



High resolution climate scenarios for Spain produced with a two step analog statistical downscaling method

L. Torres, M. del Carre, J. Ribalaygua, A. Portela

Fundación para la Investigación del Clima, Spain (fic@ficlima.org / Phone: +34 914503393)

This paper presents a methodology for the generation of future climate scenarios in Spain, which fulfill the requirements demanded for impact assessment and the planning of climate change adaptation activities in different sectors: local specificity, covering the whole XXI century, appropriate to feed impact assessment models (daily series -instead of temporal averages-, which properly represent extreme events, and not only mean values). Finally the scenarios should consider and quantify as much as possible the uncertainties inherent to climate simulations.

The methodology developed is a statistical downscaling technique called "Two-Step Analog Method", to which a probabilistic approach has been added in order to consider the uncertainties related to downscaling. The predictands are daily maximum and minimum temperatures, and precipitation. The methodology description pays special attention to its physical and theoretical robustness (selection of predictors, approaches to avoid the stationarity problem, adaptation to General Circulation Models -GCM-characteristics and limitations).

A careful verification analysis has been undertaken, applying the methodology to ERA40, and using daily series of 5584 Spanish stations provided by the Spanish Instituto Nacional de Meteorología (INM). Verification results are excellent for temperature, and worse for precipitation, as usually happens. These good verification results confirm previous quality analysis, for example within STARDEX (5th FP European Research Project "Statistical and Regional dynamical Downscaling of Extremes for European regions").

After this verification, the methodology has been applied to Canadian CGCM2, German ECHAM4/OPYC3 and British HadAM3P GCM outputs, for SRES A2 and B2

emission scenarios, in order to consider and quantify the uncertainties inherent to climate simulations. The climate scenarios produced fulfill the requirements described, and were integrated in the official climate scenarios catalog produced by the Spanish INM, in the first phase of the “Programa Nacional de Generación de Escenarios”. These results show a clear space variability that totally justifies the necessity of downscaling, and a clear interannual variability. Finally, the results obtained with different MCGs and emission scenarios are very coherent one to each other, which guarantees their technical robustness.