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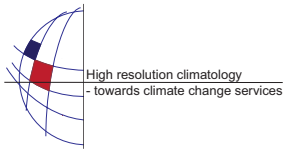

Dealing with multi-GCM ensemble in developing the climate change scenarios the probabilistic impact assessments

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The volume of GCM simulations available for climate change impact studies continually increases. On the one hand, this allows for a better representation of uncertainties (between GCMs, between emission scenarios, between parameterizations, etc.). On the other hand, the volume of available GCM output data has become so large such that it poses a strong requirement for more effective organization of climate change impact analyses: it is not always possible to involve scenarios from all available GCMs. To account for the uncertainties in this case, two approaches are at hand: (i) Applying scenarios from a subset of all available GCMs. (ii) Applying scenario emulator/generator, which may produce a large set of climate change scenarios representing the multivariate probability density function of the scenarios. The present contribution addresses both of these two approaches: (A) Choice of the "representative" subset of GCMs. In defining the subset, two circumstances are taken into account: (i) performance of GCMs to reproduce the present climate, (ii) ability of the subset to represent the variability of scenarios across the whole set of GCMs. The gridded maps will show the chosen subsets for the whole Europe. (B) Use of the stochastic climate change scenario generator. The generator used here is based on a multivariate parametric model whose parameters are derived from a set of GCM based scenarios (no limit on the size of the calibration set, the model may also be calibrated with a very large perturbed-physics ensemble). Once calibrated, the generator may produce an arbitrarily large set of climate change scenarios. The results of the validation of the scenario generator will be presented. The validation consists in comparing distribution functions of changes in temperature, precipitation and drought conditions (in terms of Palmer drought indices) in several sites in Europe and U.S.A. based on (i) a set of individual GCM simulations (taken from IPCC AR4 database) vs (ii) a set of synthetic scenarios produced by the scenario generator calibrated with the GCM-based scenarios. Moreover, the results will be compared also with impacts based on a subset of GCMs selected in approach (A).

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