

Statistical Downscaling of Surface temperature in different Köppen-Geiger climate zones of Equatorial South America. Carlos F. Gaitán¹ & Jose M. Plazas² ¹University of British Columbia, Vancouver, Canada,



Correspondence to: Carlos F. Gaitan cgaitan@eos.ubc.ca

² Centro Investigaciones Oceanográficas e Hidrográficas, Cartagena, Colombia

- 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	Methods and Results				Discussion			
Given the low resolution of the current global circulation models	Models.					 Higher errors correspond to Am and Bs. No significant differences between 		
ocal orographic effects and other physiographical features are lost.	Model type	Regression method	Predictors used	Model ID	•	predictors. Nonlinear methods outperformed the linear ones		
			500hPa-850hPa					
Purpose & Aims			Geopotentials			Average MSFs		
 Compare the performance of different temperature SD models (MSEs). Identify the most suitable models for a given 	Linear	MLR	From the surrounding 20 NCEP/NCAR grid cells (5 x 4)	LRHP				
zone/weather station.			NCEP/NCAR					

World Map of Köppen–Geiger Climate Classification

updated with CRU TS 2.1 temperature and VASClimO v1.1 precipitation data 1951 to 2000															
Af	Am	As	Aw	BW	k BW	h B	Sk E	Sh (Cfa	Cfb	Cfc	Csa	Csb	Csc	Cwa
Cwb	Cwe	Dfa	Dfb	Dfc	Dfd	Dsa	Dsb	Dsc	Ds	d Dwa	a Dwb	Dwc	Dwd	\mathbf{EF}	ЕТ
Main	clima	tes	Pr	ecipi	tation		Tem	perat	ure						
Main A: equ	clima atorial	tes	Pr W:	ecipi deser	tation t	_	Tem h: hot	perat t arid	ure	F	: polar	frost			
Main A: equ B: arid	clima atorial I	ites	Pr W: S:	ecipit deser steppe	tation t	_	Tem h: hot k: col	perat t arid d arid	ure	F	: polar : polar	frost tundra			
Main A: equ B: arid C: war	clima atorial I rm tem	tes perate	Pr W: S: f: f	ecipit deser steppe ully hu	tation t umid	_	Tem h: hot k: col a: hot	perat t arid d arid t summ	ure er	F	: polar : polar	frost tundra			
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Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of Köppen-Geiger Climate Classification ted. *Meteorol. Z.*, **15**, 259-263.

Predictors

 Table 1 Predictor variables available for the CGCM 3.1

 and the NCEP/NCAR Reanalysis

Mean sea level	500hPa wind	850hPa wind				
pressure	speed	speed				
1000hPa wind	500hPa U	850hPa U				
speed	component	component				
1000hPa U	500hPa V	850hPa V				
component	component	component				
1000hPa V	500hPa vorticity	850hPa vorticity				
component	(Pa/s)	(Pa/s)				
1000hPa vorticity	500hPa	850hPa				
(Pa/s)	geopotential	geopotential				
1000hPa wind	500hPa wind	850hPa wind				
direction	direction	direction				
1000hPa	500hPa	850hPa				
divergence (s ⁻¹)	divergence (s ⁻¹)	divergence (s ⁻¹)				
1000hPa specific	500hPa specific	850hPa specific				
humidity	humidity	humidity				
Temperature at						
2m						
Predictands						
 Weather station daily data from 5 						

Linear	MIR	temperatures from the	IRT	
Linca		surrounding 20 NCEP/		
		NCAR grid cells (5 x 4)		
		SW selected from the		
Linear	MLR	surrounding 20 NCEP/	LRall	
		NCAR grid cells (5 x 4)		
Nonlinoor	Genetic	Sama as I DUD	ОППО	
noniinear	Programming	Same as LRHP	GFNF	
	Genetic			
Nonlinear	Programming	Same as LRT	GPT	

SD daily temperatures MSE





Š 0.8

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).

Zones and Weather Station:

Af: S1

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