Centrum Modelowania Meteorologicznego

EPS-skill based on the values of selected percentiles. Climatological assessment using measurements at Polish synoptic stations. Comparison with regular, EPS- mean-based skill.

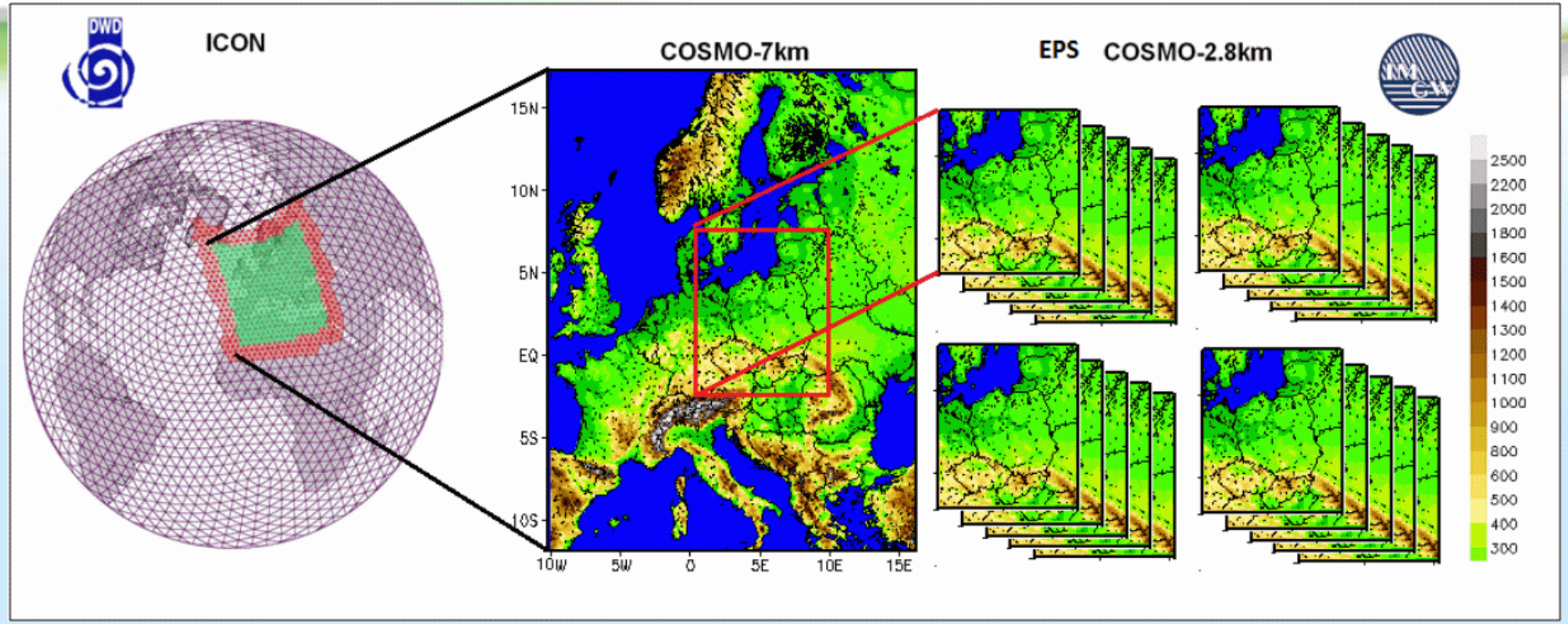
Andrzej Mazur, Joanna Linkowska, Grzegorz Duniec, Witold Interewicz

Institute of Meteorology and Water Management
National Research Institute

Contents

Centrum Modelowania Meteorologicznego

Operational setup



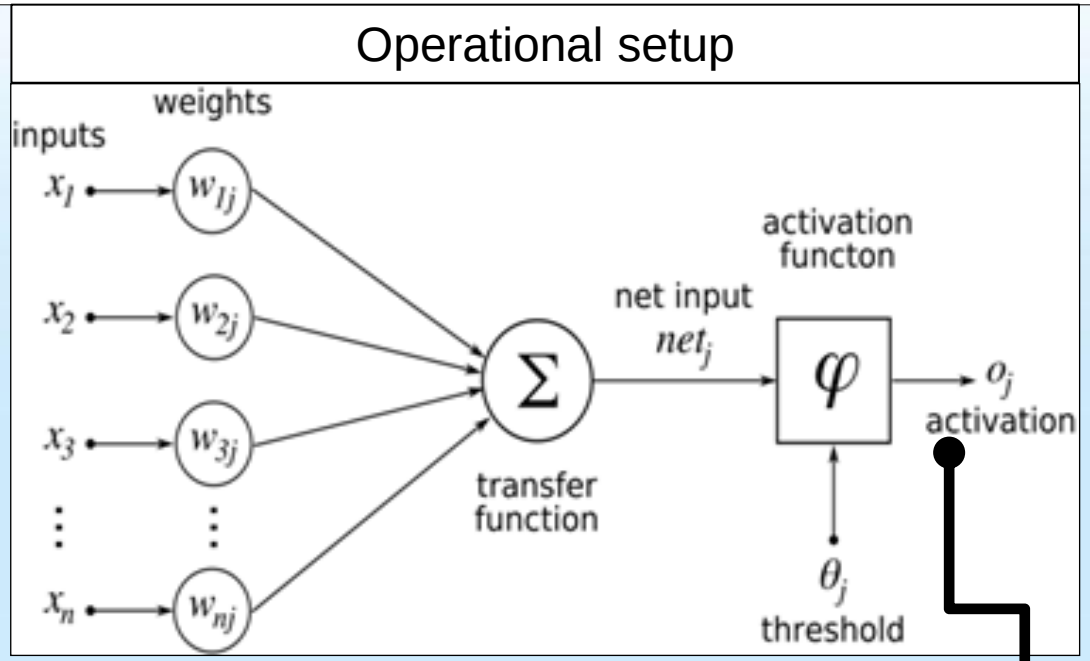
Details of the deterministic models configuration.

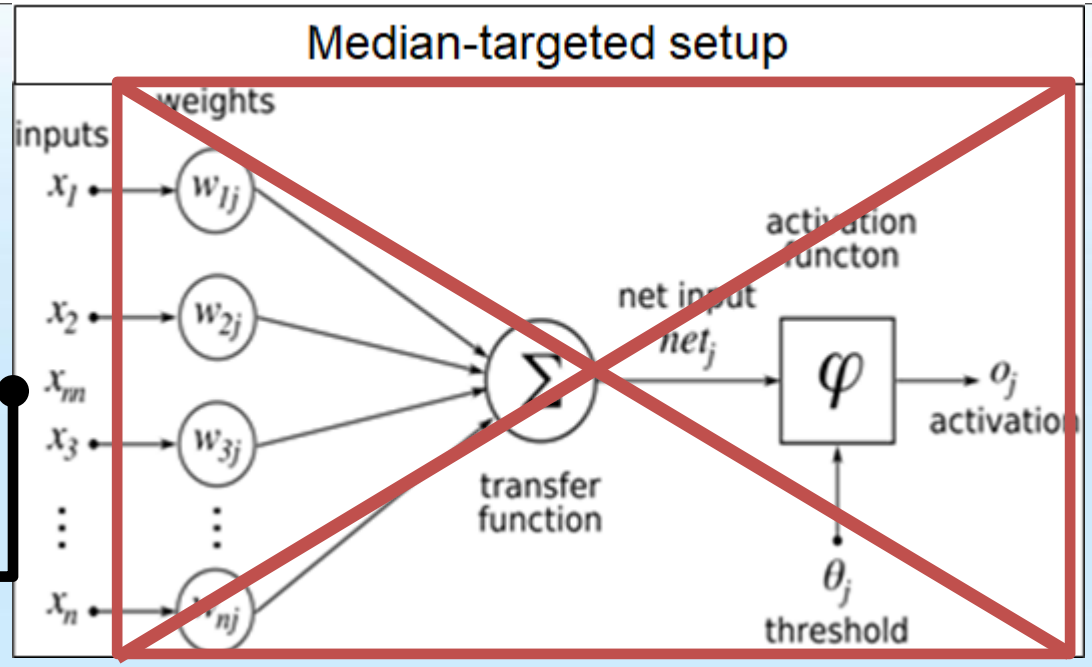
Model	Resolution	Grid size NxMxL	Forecast length [h]
ICON (DWD)	13	2949120 triangles	96
COSMO	7	415x460x40	96
COSMO	2.8	380x405x50	36

Mean vs. median (2011-2022)

Centrum Modelowania Meteorologicznego

Interesing remark from our forecasters/synopticians – what if take into account not (or – not only) EPS-mean, but also a median?

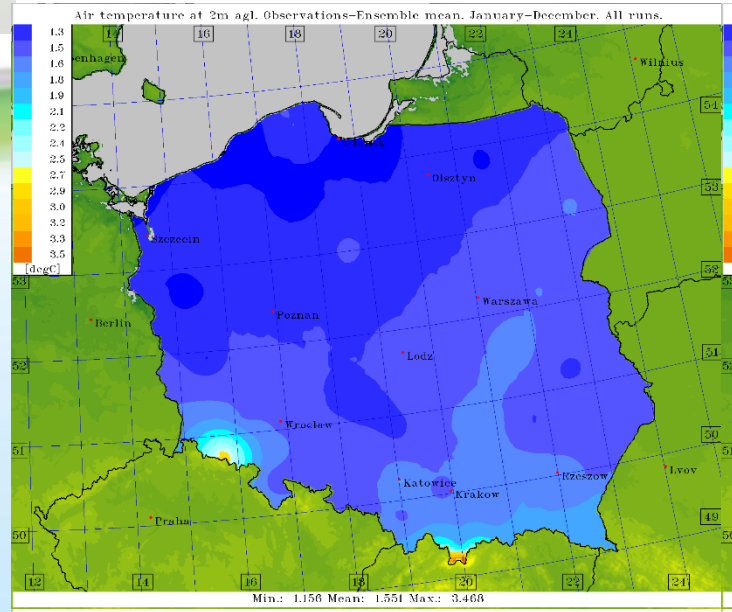


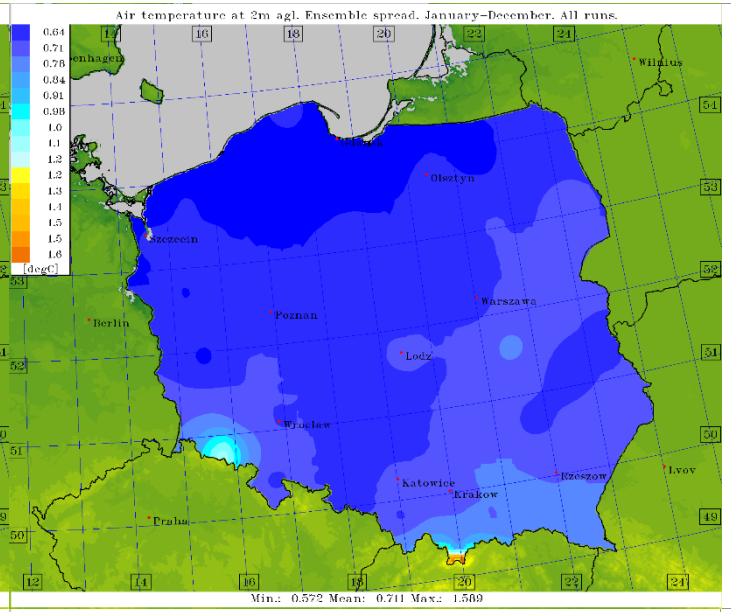


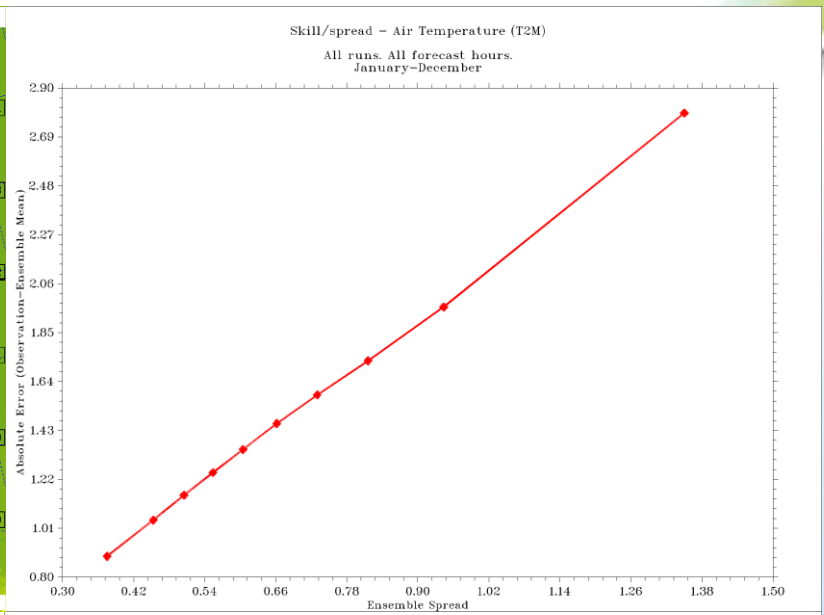
Final output

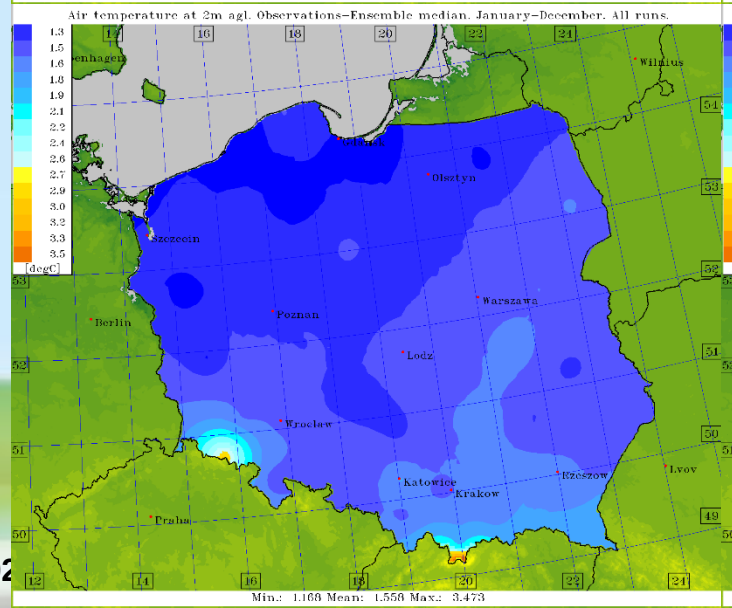
Dataset used for verification – measurements in Polish SYNOP stations, 2011-2020, hourly data.

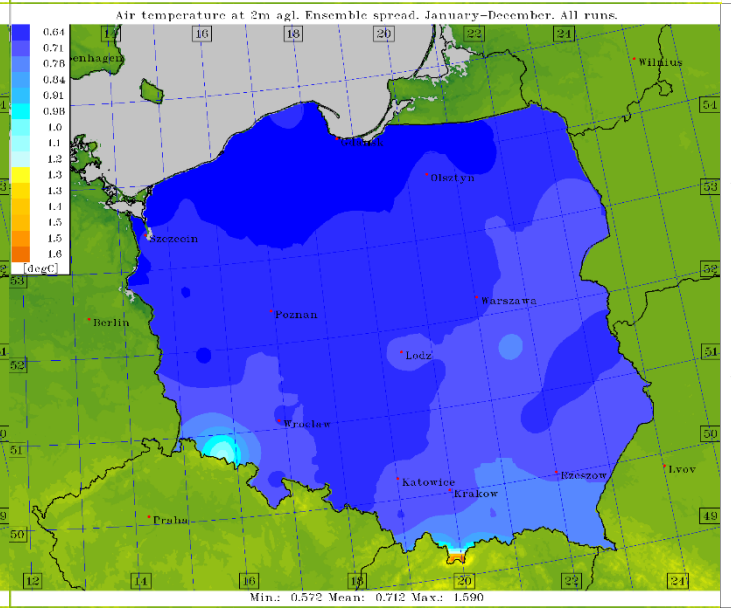
Mean vs. median – Air Temperature

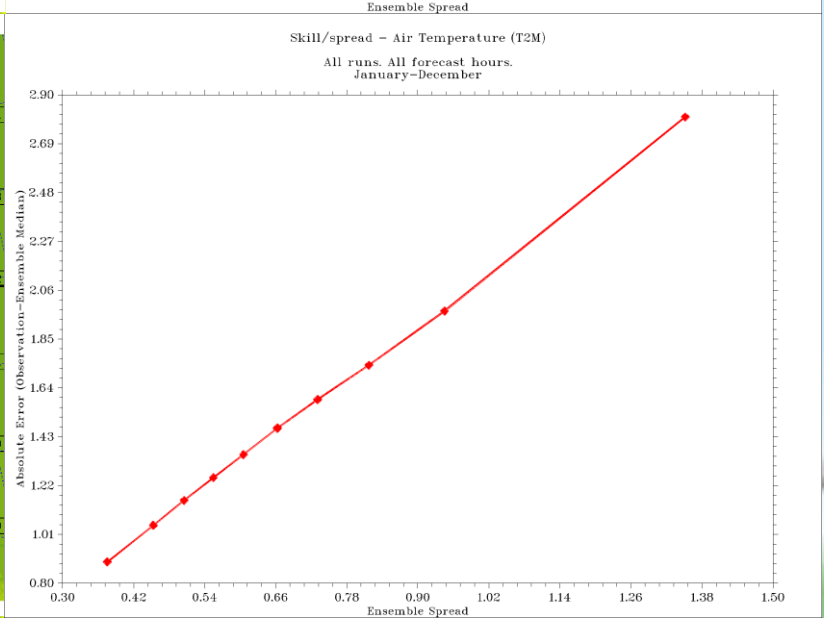




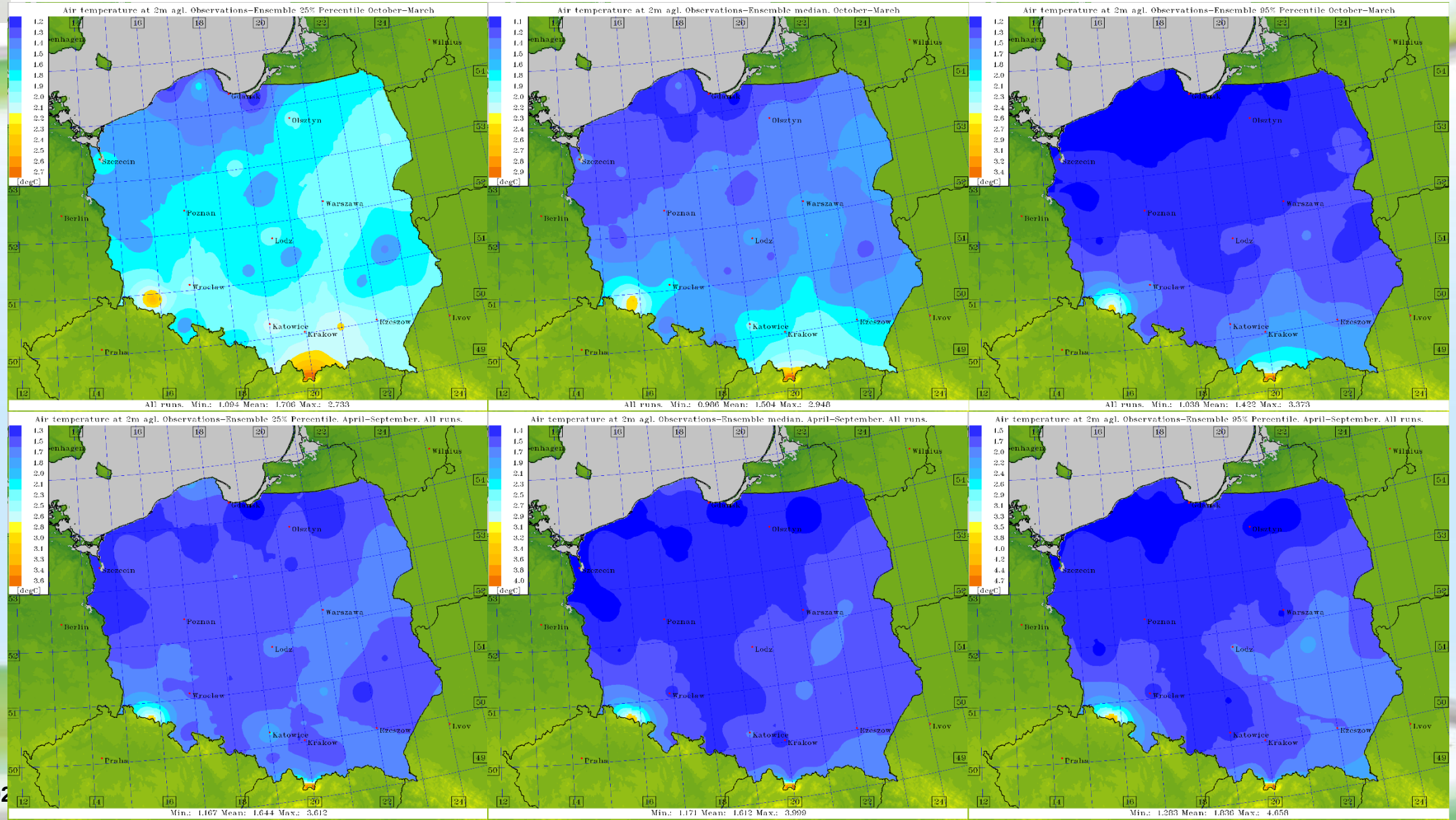




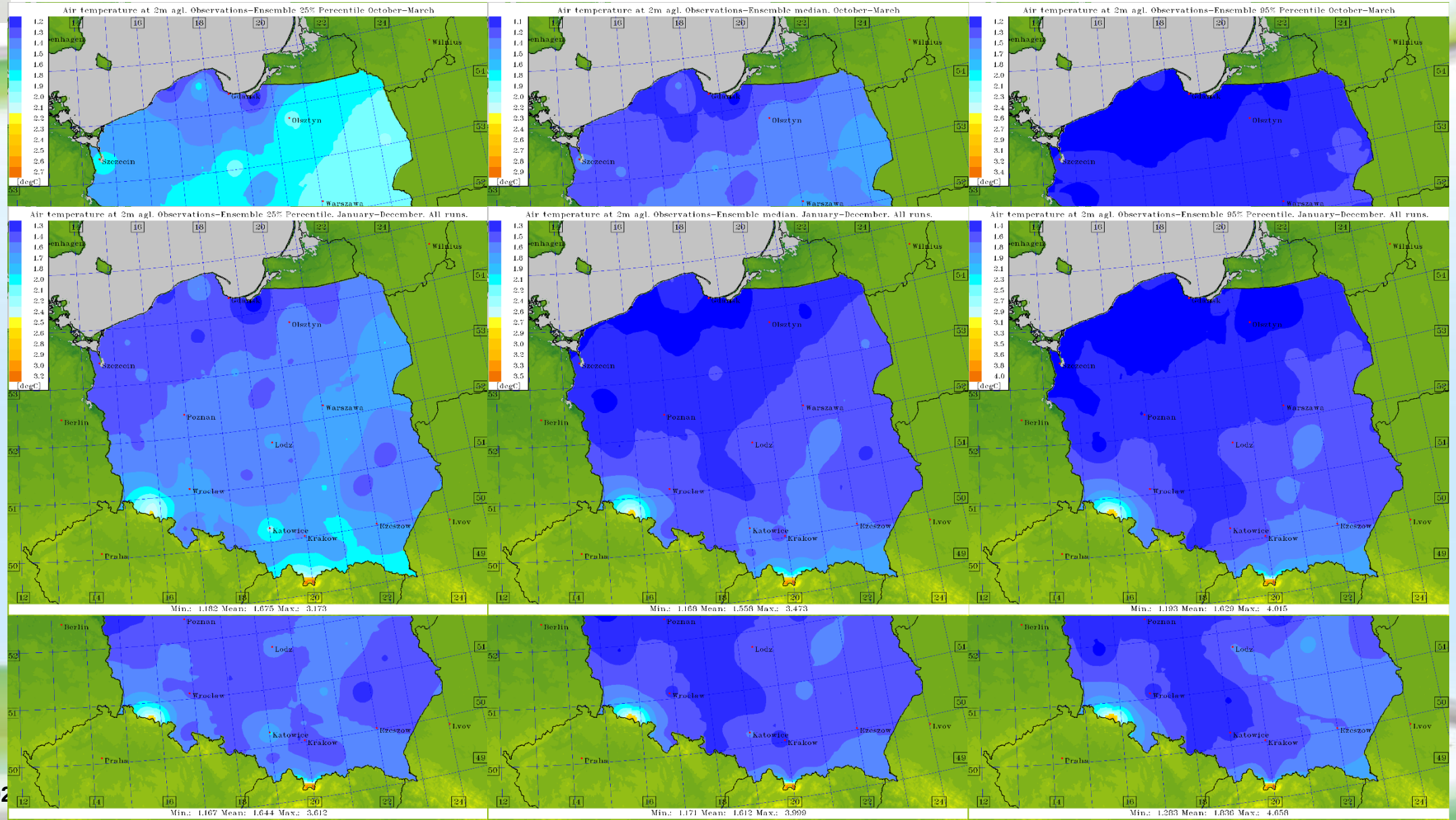




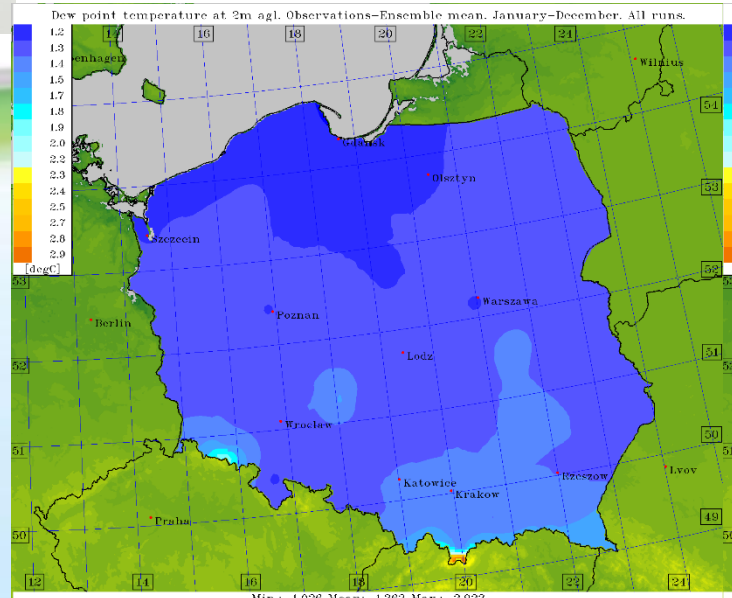
Mean vs. median vs. percentiles – Air Temperature

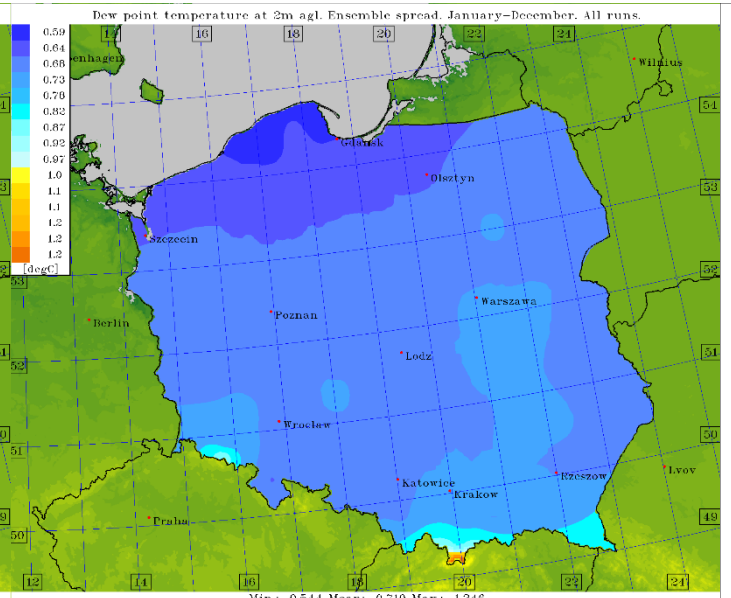


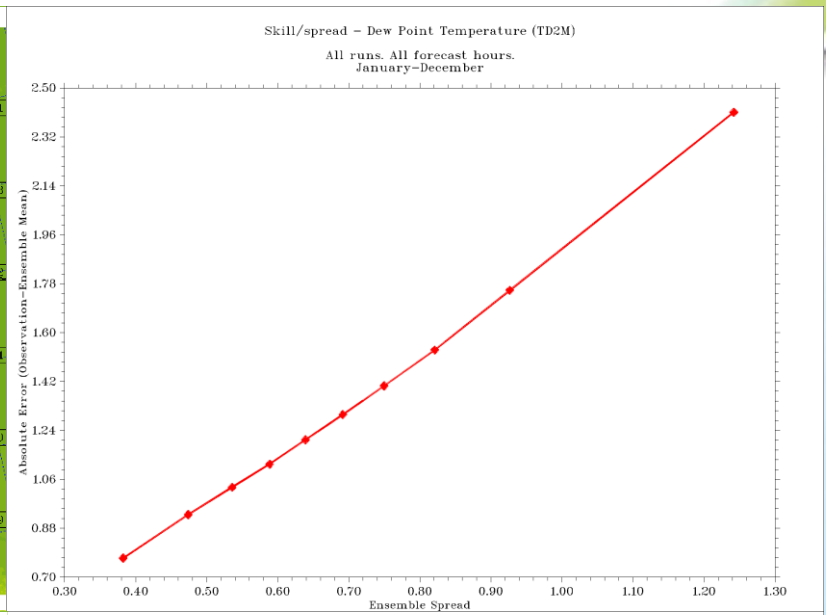
Mean vs. median vs. percentiles – Air Temperature

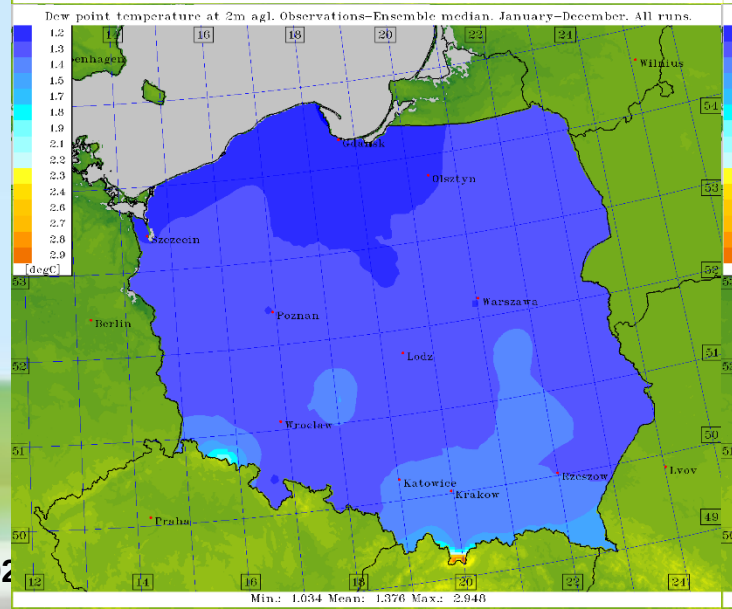


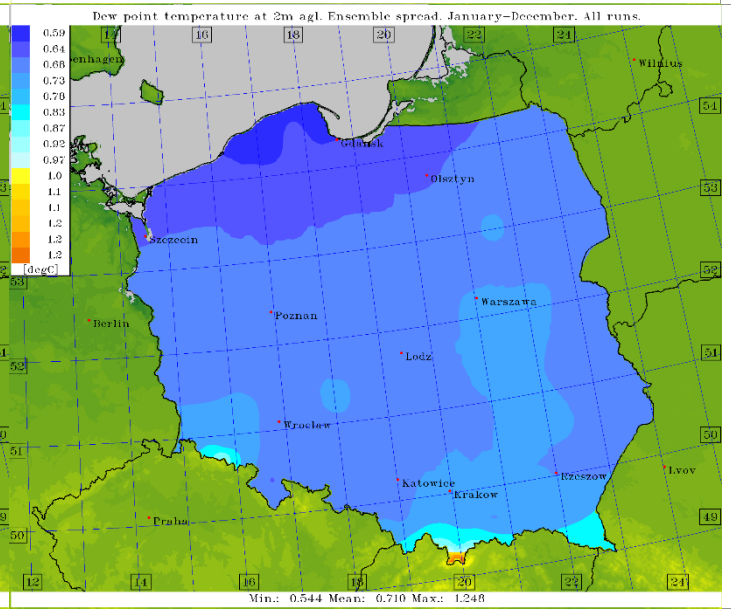
Mean vs. median – Dew Point Temperature

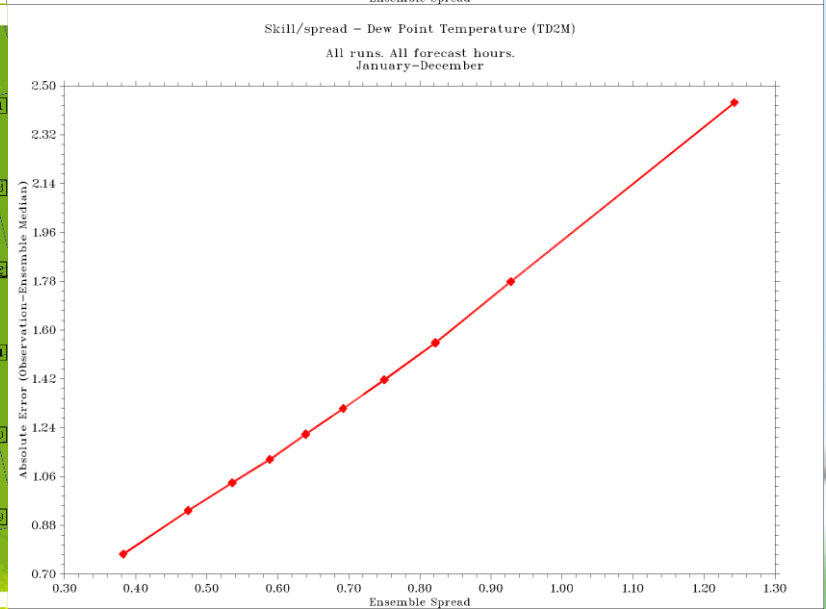




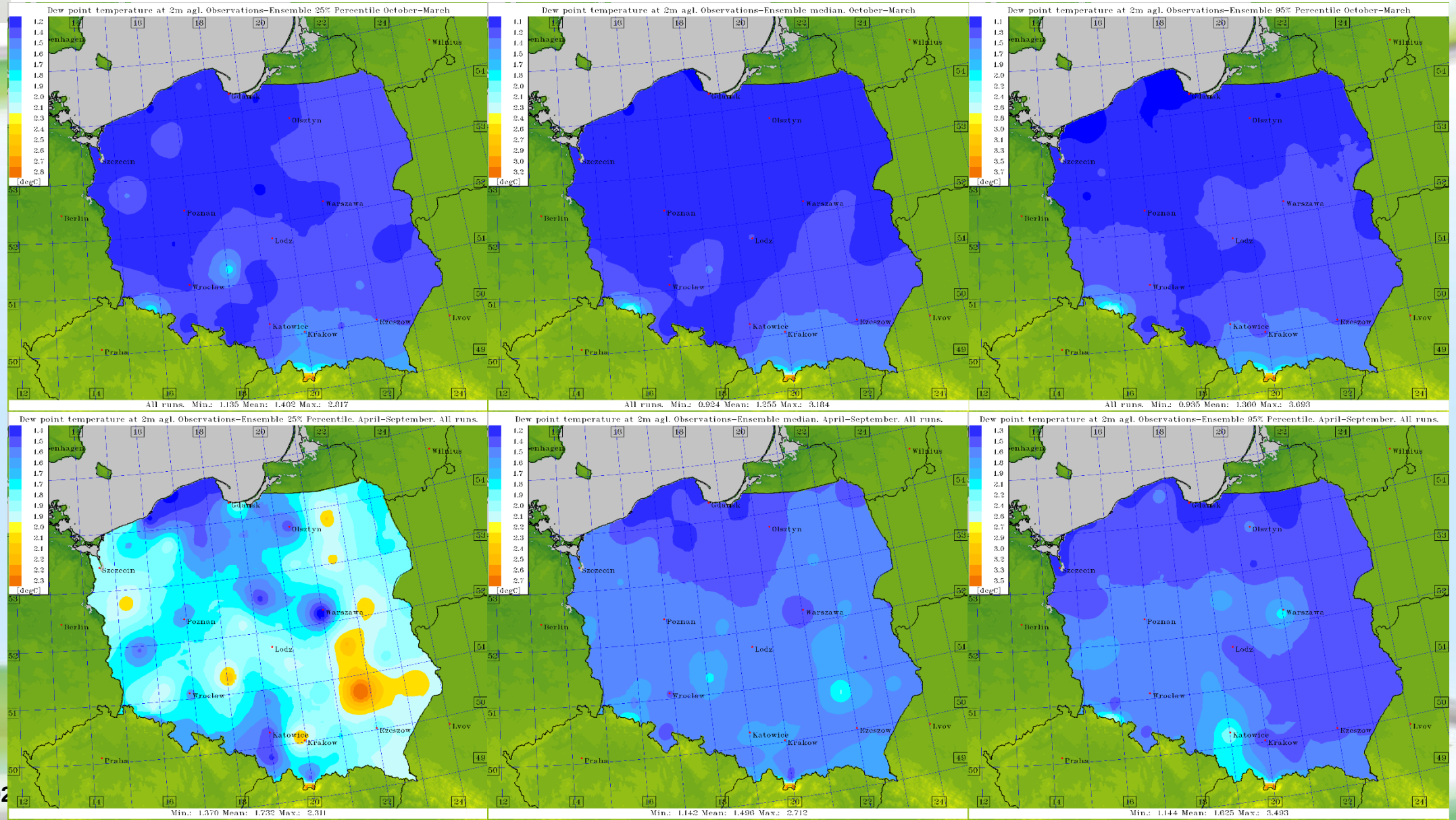




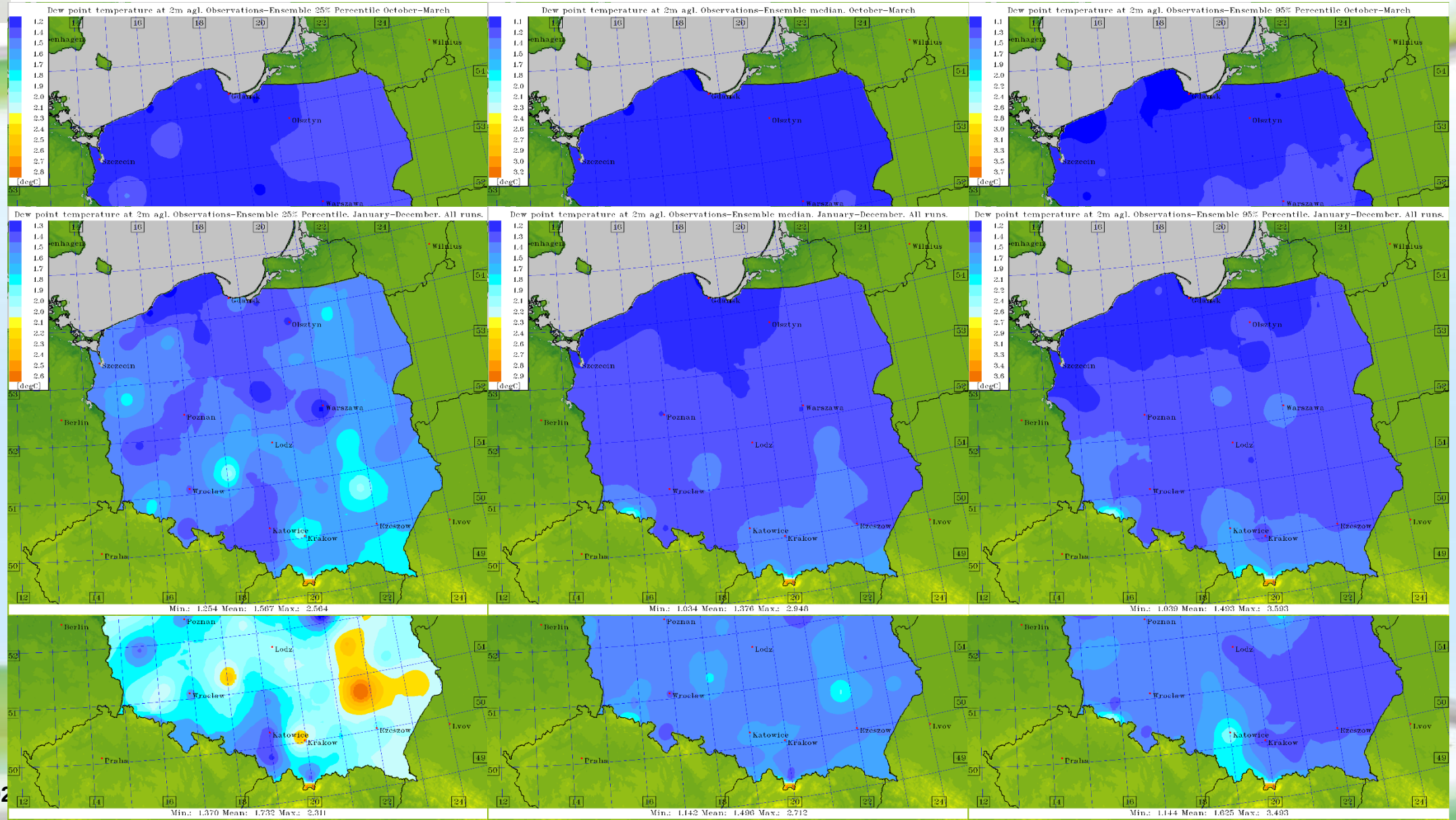




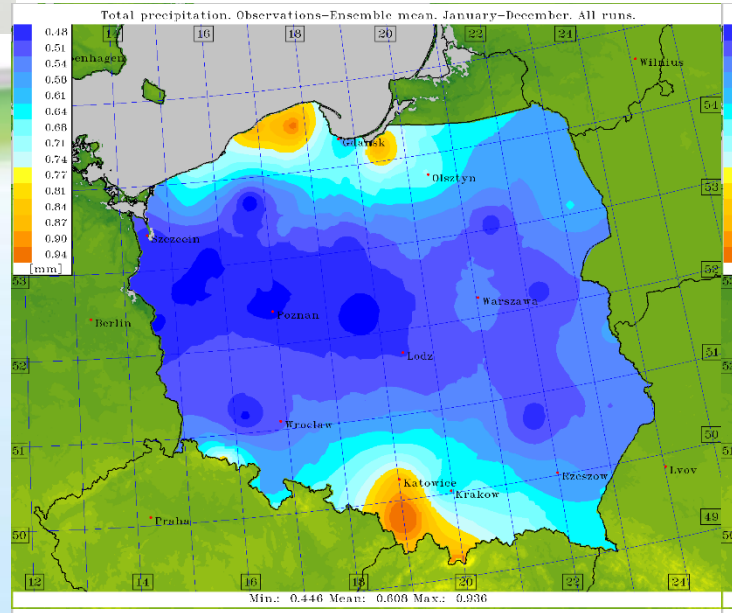
Mean vs. median vs. percentiles – Dew Point Temperature

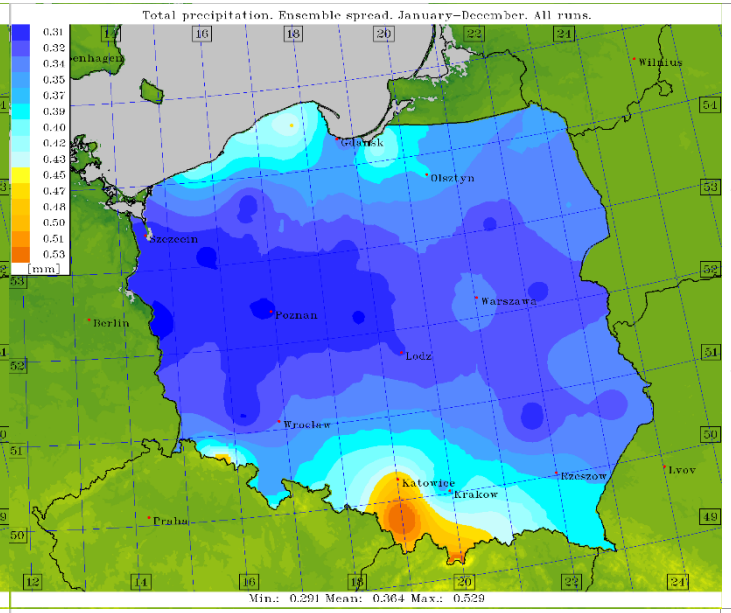


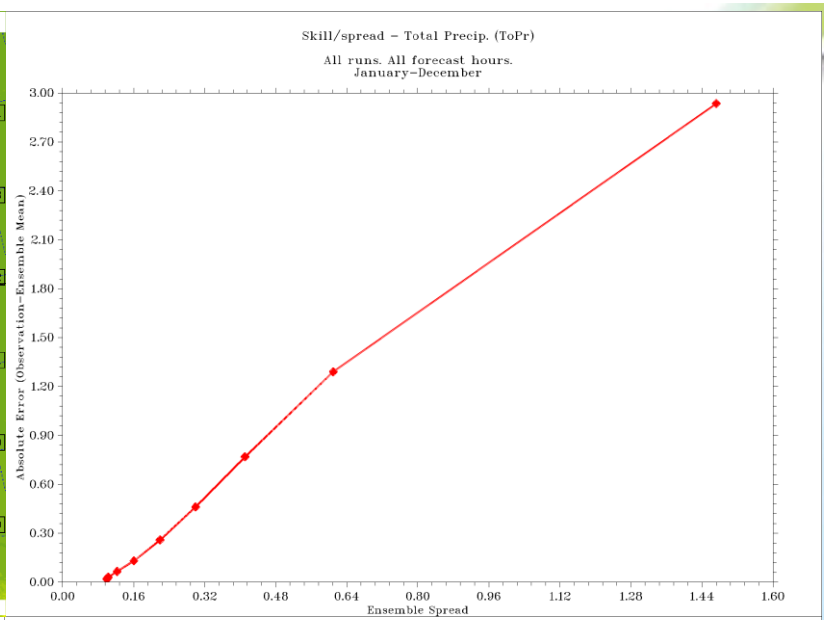
Mean vs. median vs. percentiles – Dew Point Temperature

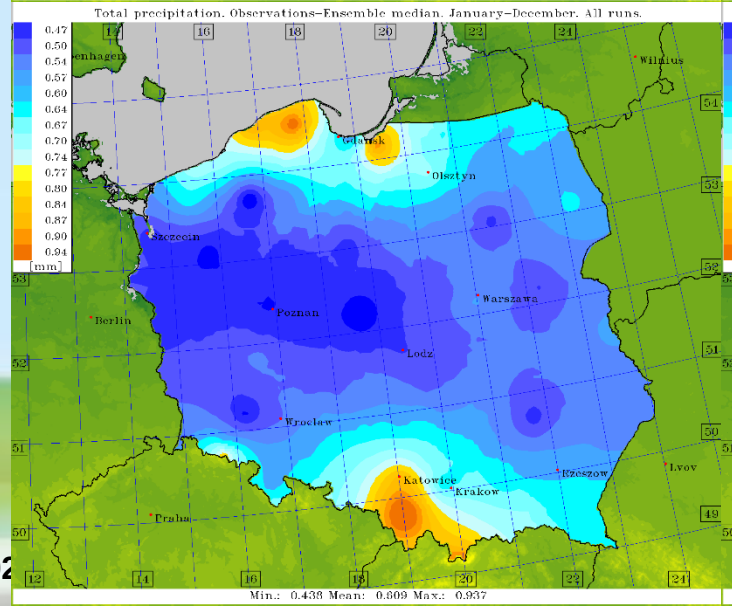


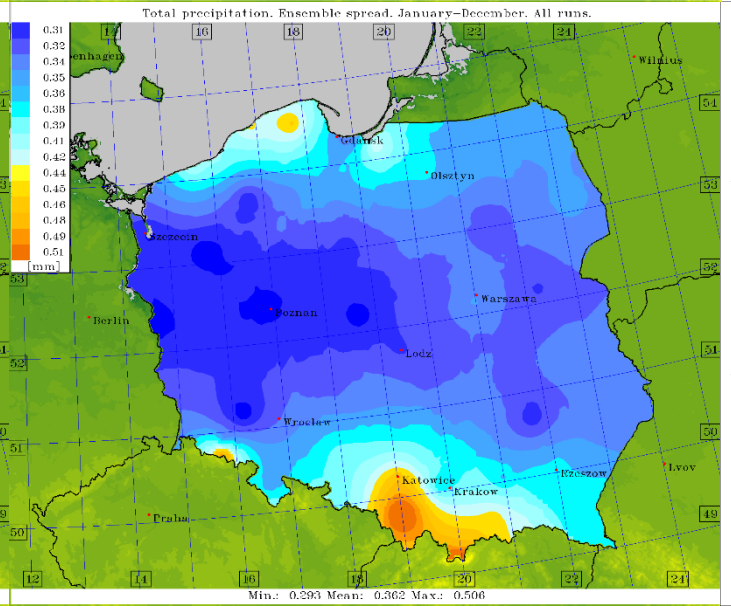
Mean vs. median – Total Precipitation

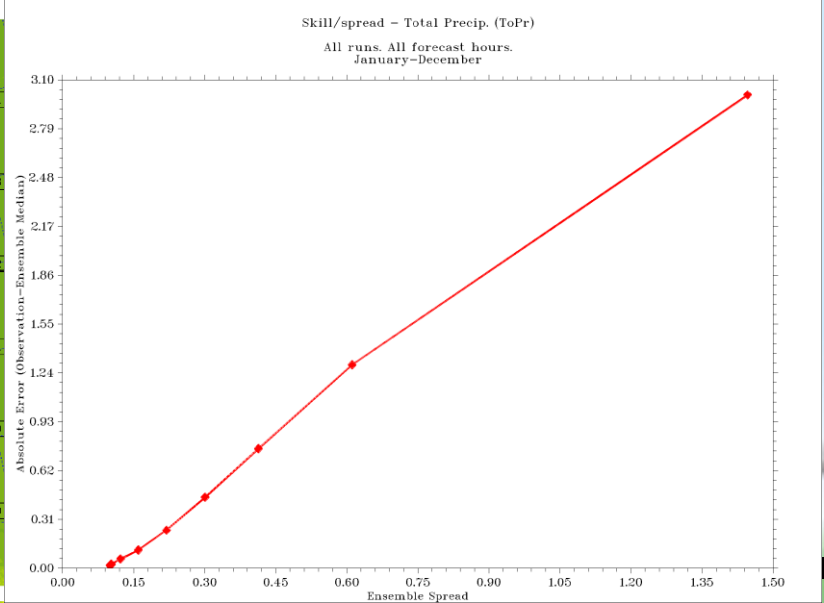




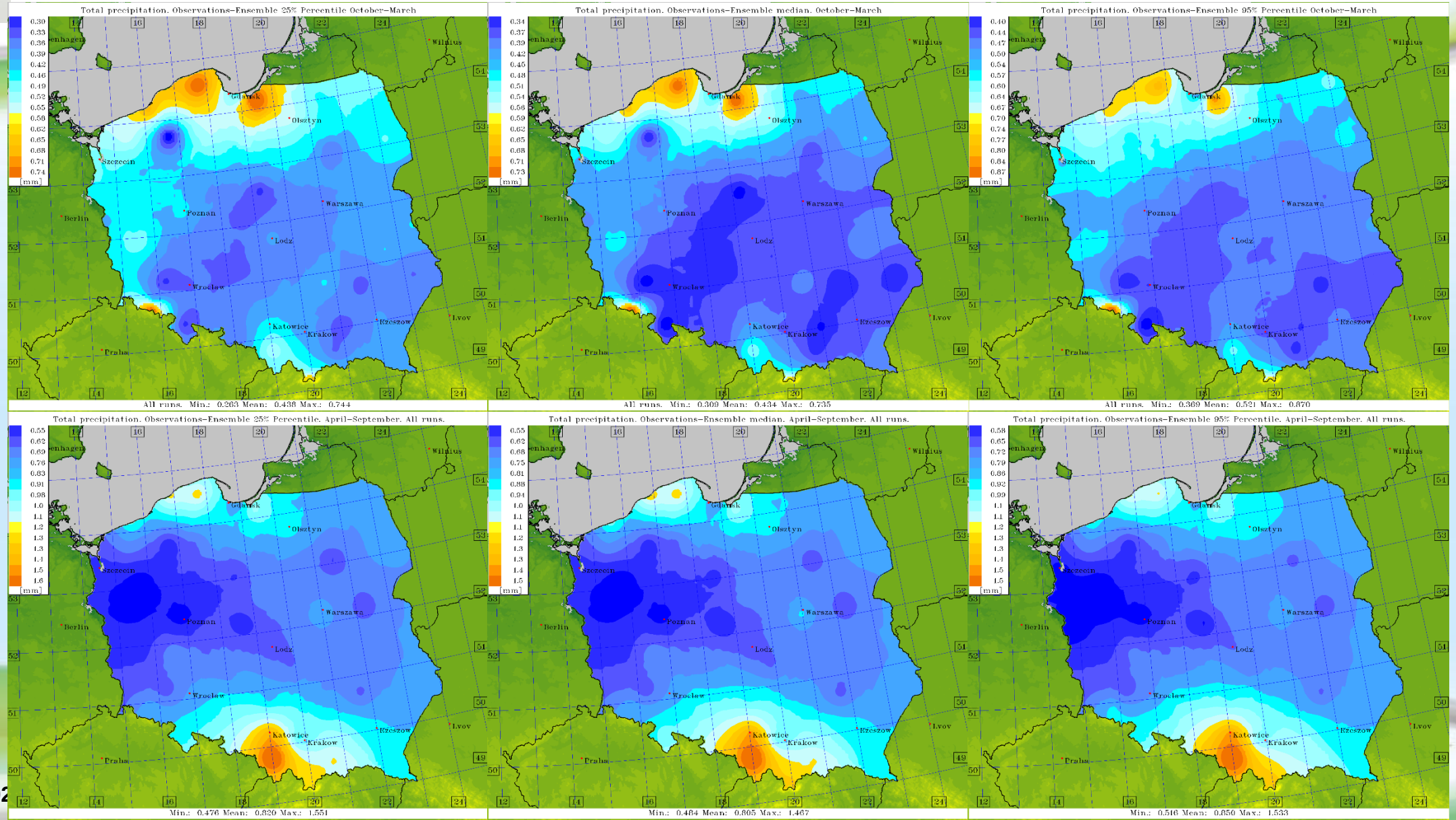




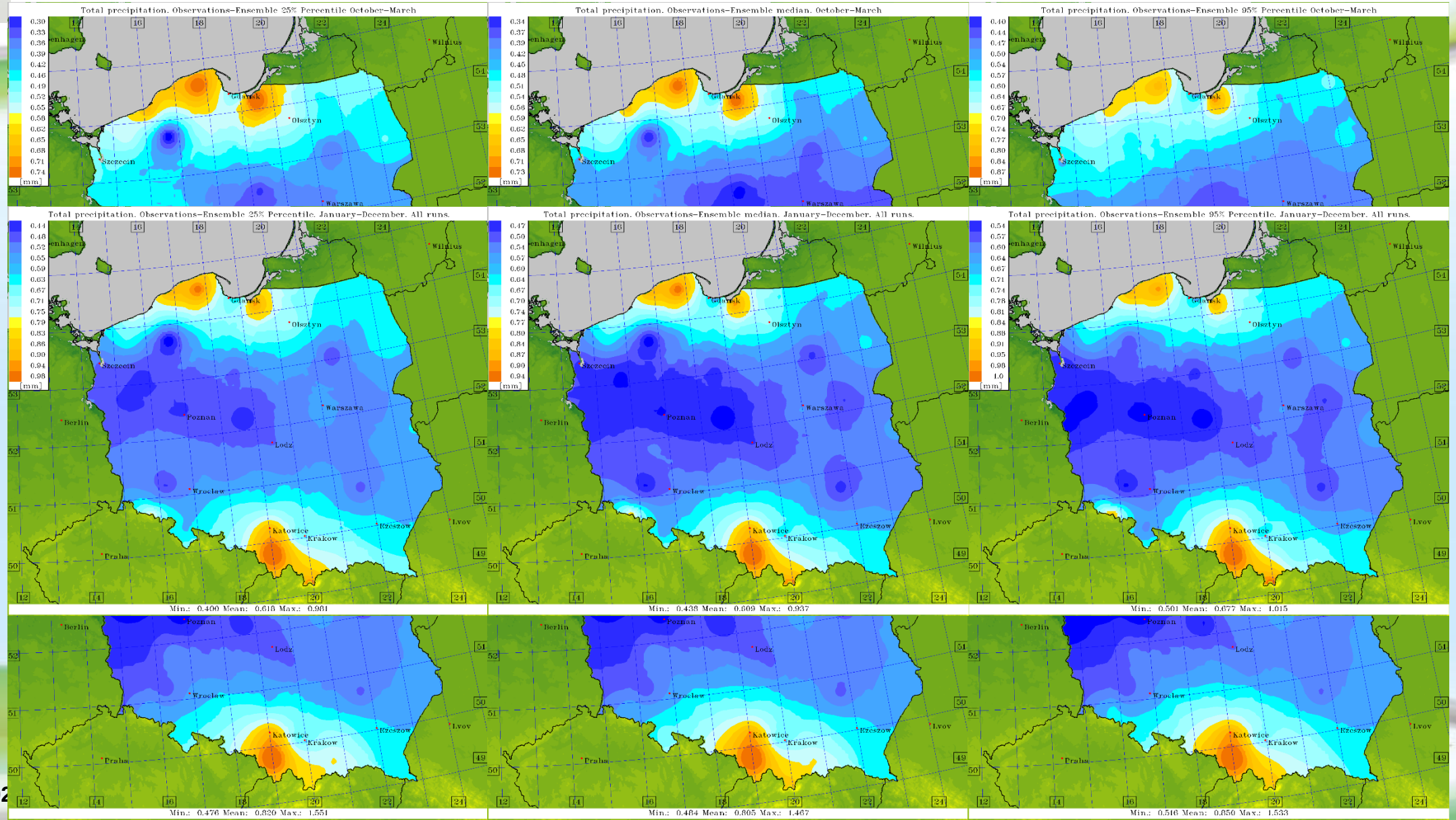




Mean vs. median vs. percentiles – Total Precipitation



Mean vs. median vs. percentiles – Total Precipitation



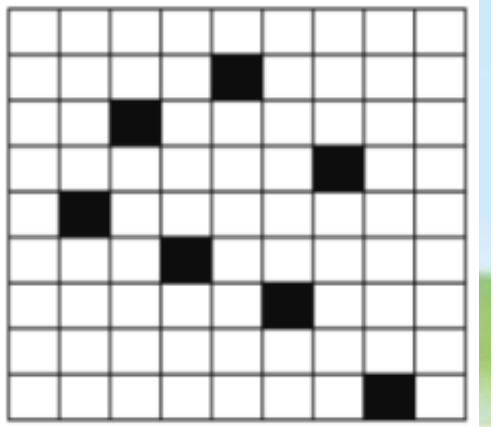
Mean vs. median – Total Precipitation (FSS)

Unlike the forecast of the spatial distribution of temperature, pressure or wind speed, the precipitation forecast is usually a discontinuous field. Hence, other methods should be (?) used for verification.

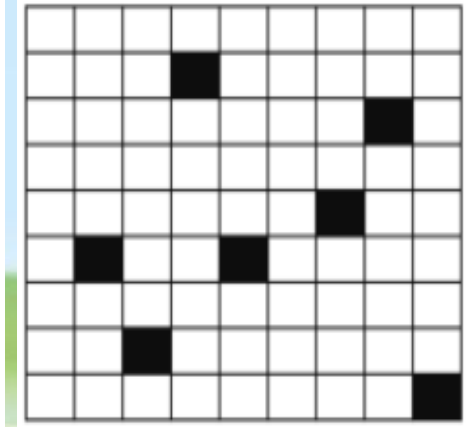
The fractions skill score (FSS), a neighborhood spatial verification method, compares the fractional coverage of events in windows surrounding the observations and forecasts.

Quoting the available literature, it is arguably one of the most popular spatial verification metrics in use today. To compute the score, the fraction of grid points exceeding a threshold within a forecast and observed field neighborhood are examined.

Observations



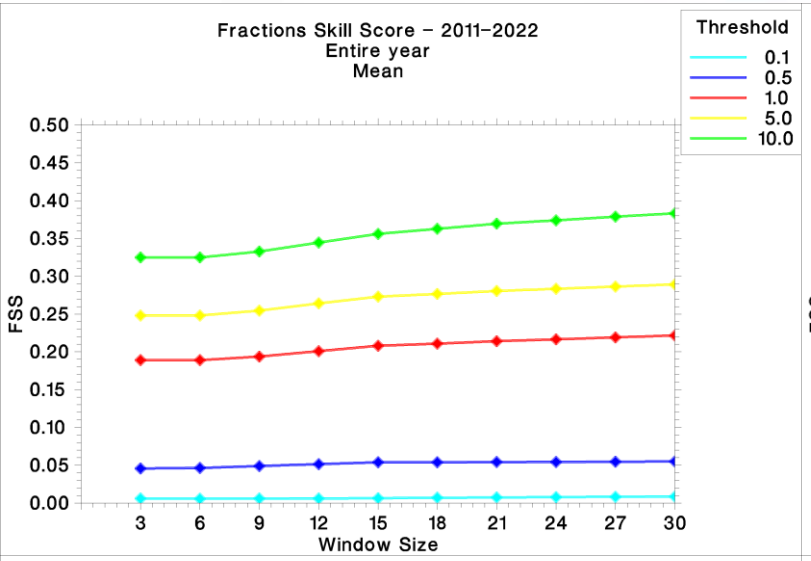
Forecasts

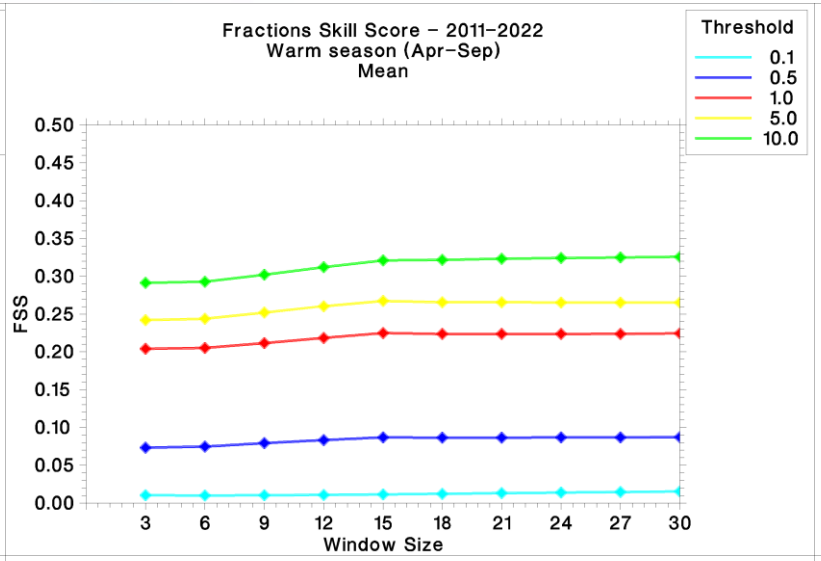


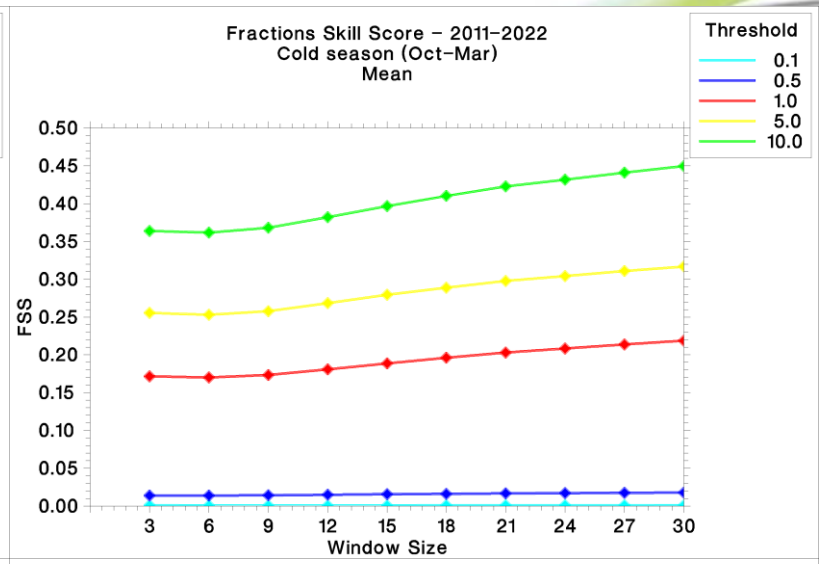
$$FSS = 1 - \frac{\frac{1}{N}\sum_{i=1}^{N}\left(p_f - p_o\right)^2}{\frac{1}{N}\sum_{i=1}^{N}p_f^2 + \frac{1}{N}\sum_{i=1}^{N}p_o^2}$$

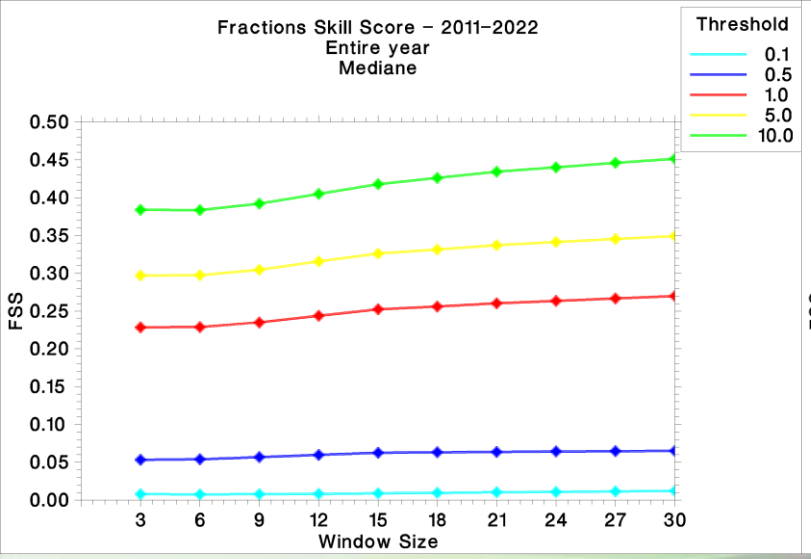
N is the number of windows in the domain, pf is the forecast fraction, po is the observed fraction of the sliding window

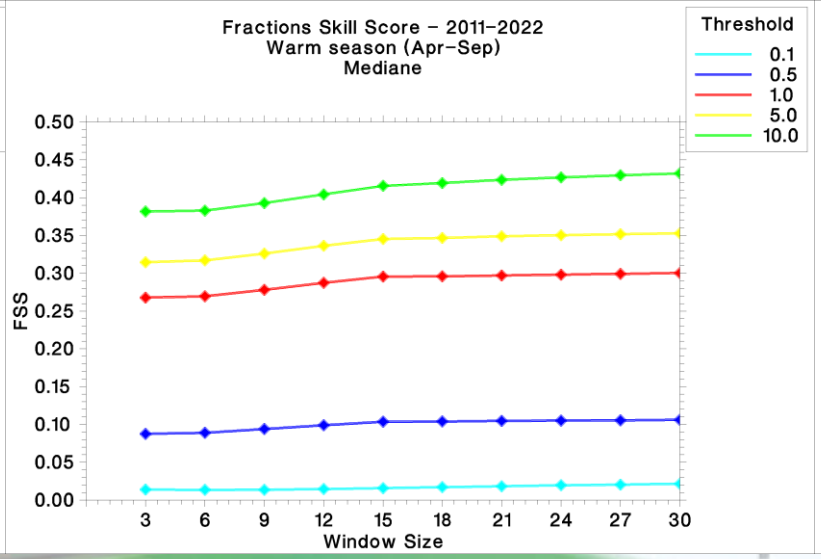
Mean vs. median – Total Precipitation (FSS)



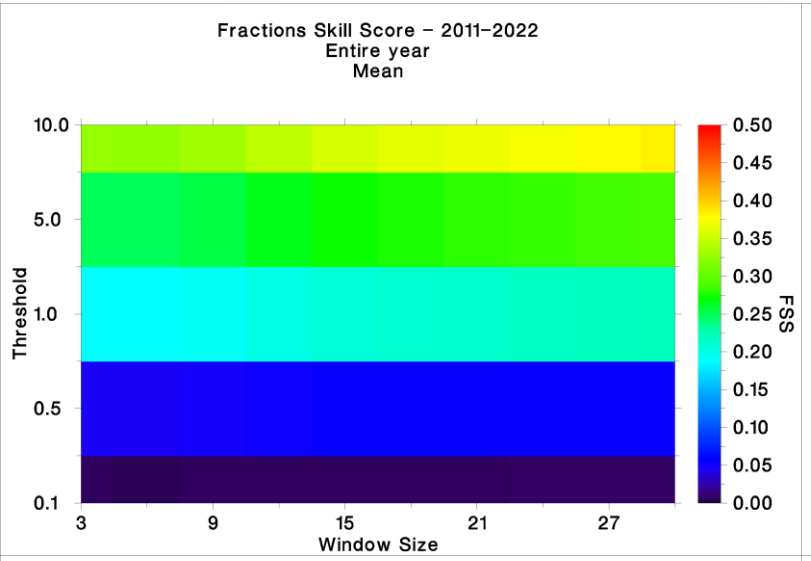


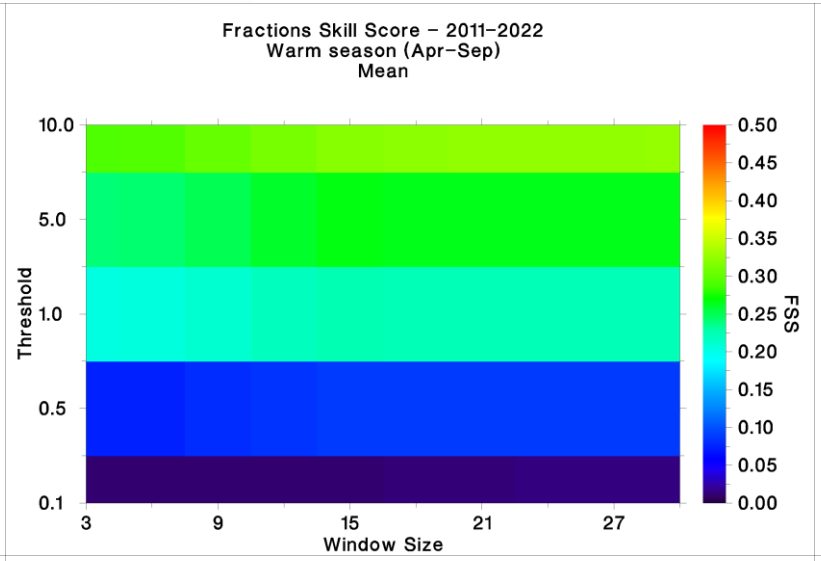


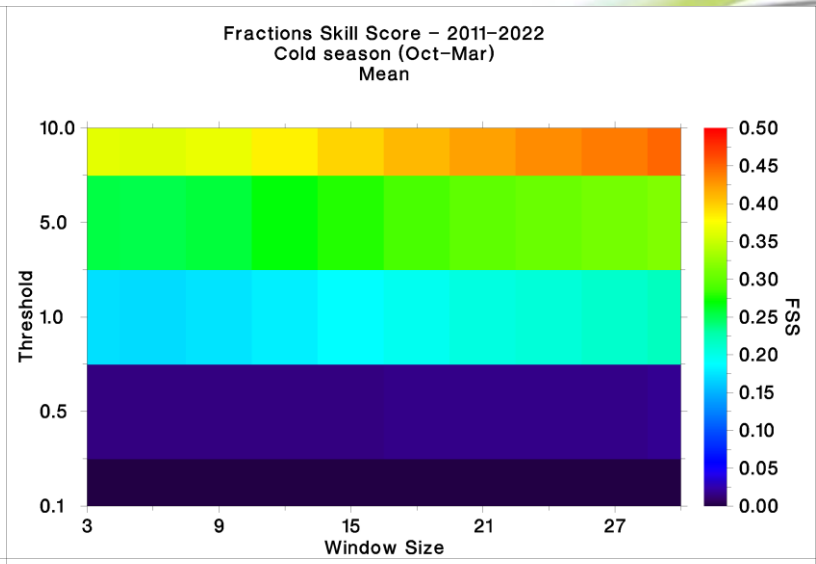


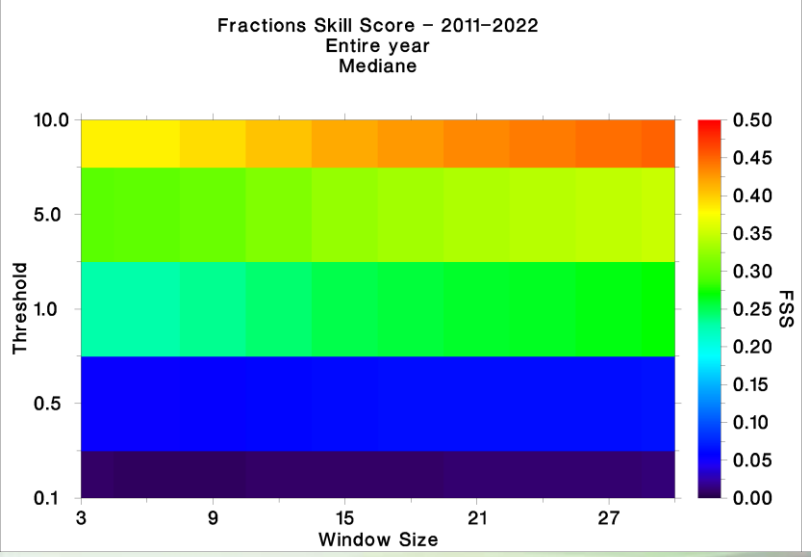


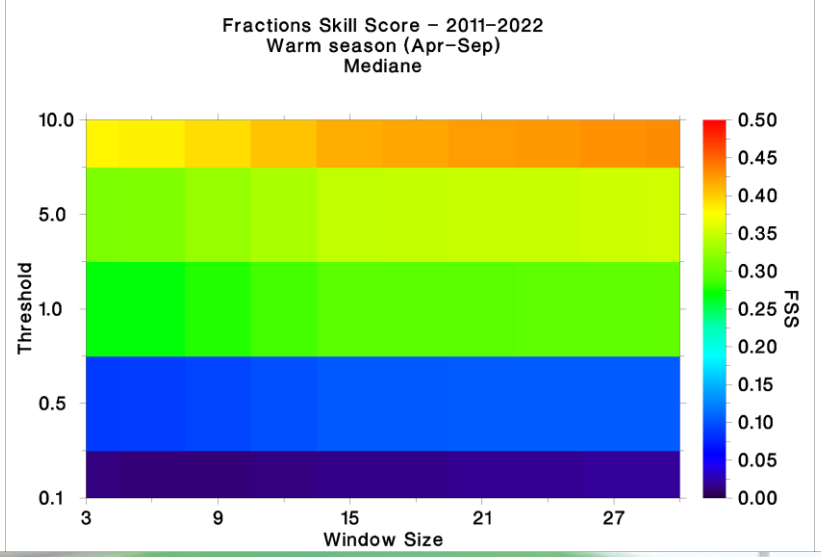
Mean vs. median – Total Precipitation (FSS)

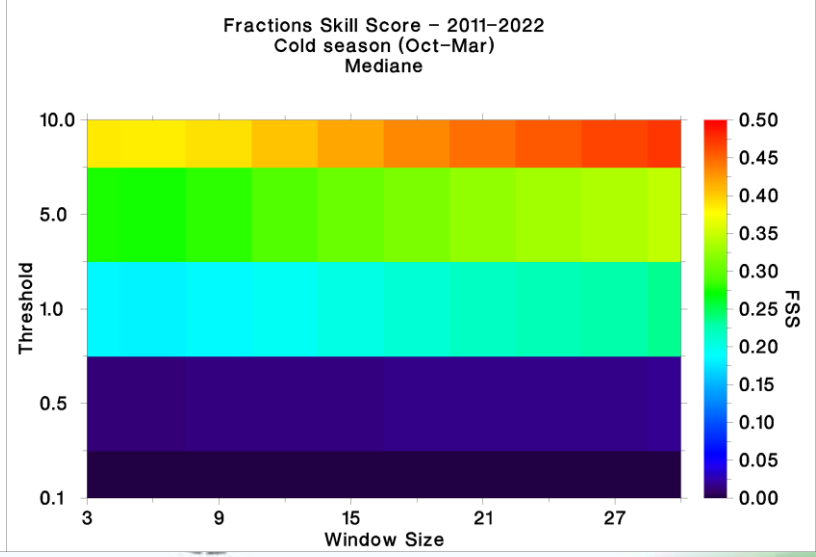




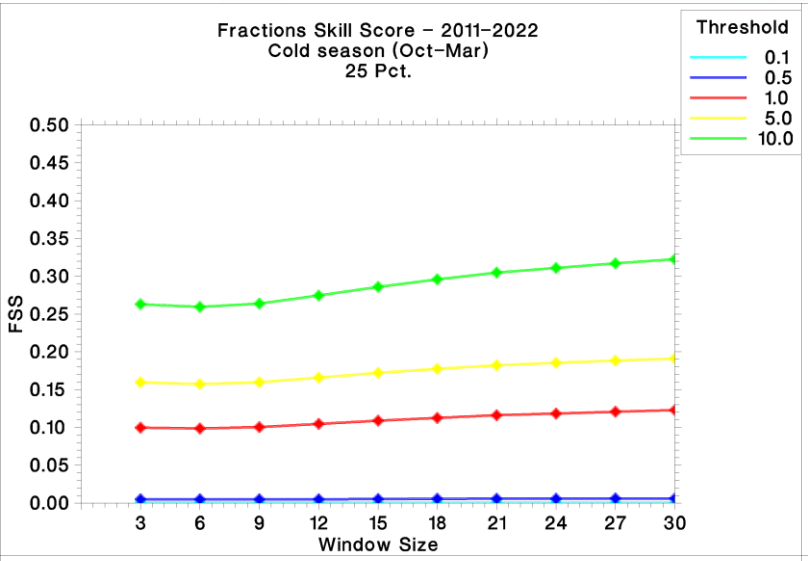


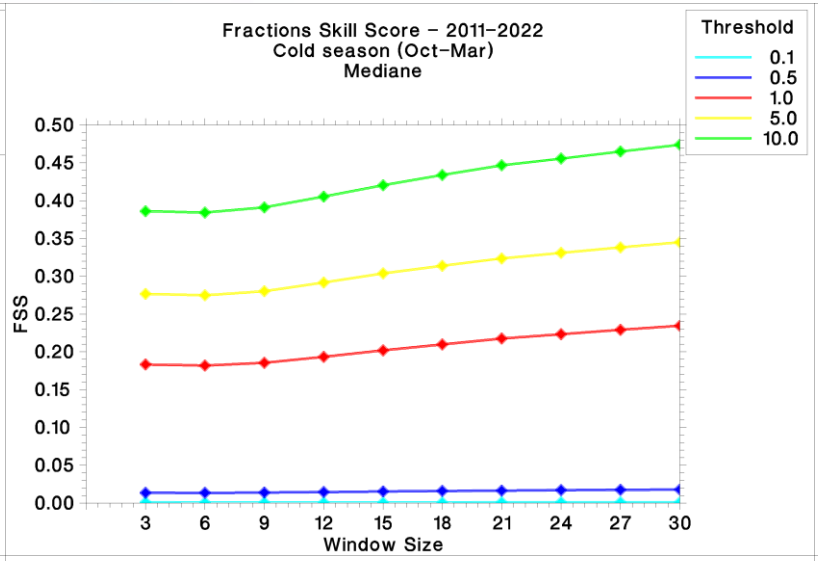


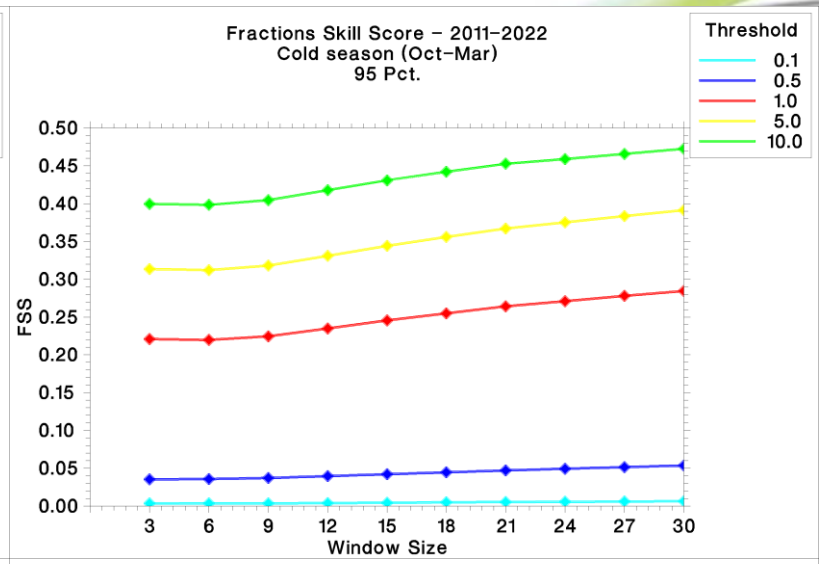


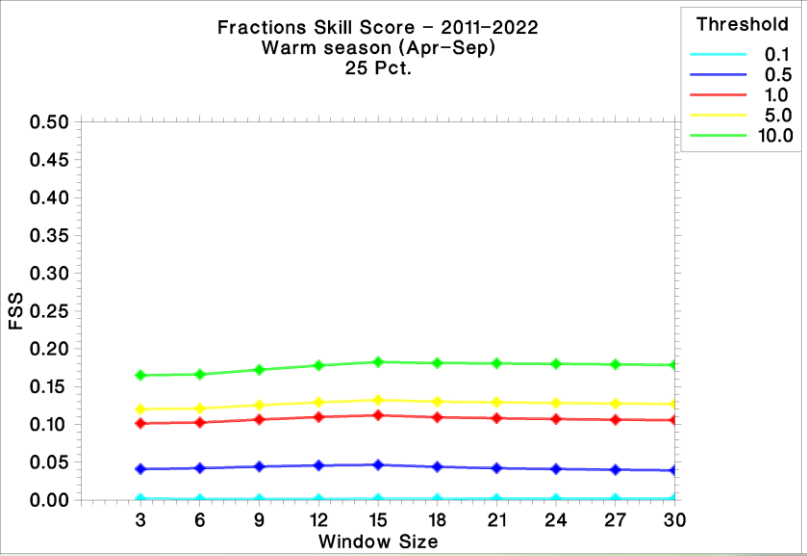


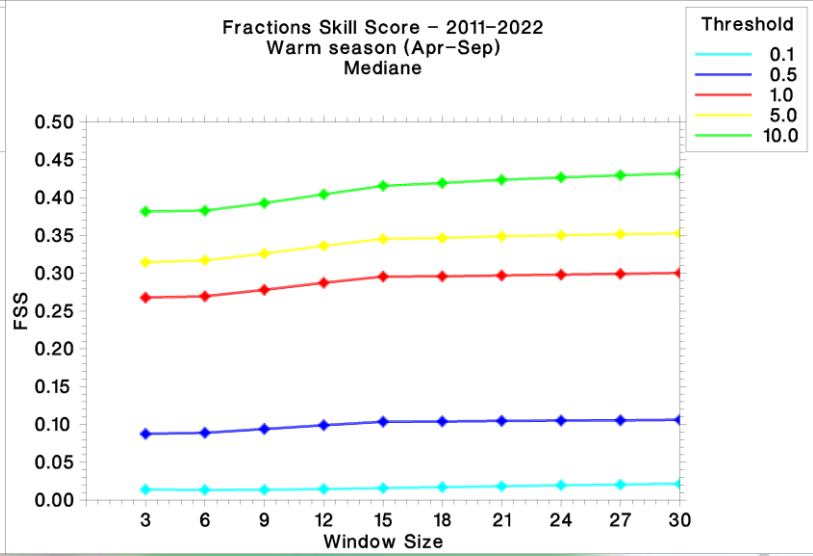
Mean vs. median vs. Percentiles – Total Precipitation (FSS)

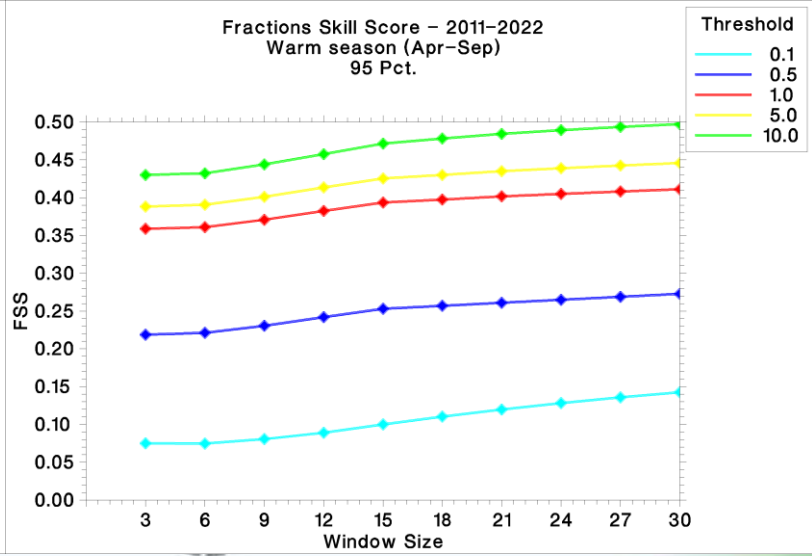




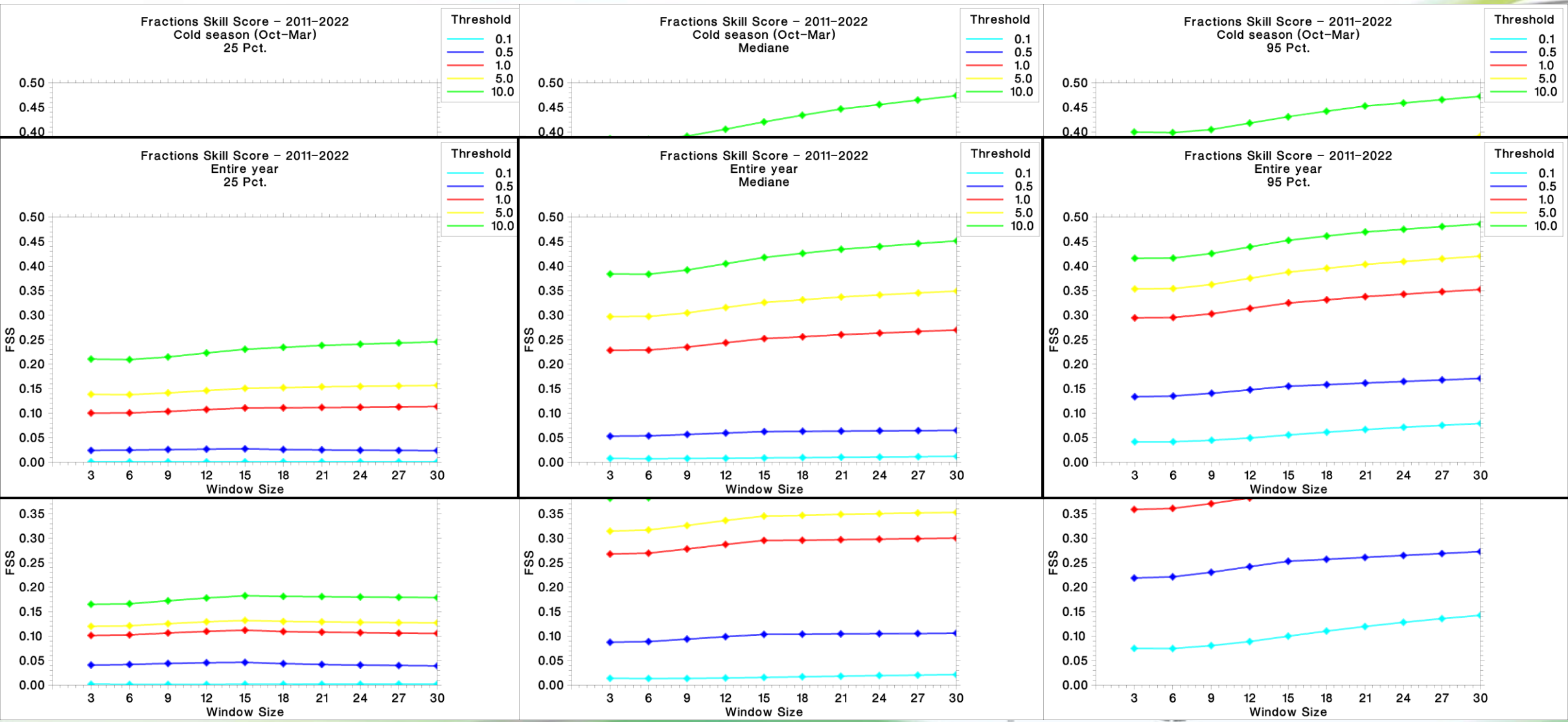




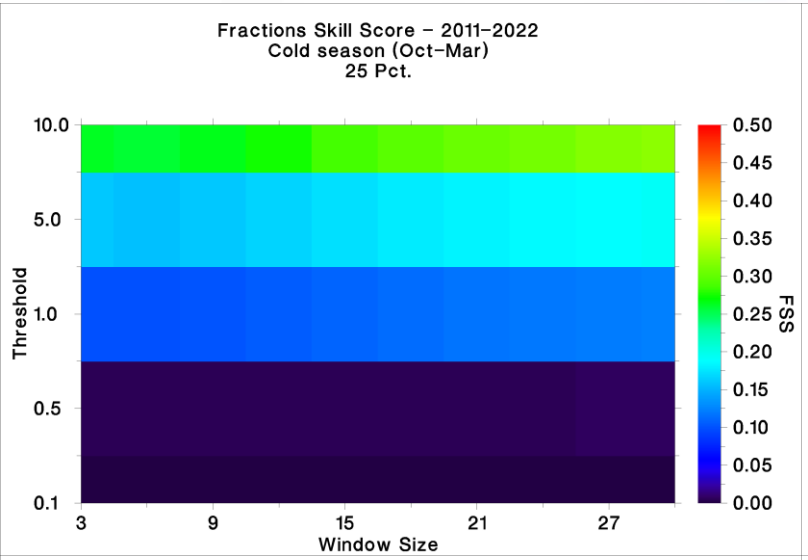


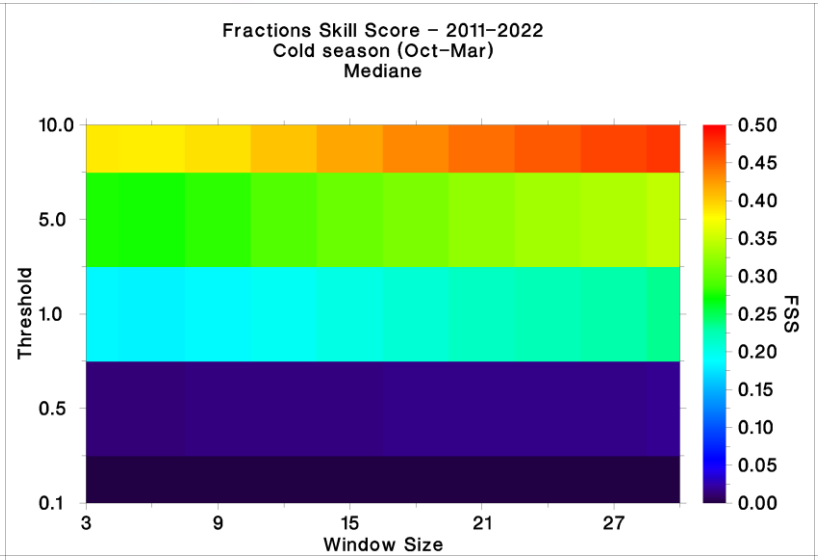


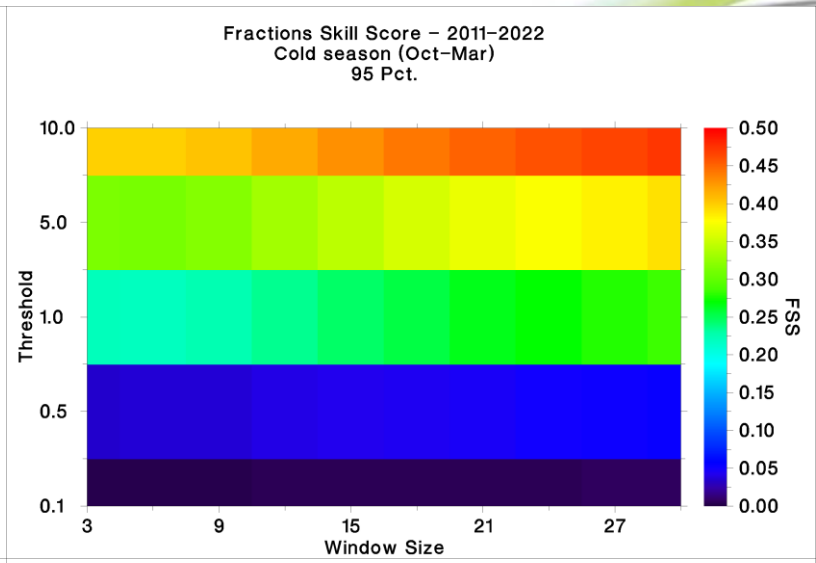
Mean vs. median vs. Percentiles – Total Precipitation (FSS)

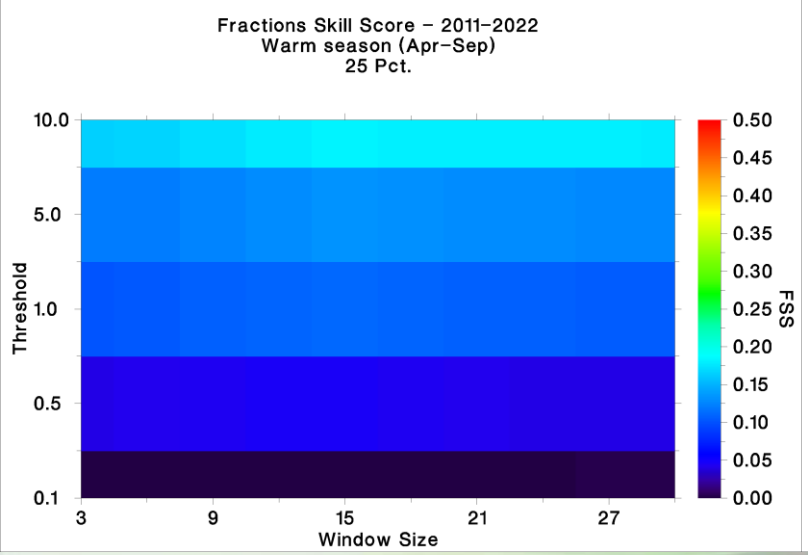


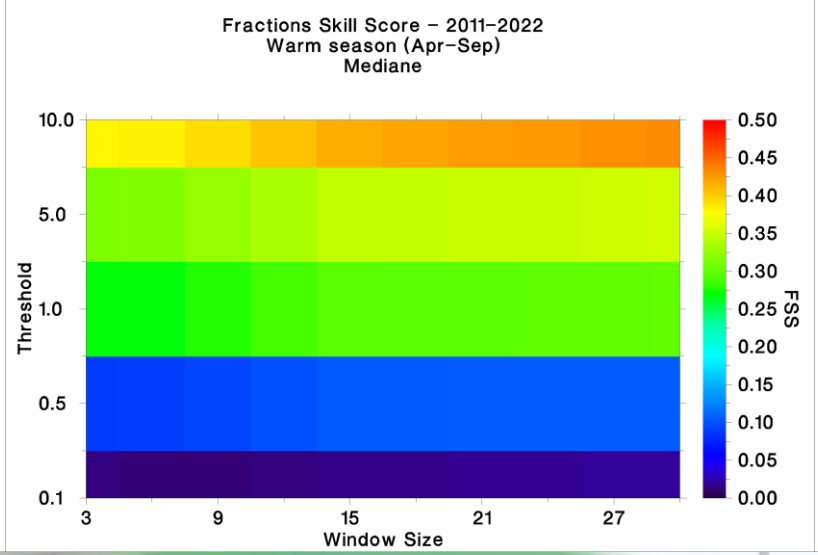
Mean vs. median vs. Percentiles – Total Precipitation (FSS)

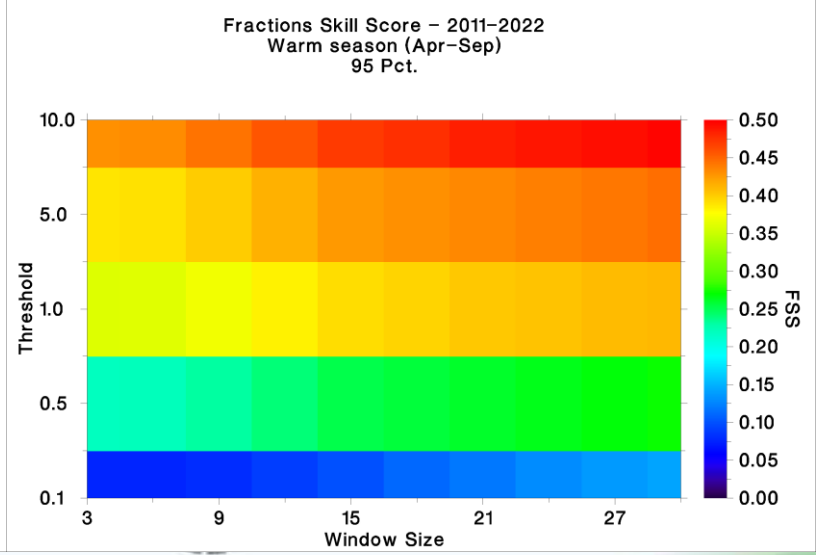




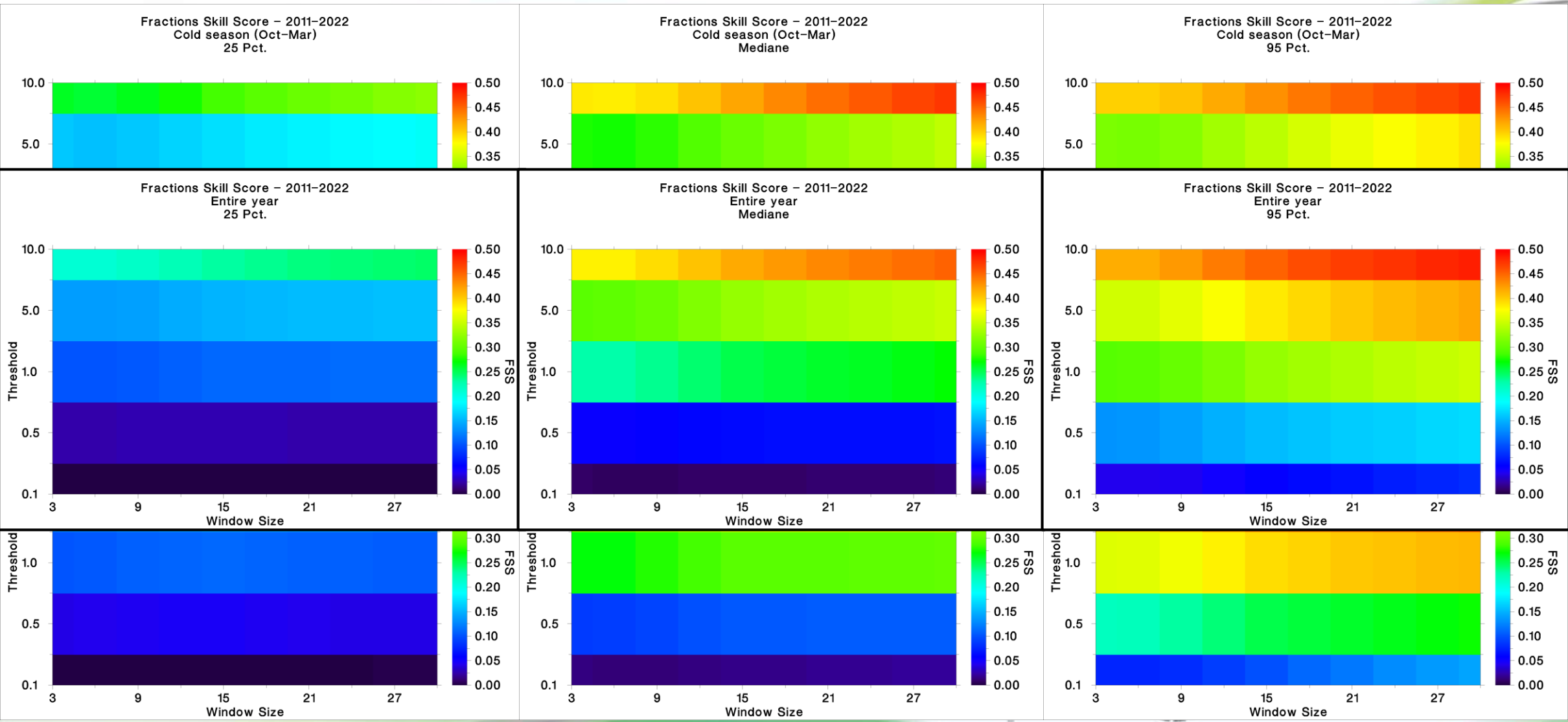








Mean vs. median vs. Percentiles – Total Precipitation (FSS)



Conclusions

Dataset used for verification – measurements in Polish SYNOP stations, 2011-2020, hourly data.

1. Preliminary studies have been conducted on the issue of mean vs. median. With the exception of precipitation (and use of FSS statistics), the differences are not very significant. Further work was carried out using ensemble percentiles.
2. AFA continuous elements (temp., dew point…) are concerned, other percentiles do not improve results. While the 25th percentile is only slightly worse than the median, the results using higher percentiles are much worse.
3. The situation is significantly different when considering the results for precipitation using FSS. Here – the higher the percentile, the better FSS.