

Automatic Forecasts Algorithm

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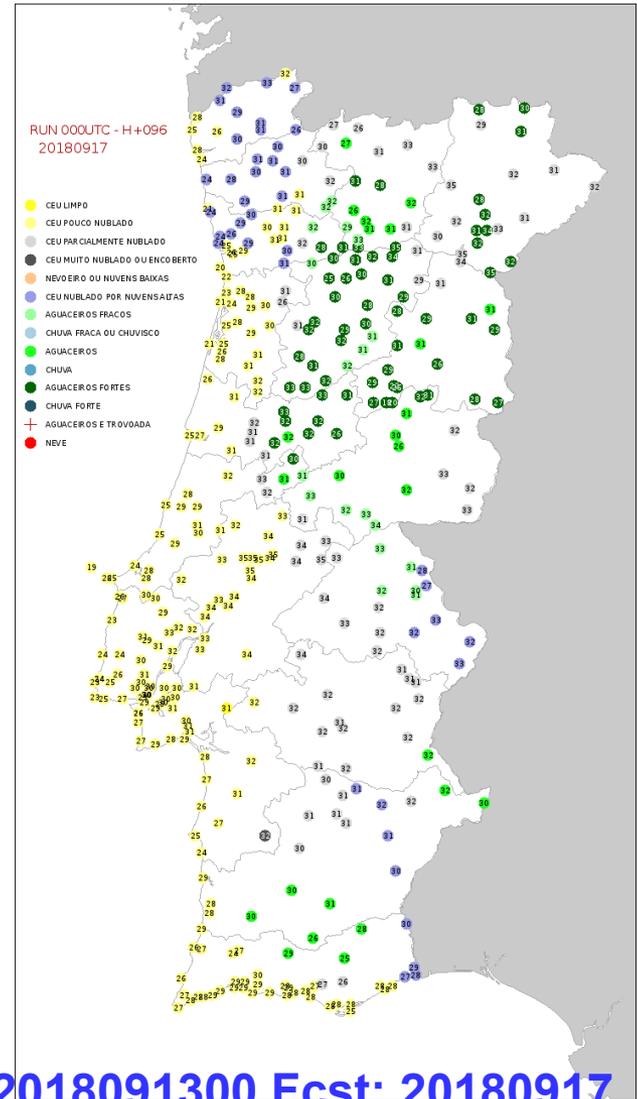
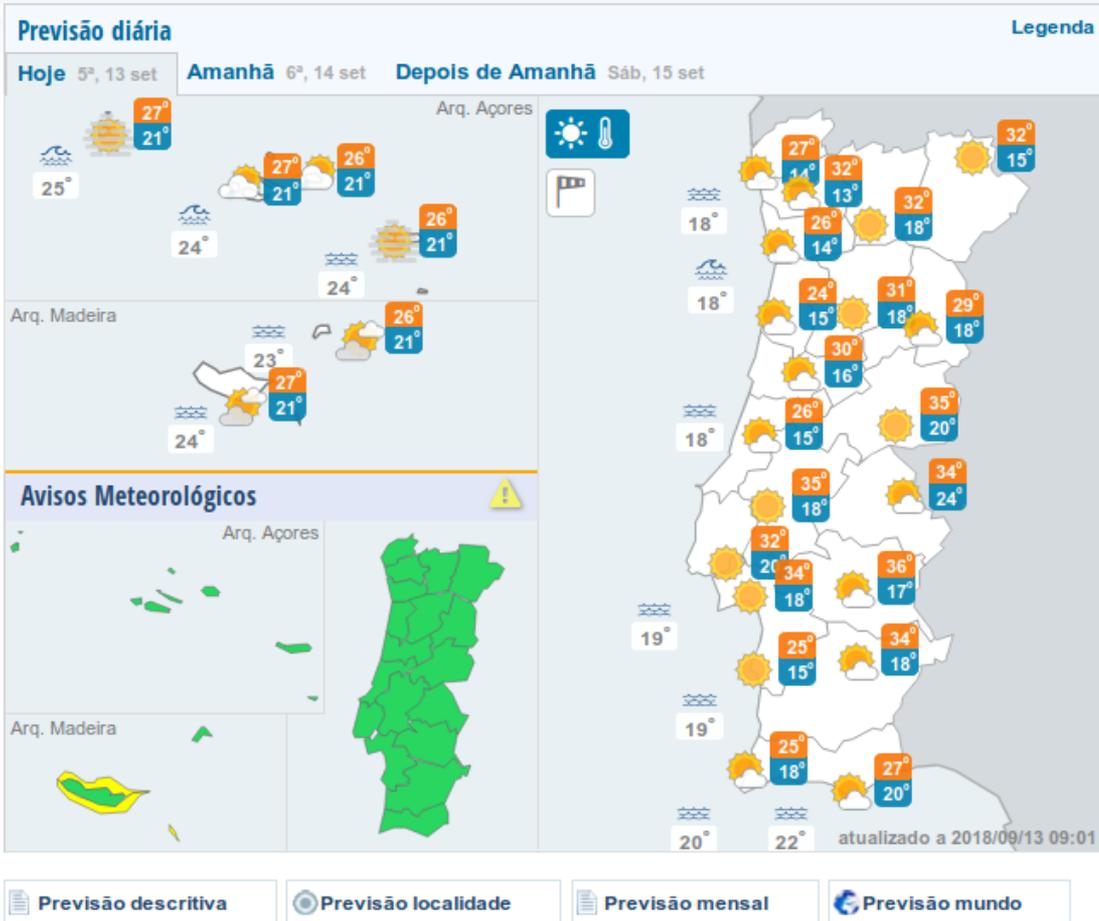
AEMET, Madrid, September 2018

Overview

1. Public forecasts

2. Methodology

3. Further developments



Run: 2018091300 Fcst: 20180917

Daily view

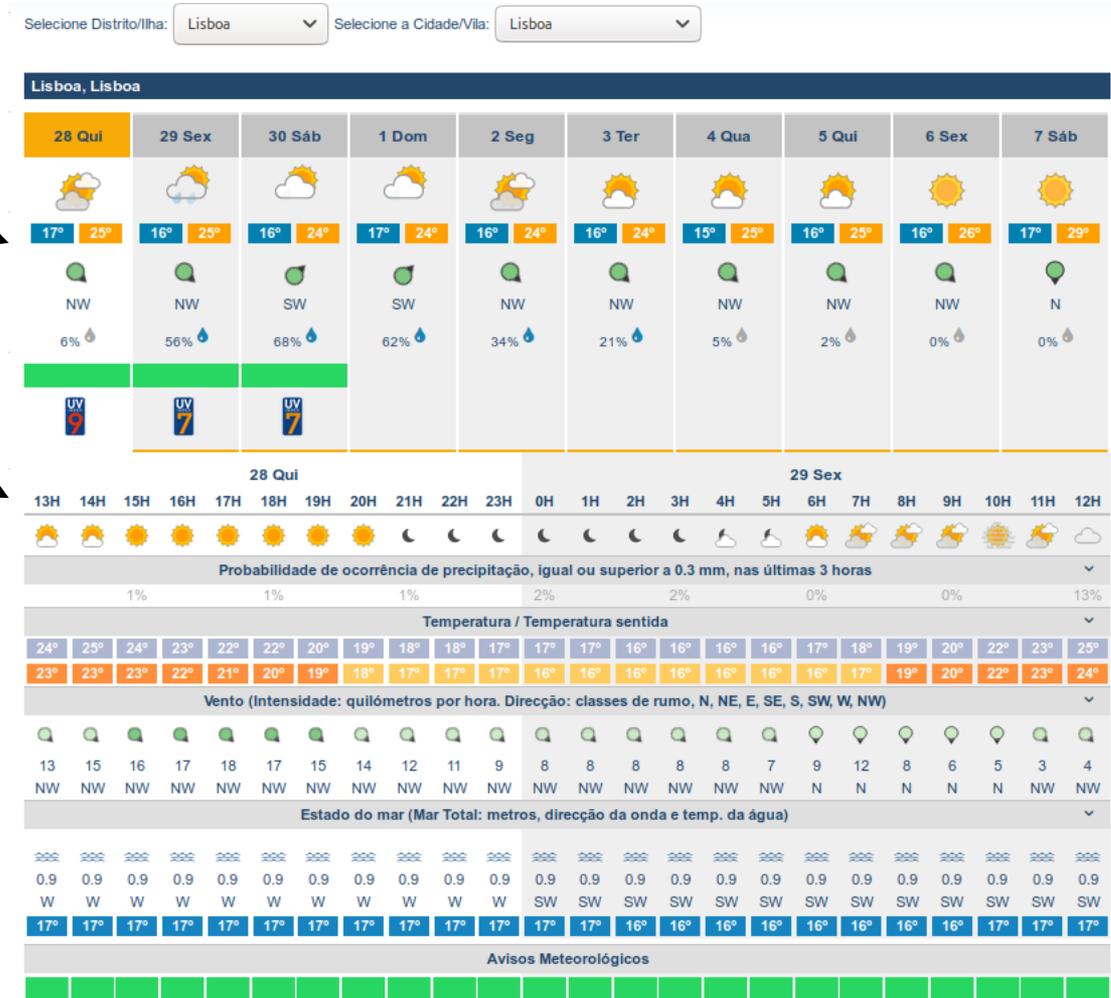
1h/3h view

Latest updates:

Probability of precipitation in 3h

Symbol: visually homogeneous

Weather: Drop distinction between "Rain" and "Showers"



- **Forecasts for 400 locations**
- **Observations from weather stations**
140 (Mainland, Madeira and Açores)
- **Models:**
ECMWF HRES e ENS (10 days) and AROME (48h)
- **Statistical Post-processing (MOS and Kalman Filter)**

- **MOS (40 days); KALMAN (30 days)**
- **Applies to AROME and ECMWF HRES**

2 m temperature and 10 m wind speed

relative humidity is corrected using the temperature

- **MOS (40 days); KALMAN (30 days)**
- **Applies to AROME and ECMWF HRES**
2 m temperature and 10 m wind speed
relative humidity is corrected using the temperature
- **Final forecast is the average of all available statistical post-processing values**
- **0-48h: 4 values; from day 3: 2 values**
- **Forecasts for locations without observations: assumes the statistical adjustment in locations with similar topography is the same**

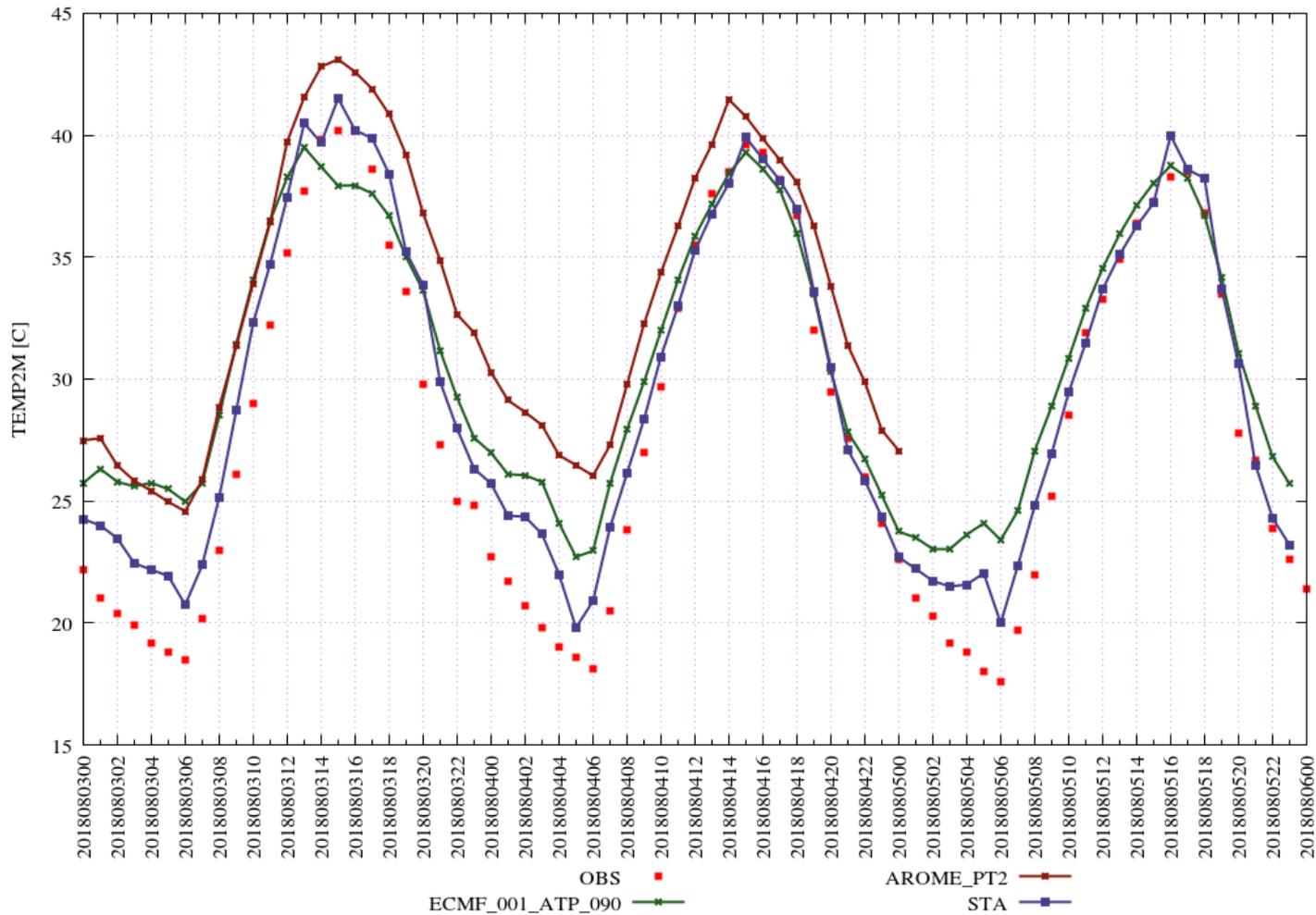
STATION: CHAVES PERIOD: 2018080300-2018080600

OBS

AROME

ECMWF

STA



T850 hPa

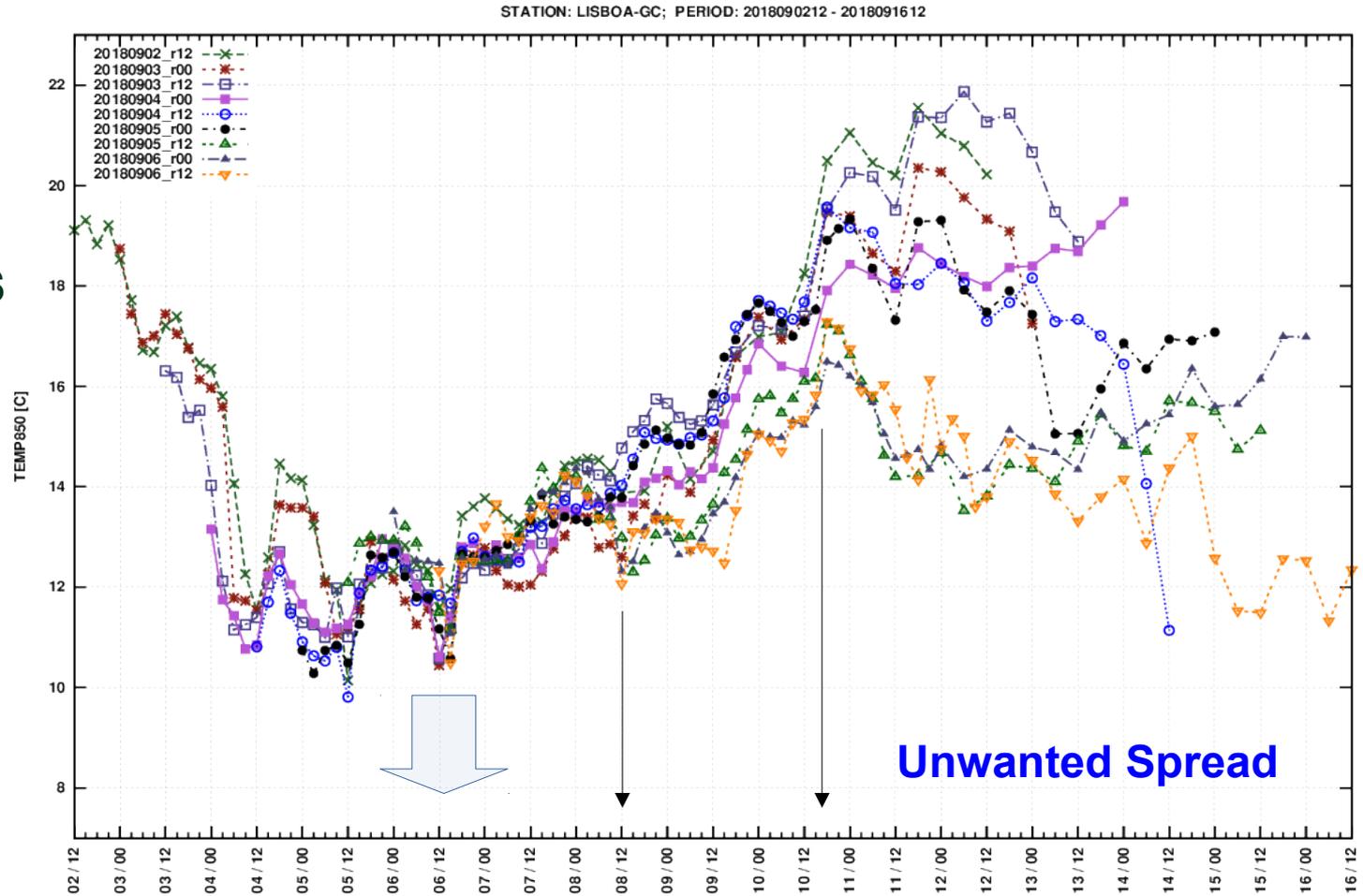
Lisbon

ECMWF-HRES

9 runs:

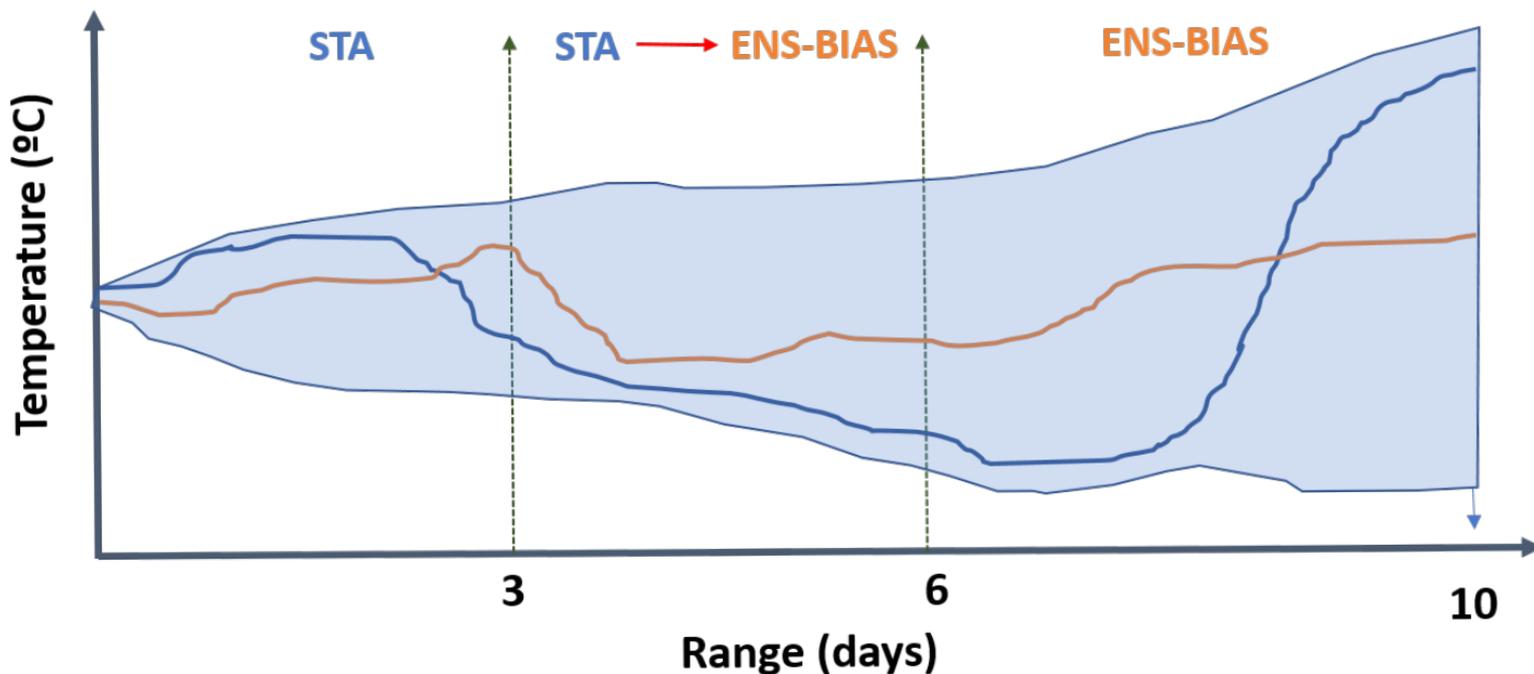
2018090212

2018090612

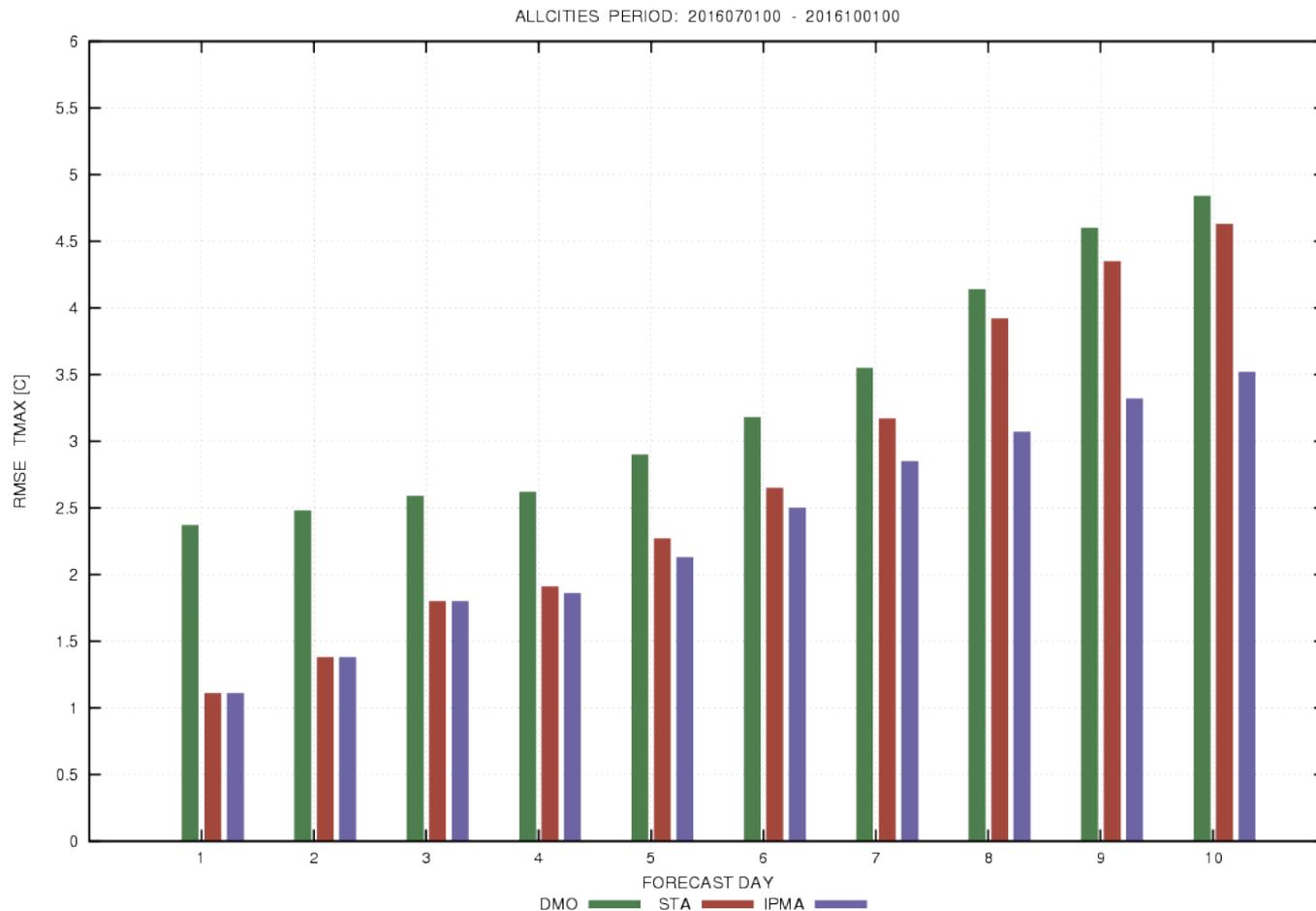


Using only HRES will lead to excessive spread in forecast temperatures, mainly beyond day 6/7.

Use ECMWF-ENS to control this issue.



RMSE TMAX 100 Stations



DMO: direct model output

STA: only HRES

IPMA: HRES+ENS

Hourly/3h, up to day 6

Initial forecast weather from ECMWF-HRES

The weather may be changed, since H+3, based on the probability of precipitation coming from ECMWF-ENS

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Advantages:

Takes into account the uncertainty of the forecast

Reduces somewhat the variability between consecutive forecasts

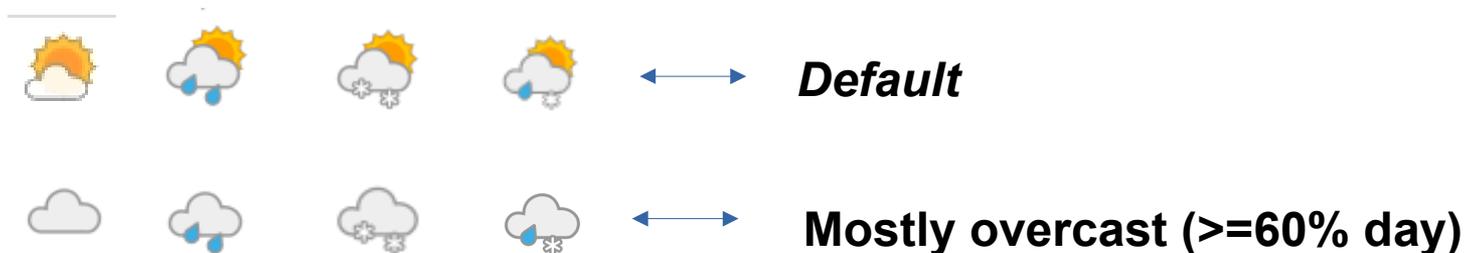
Weather: total of 19 types, from “clear” to “thunderstorms”

Daily, up to day 6:

Precipitation/No precipitation: most severe

Inside each class: Most frequent

A daily symbol with or without sun depends on how long and how much cloudiness there will be



Daily, up to day 6:

Severe or *unusual* weather is avoided (e.g. *thundestorms* or *snow at medium/low levels*)



Wind intensity: usually, depends on the mean value

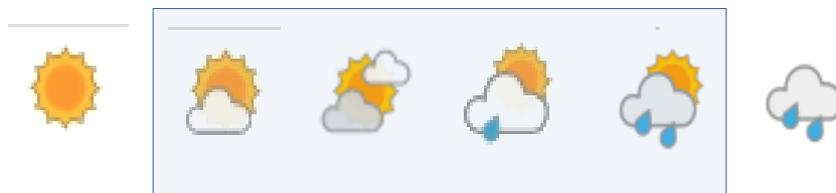
Wind direction: depends on the frequency and the mean wind speed of each direction

Daily, from day 7 to 10:

Goal is to provide an outlook, with low spatial variability

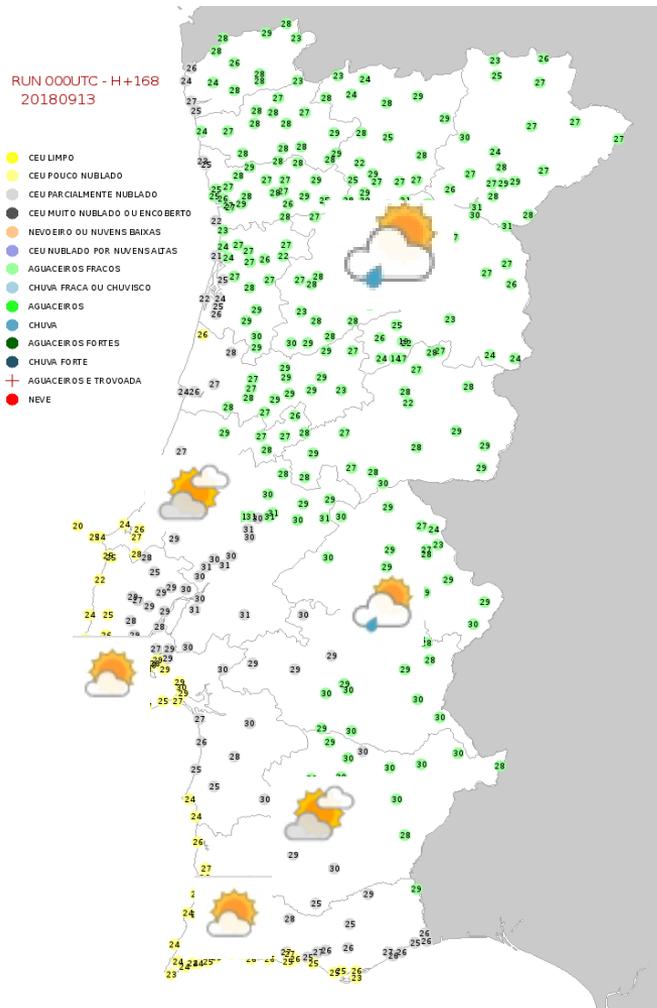
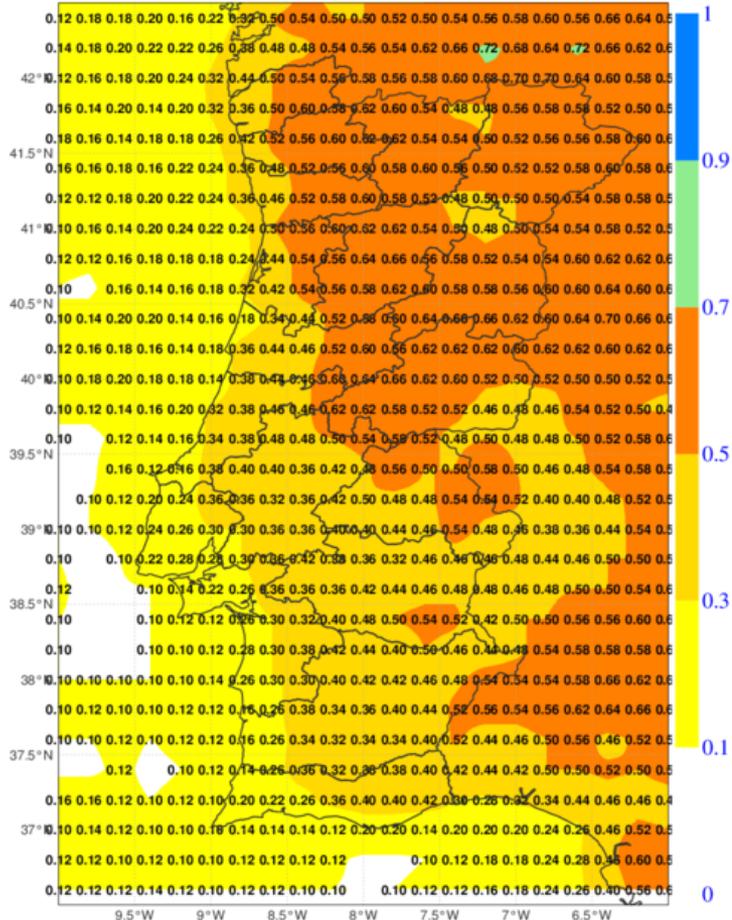
Forecast depends exclusively on ECMWF ENS (probability of precipitation in 24h)

Only 6 weather types allowed, but usually only 4 used



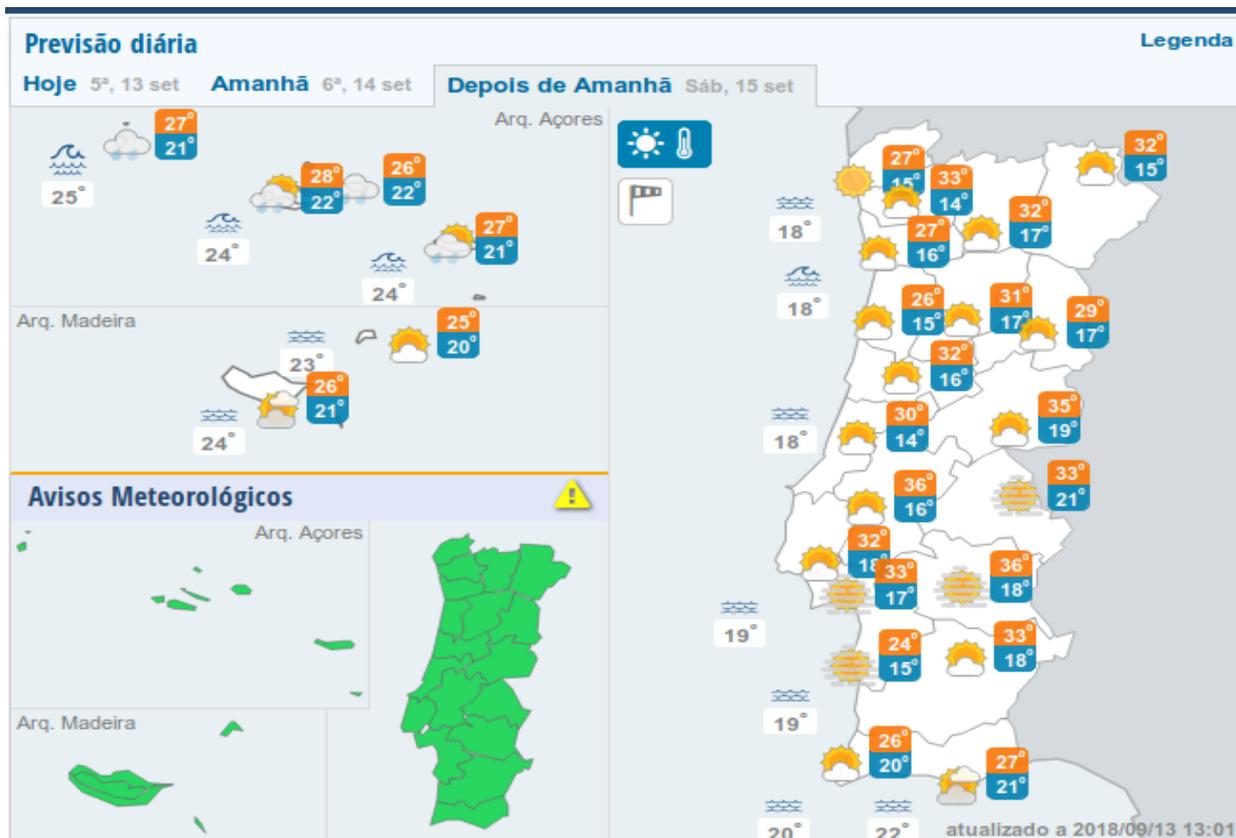
Forecast Day 8

Forecast model: ENS_ECMWF PROB_OVER_0.8
 Variable: PROB PRECIP024h
 Run: 2018090600 Valid: 2018091300 - 2018091400



Probability of precipitation \geq 0.8 mm/24h

- **Using AROME for weather, mainly by probability of precipitation**
- **Using new variables from ECMWF, both HRES and ENS (e.g. precipitation rate, lightning flashes)**
- **Post-processing 10 m wind gusts**



1. Validate the forecasts

2. Changing the forecasts only when the output has a serious issue

Daily extreme values

Accuracy [$\pm 2^{\circ}\text{C}$]

1, 4 and 7 days in advance

Main cities



Gracias!