CPTEC
Centro de Previsão de Tempo e Estudos Climáticos

MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

MEC
Model Evaluation Comparator

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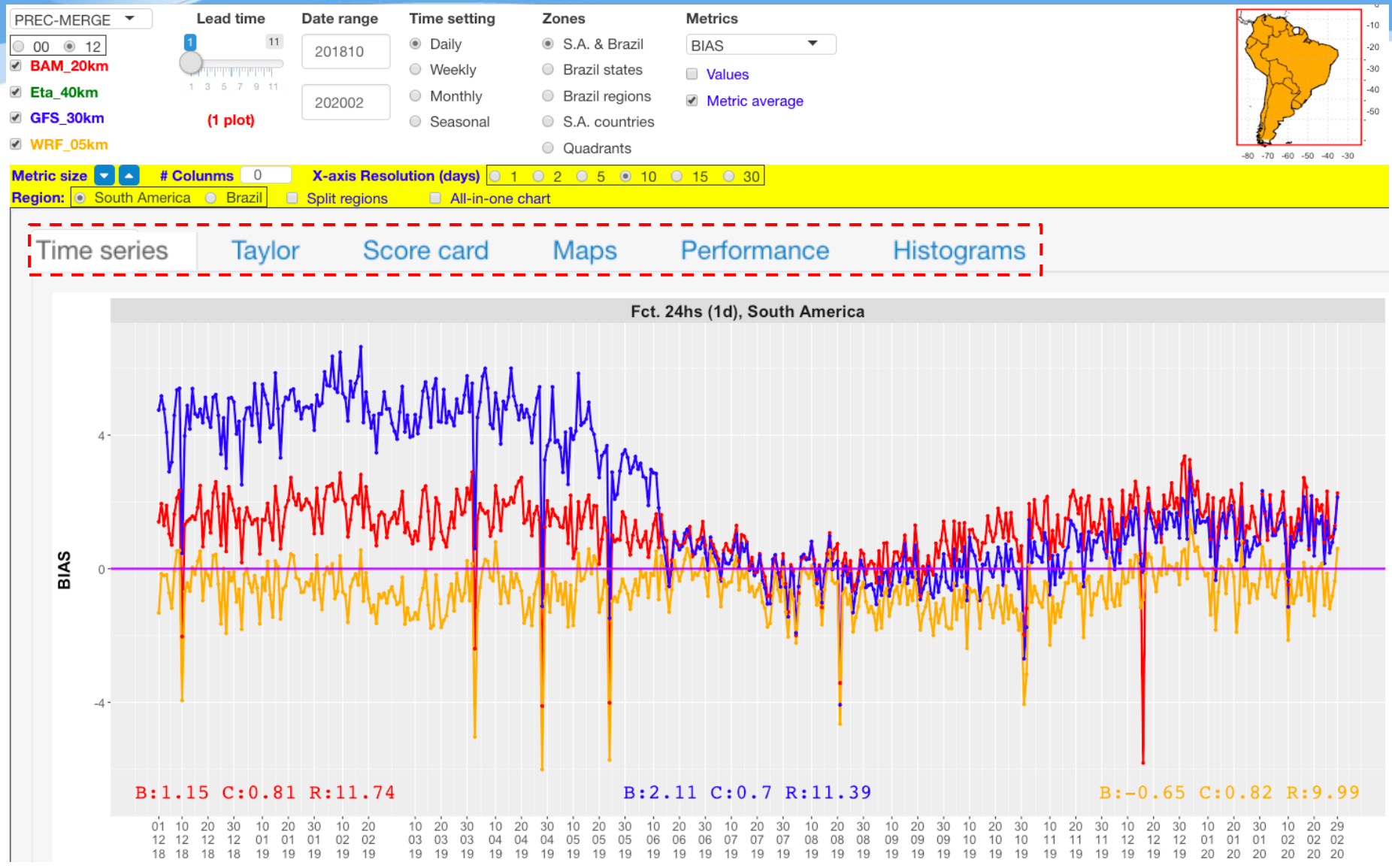
MEC overview

- Highly interactive web-based tool to visualise forecast verifications from different ways. Pilot at: https://garcia-cptec.shinyapps.io/CPTEC_DAILY/

- 3-phase system
  - **Model and observation preprocessing**: meteorological fields are scaled and regridded to a common spatial domain and stored in NetCDF files. **Uses**: shell scripts, grads, and CDO (Climate Data Operators).
  - **Evaluation:** daily-basis forecast evaluation stores the metric results in R binary files distincted by pre established parameters such as: observation, models, lead time, regions, metric, target date, etc. **Uses**: shell scripts, shapefiles and R.
  - **User Interface:** R (Shiny, ggplot, maps, data table, sf) and some HTML.

Dashboard overview



Time series

PREC-MERGE

00 12

BAM_20km

Eta_40km

GFS_30km

WRF_05km

Lead time: 1 4 11 (1 3 5 7 9 11) — (4 plots)

Date range: 202010 — 202011

Time setting: Daily; Weekly; Monthly; Seasonal

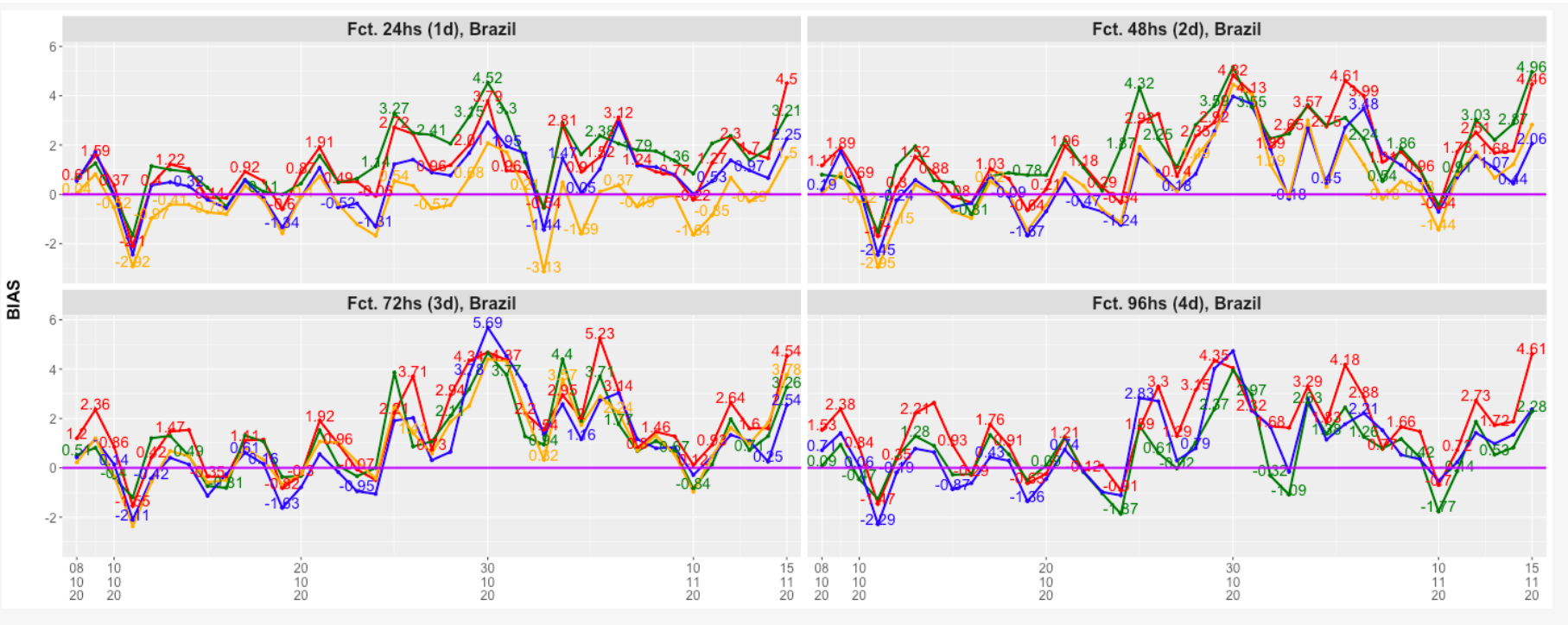
Zones: S.A. & Brazil; Brazil states; Brazil regions; S.A. countries; Quadrants

Metrics: BIAS — Values; Metric average

BIAS
- BIAS
- RMSE
- URMSE*
- FCT x OBS

Metric size # Columns 0 **X-axis Resolution (days)**: 1 2 5 10 15 30

Region: South America Brazil Split regions All-in-one chart



Time series

PREC-MERGE

00 12

BAM_20km

Eta_40km

GFS_30km

WRF_05km

Lead time: 1 – 2 (11)

(8 plots)

Date range: 202010 – 202011

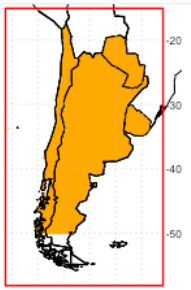
Time setting: Daily, Weekly, Monthly, Seasonal

Zones: S.A. & Brazil, Brazil states, Brazil regions, S.A. countries, Quadrants

Metrics: BIAS

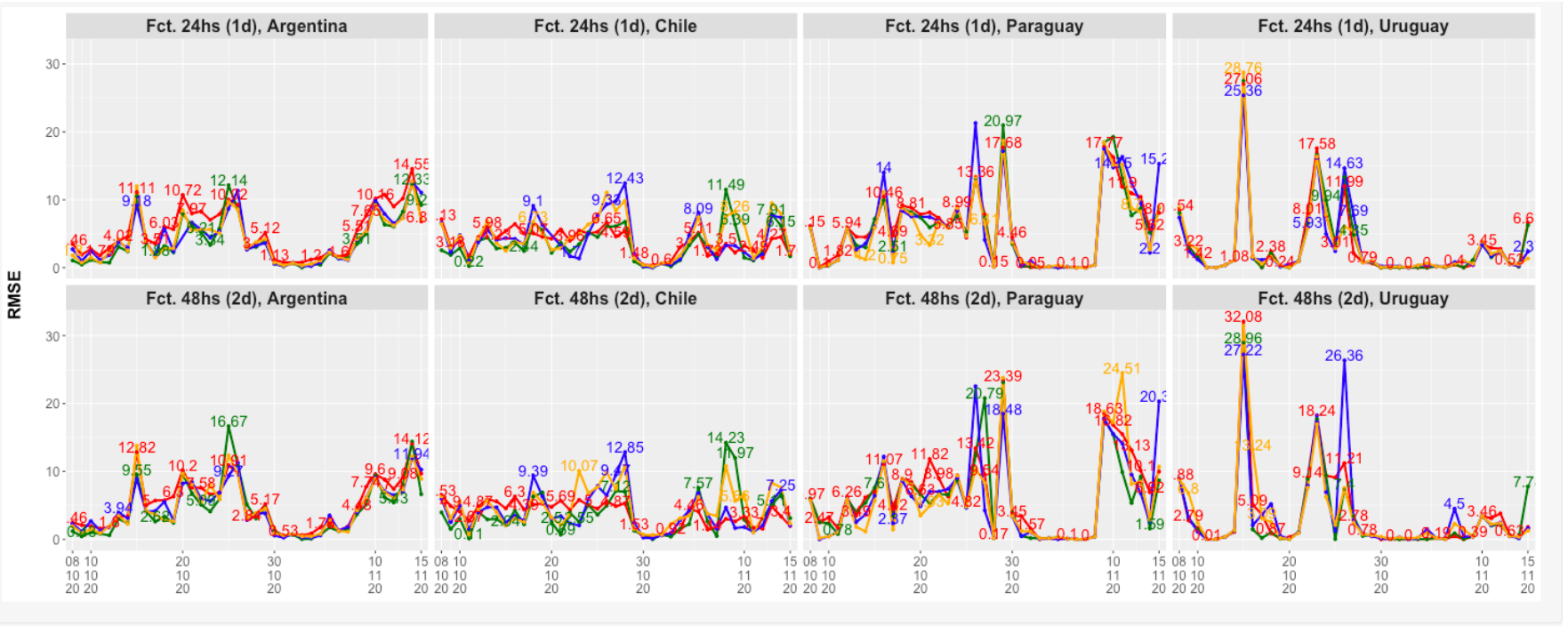
Values

Metric average

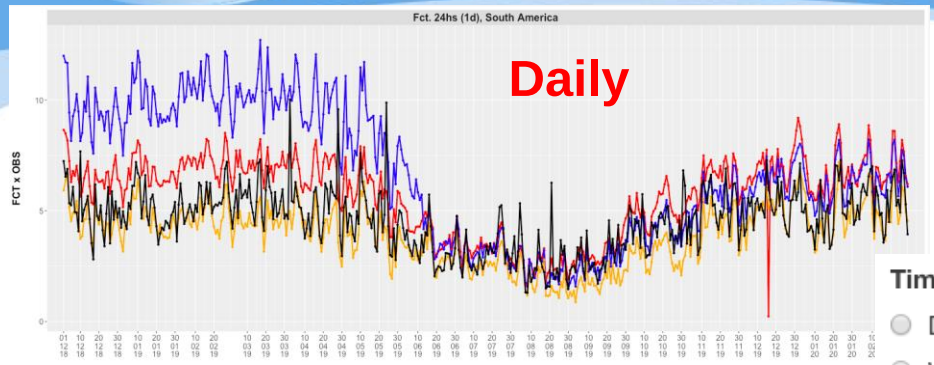


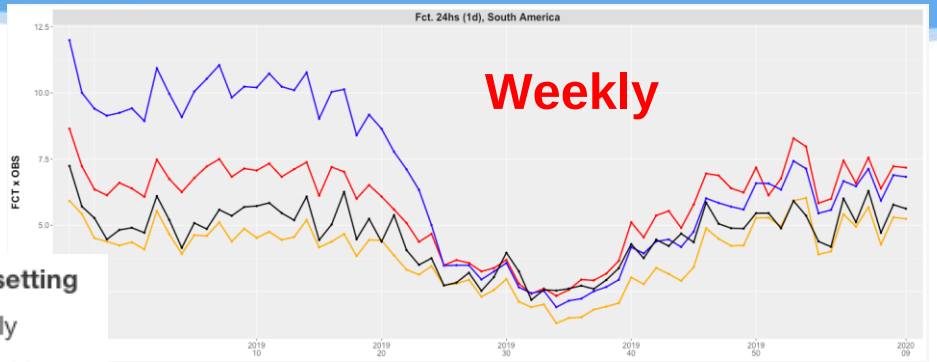
Metric size # Columns 0 X-axis Resolution (days): 1 2 5 10 15 30

Region: Argentina Bolivia Chile Colombia Ecuador Paraguay Peru Uruguay Venezuela Split regions



Time series - Time setting

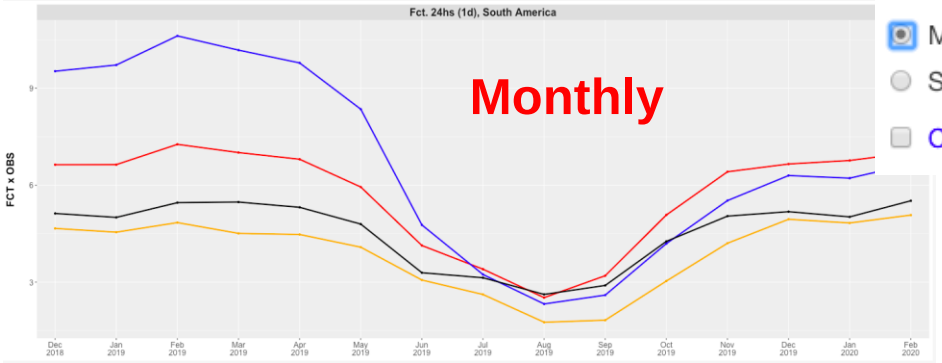


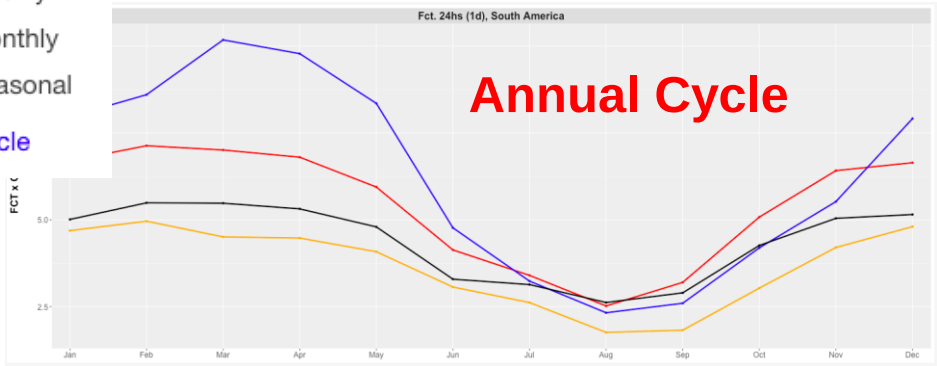


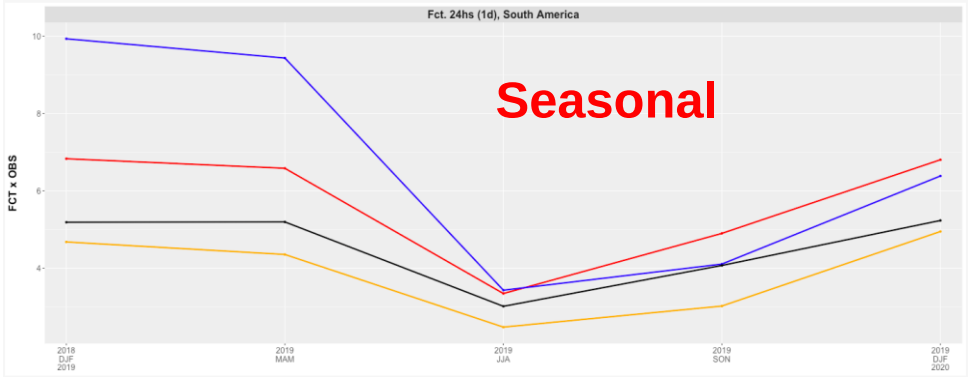
Time setting

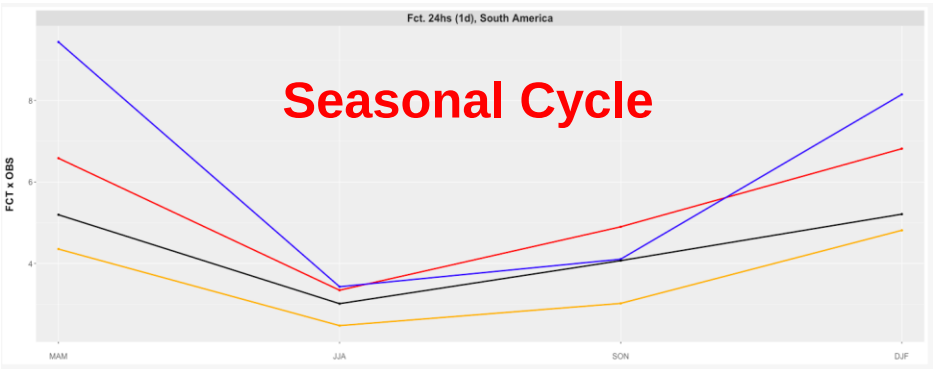
- Daily
- Weekly
- Monthly
- Seasonal

Cycle

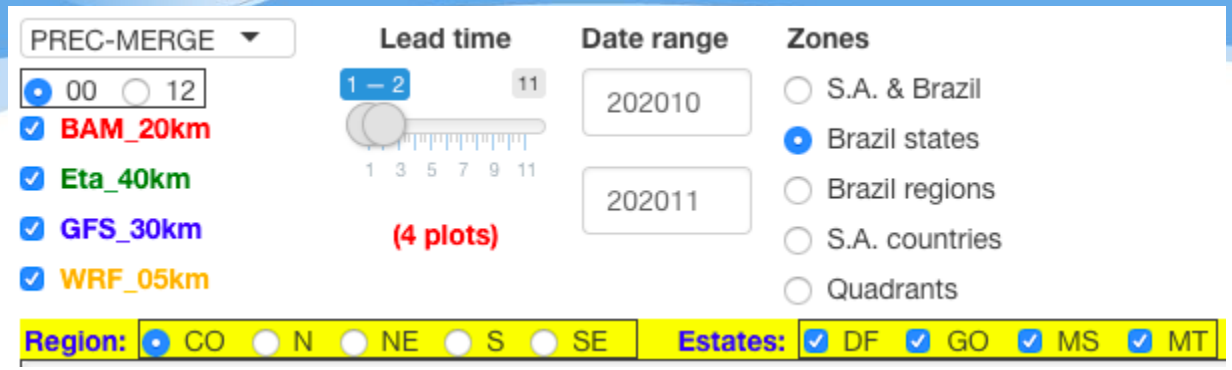


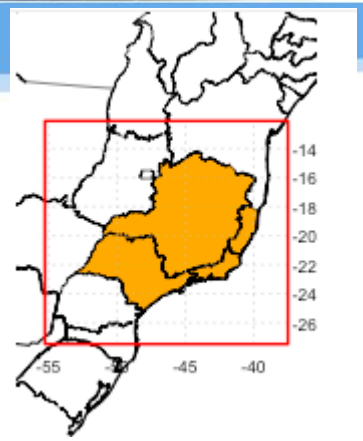


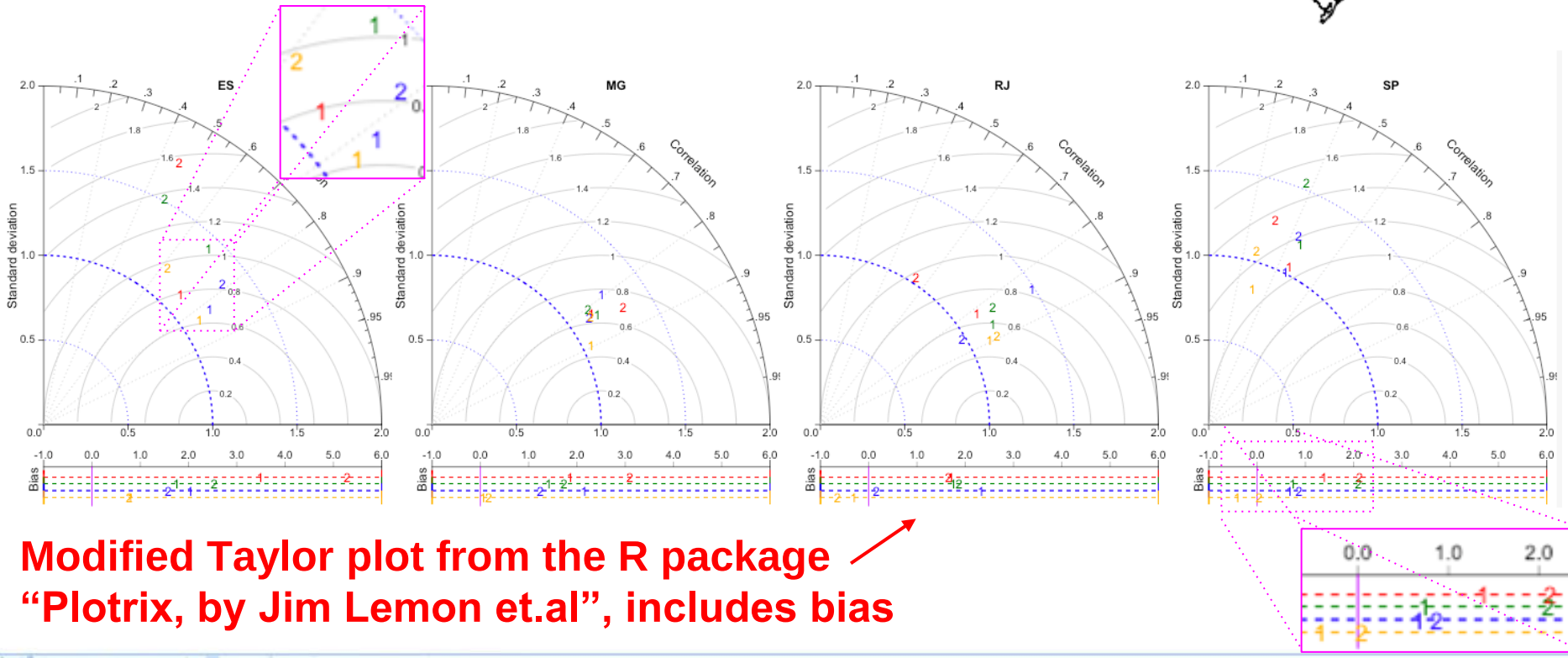




Taylor diagrams

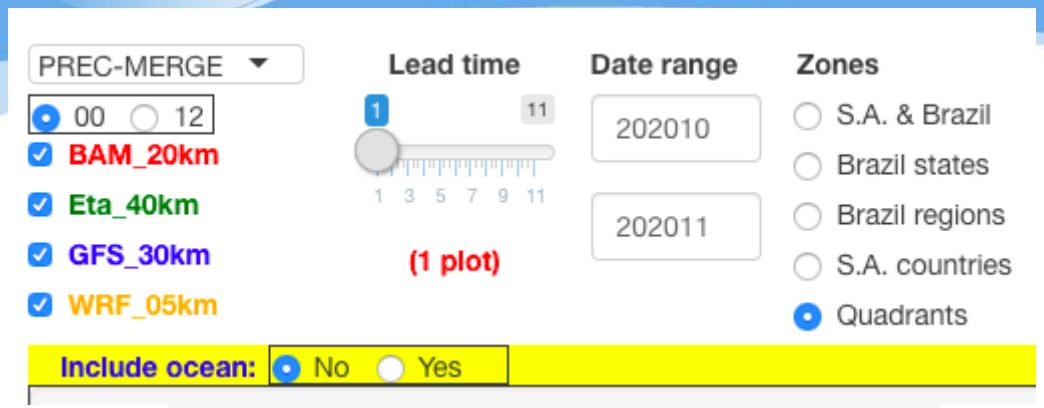


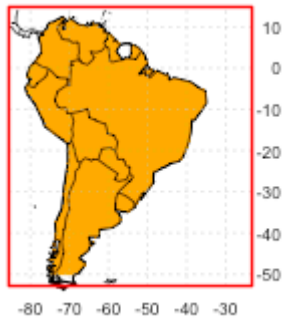


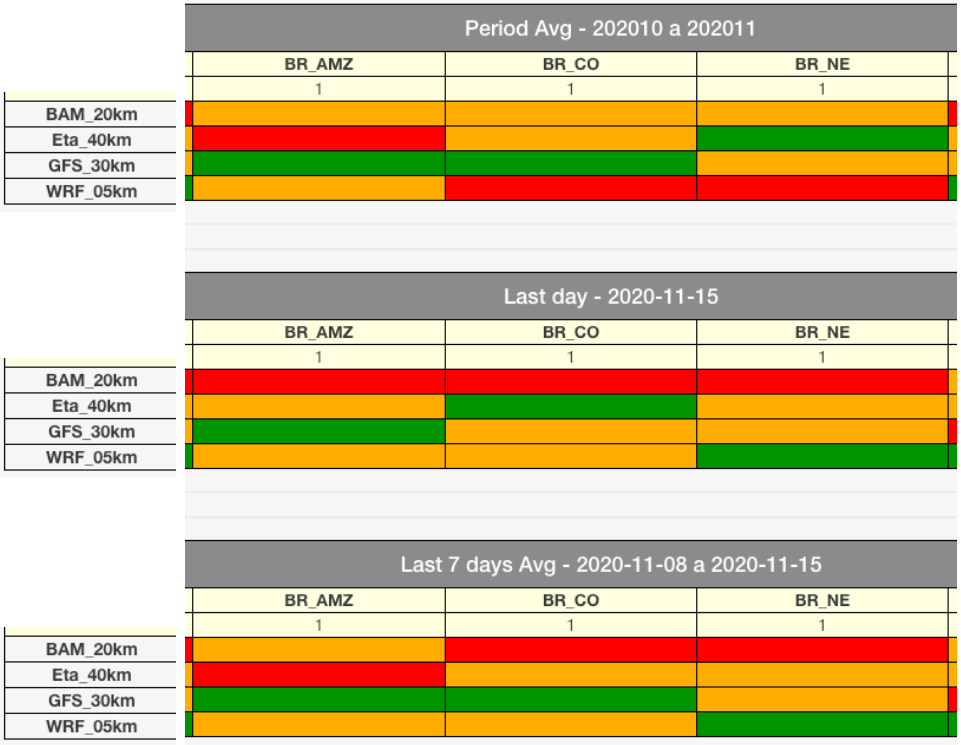


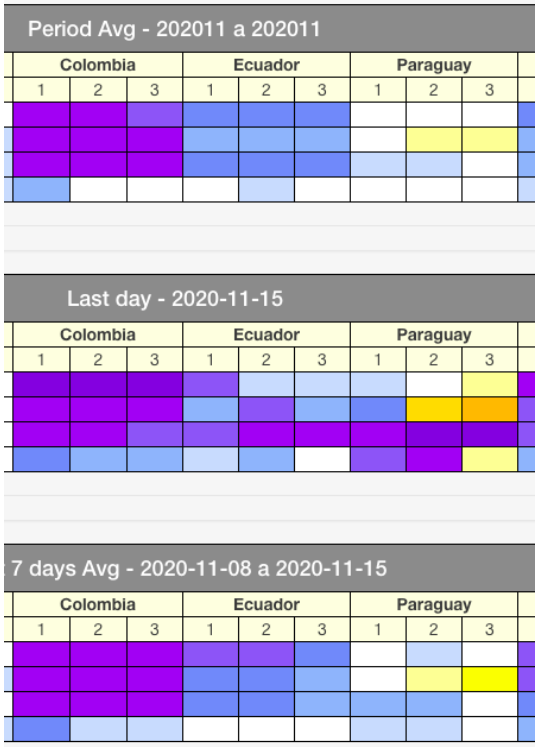
Modified Taylor plot from the R package
"Plotrix, by Jim Lemon et.al", includes bias

Score cards


PREC-MERGE
00 12
BAM_20km
Eta_40km
GFS_30km
WRF_05km
Lead time
1 11
1 3 5 7 9 11
(1 plot)
Date range
202010
202011
Zones
S.A. & Brazil
Brazil states
Brazil regions
S.A. countries
Quadrants
Metrics
BIAS
BIAS
COR
RMSE
Color palette
Bias gradient
Best vs. Worst
Include ocean: No Yes


10
0
-10
-20
-30
-40
-50
-80 -70 -60 -50 -40 -30

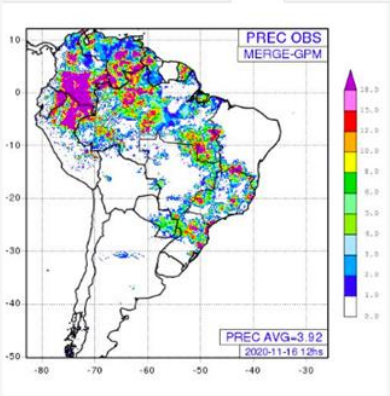

Period Avg - 202010 a 202011
BR_AMZ
BR_CO
BR_NE
BAM_20km
Eta_40km
GFS_30km
WRF_05km
Last day - 2020-11-15
Last 7 days Avg - 2020-11-08 a 2020-11-15
Color palette
Bias gradient
Best vs. Worst

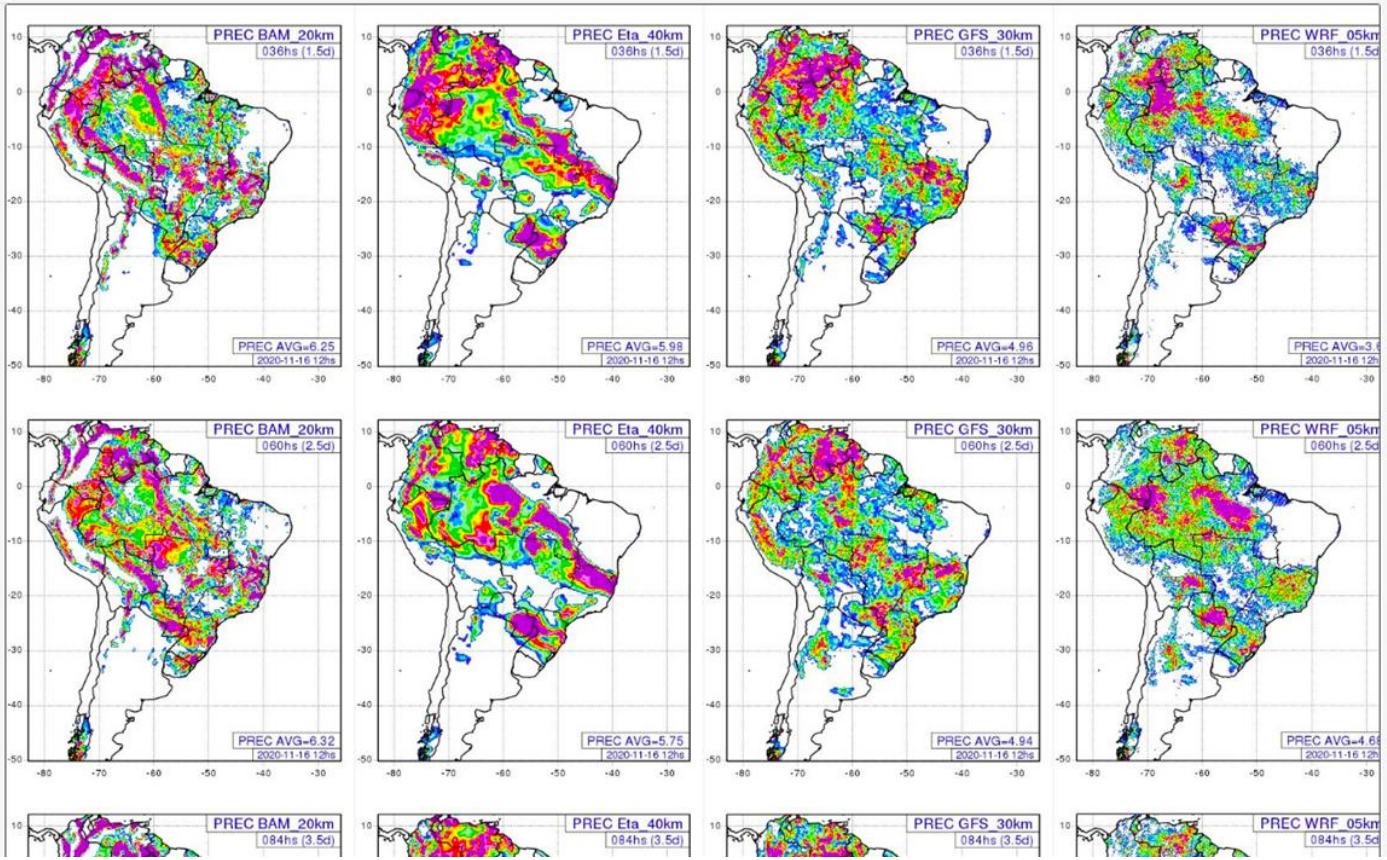

Period Avg - 202011 a 202011
Last day - 2020-11-15
7 days Avg - 2020-11-08 a 2020-11-15
Colombia
Ecuador
Paraguay

Pred vs. Obs maps

Time setting

- (•) Daily ← Up to 5 previous days
- ( ) Monthly ← Previous months and seasons average
- ( ) Seasonal

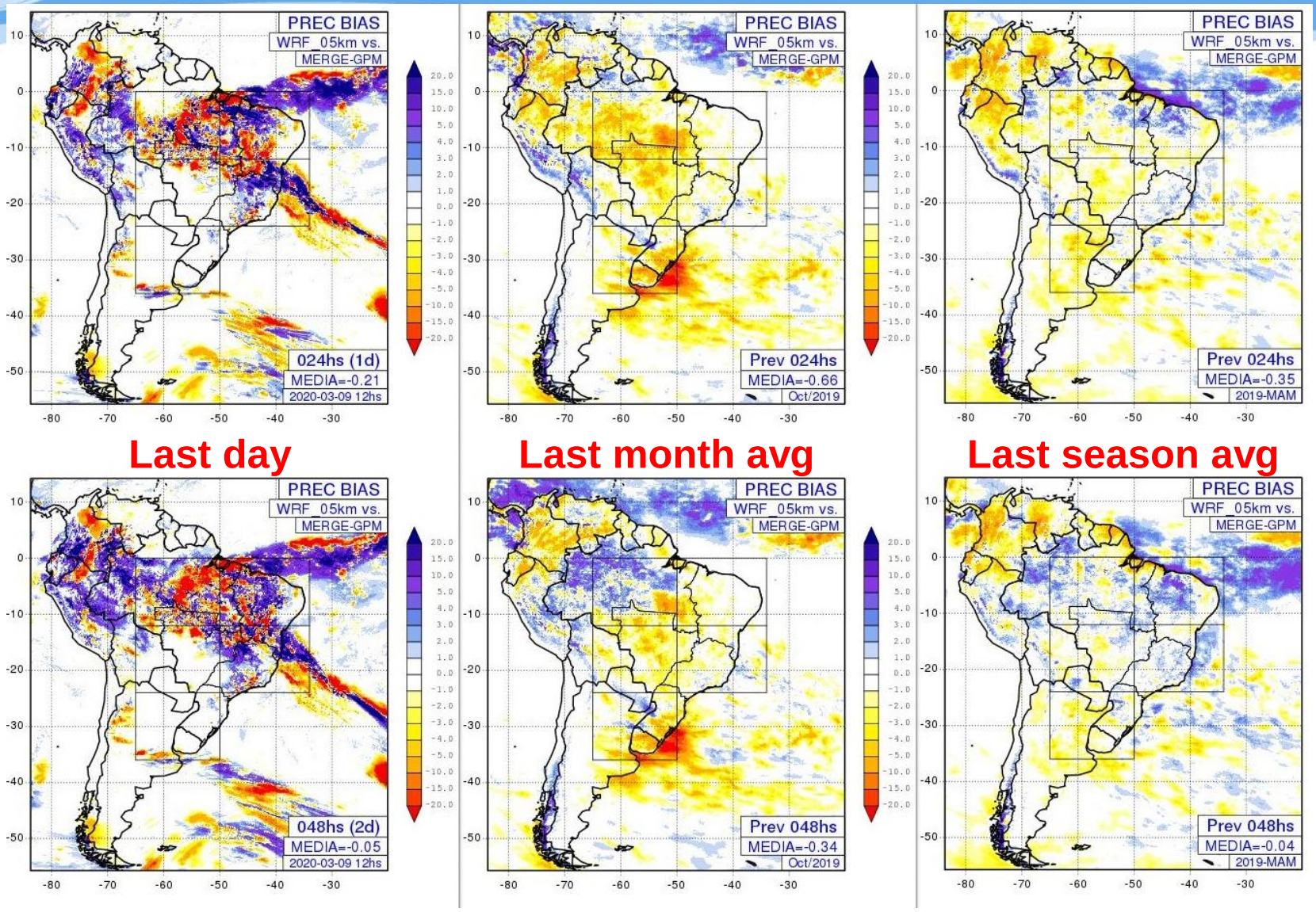




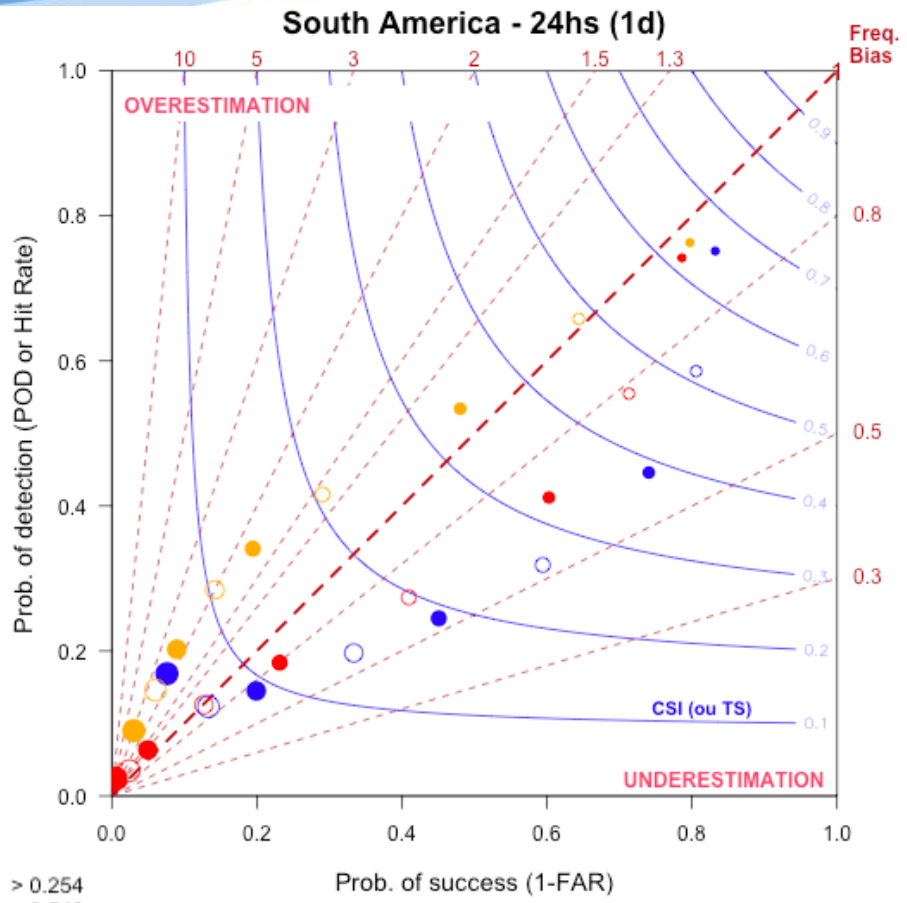
Lead time

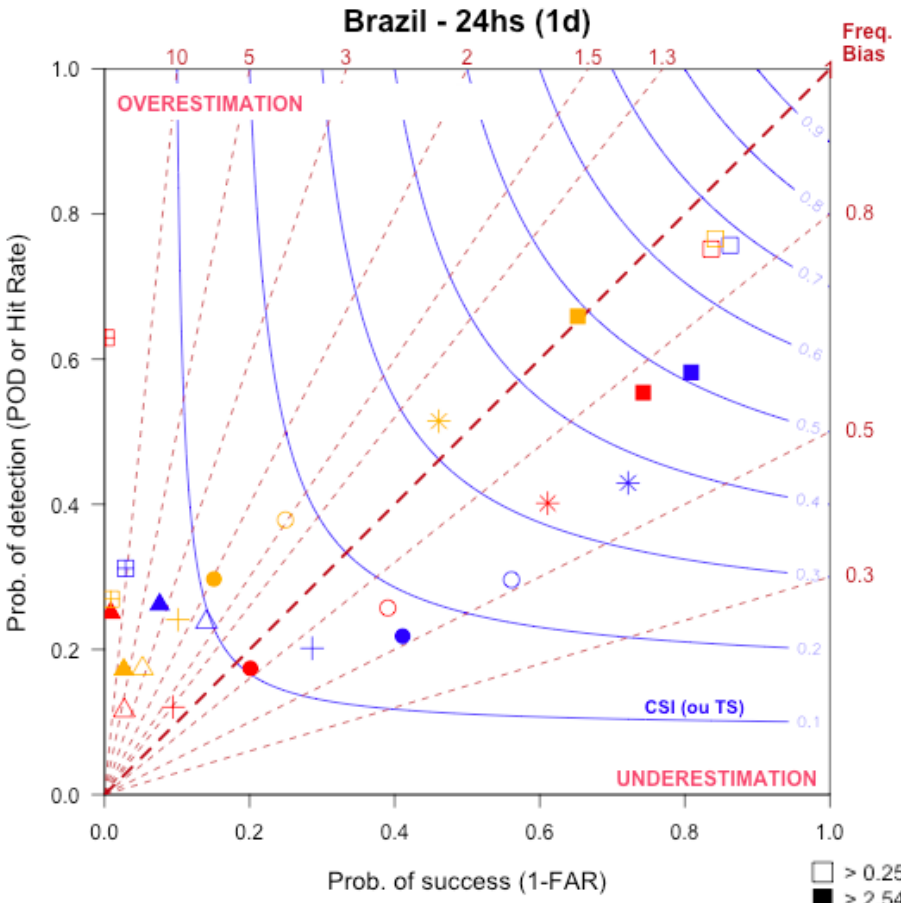
Bias maps

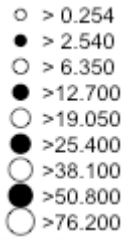
Include ocean:
No Yes

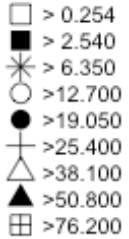


Performance diagrams



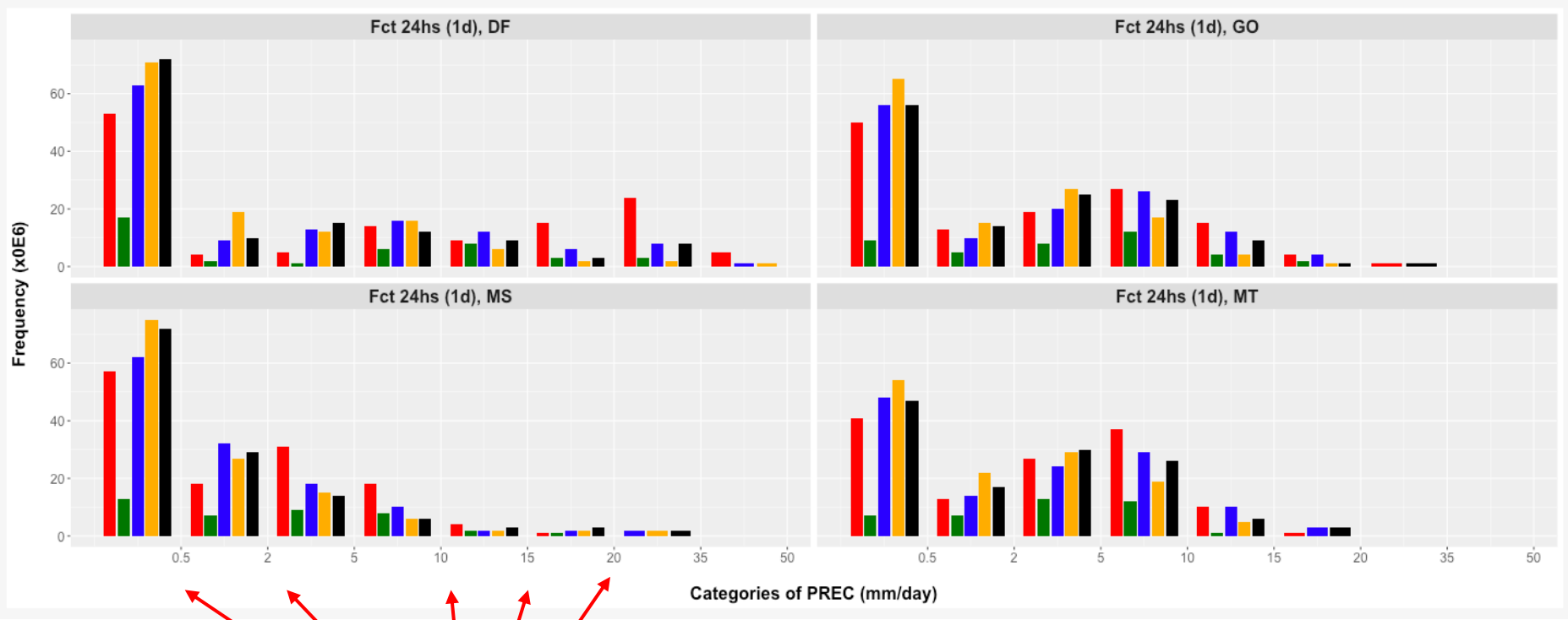






Modified performance diagram from the R package "Verification, by Eric Gilleland (NCAR)"

Categorical histograms



Categories

MEC

Interactivity and accessibility are the main aspect of MEC

TODO LIST:

- More variables, observations, metrics, plots, ...
- Outliers alert
- Objective evaluation
- Studies on the results: top errors, top hits
- Expand to global models
- MET integration (MEC over MET?)
- SCANTEC integration
- Bug fixes, internationalization (on test)
- ...

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THANK YOU!

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