Statistical Downscaling of Surface temperature in different Köppen-Geiger climate zones of Equatorial South America.

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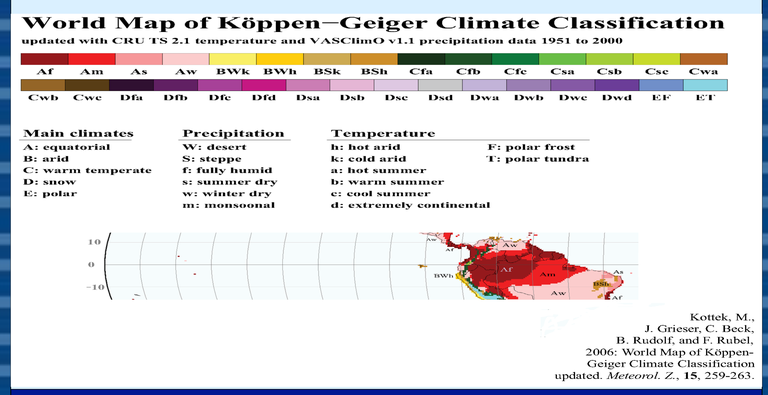
- Downscaling techniques are used to generate finer scale projections of near surface climatologies (Salameh, et al. 2008).
- Statistical downscaling (SD) outputs are comparable to dynamical downscaled (DD) ones (Huth, 2011).
- SD techniques offer a low cost (computational and monetary) alternative to DD.
- Few studies have been made downscaling NCEP/NCAR Reanalysis fields over Equatorial South America.

Background

Given the low resolution of the current global circulation modelsl ocal orographic effects and other physiographical features are lost.

Purpose & Aims

- Compare the performance of different temperature SD models (MSEs).
- Identify the most suitable models for a given zone/weather station.



Predictors

Table 1 Predictor variables available for the CGCM 3.1 and the NCEP/NCAR Reanalysis

Mean sea level pressure	500hPa wind speed	850hPa wind speed
1000hPa wind speed	500hPa U component	850hPa U component
1000hPa U component	500hPa V component	850hPa V component
1000hPa V component	500hPa vorticity (Pa/s)	850hPa vorticity (Pa/s)
1000hPa vorticity (Pa/s)	500hPa geopotential	850hPa geopotential
1000hPa wind direction	500hPa wind direction	850hPa wind direction
1000hPa divergence (s^{-1})	500hPa divergence (s^{-1})	850hPa divergence (s^{-1})
1000hPa specific humidity	500hPa specific humidity	850hPa specific humidity
Temperature at 2m		

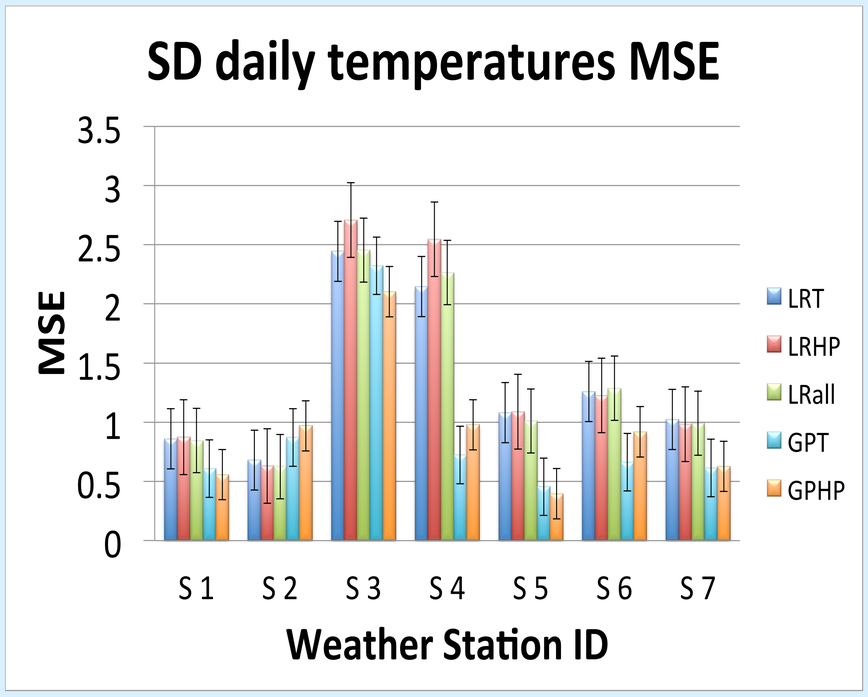
Predictands

- Weather station daily data from 5

Methods and Results

Models.

Model type	Regression method	Predictors used	Model ID
Linear	MLR	500hPa-850hPa Geopotentials From the surrounding 20 NCEP/NCAR grid cells (5 x 4)	LRHP
Linear	MLR	NCEP/NCAR temperatures from the surrounding 20 NCEP/ NCAR grid cells (5 x 4)	LRT
Linear	MLR	SW selected from the surrounding 20 NCEP/ NCAR grid cells (5 x 4)	LRall
Nonlinear	Genetic Programming	Same as LRHP	GPHP
Nonlinear	Genetic Programming	Same as LRT	GPT

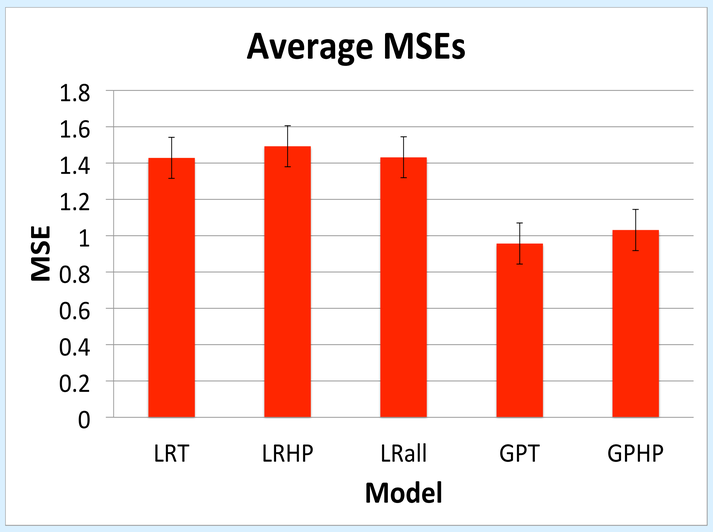


Zones and Weather Station:

Af: S1

Discussion

- Higher errors correspond to Am and Bs.
- No significant differences between predictors.
- Nonlinear methods outperformed the linear ones.



Next Steps

- Try different nonlinear methods/predictor selection methods (Gpall).
- Consider using a different Reanalysis product (ERA40).
- Obtain downscaled outputs under different emission scenarios (A2, A1B).

Limitations

- NCEP/NCAR Reanalysis outputs over the equatorial zone.
- Lack of weather stations with reliable and continuing climatological data for each climate zone.
- Observed record length.

Acknowledgments

- Data Access Integration for the access