

# **Analysis of the performance of the WRF model in high latitude region of the southern hemisphere**

Robson Will

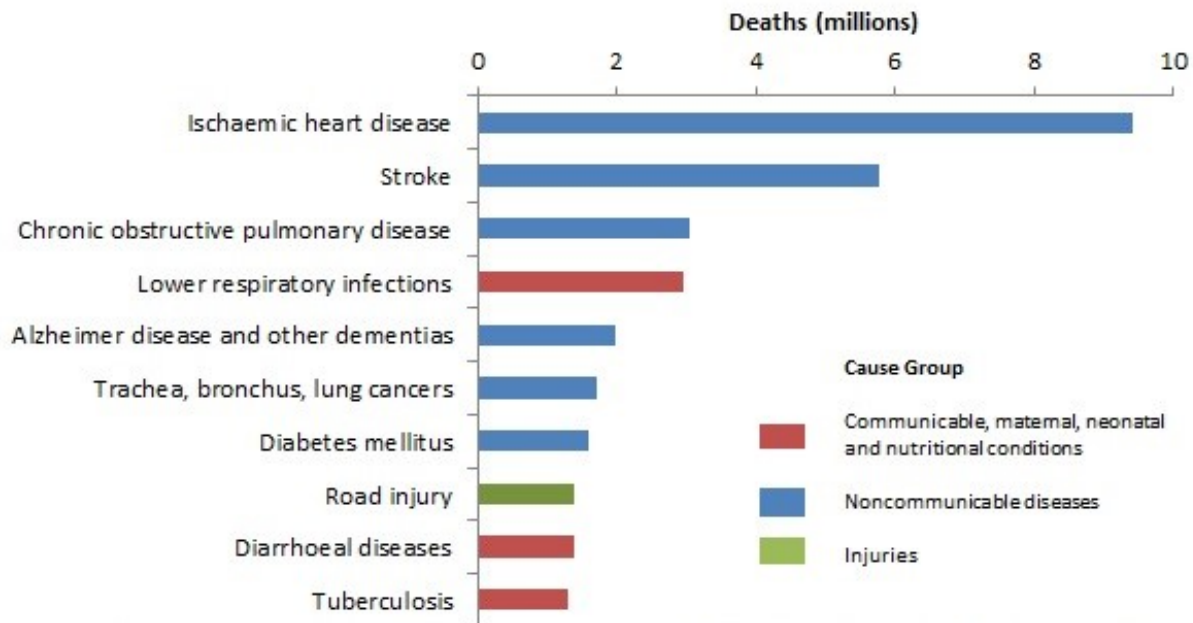
supervisor: Dr. Leonardo Hoinaski

supervisor: Dra. Marina Hirota



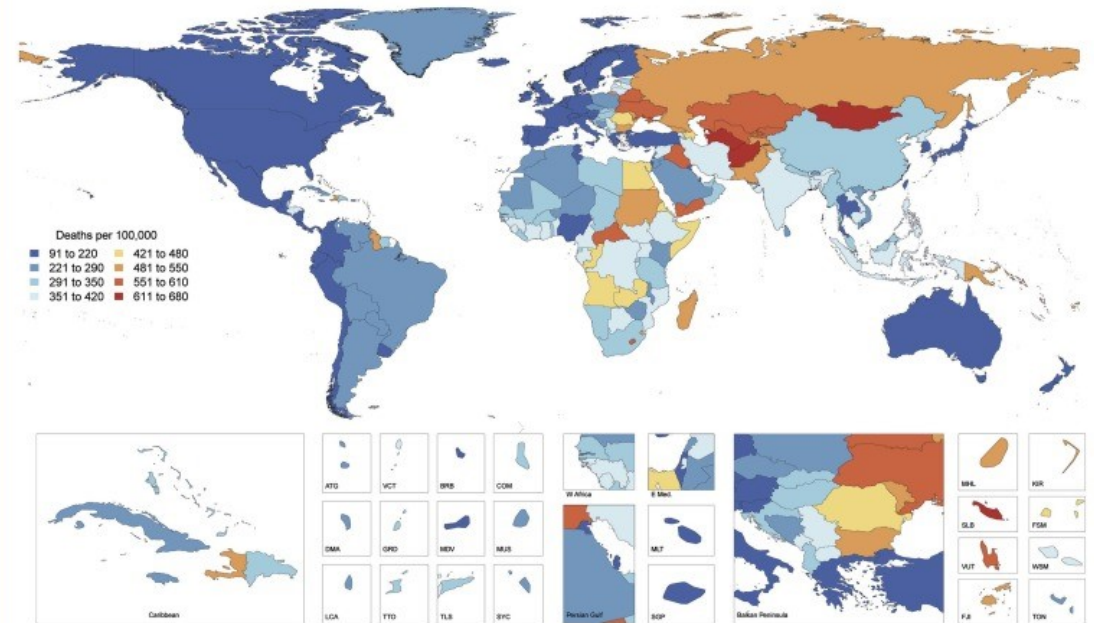
# Cardiorespiratory diseases

## Top 10 global causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.

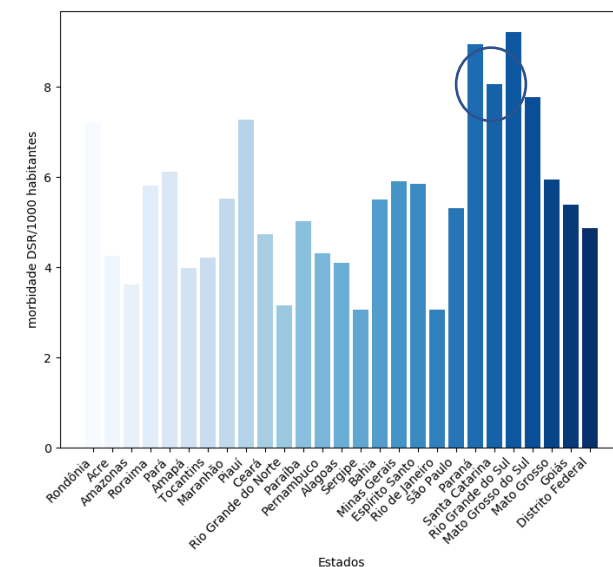
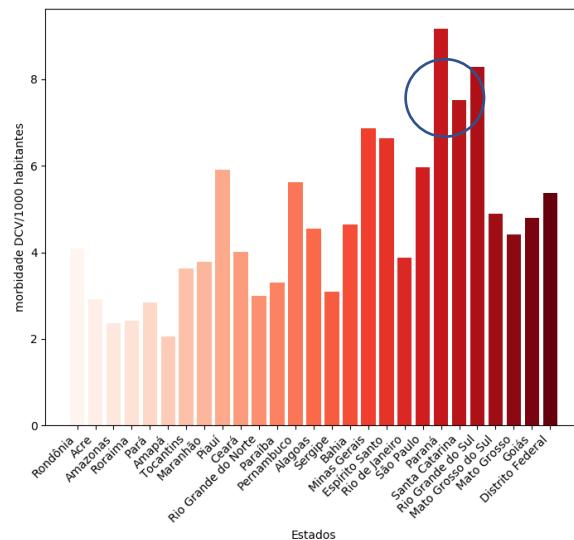
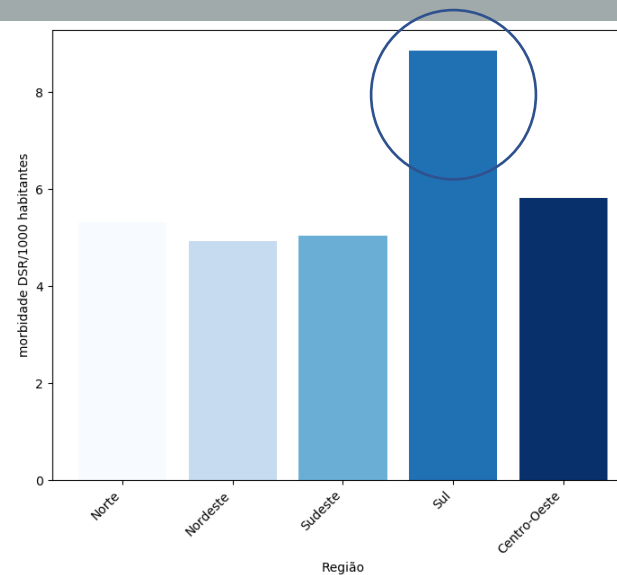
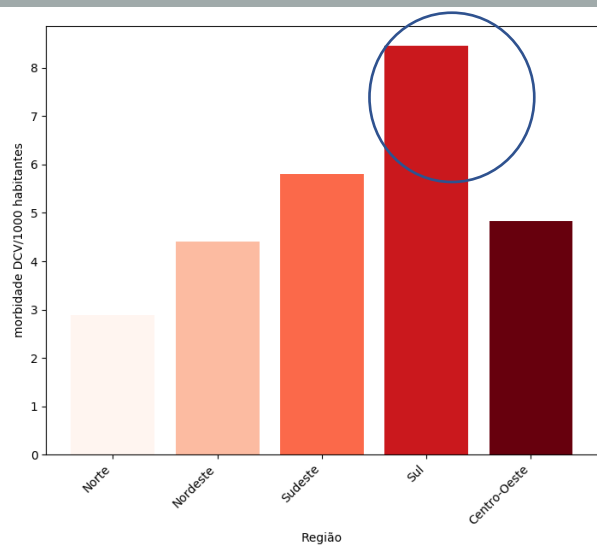
## CENTRAL ILLUSTRATION: Global Map, Age-Standardized Death Rate of CVD in 2015



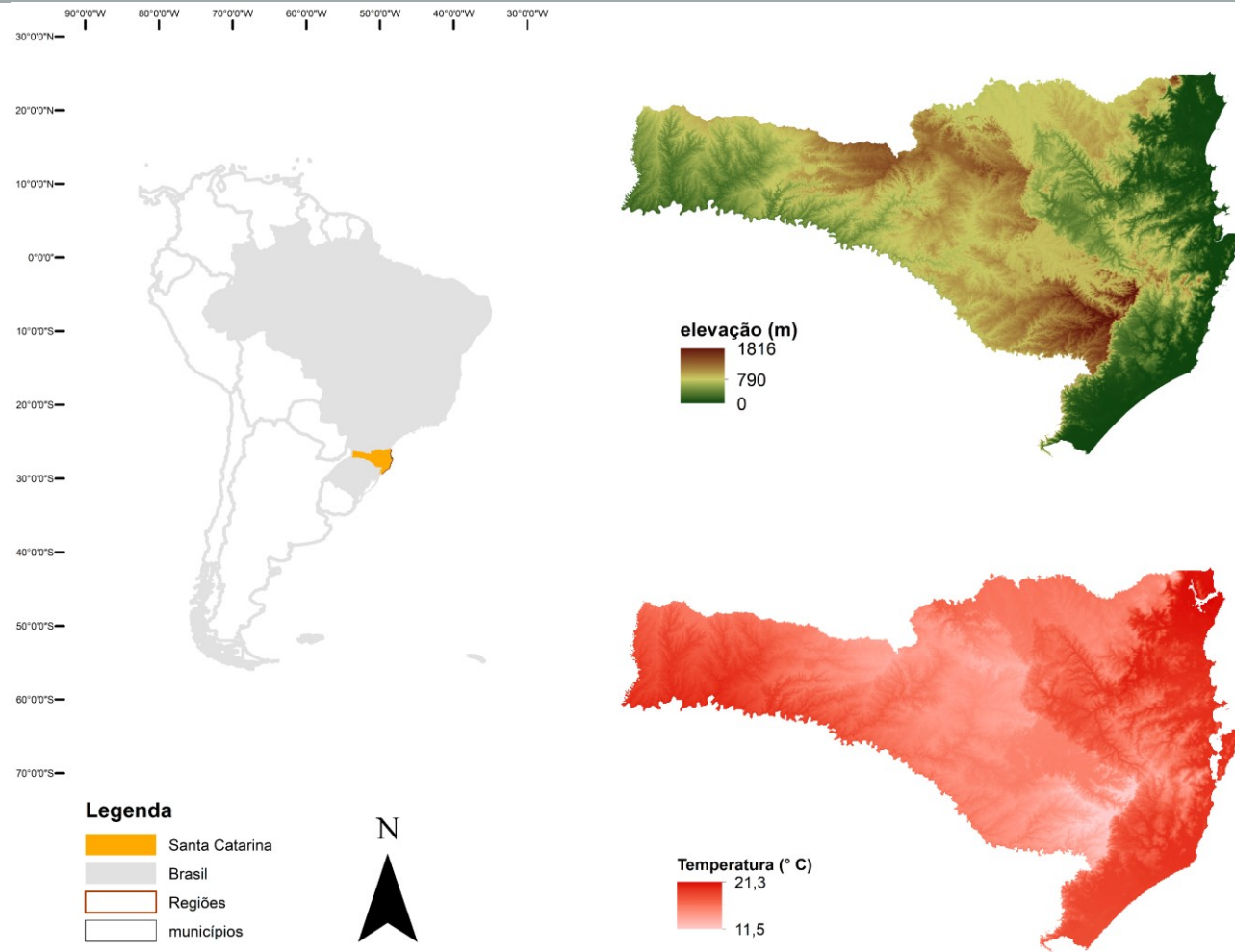
Roth, G.A. et al. J Am Coll Cardiol. 2017;70(1):1-25.



# Cardiorespiratory diseases in Brazil



# Study location



# Modeling domains and namelist



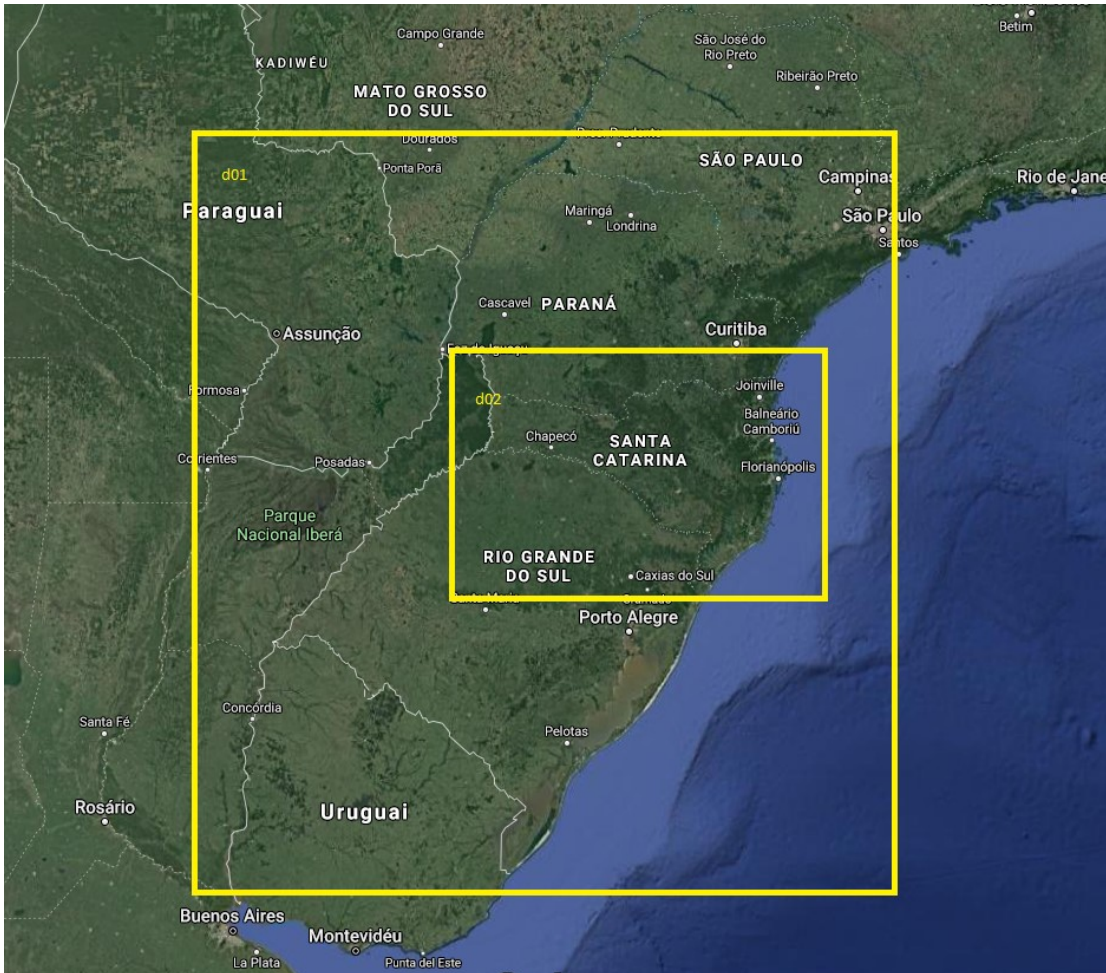
configurations used::

- Microphysics (WSM6, Thompson, Morrison);
  - boundary-layer option (YSU/MM5, AMC2/Pleim-XU);
  - land-surface option (NOAH);
  - Longwave/shortwave radiation option (RRTM/RRTM);
  - cumulus option (kain-Fritch).
- 
- Grid d01 - 45km
- Parent grid ratio 3
- Grid d02 - 15km





# Namelist tests



configurations used:

| simulation | microphysics option            | boundary-layer option   |
|------------|--------------------------------|-------------------------|
| 1          | 6 - WSM 6-class graupel scheme | 7 - ACM2 (Pleim) scheme |
| 2          | 8 - Thompson graupel scheme    | 1 - YSU scheme          |
| 3          | 6 - WSM 6-class graupel scheme | 1 - YSU scheme          |
| 4          | 8 - Thompson graupel scheme    | 7 - ACM2 (Pleim) scheme |
| 5          | 10 - Morrison 2-moment scheme  | 7 - ACM2 (Pleim) scheme |
| 6          | 10 - Morrison 2-moment scheme  | 1 - YSU scheme          |



# Materials and Methods - analysis criteria

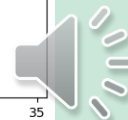
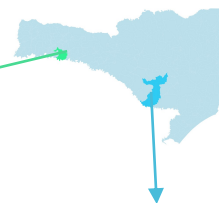
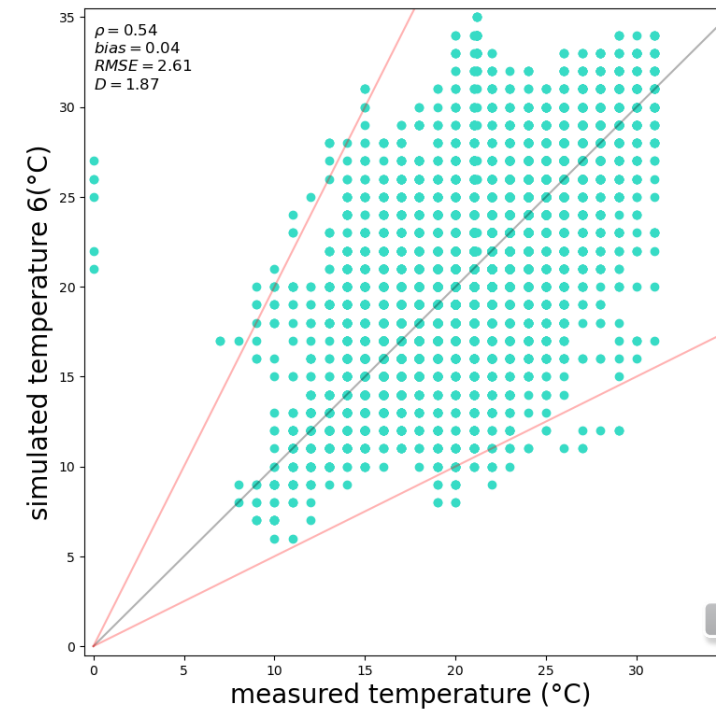
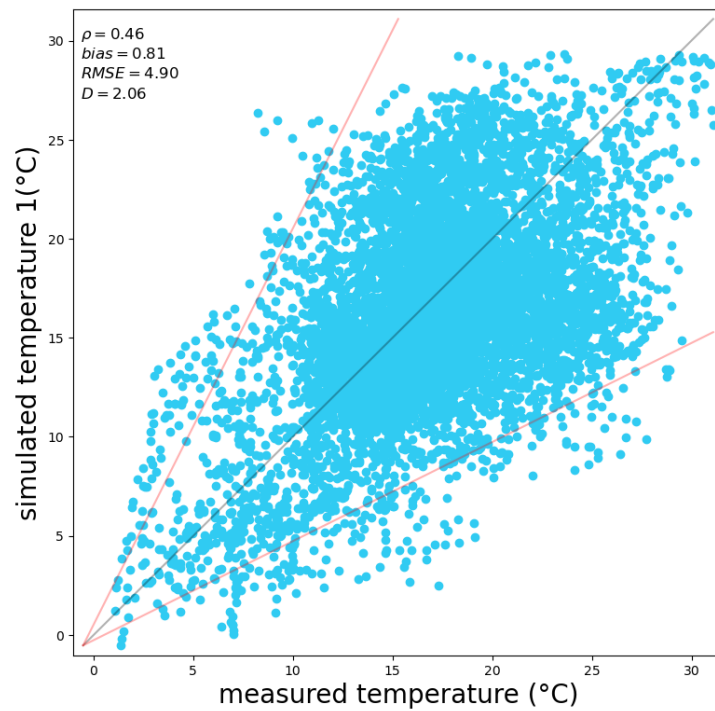
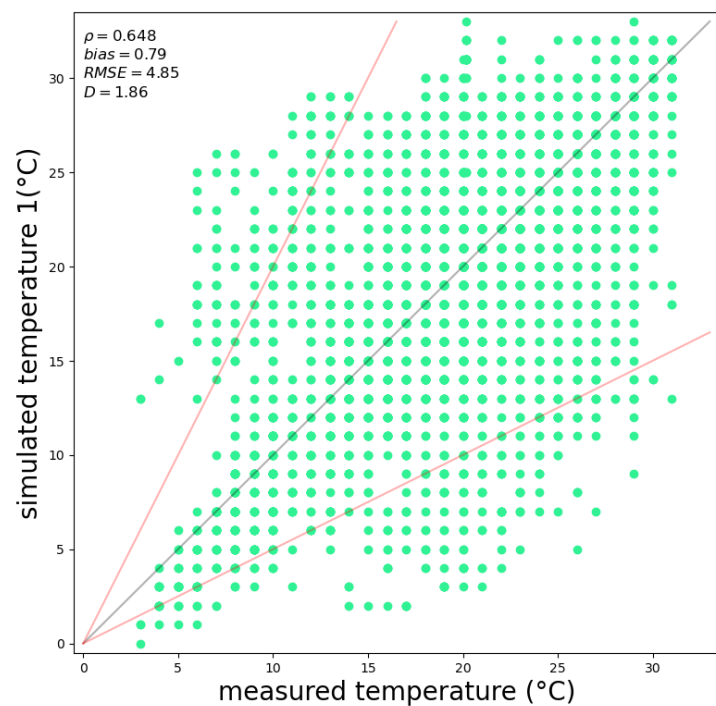
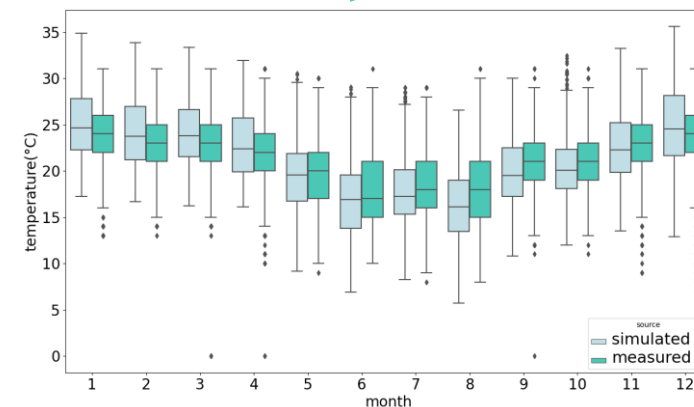
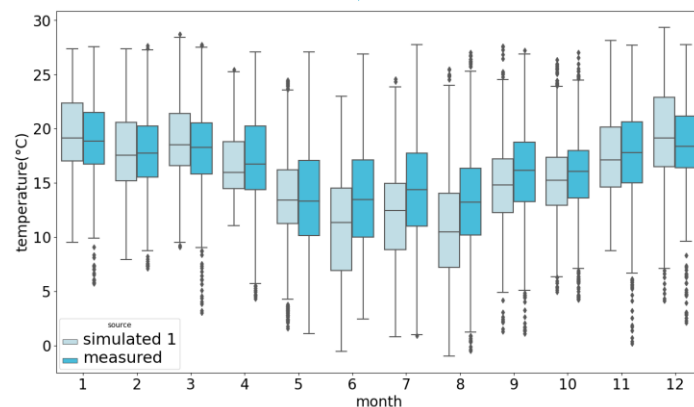
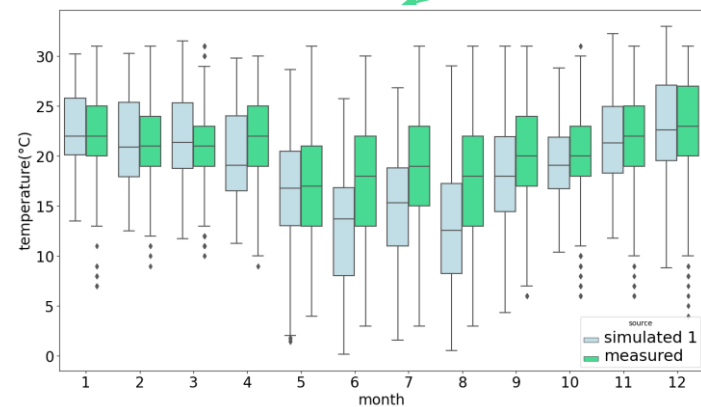
- Weather datas Metar and Epagri/Ciram
- GFSanl 0.5°

## Analysis

- Correlation – spearman
- Bias
- RMSE
- D-pielke

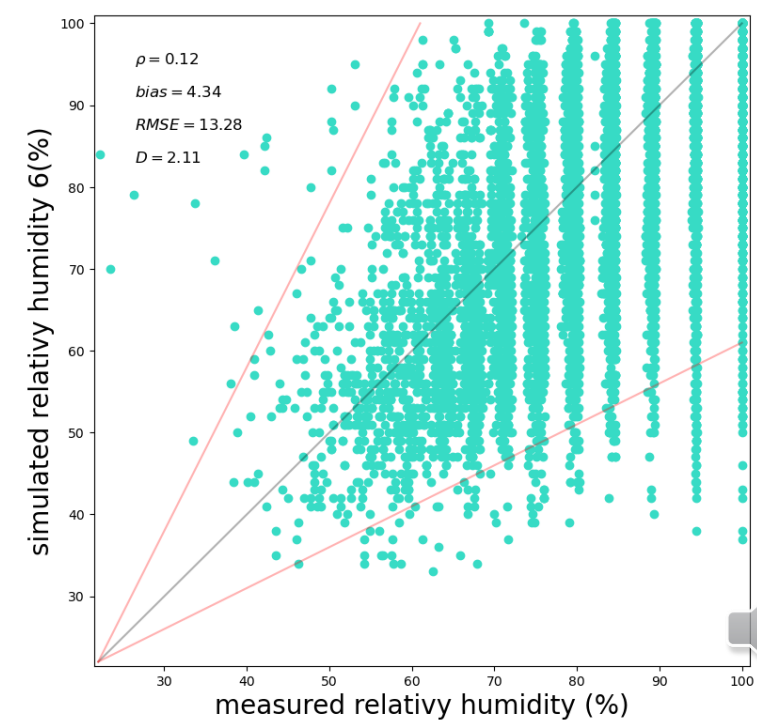
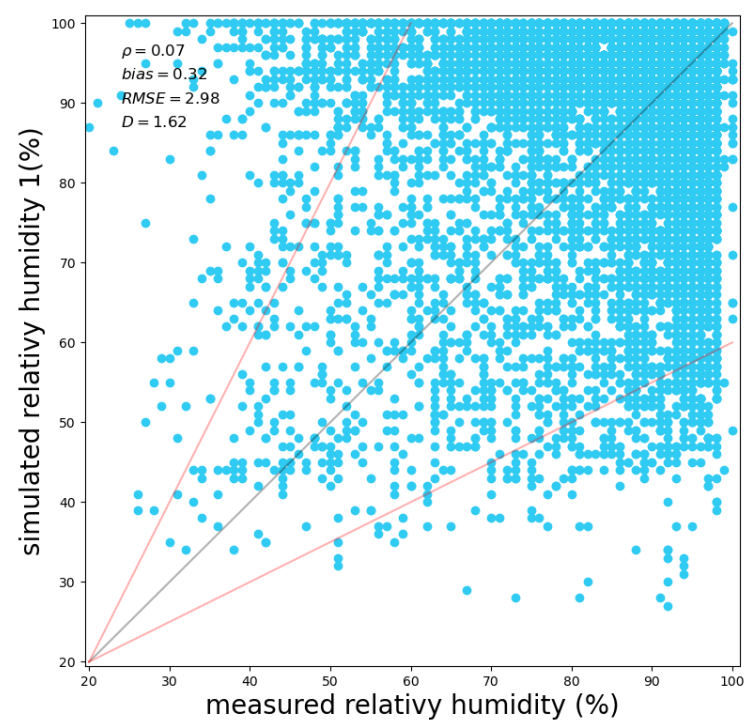
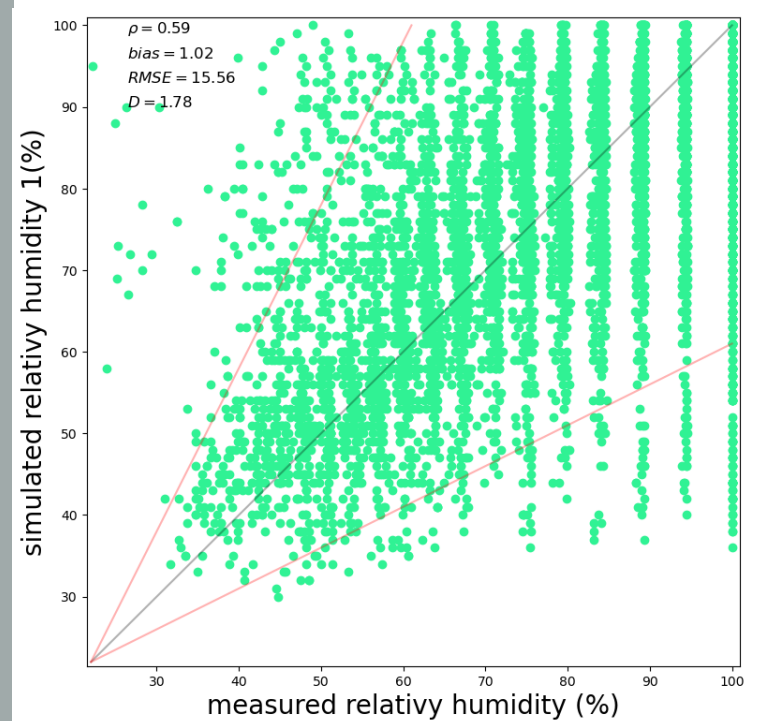
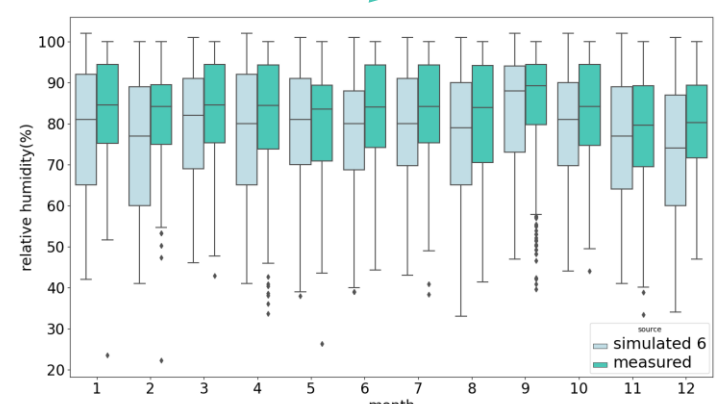
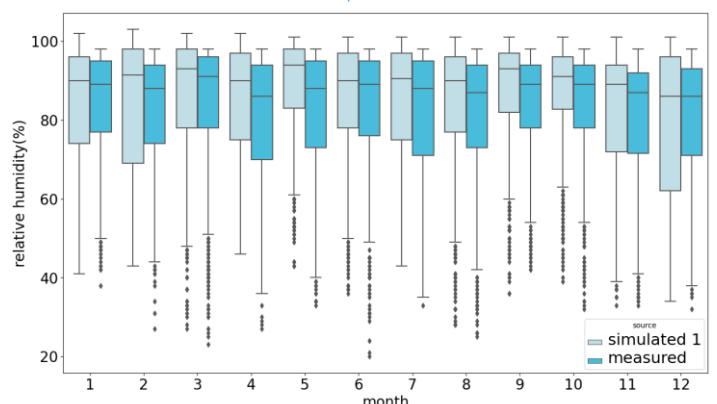
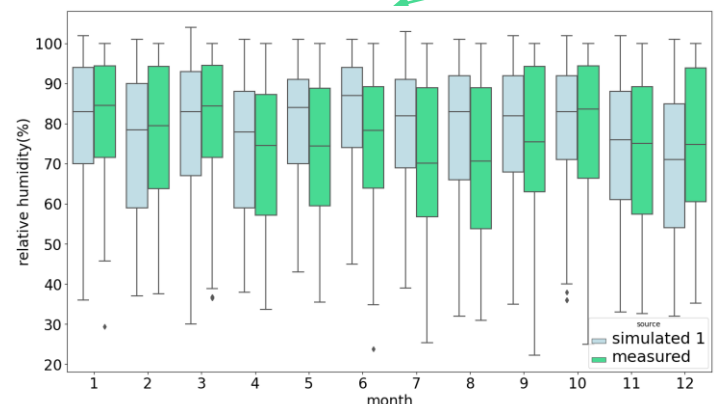
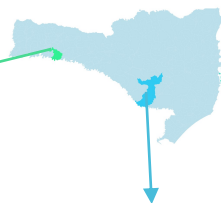


# Results

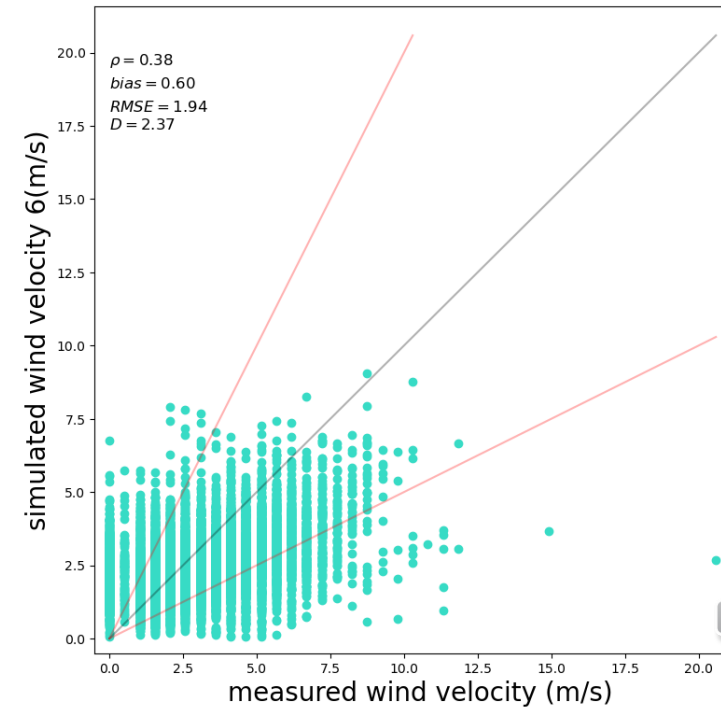
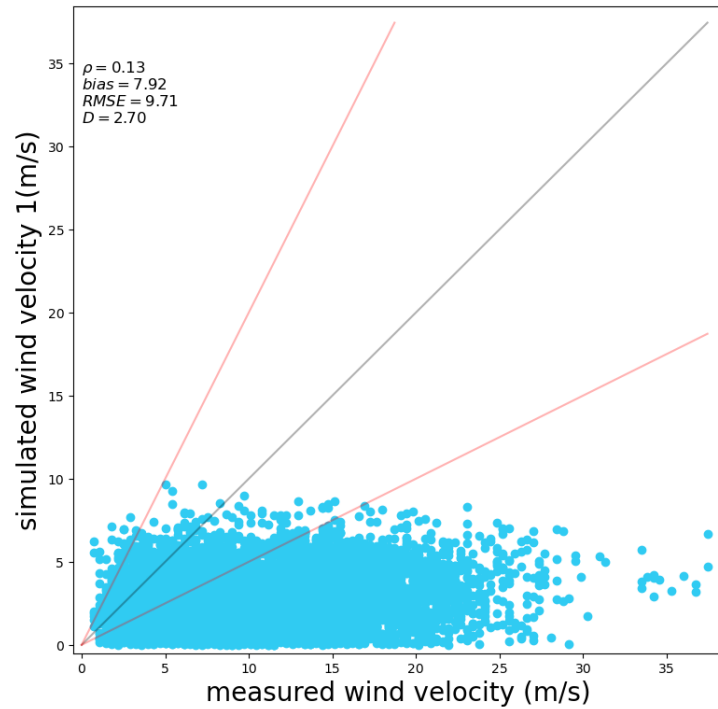
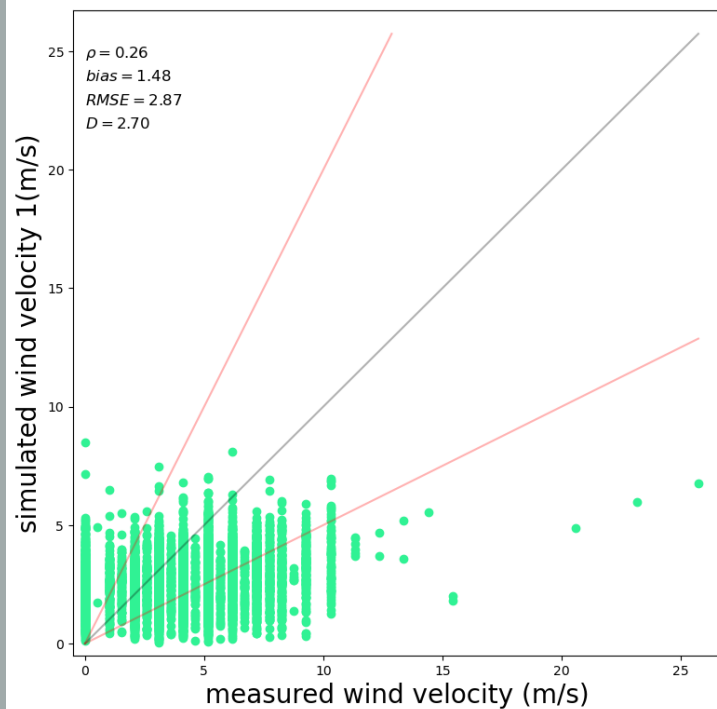
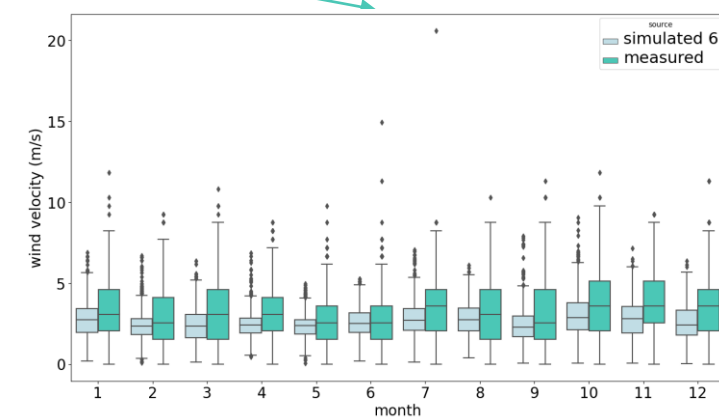
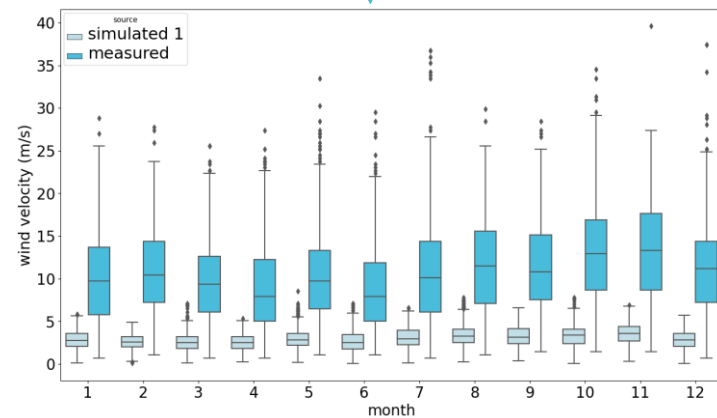
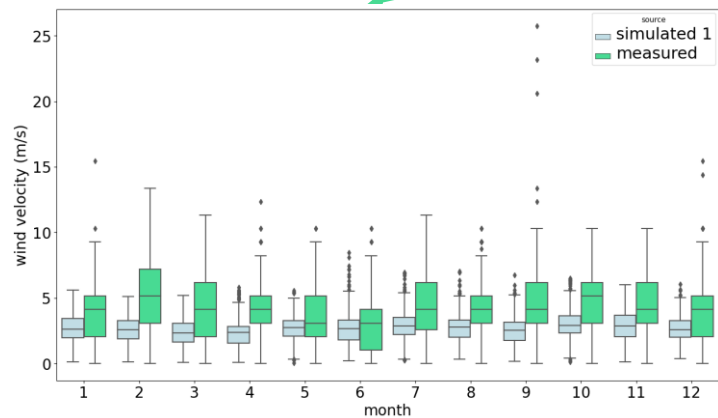
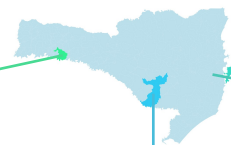




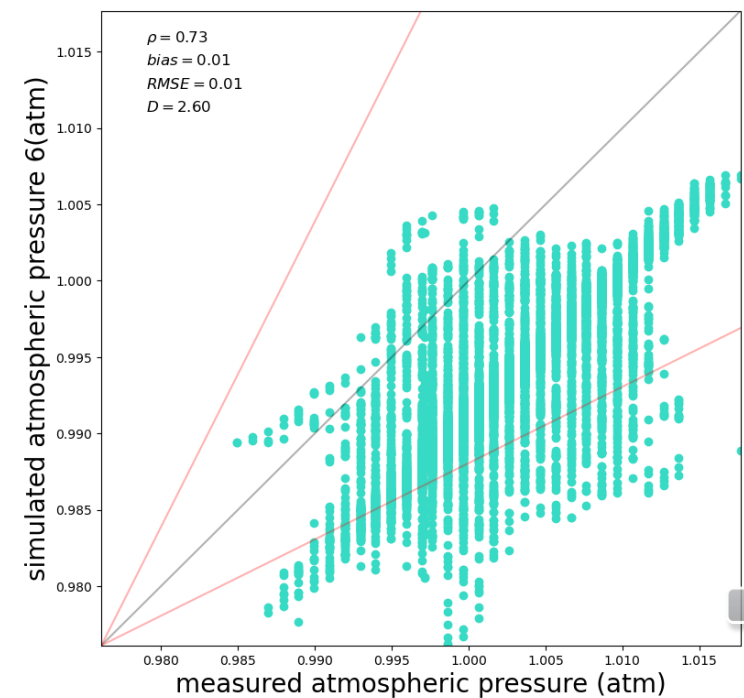
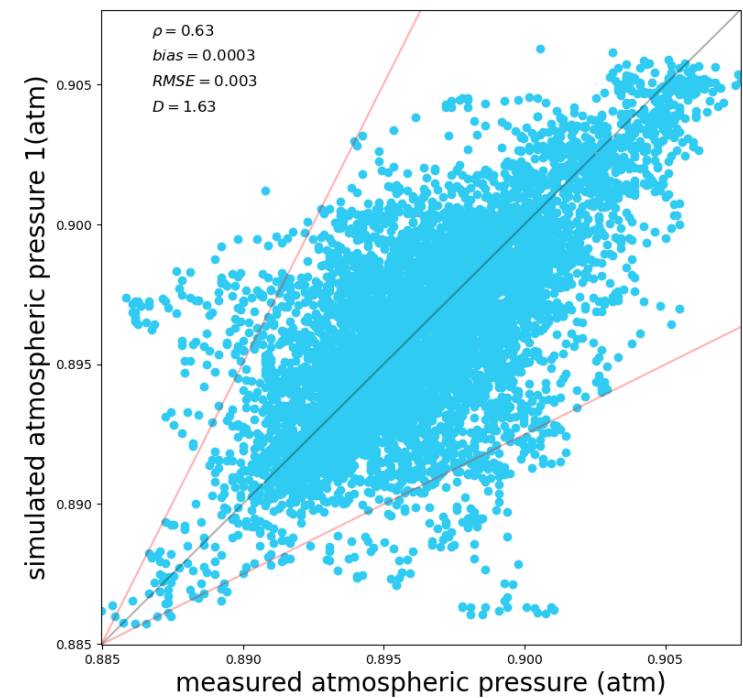
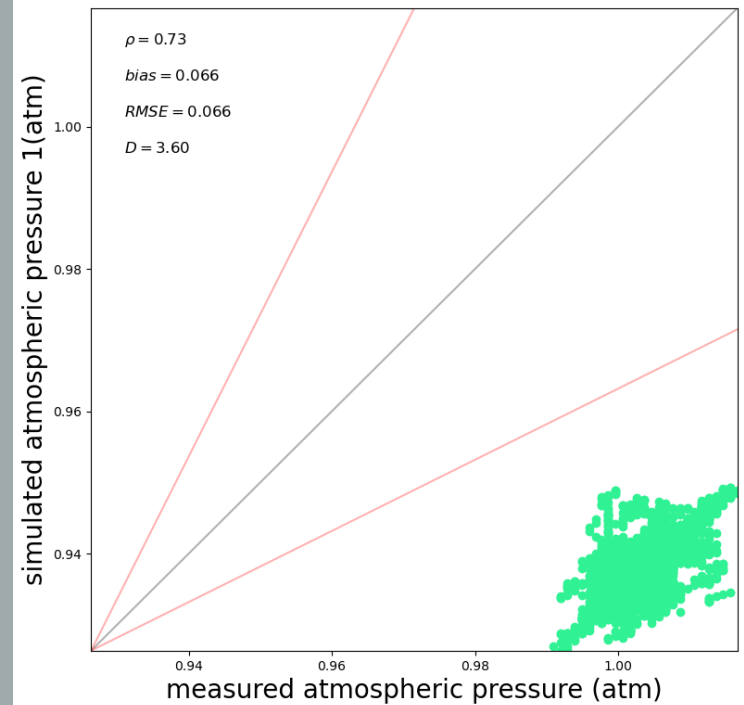
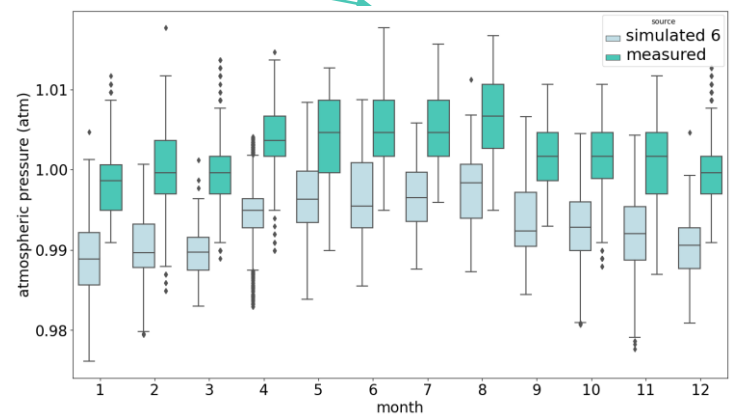
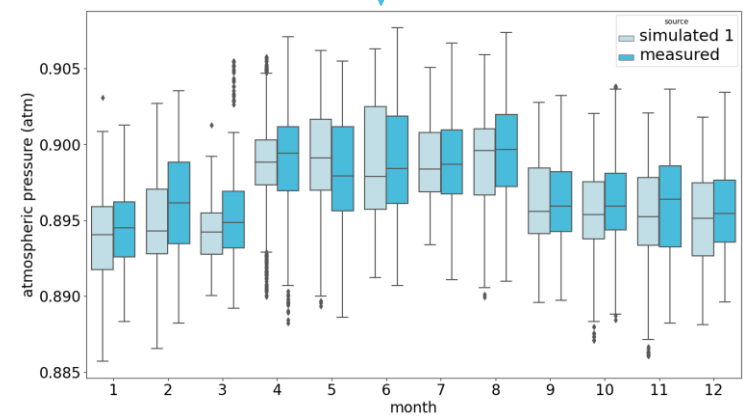
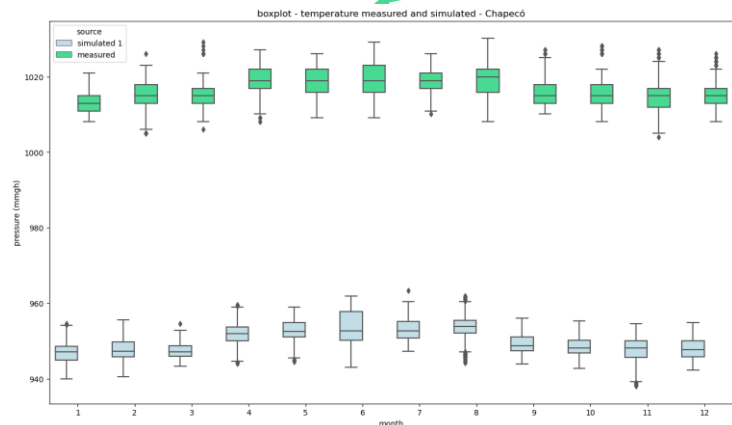
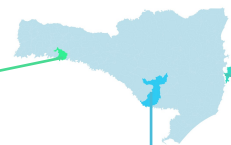
# Results



# Results



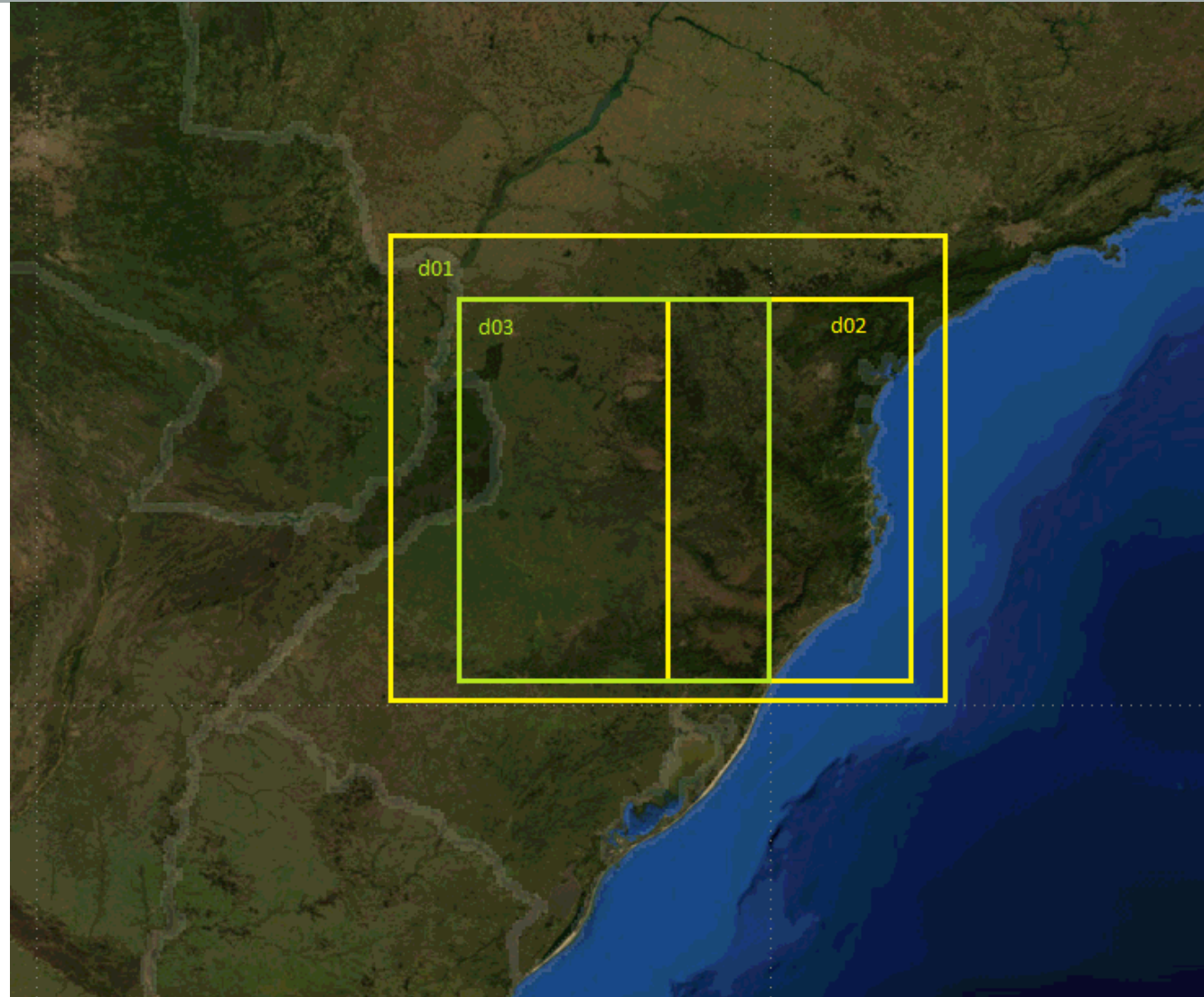
# Results



| city          | Simulation | Score | Difference % |
|---------------|------------|-------|--------------|
| Florianópolis | 1          | 3     | 36%          |
|               | 2          | 5     | 27%          |
|               | 3          | 3     | 19%          |
|               | 4          | 1     | 50%          |
|               | 5          | 1     | 47%          |
|               | 6          | 7     | 17%          |
| Lages         | 1          | 6     | 20%          |
|               | 2          | 2     | 41%          |
|               | 3          | 5     | 23%          |
|               | 4          | 5     | 33%          |
|               | 5          | 2     | 16%          |
|               | 6          | 0     | 21%          |
| Chapecó       | 1          | 9     | 7%           |
|               | 2          | 2     | 13%          |
|               | 3          | 0     | 10%          |
|               | 4          | 1     | 19%          |
|               | 5          | 4     | 9%           |
|               | 6          | 4     | 7%           |



# Conclusion





# Thank you

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