RMAWGEN: A software project for a daily Multi-Site Weather Generator with R

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The modeling in in climate change applications for agricultural or hydrological purposes often requires daily time-series of precipitation and temperature. This is the case of downscaled series from monthly or seasonal predictions of Global Climate Models (GCMs). This poster presents a software project, the R package RMAWGEN (R Multi-Sites Auto-regressive Weather GENerator), to generate daily temperature and precipitation time series in several sites by using the theory of vectorial auto-regressive models (VAR). The VAR model is used because it is able to maintain the temporal and spatial correlations among the several series. In particular, observed time series of daily maximum and minimum temperature and precipitation are used to calibrate the parameters of a VAR model (saved as "GPCAvarest2" or "varest2" classes, which inherit the "varest" S3 class defined in the package vars [Pfaff, 2008]). Therefore the VAR model, coupled with monthly mean weather variables downscaled by GCM predictions, allows to generate several stochastic daily scenarios. The structure of the package consists in functions that transform precipitation and temperature time series into Gaussian-distributed random variables through deseasonalization and Principal Component Analysis. Then a VAR model is calibrated on transformed time series. The time series generated by VAR are then inversely re-transformed into precipitation and/or temperature series. An application is included in the software package as an example; it is presented by using a dataset with daily weather time series recorded in 59 different sites of Trentino (Italy) and its neighborhoods for the period 1958-2007. The software is distributed as a Free Software with General Public License (GPL) and is available on CRAN website (http://cran.r-project.org/web/packages/RMAWGEN/index.html) .

MAIN REFERENCES
Bernhard Pfaff (2008). VAR, SVAR and SVEC Models: Implementation Within R Package vars. Journal of Statistical Software 27(4). URL http://www.jstatsoft.org/v27/i04/