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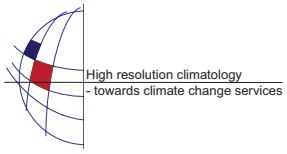

Phytoclimatic Atlas of the Spanish Peninsular territory. First approach: Climate Atlas of Spain

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The present work develops a new Climate Atlas of the Spanish Peninsular territory in the framework of a new phytoclimatic model based in a Ecosystem Functional Types (EFTs) Classification applied to this area. The phytoclimatic diagnosis of a territory requires a geo-database with spatially continuous phytoclimatic factors (independent variables of the phytoclimatic model). These are derived directly from climatic variables having structural and functional implications on the vegetation cover.

The complete record series of the National Meteorological Database (Spanish Meteorological Agency) was used to compute the following climatic variables: t, mean temperature for the month, tmmf, mean of minimum temperatures for the month, tmmc, mean of maximum temperatures for the month and p, total monthly precipitation. Meteorological data spanning 1951-1999 was exhaustively explored and filtered. The spatial and temporal consistency of temperature and precipitation data, and the record series homogeneity was analyzed. Once filtered, the net of meteorological ground stations was integrated by a total of 1339 stations with temperature and rain data, and 4078 stations with only rain data.

Prior to test the climatic variables regionalization process, a temperature stratification and a seasonal precipitation stratification based in the different spatial scales of variation, were calculated in order to avoid the non-stationary trends of these variables over all the territory. Multivariate Factorial Kriging allows us to estimate the random function components, detecting and separating regional and local characteristics of the studied phenomena (temperatures and seasonal precipitation). Two calculated factors (principal components) by scale of variation were used to run a K-means procedure with a large number of sets and to test a hierarchical clustering over the matrix of Mahalanobis distances between sets.

Auxiliary variables were selected to improve the climatic variables regionalization process: height, real distance to the coast, potential radiation and cloudiness for temperature-related target variables, and height, Euclidean distance to the coast and cloudiness for precipitation target variables.

Height and distance to de coast, were derived from the Digital Elevation Model DEM 250 MONA pro Europe provided by DG-Joint Research Centre of the European Commission. The spatial resolution of this DEM is of 0,0025º (approximately 278 m in UTM projection, Zone 30).

Potential radiation was computed using r.sun radiative transference model (©JRC Institute for Environment and Sustainability, 2003). As for the orographic effect it was analysed by computing an hemispheric viewshed with the above-mentioned DEM.

Cloudiness was obtained from cloud masks derived from multitemporal satellite imagery recorded on a daily basis by the AVHRR instrument on board of NOAA satellites (National Oceanic and Atmospheric Administration - NOAA. NESDIS/NCDC. Climate Services Division. Satellite Services Branch. USA). To this purpose, NOAA daily images for the period 1987 -2004 (resampled at 1 km resolution) were provided by the Remote Sensing Laboratory of Valladolid University.

After the cross-validation of co-regionalization models, Ordinary Co-Kringing method was selected as the best option to obtain a geo-database with 48 spatially continuous climatic variables (4 monthly variables along 12 month) with 1 km spatial resolution.