Evaluation of the Nowcasting and very short-range prediction system of the National Meteorological Service of Cuba

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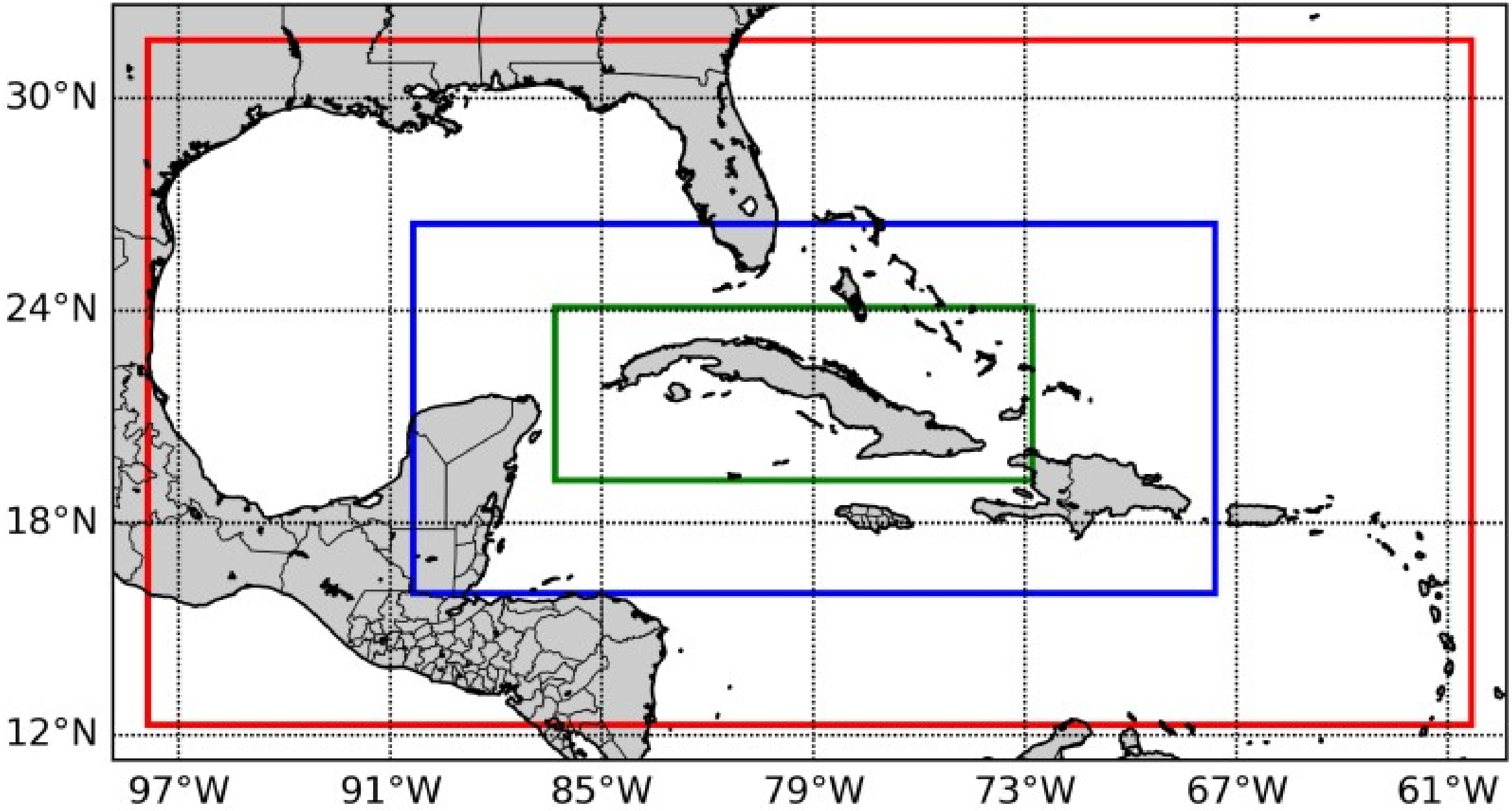
The **the Nowcasting and very short-range prediction system (SisPI**, by the acronyms in spanish) is based on the numerical forecast model Weather Research & Forecast (WRF) with the dynamic core **ARW**.

The initialization is based on Global Forecast System (GFS) data of 0.5 degrees of spatial resolution.

Parameters	Settings
Spatial resolution	Three nested domains of 27, 9, 3 km
Nx	145, 262, 469
Ny	82, 130, 184
Vertical Levels	28, 28, 28
Domain Center	21.8 N and -79.74 W
Integration Time Step	150 s
Microphysics	WSM5,WSM5, double moment Morrison
Cumulus	Grell-Freitas, Grell-Freitas, Not activated
PBL	Mellor-Yamada-Janjic, Mellor-Yamada-Janjic, Mellor-Yamada-Janjic

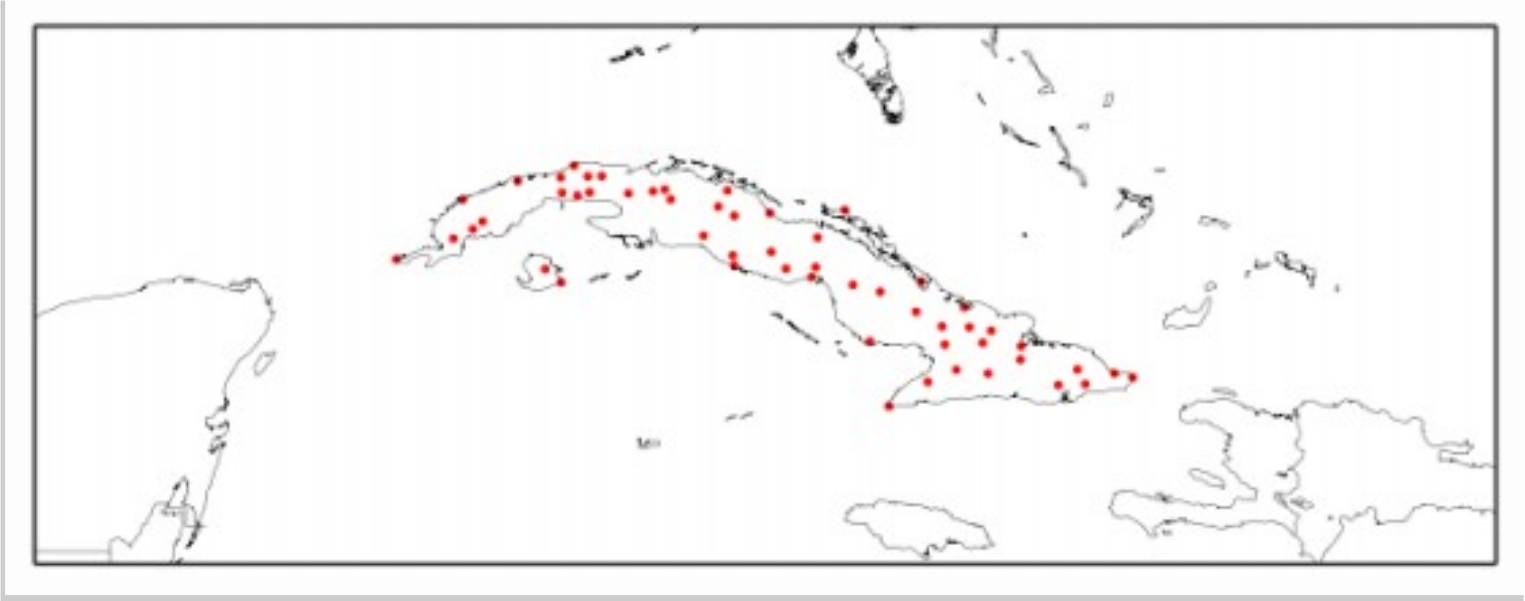


Simulation domains

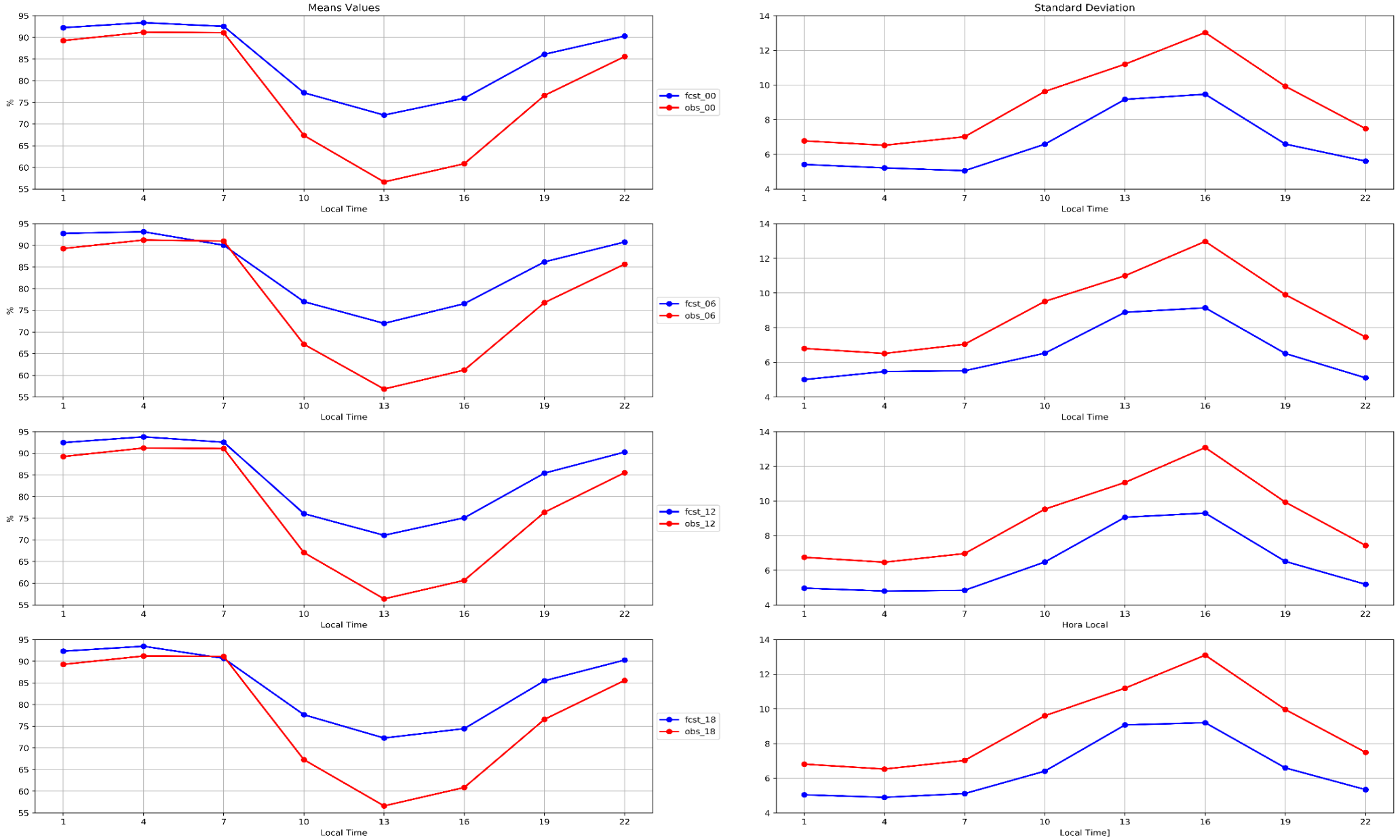
In this study the domain of 3km of SisPI is evaluated. For this, the data from the network of meteorological stations in Cuba corresponding to the year 2019 were taken.

The cell-point evaluation methodology was employed, interpolating the data from the SisPI output to the coordinates of the stations with the nearest neighbor for precipitation, and linear interpolation for the rest of the variables.

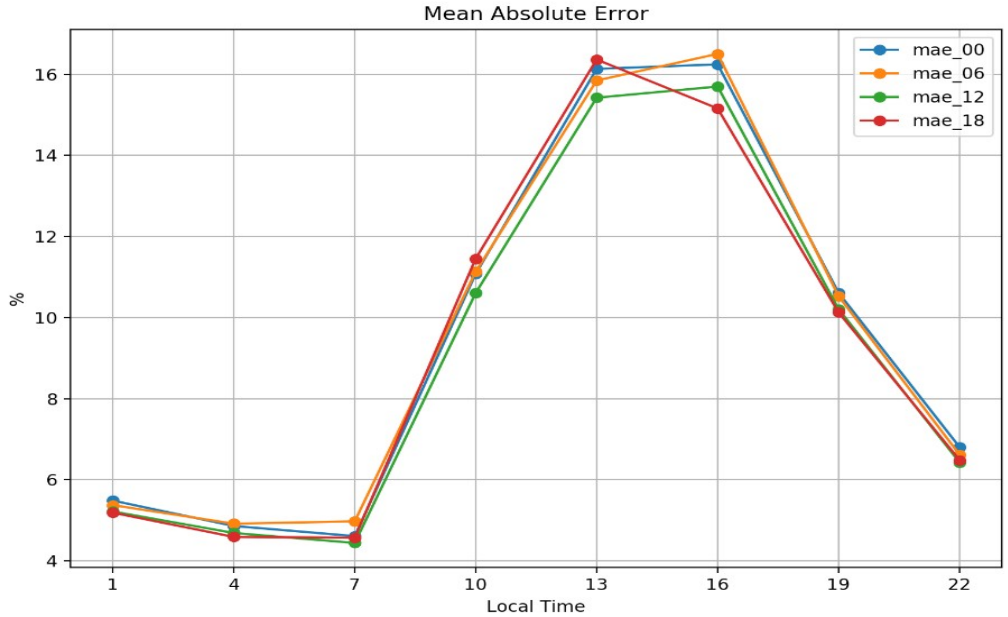
To characterize the behavior of the SisPI, the following statistics were used: mean absolute error, mean relative error mean square error, standard deviation, Pearson's correlation, adjust index and bias.

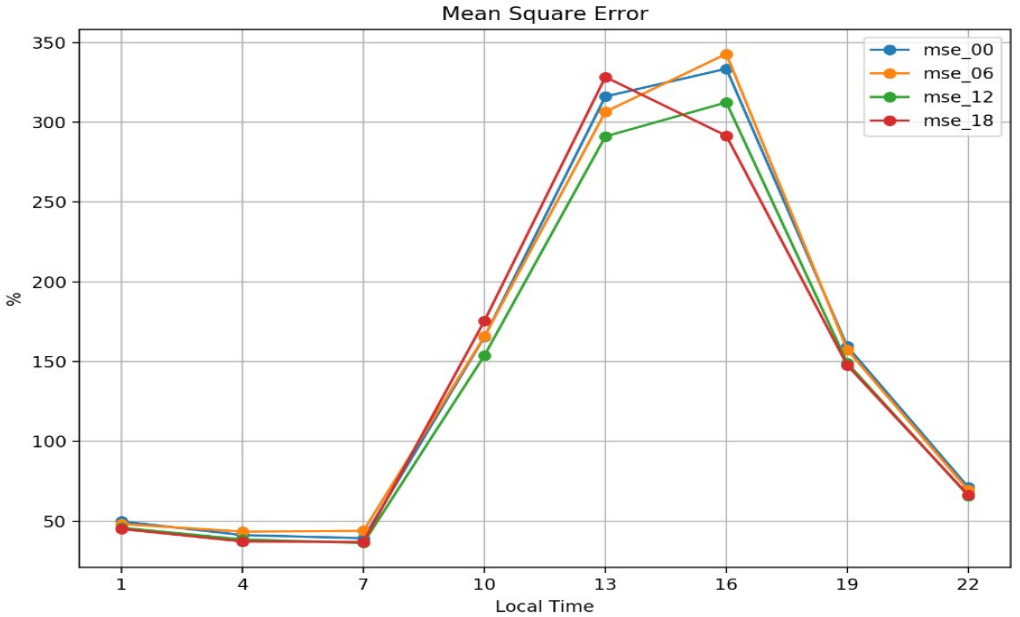


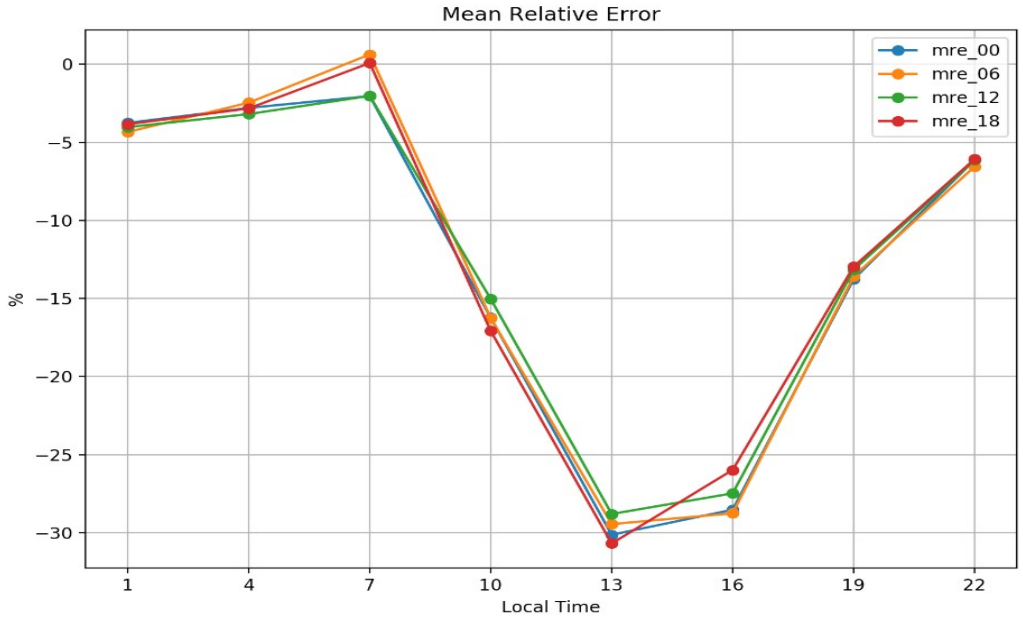
Materials and Methods

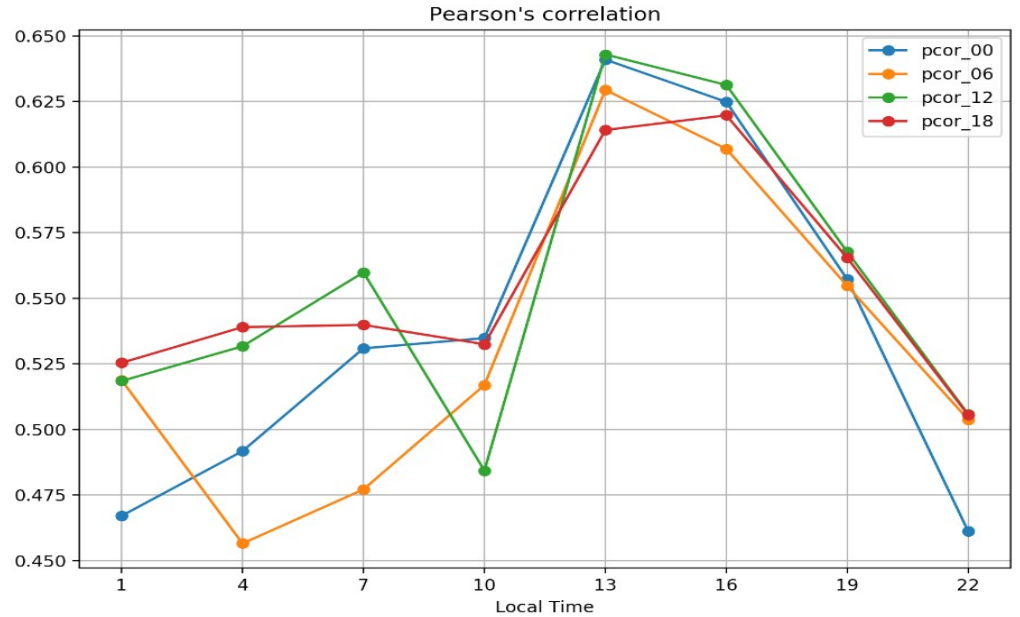


Relative humidity

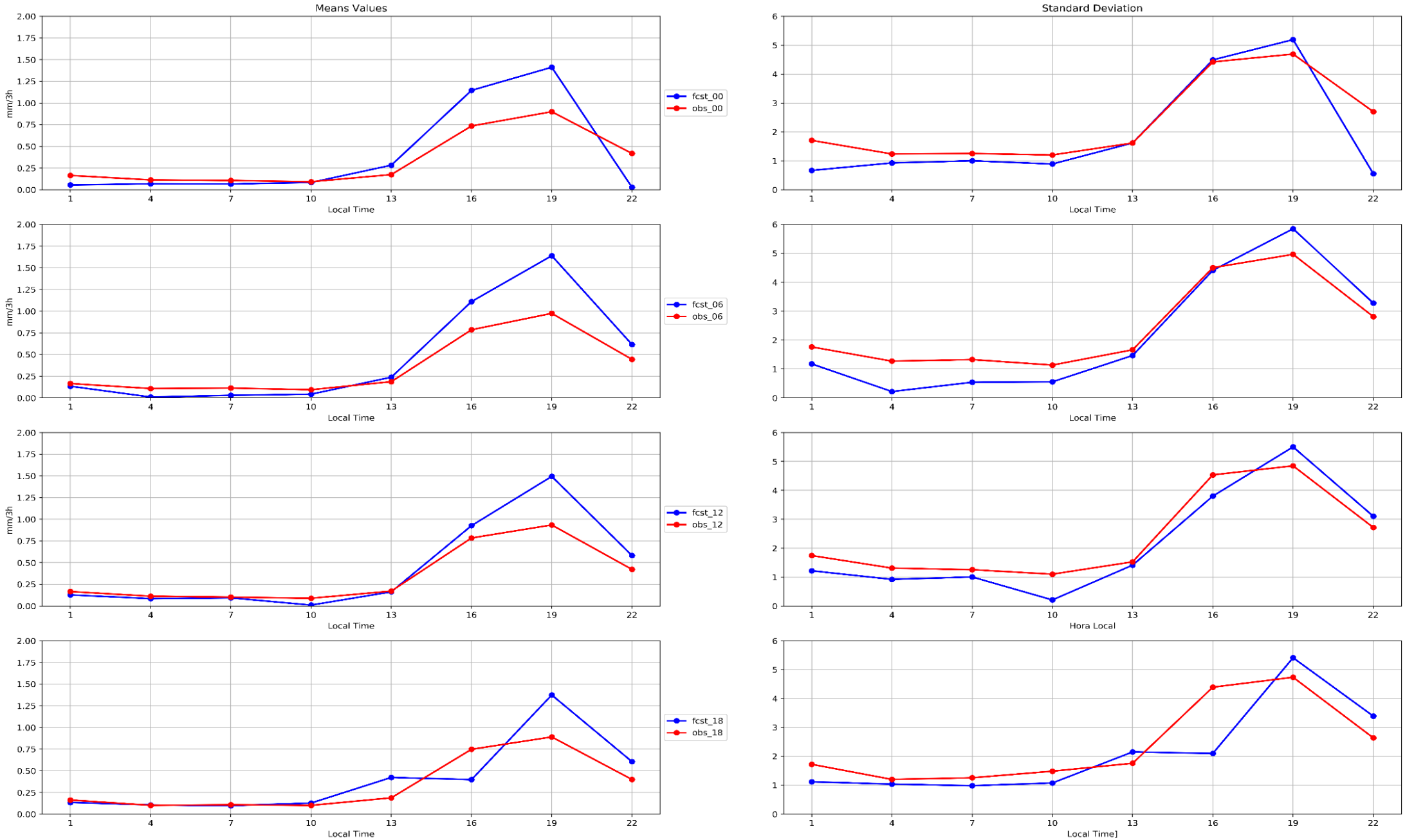




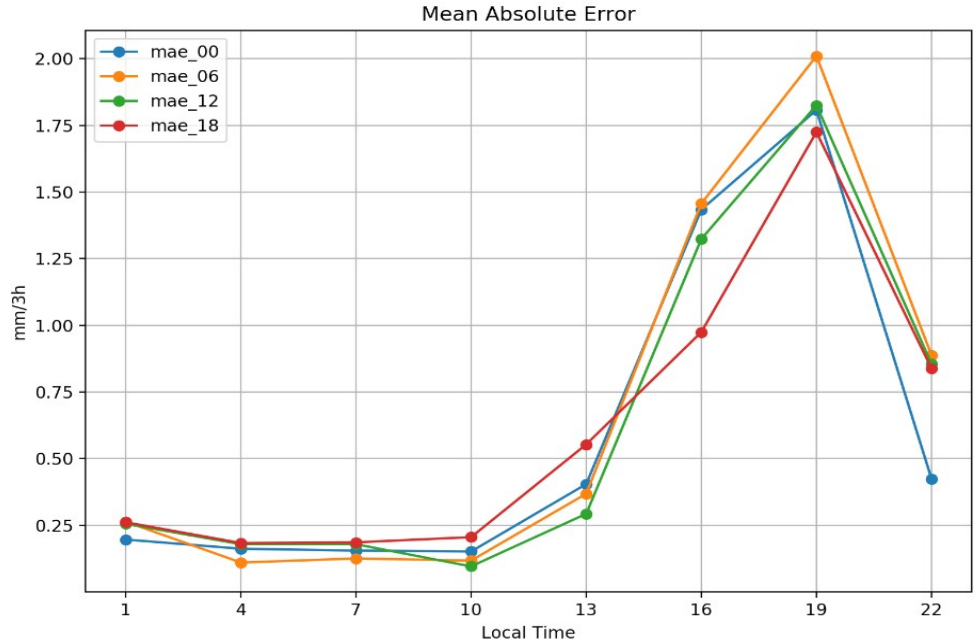


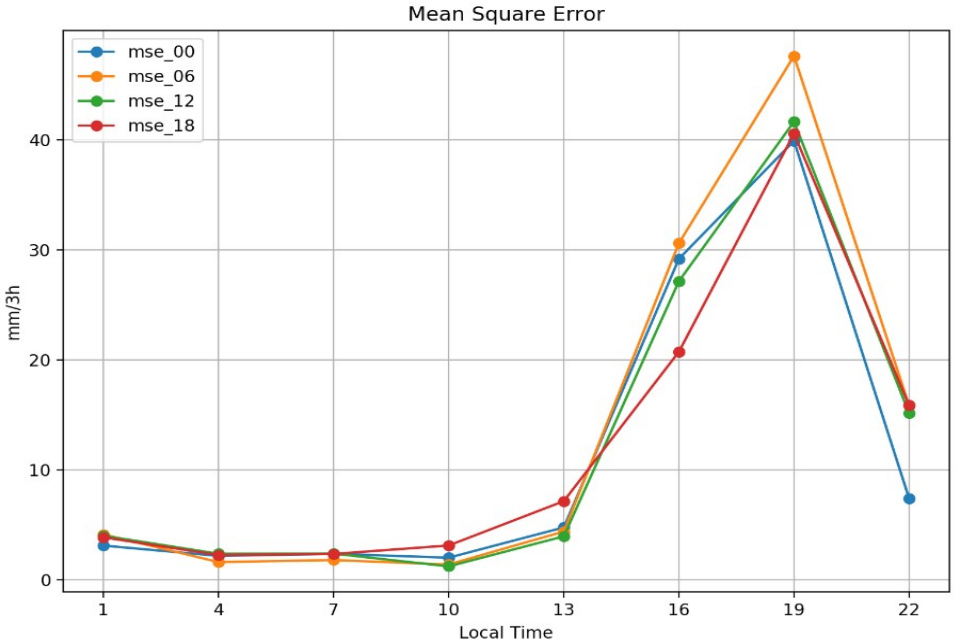


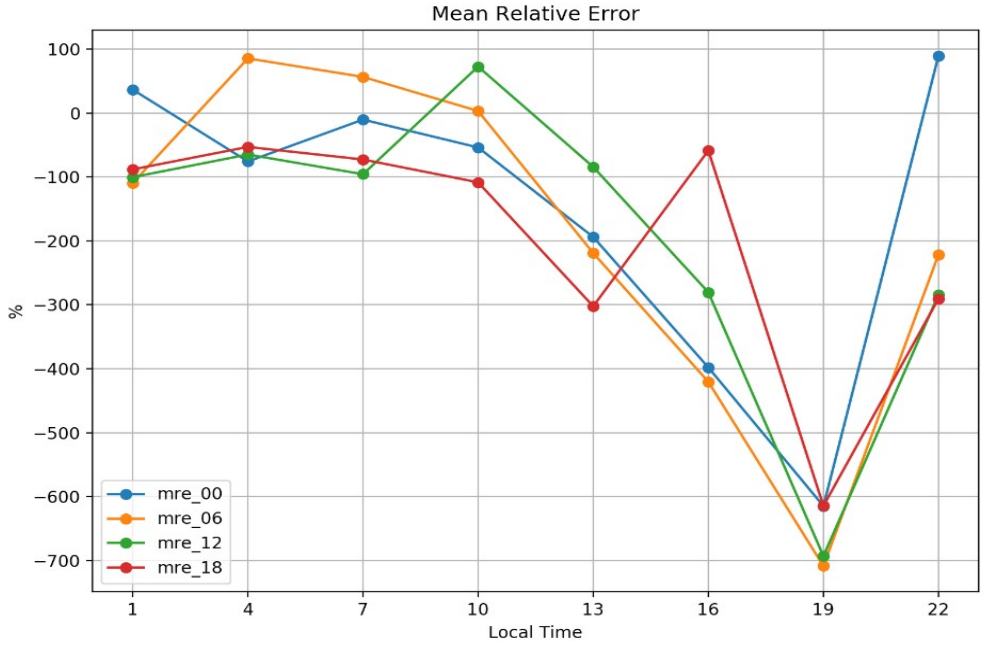
Relative humidity

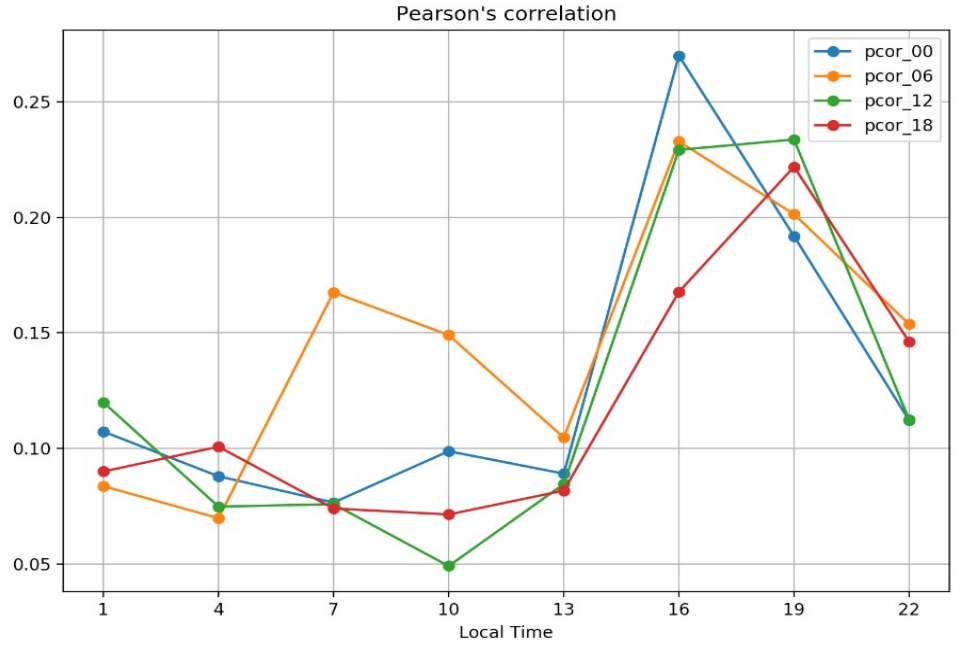


Precipitation

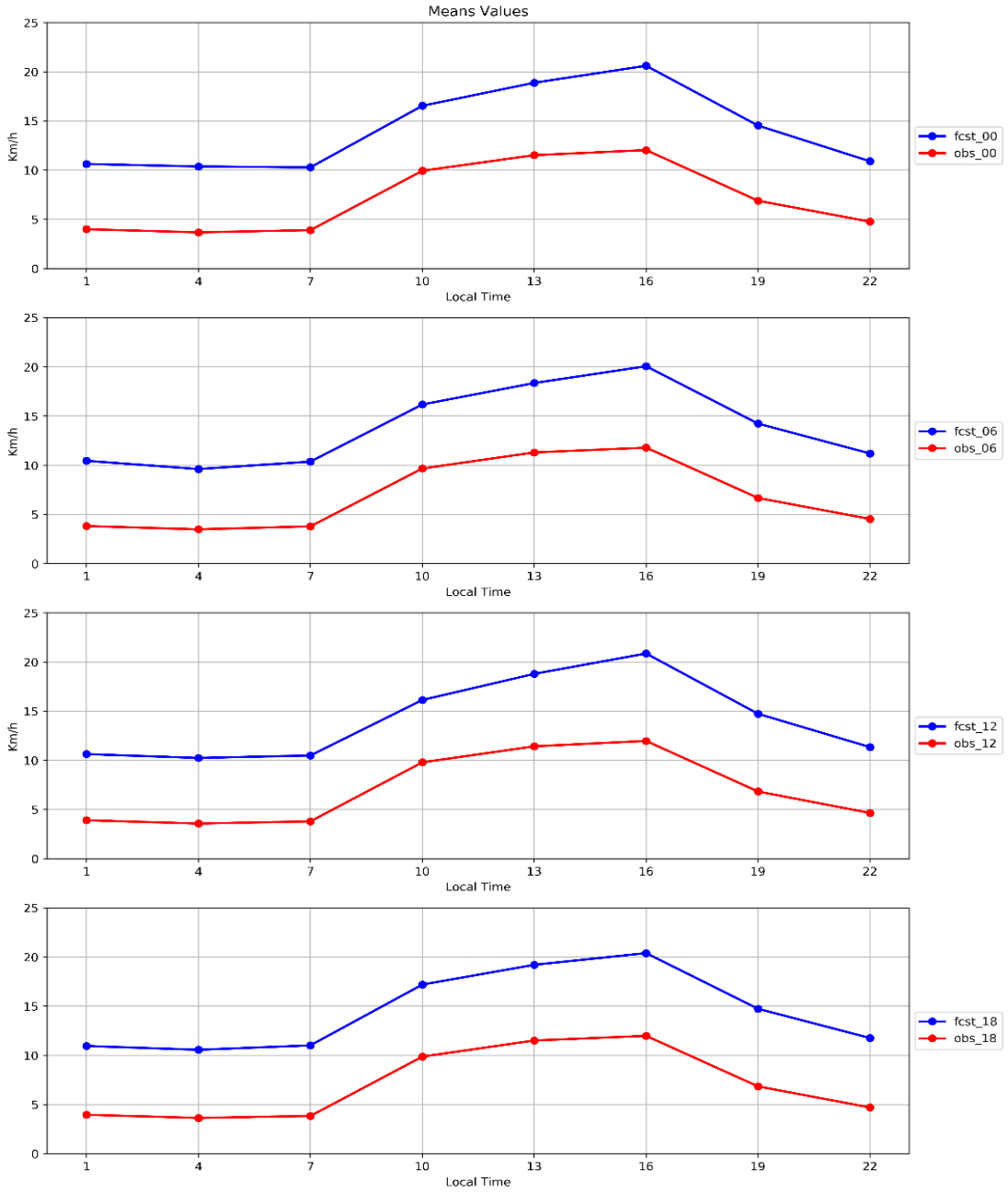


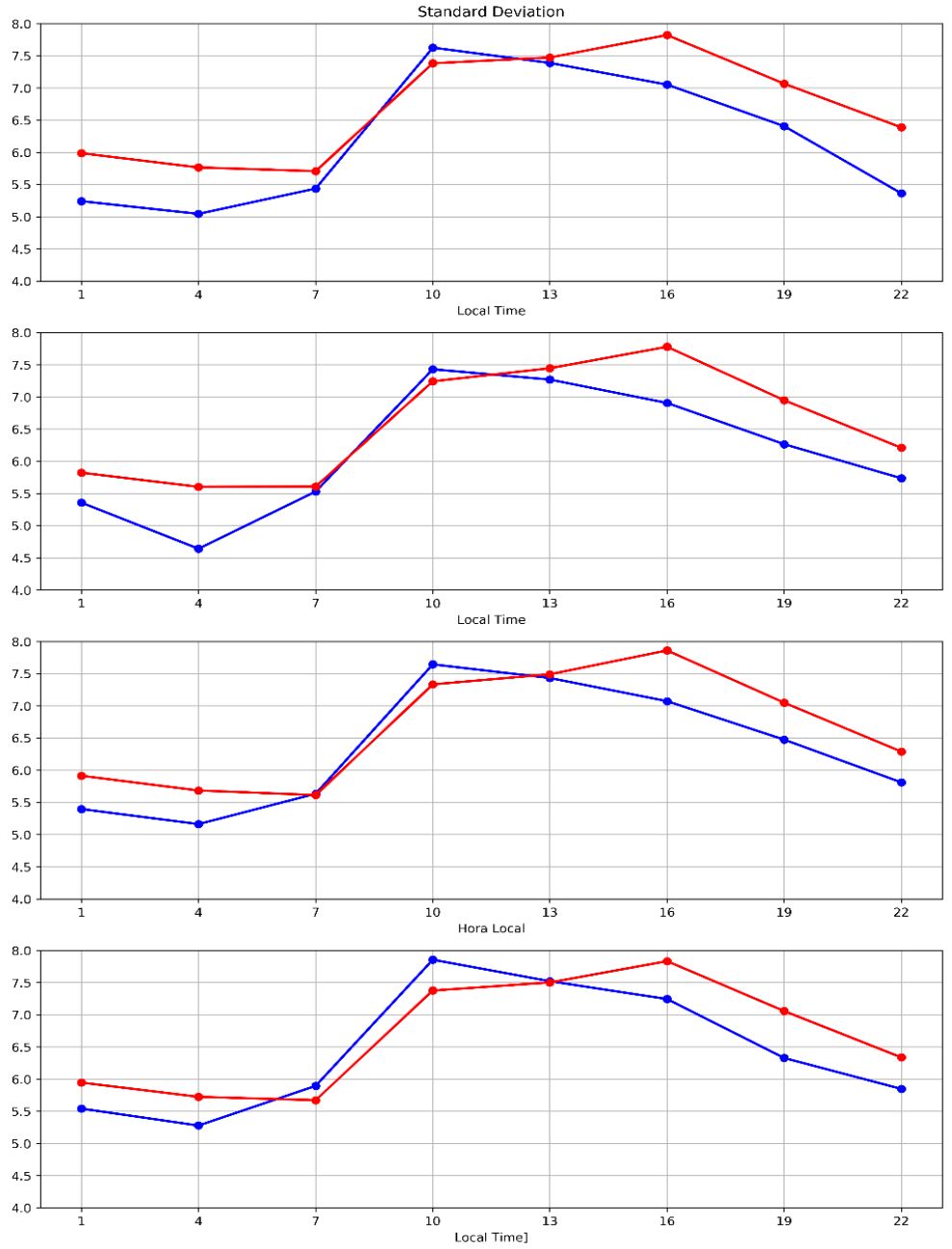




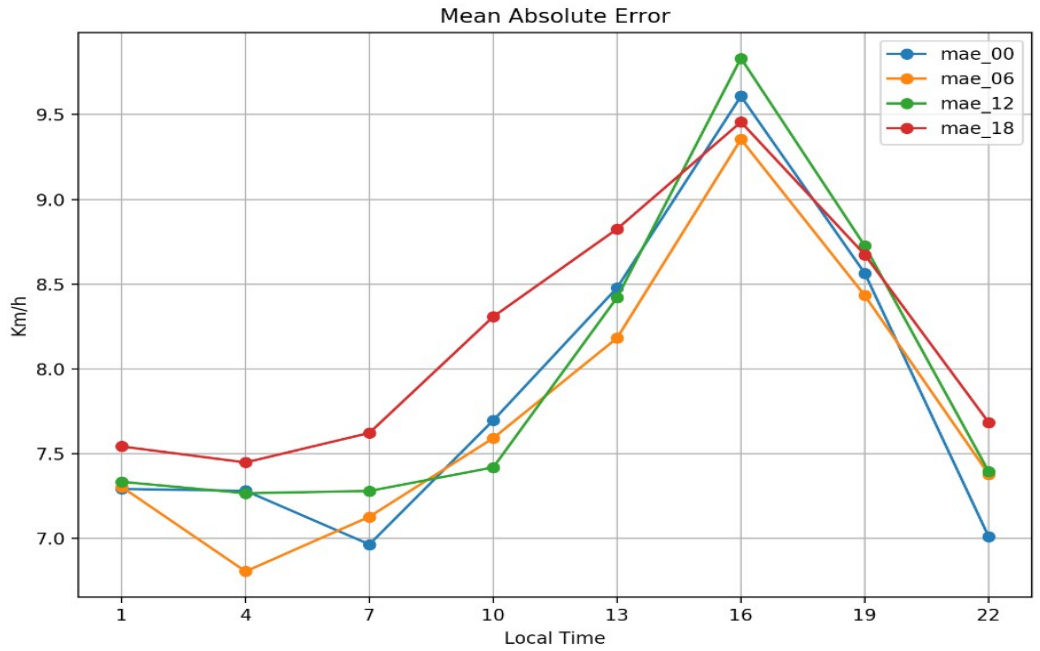


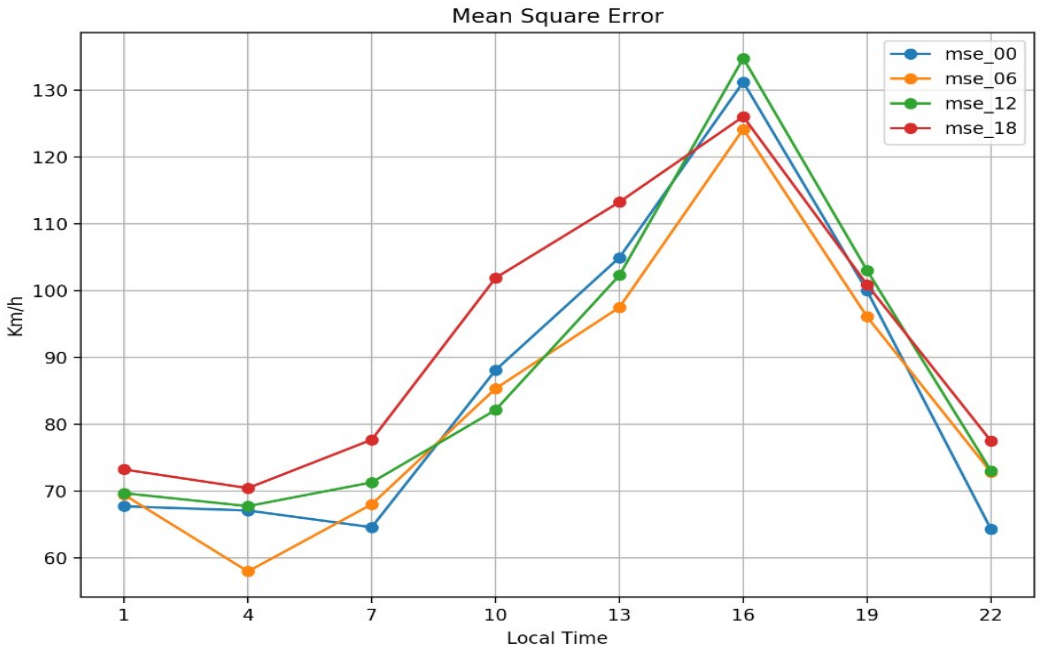
Precipitation

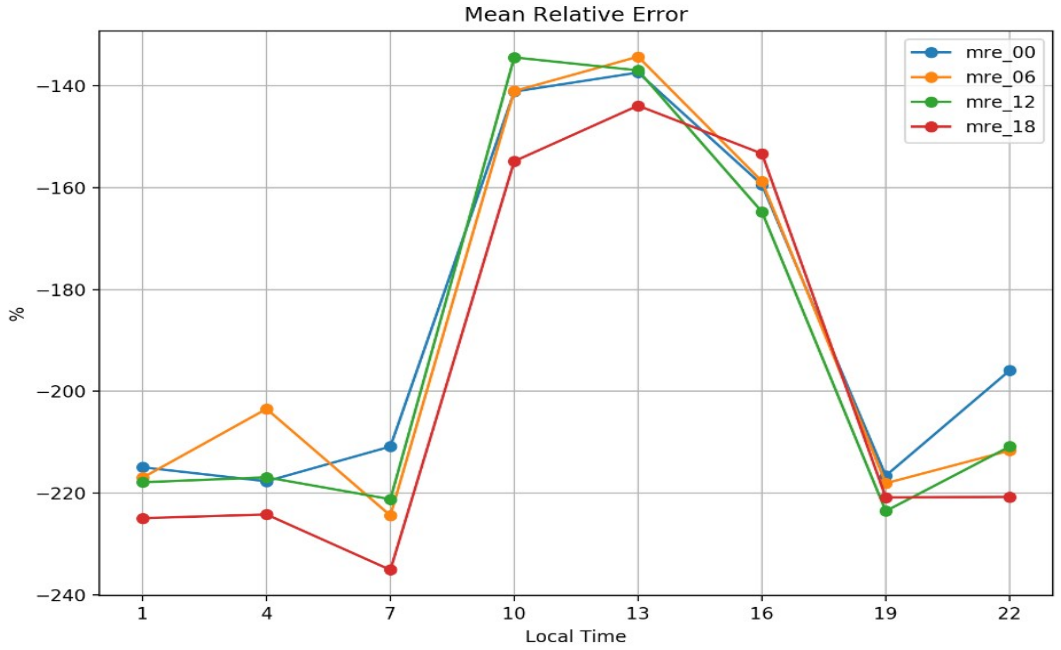

Means Values
Km/h
Local Time
fcst_00
obs_00
fcst_06
obs_06
fcst_12
obs_12
fcst_18
obs_18

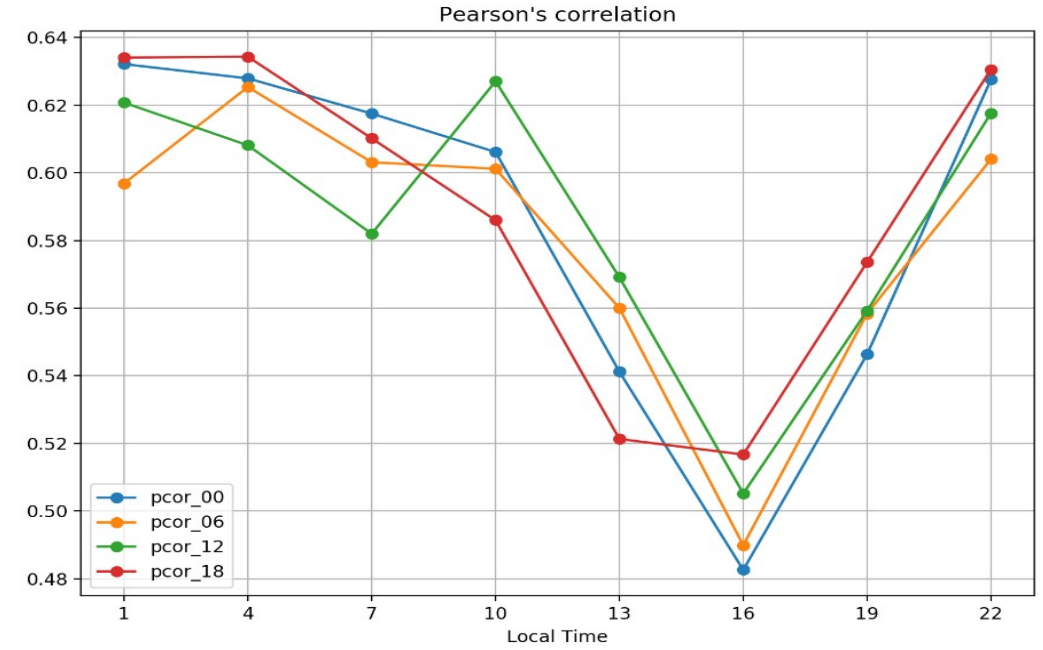

Standard Deviation
Local Time
Hora Local
Local Time]

Wind speed


Mean Absolute Error
mae_00
mae_06
mae_12
mae_18
Km/h
Local Time


Mean Square Error
mse_00
mse_06
mse_12
mse_18
Km/h
Local Time


Mean Relative Error
mre_00
mre_06
mre_12
mre_18
%
Local Time


Pearson's correlation
pcor_00
pcor_06
pcor_12
pcor_18
Local Time

Conclusions

In this research, the proposed objectives are fulfilled, achieving a characterization of the forecast of the atmospheric variables at the surface level from the evaluation of the outputs of the model for all the stations of the country in the year 2019.

The SisPI tool shows good ability to forecast the diurnal cycle of the variables studied.

- In relation to Relative Humidity, the SisPI overestimates the values.
- In the case of Precipitation, the model presents the poorest skill highlighting the difficulty in forecasting the amount of precipitation.
- In the case of Wind speed, an overestimation by the SisPI is observed.

In general the SisPI run initialized at 1200 UTC yields the best results in terms of forecast accuracy.

Thanks for your attention
Questions?