# INTERPOLATED CLIMATE LAYERS FOR USE IN SPECIES MODELING:

*Interpolation of temperatures*

**05-20-2013**

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**ROUND-UP IPLANT MEETING**

# MODELS TEMPERATURES PREDICTIONS STATUS

**Venezuela: Models in green not predicted**

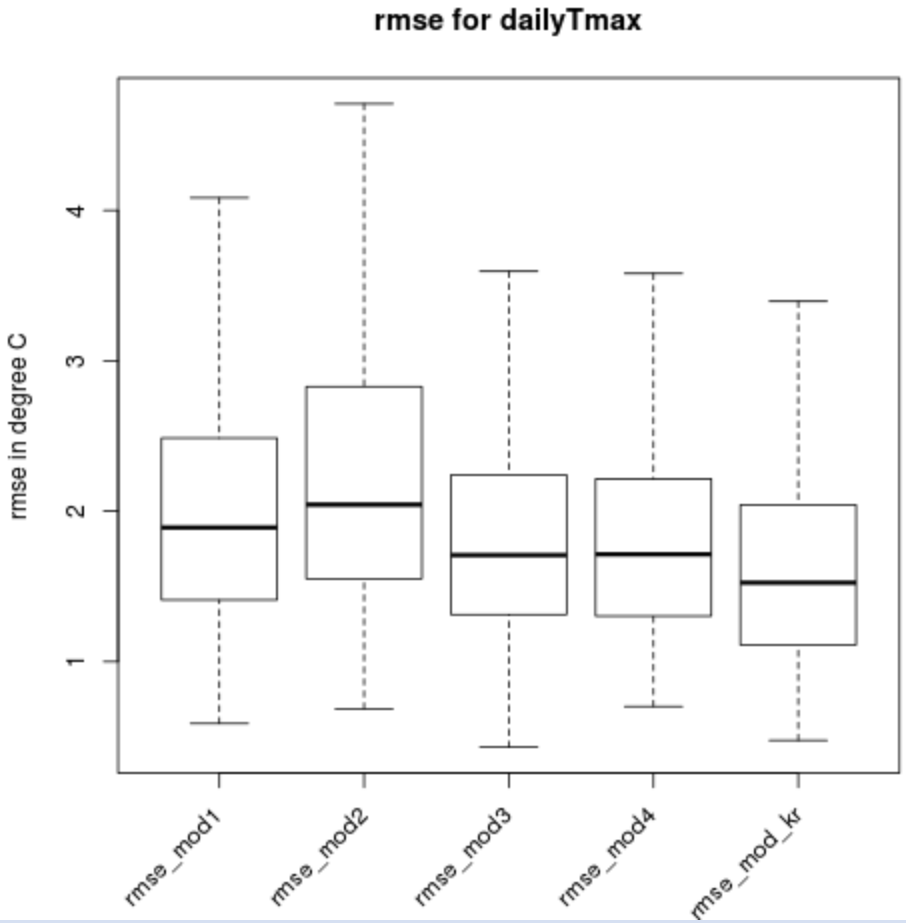
Mod1: y_var ~ s(elev_s)
Mod2: y_var ~ s(LST)
Mod3: y_var ~ s(elev_s,LST)
Mod4: y_var ~ s(lat) + s(lon)+ s(elev_s)
Mod5:y_var ~ s(lat,lon,elev_s)
Mod6: y_var ~ s(lat,lon) + s(elev_s) + s(N_w,E_w) + s(LST) ,
Mod7: y_var ~ s(lat,lon) + s(elev_s) + s(N_w,E_w) + s(LST) + s(LC2)
Mod8: y_var ~ s(lat,lon) + s(elev_s) + s(N_w,E_w) + s(LST) + s(LC6)
Mod9: y_var ~ s(lat,lon) + s(elev_s) + s(N_w,E_w) + s(LST) + s(DISTOC)
Mod_kr: kriging

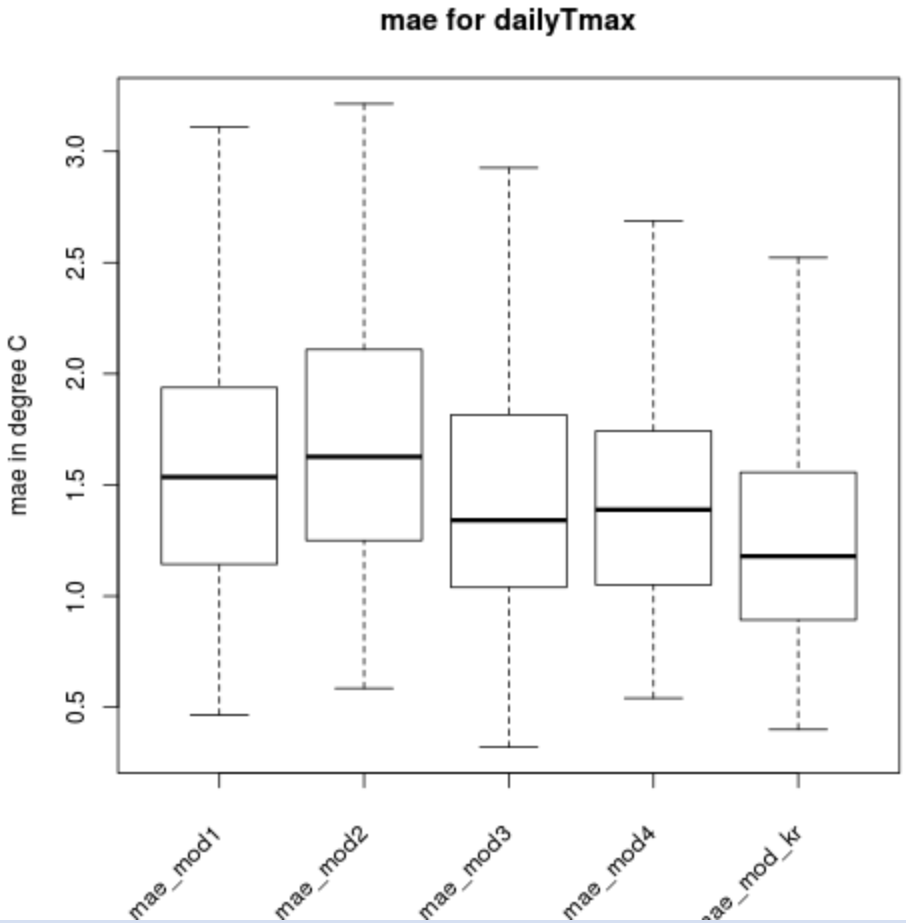
METHOD: GAM CAI

With GAM and Kriging

→ TMax monthly average created from stations within 1981-2010
→ Tmax predicted for year 2010
→ **First test run.**

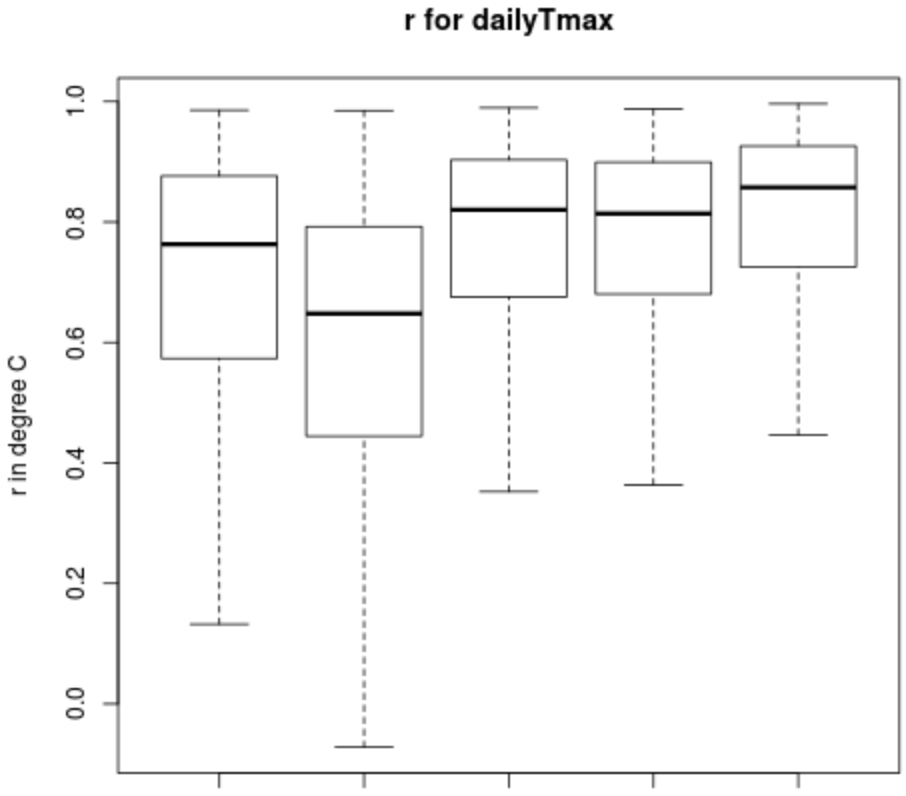
# TMAX CAI PREDICTION BOXPLOT: VENEZUELA

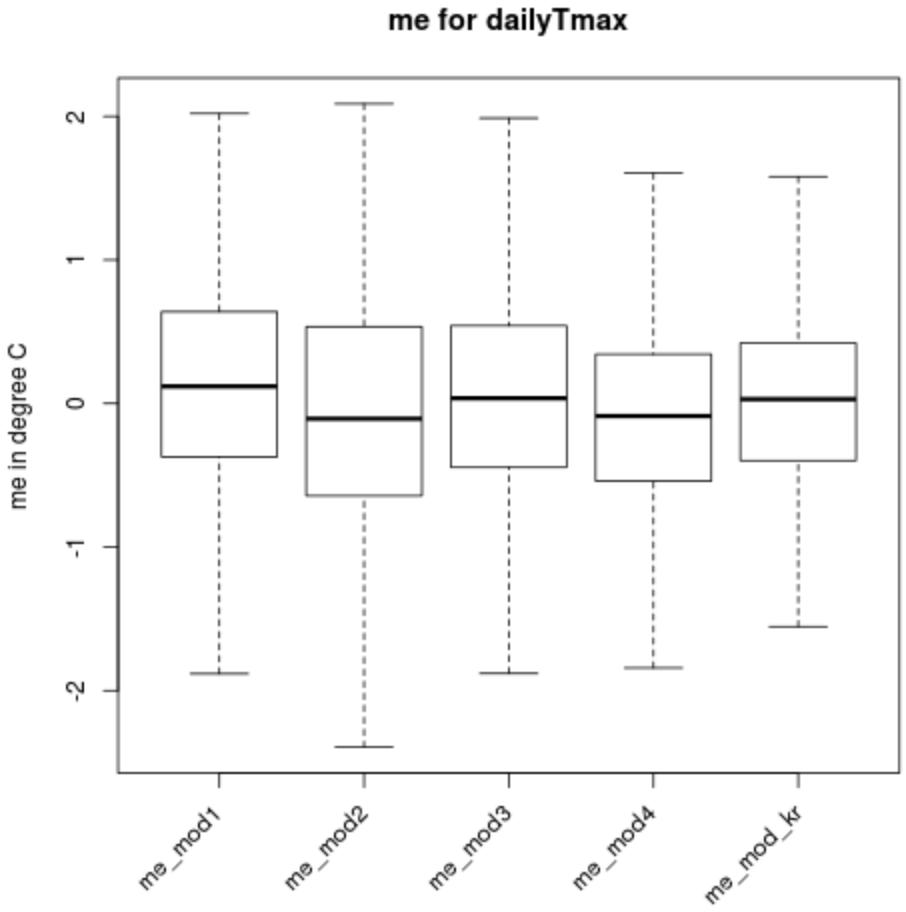



**Accuracy metrics for all five model predicted**

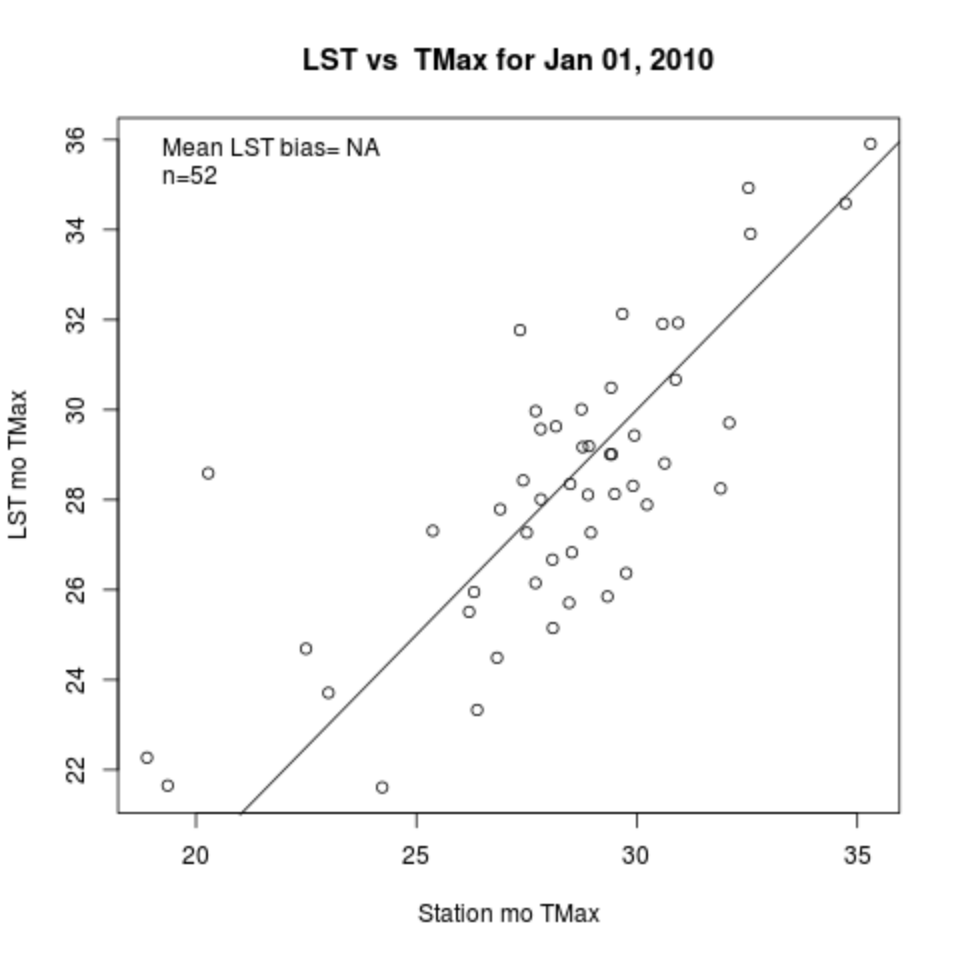
# TMAX CAI PREDICTION BOXPLOT: VENEZUELA



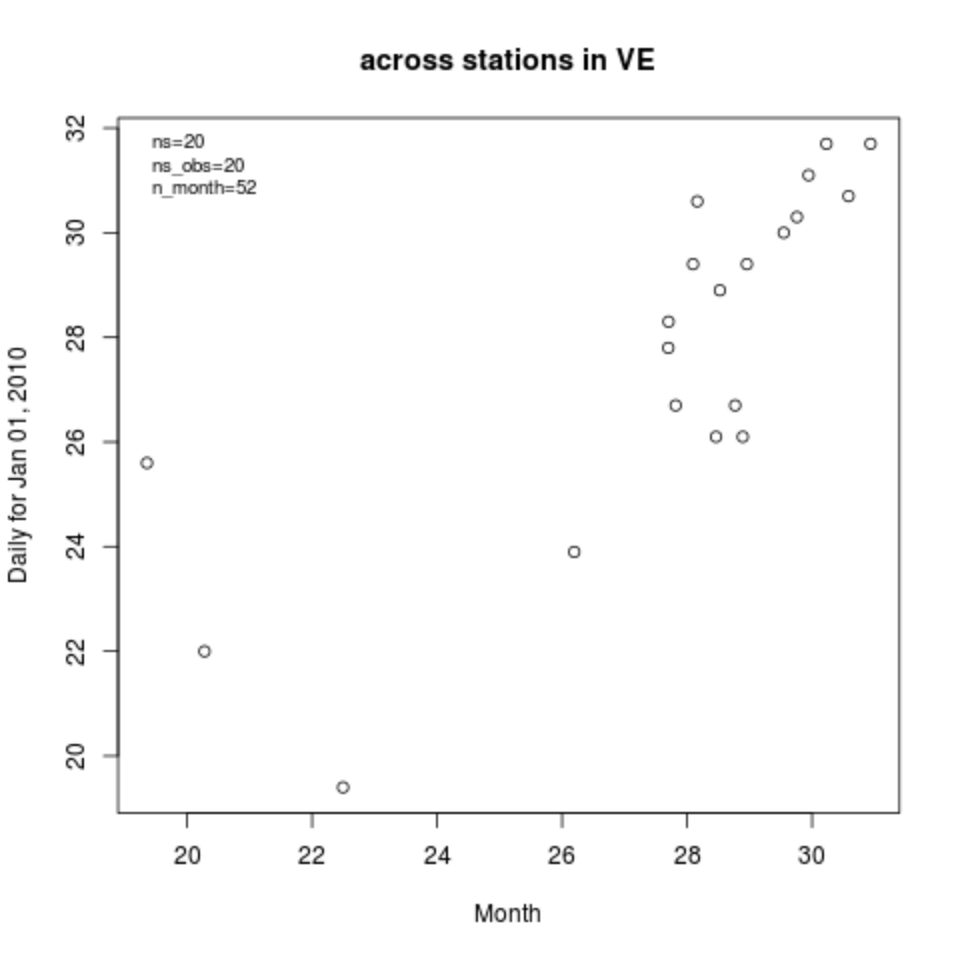




**Pearson Correlation coefficients for all five predicted models**

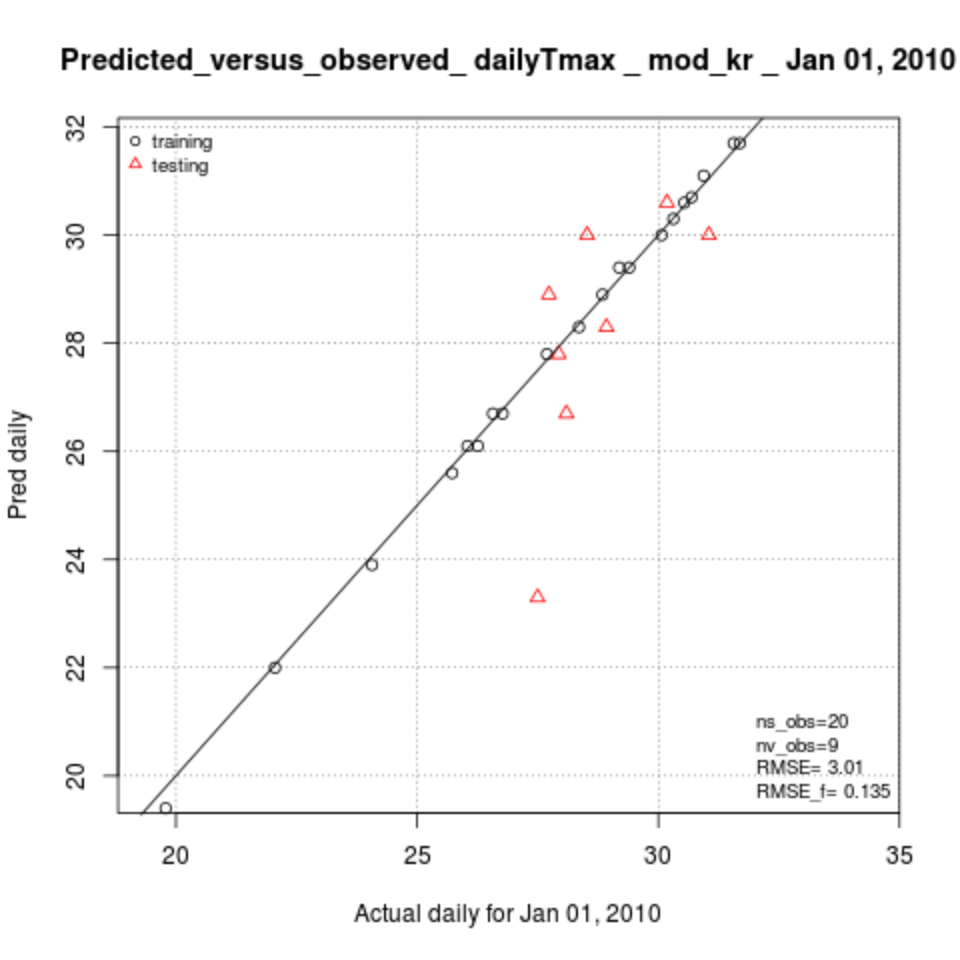
# MONTHLY TMAX STATIONS VS MONTHLY MODIS LST



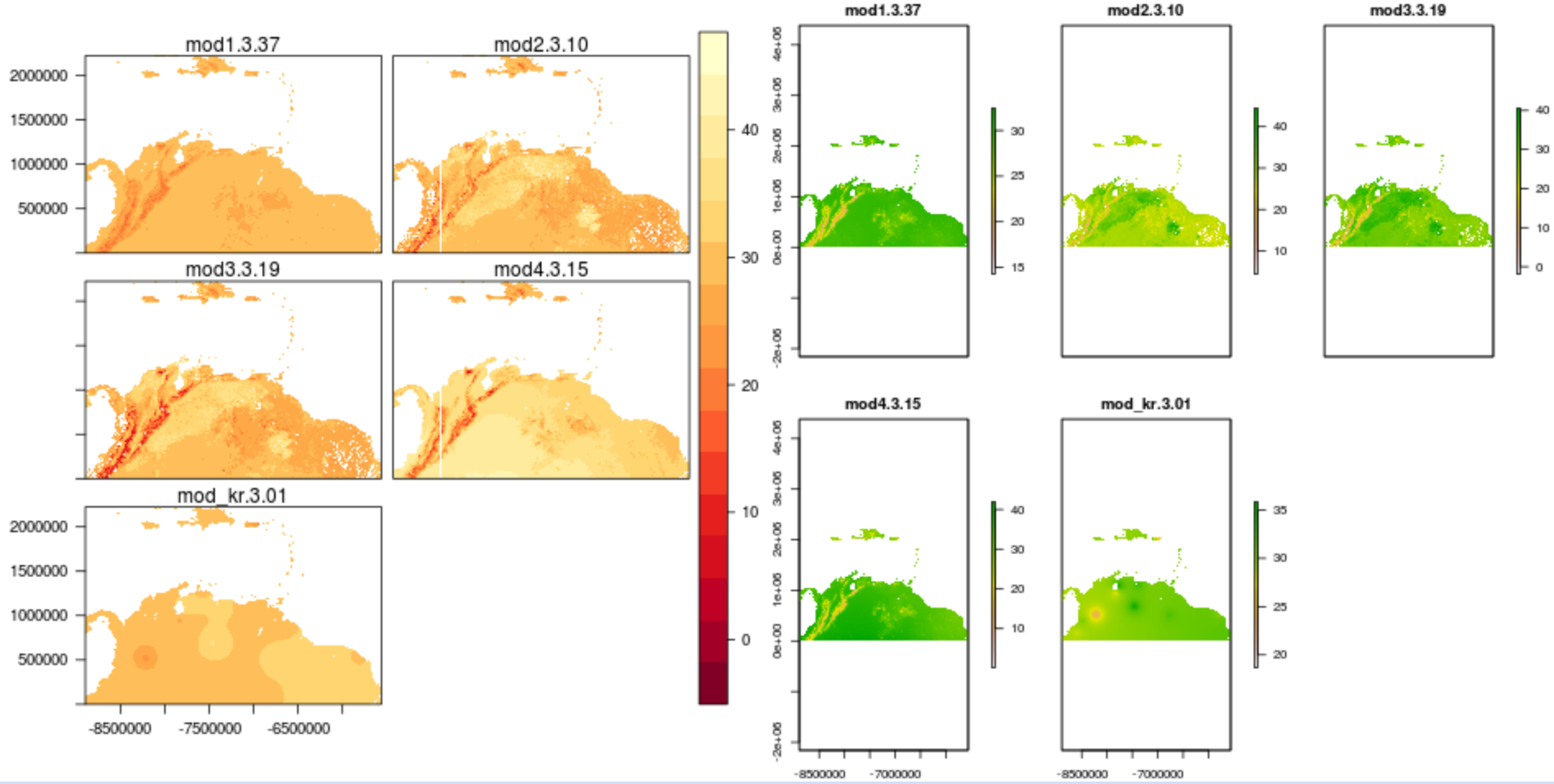
# DAILY TMAX VS MONTHLY TMAX FROM STATIONS



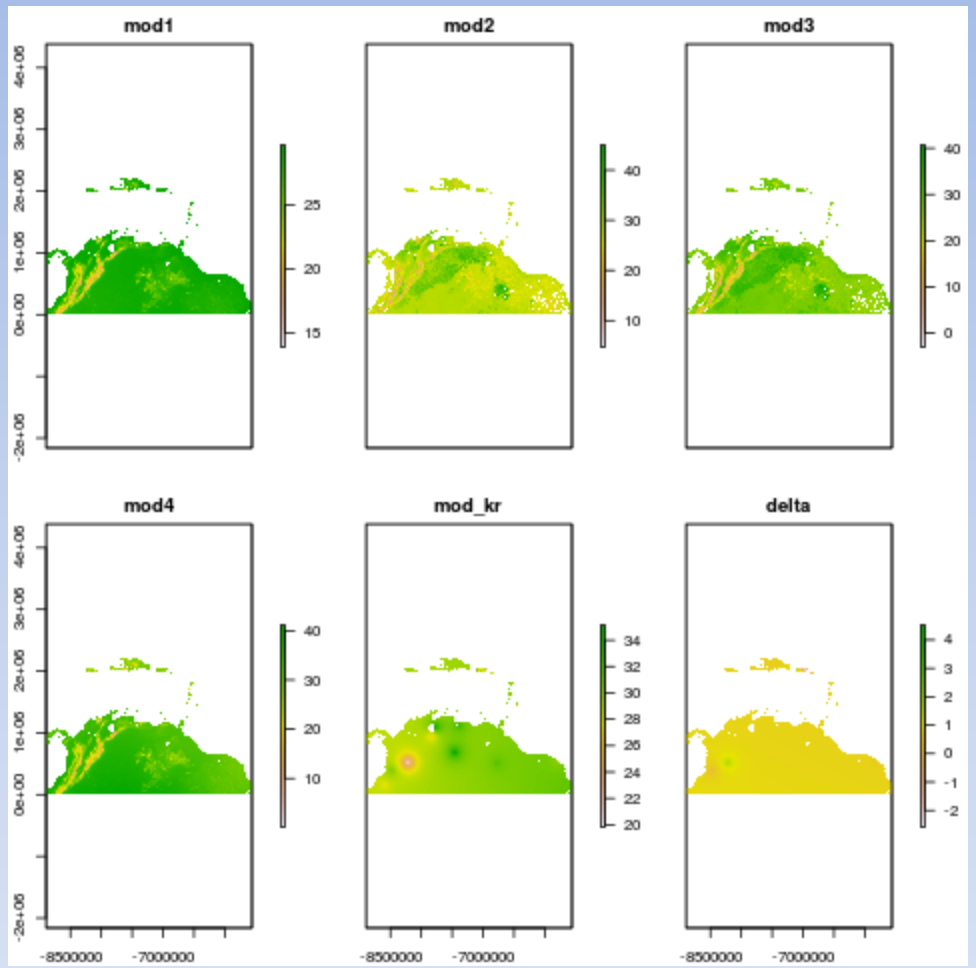
# PREDICTED VS OBSERVED DAILY TMAX



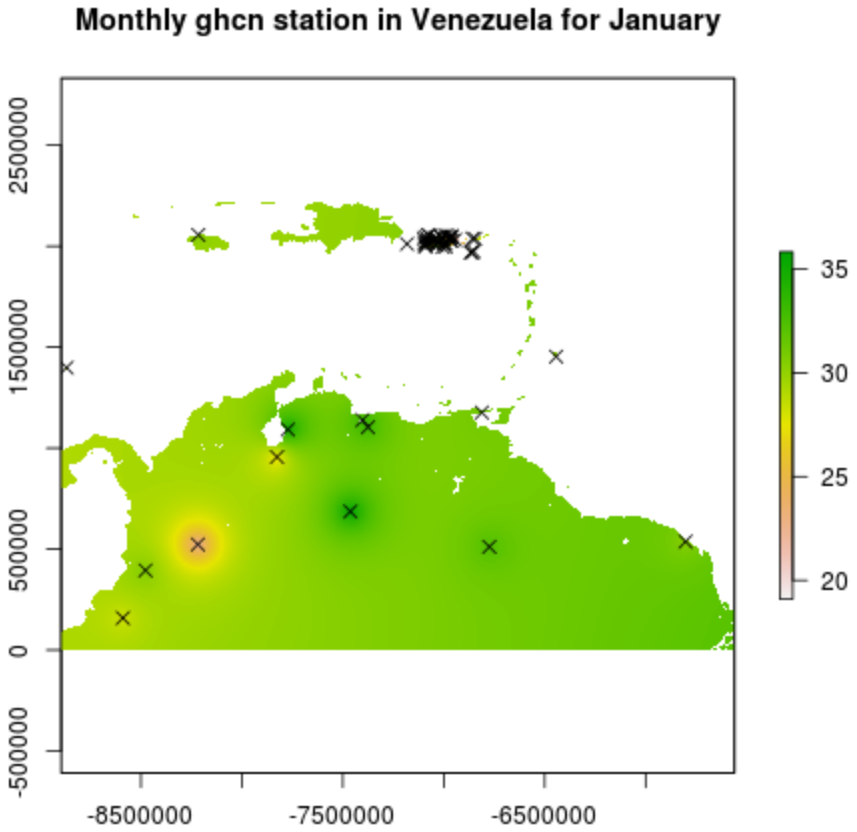
# CAI TMAX PREDICTED SURFACES ON JANUARY 1, 2010

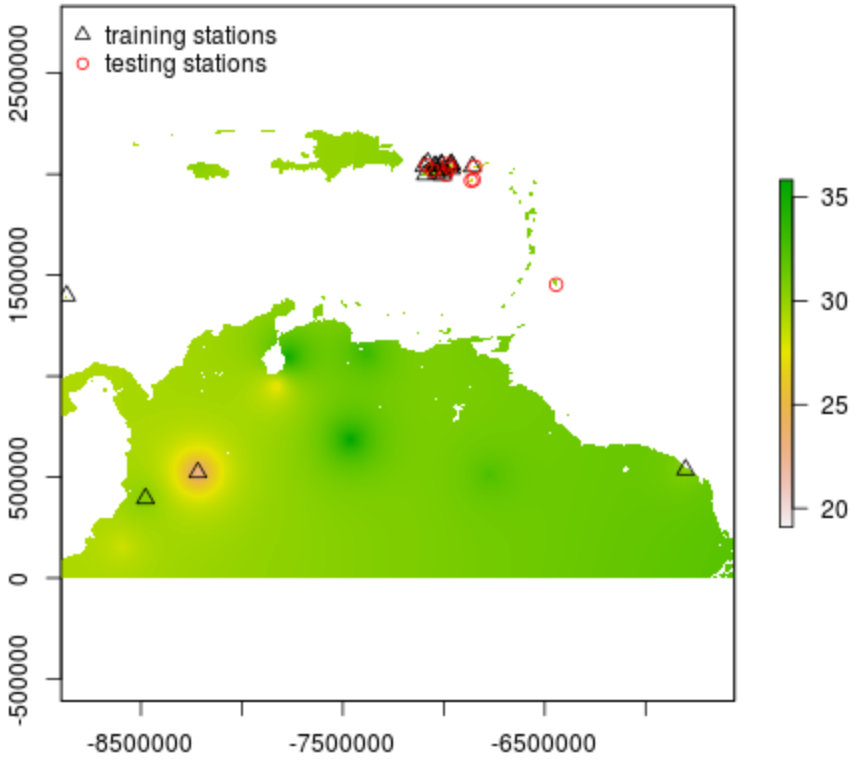


# MODELED MONTHLY TMAX AND DAILY DEVIATION (CLIMATOLOGY AND DELTA SURFACES)



# MAPS OF MONTHLY AND DAILY STATIONS USED IN THE PREDICTIONS



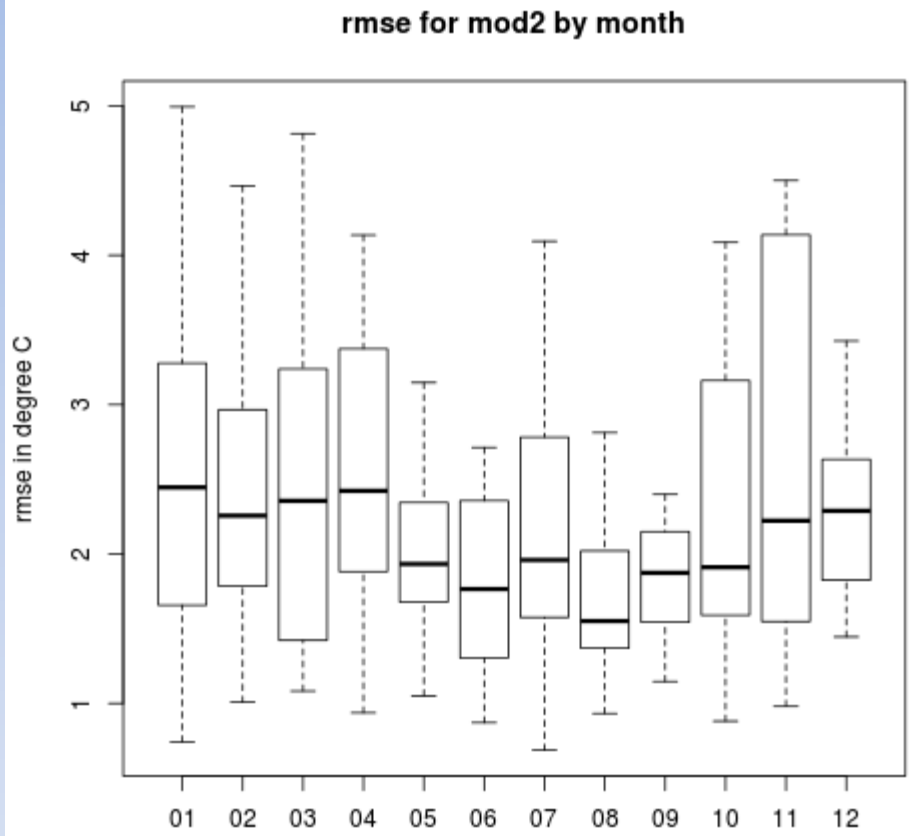
# TMAX CAI PREDICTION BOXPLOT: VENEZUELA

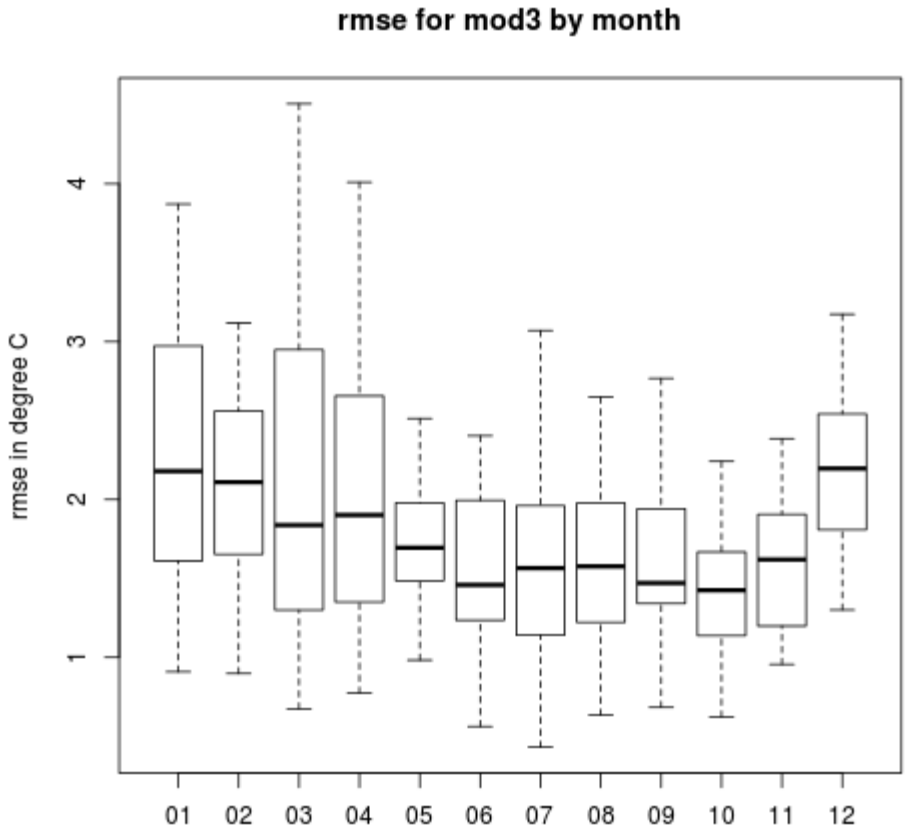
```
Browse[2]> summary_metrics_v
$avg
  pred_mod      mae     rmse           me         r         m50 run_samp   n
1     mod1 1.693040 2.218907  0.163463886 0.6638184  0.27240569        1 365
2     mod2 1.790911 2.414873 -0.046410445 0.5717142 -0.19600351        1 365
3     mod3 1.536335 2.023987  0.028467603 0.7373335  0.07481895        1 365
4     mod4 1.529399 2.039923 -0.094975809 0.7251565 -0.07783449        1 365
5   mod_kr 1.348965 1.826015  0.005717321 0.7713466  0.02577767        1 365

$median
  pred_mod      mae     rmse           me         r         m50 run_samp   n
1     mod1 1.535136 1.891401  0.11865345 0.7629409  0.24932957        1 365
2     mod2 1.626323 2.043338 -0.10626732 0.6478757 -0.23366489        1 365
3     mod3 1.340923 1.708009  0.03647456 0.8202180  0.10159454        1 365
4     mod4 1.388337 1.713170 -0.08771027 0.8139545 -0.06717567        1 365
5   mod_kr 1.179028 1.524403  0.02974346 0.8574326  0.04742165        1 365
```

CAI mod_kr has the lowest RMSE and MAE but the spatial pattern predicted is very smooth as observed in the Oregon case study.

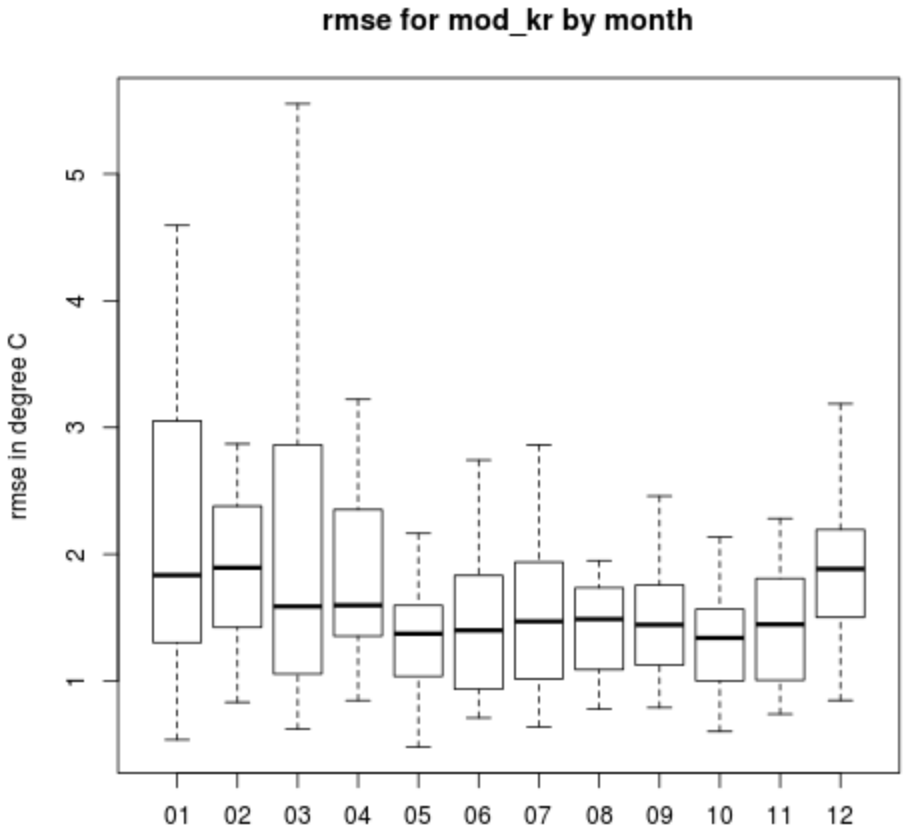
# MONTHLY AVERAGE RMSE
# TMAX CAI PREDICTION BOXPLOT: VENEZUELA

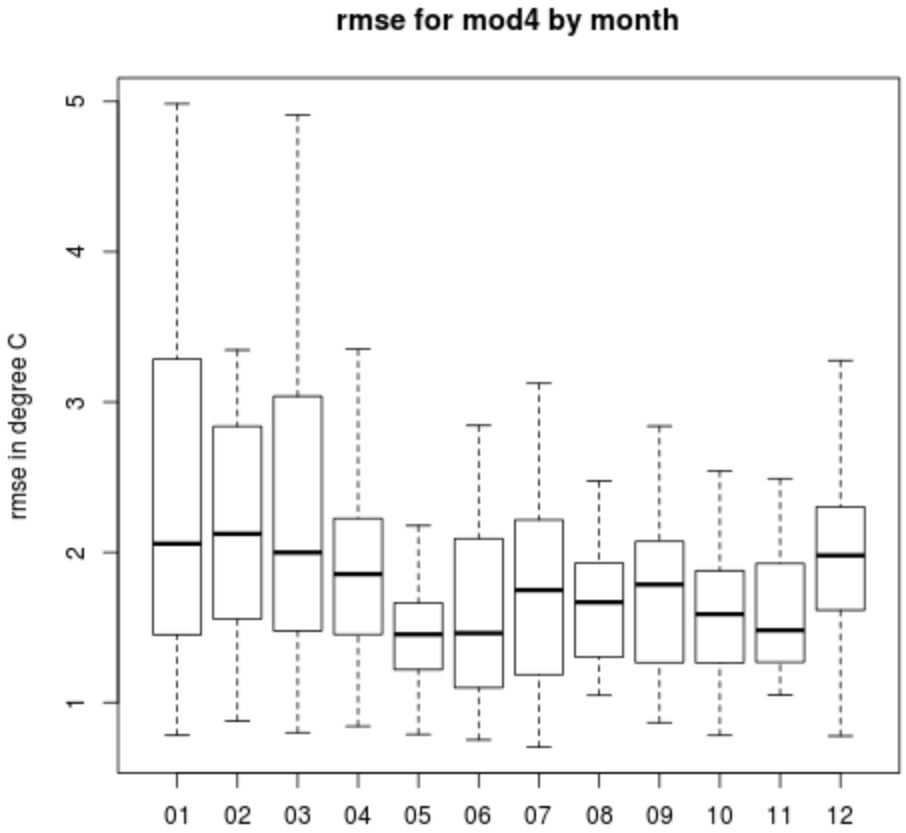



Mod2: y_var ~ s(LST)
Mod3: y_var ~ s(elev_s,LST)

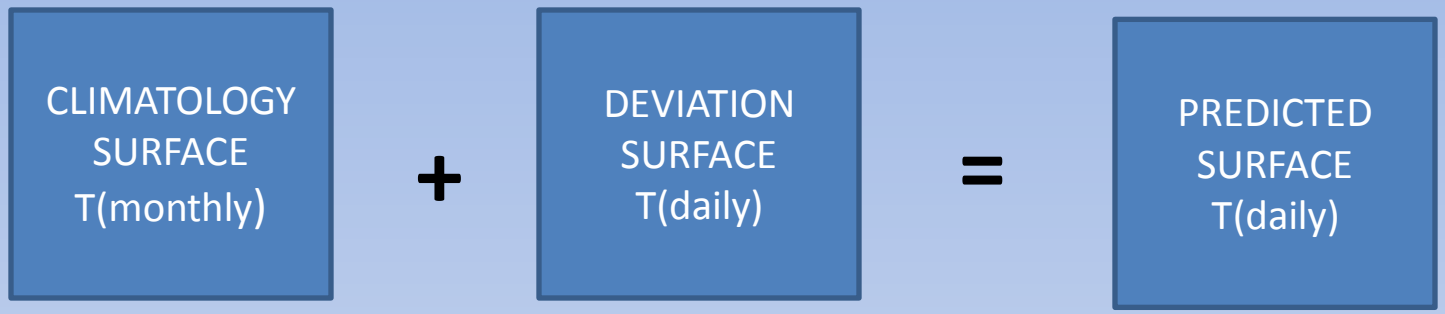
# MONTHLY AVERAGE RMSE
# TMAX CAI PREDICTION BOXPLOT: VENEZUELA




Mod4: y_var ~ s(lat) + s(lon)+ s(elev_s)

# CLIMATOLOGY AIDED INTERPOLATION

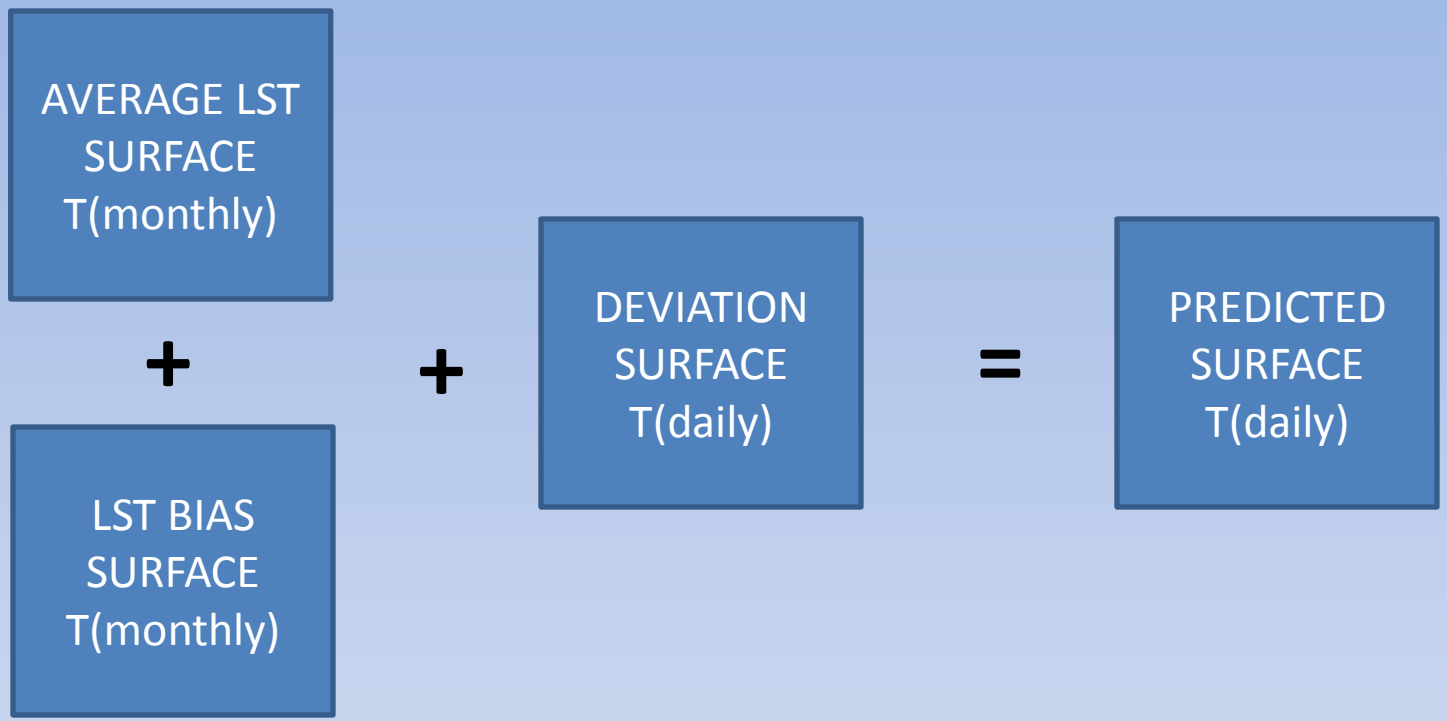



- The Climatology Aided Interpolation (CAI) method predicts temperatures by adding two surfaces: a climatology surface which represents a long term mean and; a deviation surface with represents the variation from the long term mean (Willmott 1995).

- CLIMATOLOGY SURFACE: generated from the monthly stations averages over 2000-2011. Average values are either kriged or modeled by GAM using covariates (model 1 to model 8).

- DEVIATION SURFACE : generated using the difference between monthly means and daily values at stations. It relates to weather. Deviations values are kriged to generate a continuous surfaces.

# FUSION OF SATELLITE STATION




- The Fusion of Satellite Station (FSS) is a new method that incorporates satellite based information with station information.
- LST SURFACE: calculated for each month by averaging values for the 2001-2010 time period. LST averages correspond to long term means and provide spatial structure to the predictions.
- BIAS SURFACE: generated from the difference between monthly means at stations and LST monthly averages. Bias is either kriged or modeled by GAM using covariates (model 1 to model 8).
- DEVIATION SURFACE : generated using the difference between monthly means and daily values at stations. It relates to weather. Deviations values are kriged to generate a continuous surfaces.