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New generation for reliable weather generator: STOCK-WEATHER software.

Target study area: Continental Portugal.

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The optimisation of energy costs and competitiveness is increasingly carried out through system simulation. This requires daily and hourly time series of meteorological parameters which are rarely available from the Meteorological Services (weather stations); notably of solar irradiation on tilted planes surfaces, and of multivariate data ($e.g.$, temperature, humidity, global & diffuse radiation and wind, simultaneously). This project aims at developing stochastic models controlled and improved by a hybrid forecasting scheme combining Wavelet Transform, Neural Networks and Fuzzy Logic primarily for Continental Portugal (where data availability is worse). Such models will provide hourly data with statistical properties similar enough to observed data to enable its use for system simulation. The neural network and fuzzy logic will be used to determine the best methods to maximize the benefits (optimise) to the weather generator. This is also a pilot project for improving the data supply capabilities of meteorological information. This project deals about the presentation of a new software, which will be used to provide weather data in buildings physics. This algorithm is dedicated to the description of each climatic variable included in the database and the mathematical tools used to compare statistical distributions, determine daily characteristic evolutions; finding typical days and correlations between the different climatic

variables. Artificial weather data files adapted to different simulation codes will be constructed and available. The final intend of this numerical code is to define a reliable methodology to determine weather sequences for building simulations. This method must be able in simulating the operation of buildings even under extreme climatic conditions. In addition, it has to be used in the development of climate change scenarios with a high spatial and temporal resolution are required in the evaluation of the effects of climate change on agricultural potential and agricultural risk. Such scenarios should reproduce changes in mean weather characteristics as well as incorporate the changes in climate variability. Recent work on the sensitivity of crop models and climatic extremes has clearly demonstrated that changes in variability can have more profound effects on crop yield and on the probability of extreme weather events than simple changes in the mean values. The construction of climate change scenarios based on spatial regression downscaling and on the use of a local stochastic weather generator is described. These values will be used to perturb the parameters of the stochastic weather generator in order to simulate site-specific daily weather data. This approach permits the incorporation of changes in the mean and variability of climate in a consistent and computationally non-expensive way. The stochastic weather generator will be validated across Portugal and Iberian Peninsula, including relevant climatic extremes. The importance of downscaling and the incorporation of climate variability will be considered for some available climate change scenarios.