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CLIVAR-SPAIN contributions: Application of a statistical downscaling method in phytoclimatic studies for the Spanish National Parks

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Keywords:CLIVAR-SPAIN, CLIMATE VARIABILITY AND CHANGE y SOUTHWESTERN EUROPE. There are 14 National Parks in Spain covering about 3400 km2, which are distributed throughout the national territory (four in the Canary Islands, one in the Balearic Islands and nine in the Iberian Peninsula), Each National Park has its own special environment which is largely determined by the climatic characteristics of the area. Therefore, major climate changes is likely to change the natural evolution of the Park. To know the climate evolution for the 21st century and the implications that these changes may have on the Parks forest cover, is needed to design adaptation strategies to ensure the Parks preservation and continuity. To carry out the climatic study local scenarios of future climate should be produced, ie temperature and precipitation daily series for the 21st century. These scenarios have been produced using a statistical downscaling technique based on an analog method in two steps developed by the Climate Research Foundation (Fundación para la Investigación del Clima, FIC). The method produces "raw" data (ie, the systematic error associated to the downscaled General Circulation Model and/or to the downscaling method hasn't been corrected), series of daily temperature and daily precipitation at specific points of the territory (ie, at the observatories used in the study). Both the European reanalysis ERA40, and the outputs from some GCMs (eg ECHAM5, BCM2) for different Greenhouase Gases Emission scenarios, have been used as lowresolution variables, and, as high-resolution surface variables, daily series of temperature and precipitation registered at the Spanish Meteorological Agency (AEMET) stations located in the areas of interest. The phytoclimatic study here used requires corrected series and distributed all over the zone of interest. So, the systematic error associated to the "raw" downscaled series has been corrected, and it has been carried out an interpolation in each of the Parks. The correction of the error has been developed on a monthly basis since it is the time-scale on which this phytoclimatic study works, and the interpolation technique used (Thin Plate Splines) is tuned depending on both the Park and the studied variable (precipitation or temperature). After that, a phytoclimatic study has been performed for the 21st century in all the Parks. The phytoclimatic methods used have been the Sub-types Method (AlluÈ, Andrade) and the Species Method (García-López, AlluÈ). Both methods work with monthly values of temperature and precipitation, from which are derived the different phytoclimatic suitability indexes needed to define the effect of climate on vegetation. Using these methods with both past observations and future local future climate scenarios, the evolution of vegetetion in the area of interest can be simulated. Once the impact of climate change on vegetation is assessed adaptation estrategies for keeping the natural biodiversity of the Parks can be designed. This study was funded by the Biodiversity Foundation, a public foundation of the Spanish Government.