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Statistical downscaling of surface temperature in different Koppen-Geiger climate zones of Equatorial South America.

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For first time a variety of linear and nonlinear methods including linear regression and Bayesian neural networks were used to statistically downscale NCEP/NCAR reanalysis inputs in order to obtain daily station values of mean surface temperature for 6 weather stations located under the same reanalysis grid cell, but belonging to different Koppen-Geiger climate zones of Equatorial South America. The models performance was determined after calculating the mean absolute errors (MAE) between the downscaled data and the observations, and the corresponding indices of agreement calculated from annual STARDEX climate indices. Future climatologies were obtained after downscaling the Canadian Global Climate Model 3.1 running the SRES A2 scenario. The results show that when compared to the observations all the statistical downscaling (SD) models brought an improvement over the reanalysis temperature output and were able to generate finer scale projections, and differentiate the stations climatologies. This suggests the need to use SD to update the local hydrological and engineering studies that required climate change impacts at local scale but used the same raw GCM temperature data as input. In general the nonlinear methods outperformed the linear ones when simulating climate like features, and brought a marginal improvement when simulating day by day variability, although significant performance differences were found when using different sets of predictors.