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Probabilistic climate and agroclimatic scenarios for Europe (PRASCE project results)

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Future climate projections are loaded by multiple uncertainties. PRASCE project (2008-2011), aimed at a development of the probabilistic projection of climate accounting for the uncertainties coming from various sources. The methodology was based on linking the stochastic weather generator (which may itself represent uncertainty due to natural climate variability) with the GCM-based climate change scenarios. These scenarios were determined by the pattern scaling technique, in which the changes in climatic characteristics for a specific future period, site and month of the year are determined as a product of the GCM-based standardized scenario (= scenario related to 1 K rise in global mean temperarure) and global mean temperature. Simple climate model MAGICC was used to determine the global temperature for various combinations of emission scenario and climate sensitivity to account for the uncertainties in these two parameters. The modelling (inter-GCM) uncertainty is represented either by using all available GCMs or a representative subset of 3-7 GCMs.
The first part of the contribution will present a methodology with a stress on some of its crucial steps: (i) Deriving the climate change scenario from GCM outputs. These outputs consist of monthly and daily series of surface weather characteristics, which are used to derive changes in WG parameters (including those, which drive the variability and extremes). The problem of incompleteness of the database (e.g. surface humidity and wind speed are missing in some GCM simulations) will be also mentioned. (ii) Modification of the WG (= modification of WG parameters set) according to the climate change scenario (this procedure is more complicated than the pattern-scaling's formula "the changes in climatic characteristics are proportional to changes in global mean temperature" may suggest). (iii) Choosing the representative GCM subsets. Implementation of this step follows from the fact, that some climate change impact experiments do not allow (e.g. due to limited computer resources) to involve all available GCM simulations.
The second part of the contribution will present results obtained by applying the above methodology to a set of European stations and using GCM outputs from the IPCC-AR4 database. The changes in selected climatic (focusing on the extremal precipitation and temperature characteristics) and agroclimatic (including number of days during vegetation season with heat and drought stresss) characteristics will be shown in maps representing the multi GCM mean and variability.

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