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## Adaptation from downscaling technique for Nicaragua for the calculation of indices of agricultural impact

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General Circulation Models (GCMs) are the best tool to simulate future climate. These models are able to simulate the general circulation of the atmosphere, but can not simulate relevant surface effects or atmospheric phenomena of smaller scale which are of great importance on the local scale. Most of the climate change impact assessments and adaptation studies require to adapt the information provided by the GCMs to the local scale using downscaling techniques. . In this study, a statistical downscaling method has been adapted to Nicaragua. This method has been developed by the Climate Research Foundation (Fundación para la Investigación del Clima, FIC), and it is based on a two-step analog method, in which empirical relationships between observations of predictors (as geopotential height fields) and high-resolution surface variables (called predictands, eg, temperature and precipitation), are established. To downscale predictands for future climate, these relationships are applied to predictors simulated by GCMs. Although the FIC method has been widely tested in Spain and Europe with excellent results in different national and international projects, it was needed to adapt it to the study area, because Nicaragua is affected by tropical circulation conditions that differ from those at mid-latitudes areas. To adapt the method, the American NCEP reanalysis has been used as "observed" predictors, and daily temperature and precipitation as predictands, for the period 1951-2009. The results showed that, while for Spain and Europe the best predictors are the geopotential fields on 500 and 1000 hPa surfaces, for Nicaragua the best results were obtained using as predictors wind fields on 1000, 700 and 200 hPa surfaces. In addition, relative humidity at 850 hPa is used as a potential predictor in the second step of the method. The verification and validation processes of the adapted methodology showed very good results for both temperature and precipitation - even much better that those obtained for Europe. Using the simulated temperature and precipitation daily series, some food security impact indexes were estimated, as duration and characteristics of the Canicula (few rain period inside the raining season), beginning of the winter, and extreme temperatures of planting seasons of Primera, Postrera and Apante; all of these are key indexes in food security. Since the results obtained adapting the methodology and verifying food security impact indexes were successful, we proceeded to apply this method to produce local scenarios of future climate, using GCMs outputs as predictors and obtaining daily series of temperature and precipitation for the 21st century. The results of applying food security indexes to local scenarios will allow policy-makers to define food security adaptation strategies for the future with less uncertainties at local level.. This study was funded by the Spanish International Cooperation Agency for Development (AECID) of the Ministry of Foreign Affairs and Cooperation.