Development of the Representative Climate Change Scenarios for Czechia

Martin Dubrovsky (1,2), Petr Skalak (1), Petr Stepanek (1,3), Jan Meitner (1,4), Ondrej Lhotka (1,2), Mirek Trnka (1,4), Pavel Zahradnicek (1,3)

(1) Global Change Research Institute CAS, Brno, Czech Republic, (2) Institute of Atmospheric Physics, Prague, Czech Republic, (3) Czech Hydrometeorological Institute, Prague, Czech Republic, (4) Institute of Agriculture Systems and Bioclimatology, Mendel University in Brno, Brno, Czech Republic

For use in climate change (CC) impact studies, one (or both) of the two datasets are commonly employed: (a) an ensemble of GCM simulations available from the CMIP5 dataset, and (b) an ensemble of RCM simulations available from the CORDEX dataset. In both cases, questions may arise, how to deal with a large number of available simulations: Should we use all simulations or only some of them? Should we assign weights to the models? If it is not possible (or we simply do not want) to use all available simulations, how to choose a limited representative subset of models? This contribution is a report on our effort in preparing CC scenarios for use in Czech CC adaptation studies made within the frame of SustES project. Both CMIP5 and CORDEX datasets have been considerd in preparing our CC scenarios. The contribution consists of two parts.

In the first part, we present a moethodology, which is used to choose a representative subset of GCMs from all available GCMs. The methodology is a modification of the methodology developed by Dubrovsky et al (2015, Climatic Change). In selecting a subset, following criterions were taken into account: (1) availability of both monthly and daily time series of following suface weather variables: temperature (daily averages, minima and maxima), precipitation, solar radiation, humidity and wind speed. (2) Quality of the GCM simulations represented by partial skill scores quatifying the GCMs' performance in reproducing annual cycle and spatial distribution of temperature and precipitation including their links to a larger-scale atmospheric circulation. (3) Ability of the subset to represent the mean and inter-model variability of CC scenarios in the whole GCM ensemble. (4) The fact, whether the given GCM was or was not involved in the CORDEX simulations. While accounting for all these criterions, the whole process leading to creating the final subset emerged as a mixture of objective (based on quantitative indicators) and subjectiove decisions.

In the second part, the CC scenarios derived from the GCMs (both the complete set and representative subset) will be presented and compared with CC scenarios derived from the RCMs; the development of the RCM-based CC scenarios is discussed in a separate contribution (Skalak et al., poster no. EMS2019-646).