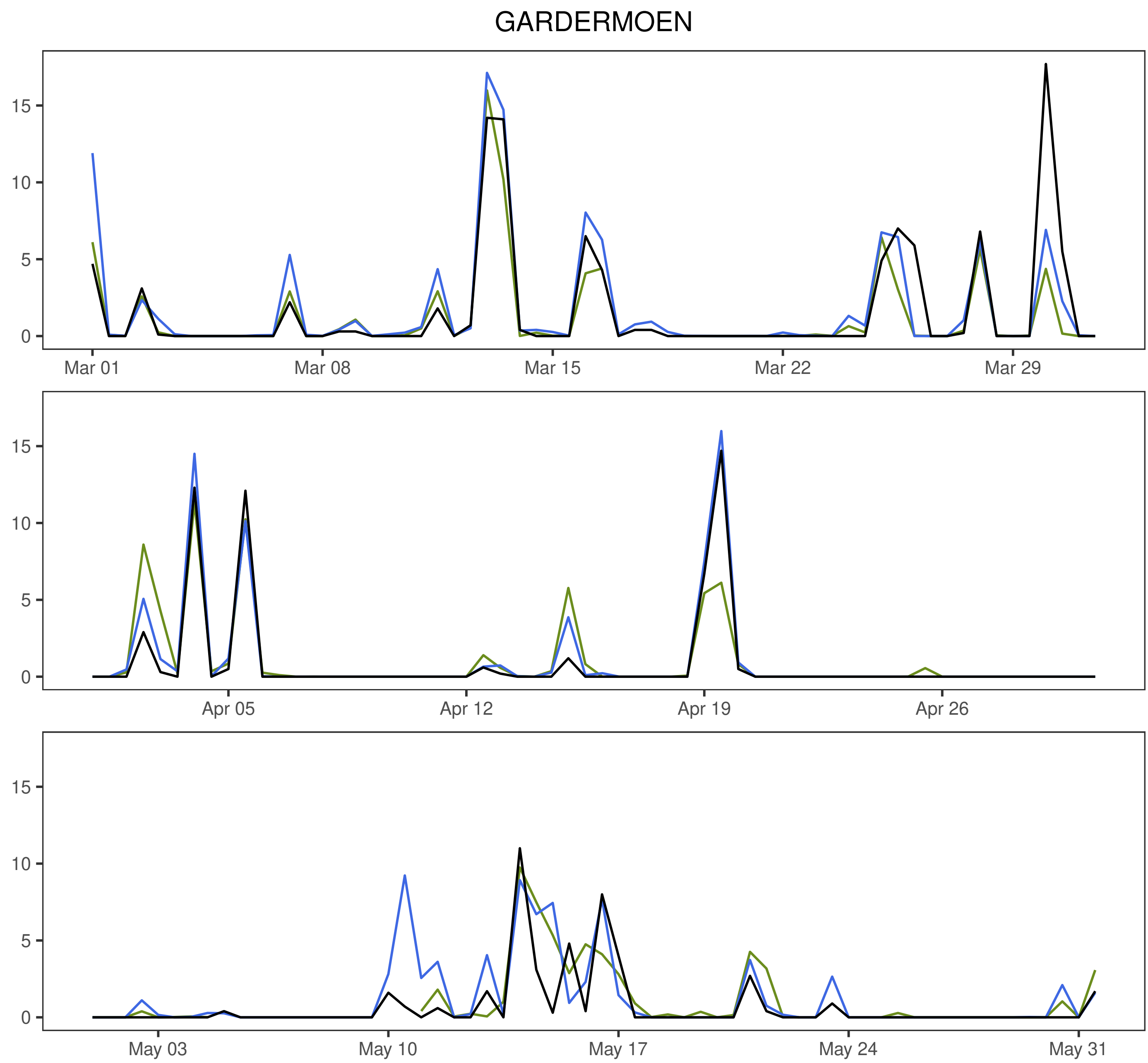
	Min	Mean	Max	Std	N
synop: 00,06,12,18	0.0	0.9	11.2	1.7	359
MEPSctrl: 12+18h,+30h	0.0	1.2	11.0	2.0	184
IFS: 12+18h,+30h	0.0	1.8	18.2	3.0	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.2	1.0	1.0	0.5	5.1	164
IFS – synop	1.0	2.2	2.4	1.1	14.3	164



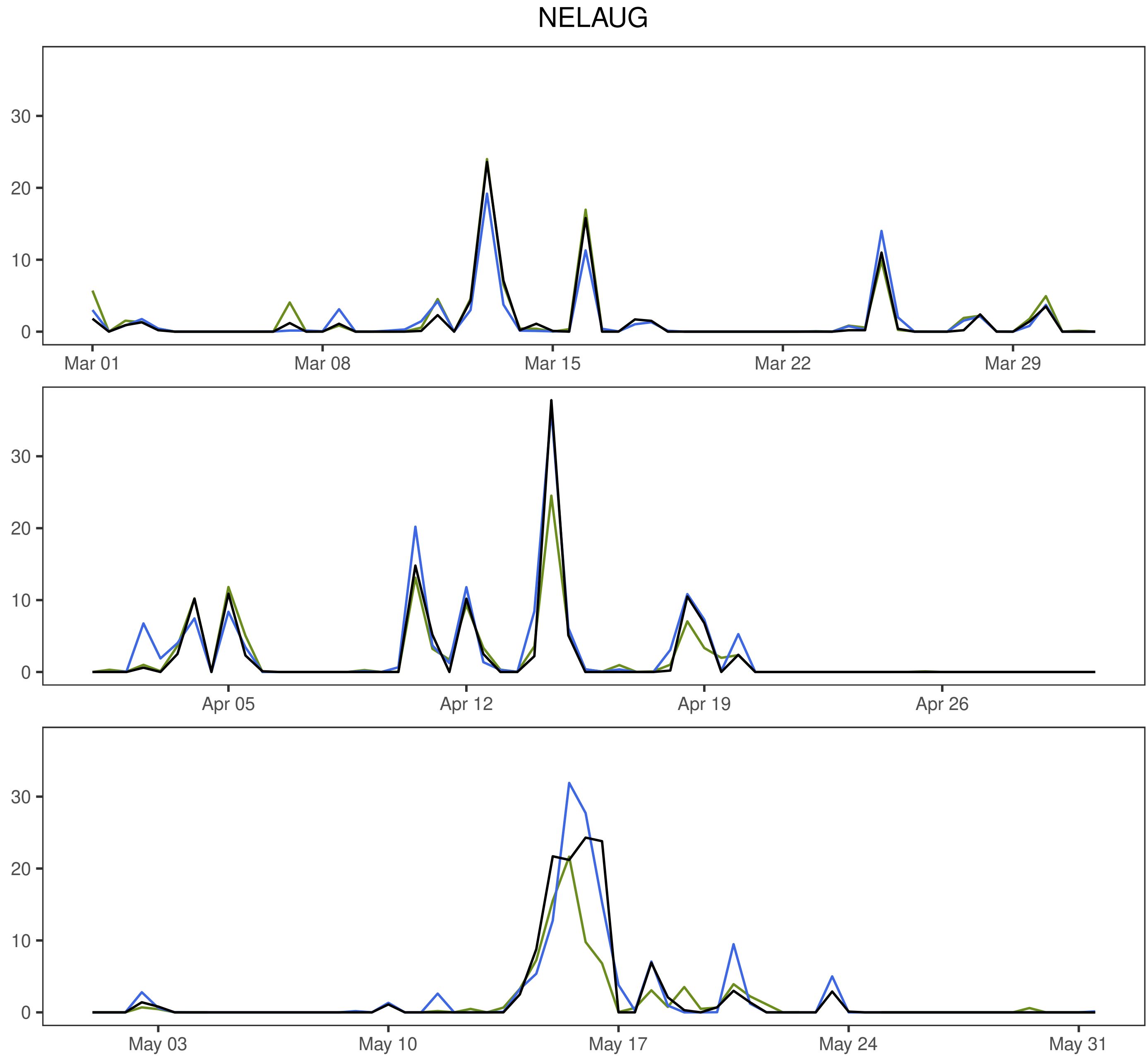
	Min	Mean	Max	Std	N
synop: 06,18	0.0	2.4	26.4	4.3	184
MEPSctrl: 12+18h,+30h	0.0	2.5	38.4	4.6	184
IFS: 12+18h,+30h	0.0	3.2	29.0	4.6	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.2	2.9	2.9	1.4	19.7	164
IFS – synop	0.9	2.9	3.1	1.7	12.9	164



	Min	Mean	Max	Std	N
synop: 06,18	0.0	1.1	17.7	3.0	184
MEPSctrl: 12+18h,+30h	0.0	1.3	17.1	3.1	184
IFS: 12+18h,+30h	0.0	1.1	16.0	2.5	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.2	1.6	1.6	0.6	10.8	164
IFS – synop	0.0	1.8	1.8	0.7	13.3	164



	Min	Mean	Max	Std	N
synop: 06,18	0.0	1.8	37.8	5.2	184
MEPSctrl: 12+18h,+30h	0.0	2.0	36.5	5.2	184
IFS: 12+18h,+30h	0.0	1.8	24.5	4.2	164

	ME	SDE	RMSE	MAE	Max.abs.err	N
MEPSctrl – synop	0.2	1.9	1.9	0.8	10.7	164
IFS – synop	–0.2	2.3	2.3	0.7	17.0	164