Application and Verification of ECMWF Products 2021

KNMI: Jos Diepeveen/Thom Zwagers

1.   Summary of major highlights

It is expected that a more detailed description of any items included here will appear in section(s) below.

## 2.   Use and application of products

Include, as appropriate, medium-range high-resolution (HRES) and ensemble (ENS) forecasts, monthly forecasts, seasonal forecasts.

2.1   Direct Use of ECMWF Products

We mostly use the HRES for short term forecasts as an addition to the non-hydrostatic limited area models such as HARMONIE. Parameters (quite standard): temperature, dewpoint, cloud base height, visibility, lightning flash density, precipitation, precipitation type, etc.
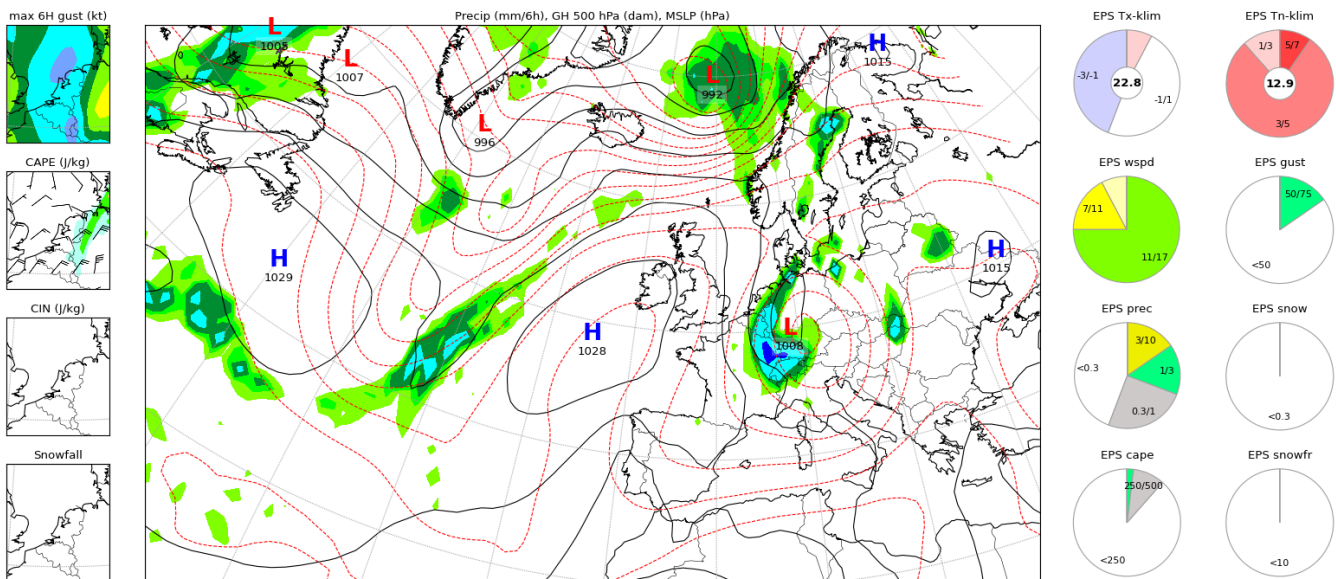

ECMWF run: 202107120600 valid: 2021-07-12 14:00:00
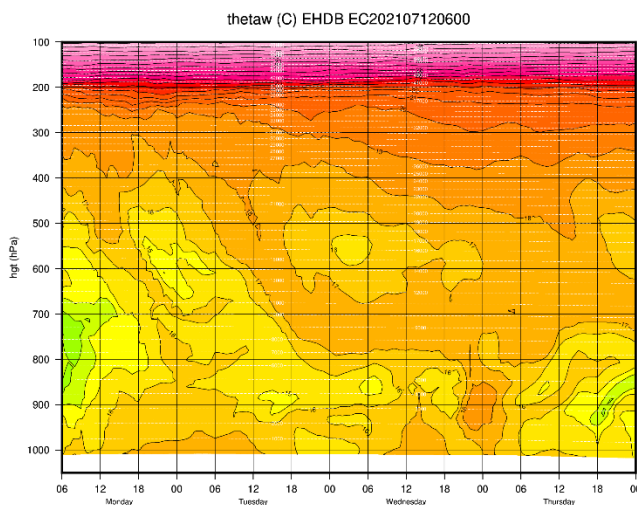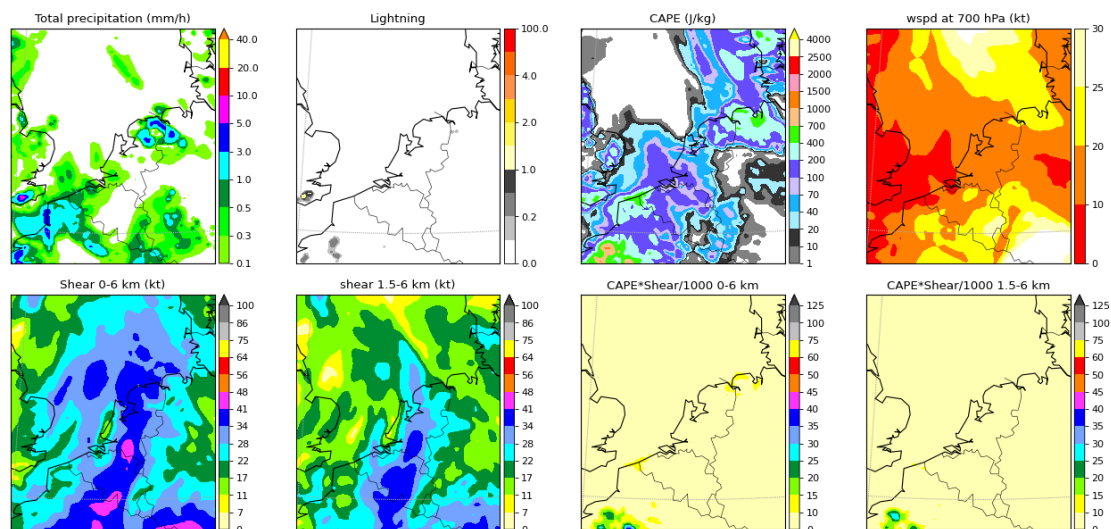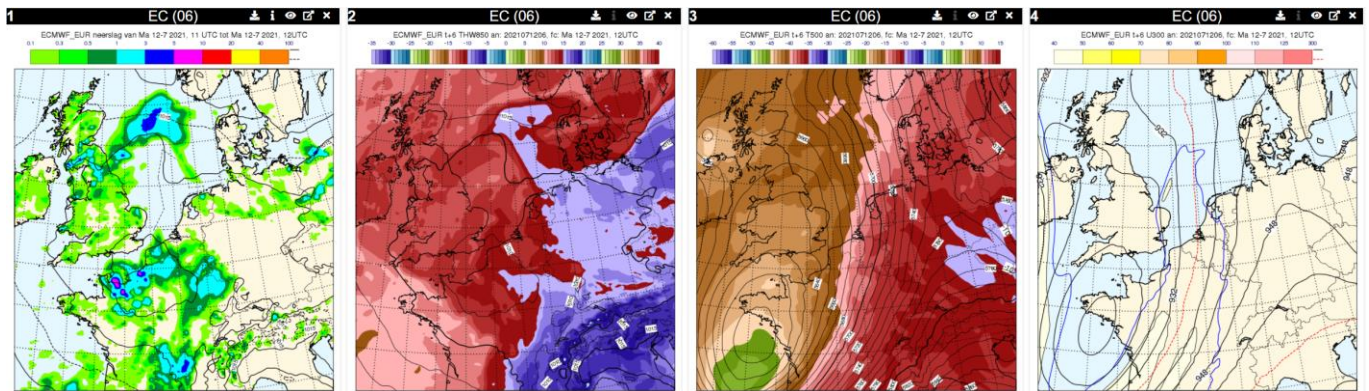
ma 12 jul. 2021 12:00 UTC

Location: EHDB ECMWF run: 202107120000 valid: Thu 15 Jul 2021 06 UTC

However, as the KNMI weather room is becoming a so called Early Warning Centre, the focus will increasingly be beyond 48 hours. We already make extensive use of various ENS products to give estimates of exceeding extreme weather criteria and the possibility of warnings that could be issued in the coming week.
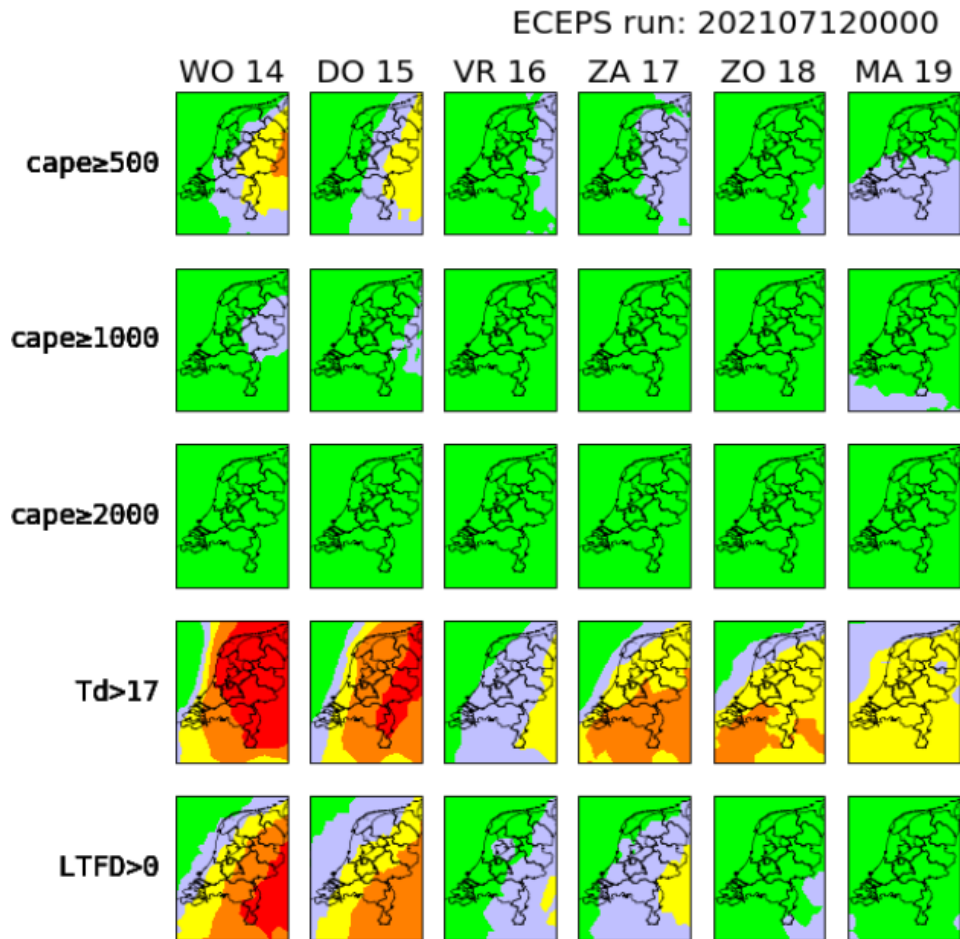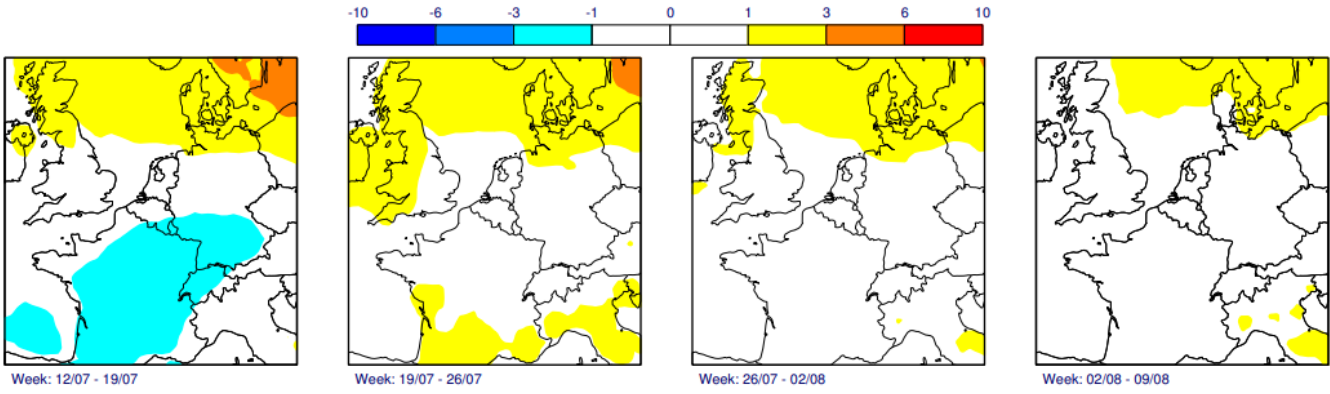
For forecasts regarding droughts and the important River Basins in the Netherlands (Rhine and Meusse), we also use the monthly forecasts of EC.
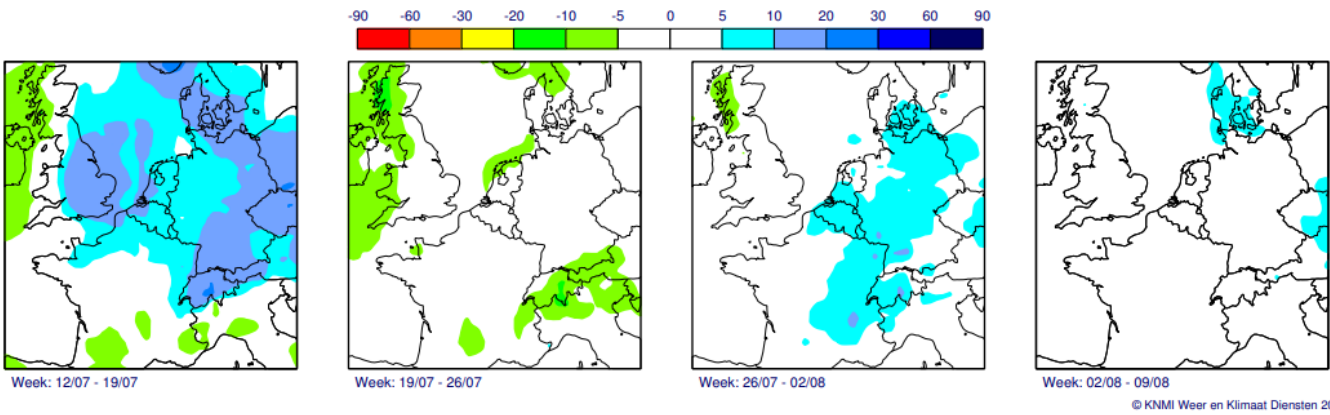

Totale 5-daagse neerslagsom (mm) maandag 12 juli t/m vrijdag 16 juli
ECMWF run: 202107120000
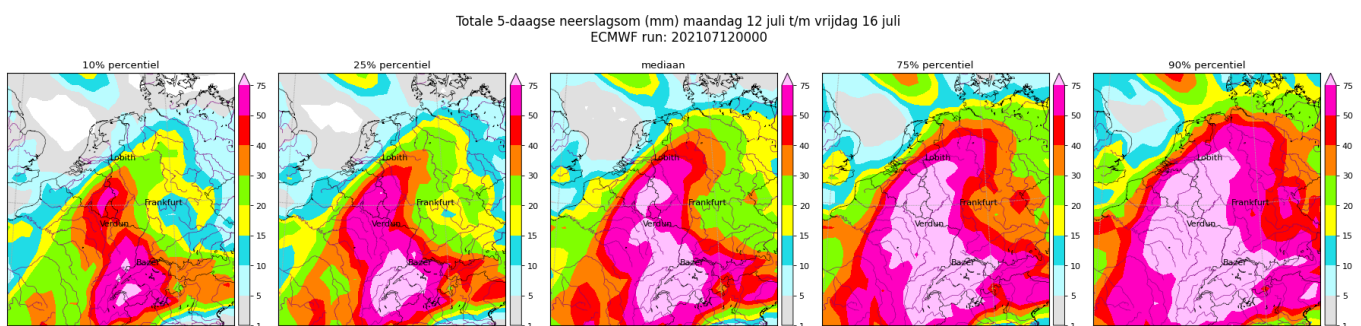
Verwachte temperatuurafwijkingen (°C)   based on ECMWF run: 2021070800

Verwachte afwijkingen in de neerslaghoeveelheid (mm)

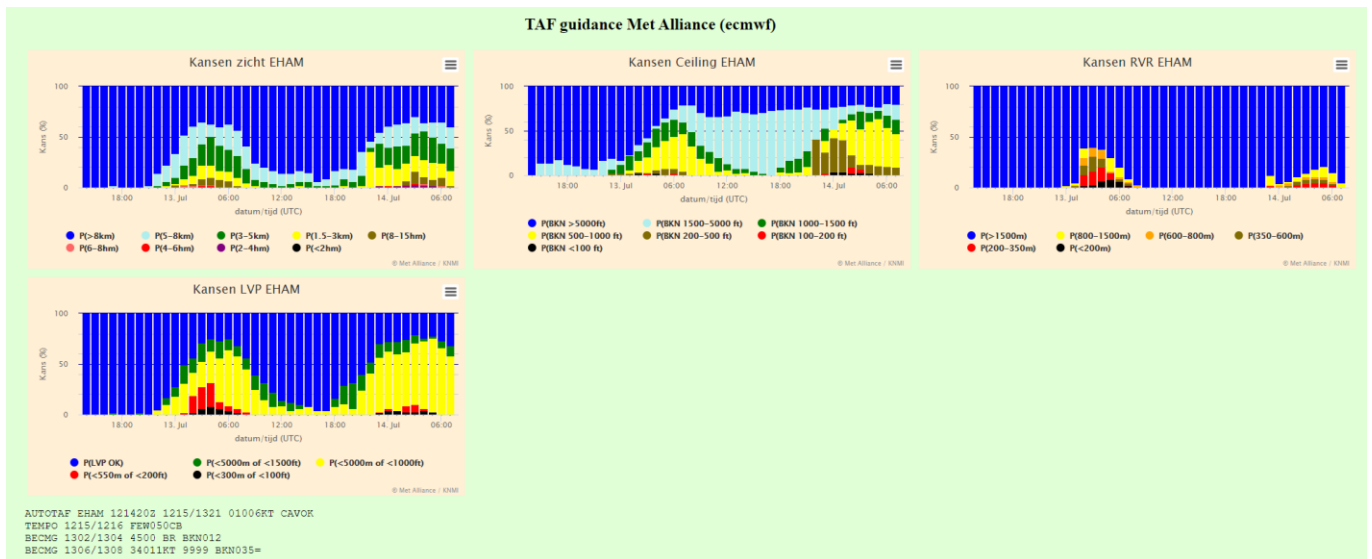© KNMI Weer en Klimaat Diensten 2020

We don't use the seasonal forecasts right now.

2.2   Other uses of ECMWF output

Describe the different ways in which you use ECMWF forecasts indirectly, in the following categories:

2.2.1   Post-processing

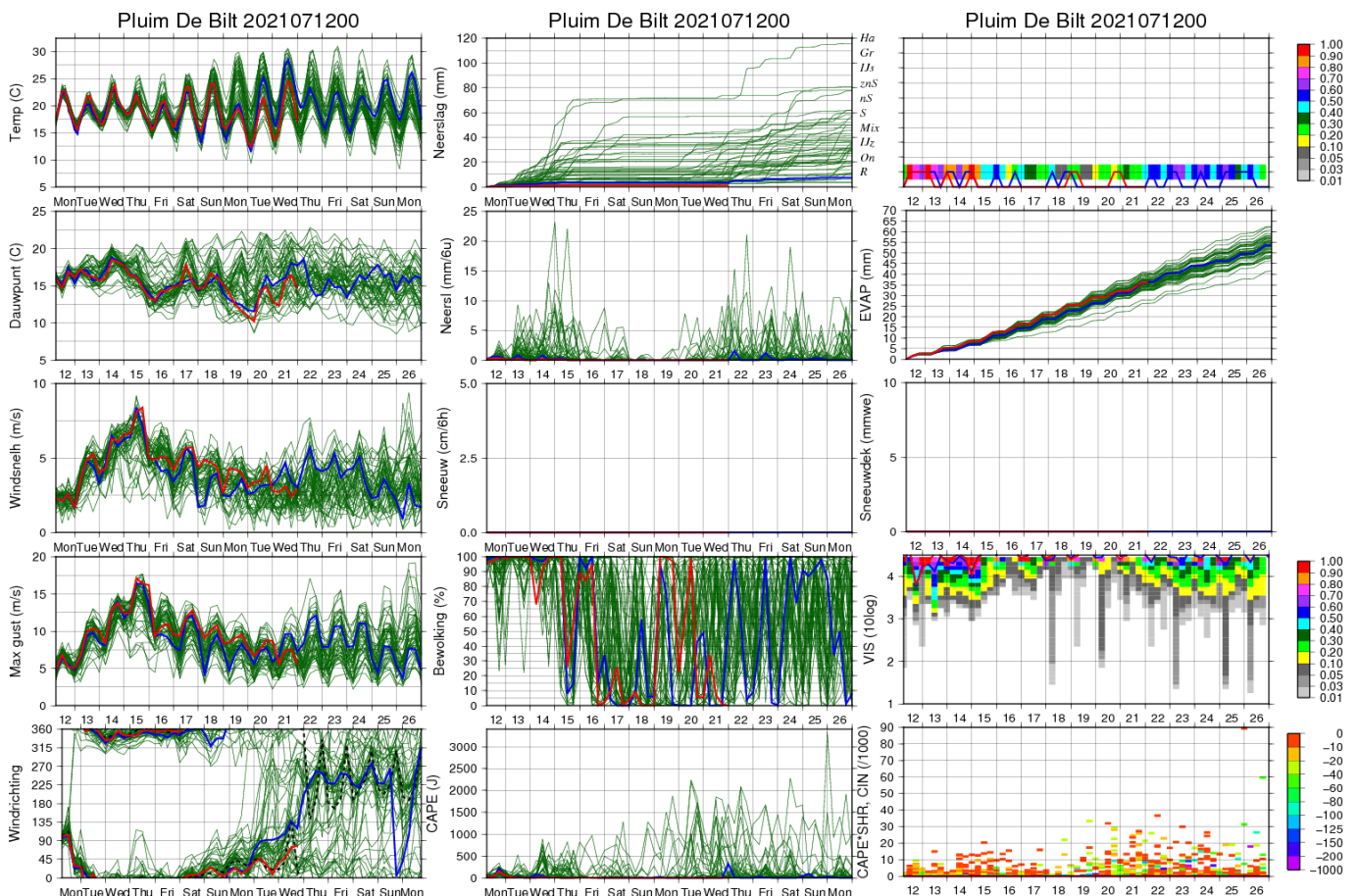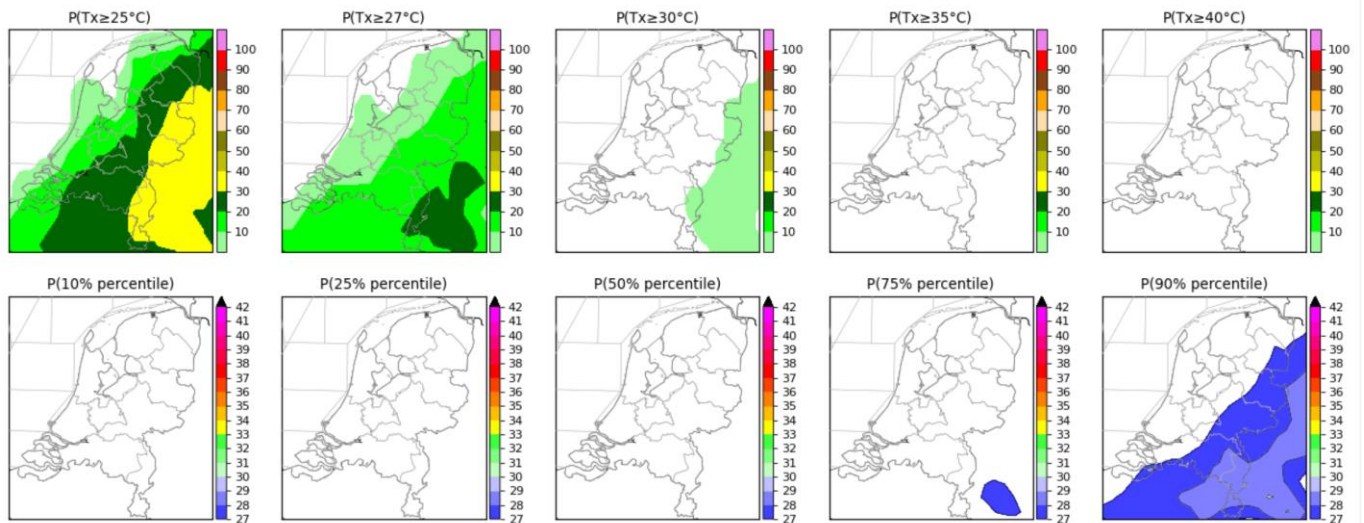ML (MOS) is applied to ECMWF model output for the "TAF Guidance".

There is also work in progress: a student is trying to use ensemble data to predict road surface temperatures for forecast hours beyond 48 hours.

2.2.2   Derived fields

Mostly grid point probabilities for several parameters.

2.2.3   Modelling

HARMONIE uses the analysis and boundary of ECMWF.

3.   Verification of ECMWF products

HRES, ENS, monthly and seasonal forecasts are all within scope. ECMWF does extensive verification of its products in the free atmosphere. However, verification of surface parameters is in general limited to using synoptic observations. More detailed verification of these weather parameters by National Services is always valuable to us. We are most interested in results for the last 1 or 2 years.

At this time (2021) ECMWF would particularly welcome:

- Conditional verification results (e.g. 10m wind bias stratified by topographical aspects/cloud cover)
- Comparisons between ECMWF ENS and external LAM-EPS systems (for probabilistic forecasts)

3.1   Objective verification

Describe verification activities and show and discuss related scores.

3.1.1   Direct ECMWF model output (both HRES and ENS), and other NWP models

We have online verification of our models for different parameters and type of plots (RMS/Bias/Scat): Below e.g. a scatter plot of the actual last 10 days of July with a forecast range of +18-24, we can compare them with our Hres models as Harmonie etc.

Verif ECMWF T2m all NL, fr=18-24 (C)
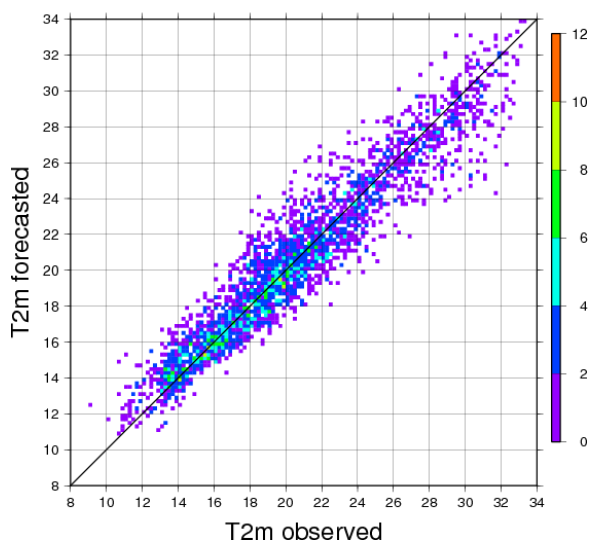
3.1.2   Post-processed products and end products delivered to users

At the moment we are working on a calibration of EC ENS data in order to construct warning polygons for early warning purposes (up to a week ahead)

3.1.3   Monthly and Seasonal forecasts

Focus on lead times beyond day 15.

3.2   Subjective verification

3.2.1   Subjective scores

Include evaluation of confidence indices when available.

3.2.2   Case studies

Severe weather events/non-events are of particular interest. Include an evaluation of the behaviour of the model(s). Reference to major forecast errors, even if they are not in a "severe weather" category, are also very welcome.

4.   Requests for additional output

The new Thermofeel library sounds very interesting, but we are not able to plot parameters such as WBGT ourselves as we would need to retrieve parameters like ssrd, fdir etc first in order to compute the non-simple WBGT. As we are looking for better ways to indicate e.g. the severity of heat, it would be

nice to have WBGT on Open Charts or Easy Charts. The same applies to e.g. the snowline, in addition to the Freezing Level.

5.   <u>References to relevant publications</u>

(Copies of relevant internal papers may be attached)

Smith, W. and **C. Jones**, 2005: Whatever the name of the article is. *Mon. Wea. Rev.*, **20**, 134–148