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Co-development of methods to utilize uncertain multi-model based information on freshwater-related hazards of climate change (CO-MICC)

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A key challenge in the projection of climate change (CC) impacts on hydrological hazards is the uncertainty, mainly from climate projections and hydrological modelling. Therefore, it is state of the art to use multi-model ensemble (MME) based information for quantifying potential CC impacts. A considerable amount of studies have been done based on these MMEs. However, little attention has been paid on how to best utilize MME derived information in CC risk management and adaptation. This type of research is done best jointly by data providers and users.

The major objective of the CO-MICC project is to co-develop methods for providing and utilizing multi-model ensemble data on freshwater-related hazards computed by global hydrological models (GHMs) for risk and adaptation assessments. The project covers various spatial scales, and it provides CC risk and adaptation knowledge on a web portal. We aim to increase availability and applicability of salient and credible information for different types of end-users, with focus on how to embrace uncertainties. The project focuses on three spatial scales; global, transboundary (Morocco: Moulouya basin, Algeria: Chelif basin, and Tunisia: Mejerda basin) and basin (Ebro River basin, Spain). At each scale, two to three expert workshops will be carried out to facilitate the co-development of methods to utilize MME based information. At the global scale, we co-develop better methods in collaboration with international companies.

The presentation is to share the first results of the focus basins along with a concise introduction to the CO-MICC project and its methods. For testing the validity and applicability of GHM outputs, streamflow simulated by four GHMs (WaterGAP, LPJML, CWatM, ORCHIDEE) driven by observation-based historical meteorological data (GSWP3) is compared to observed streamflow, and the relevance of this type of comparison for estimating the impact of climate change on streamflow is discussed. Accordingly, the climate change impact on the hydrological cycle is assessed using two indicators. 1) sensitivity of annual streamflow to inter-annual precipitation variability and 2) inter-annual variability of annual streamflow. In two expert workshops, user needs, as well as suitable hydrological hazard indicators, were identified. In addition, the experts provided feedback on potential ways for the presentation of hazards regarding precipitation, streamflow and renewable water resources by tables and maps. Outcomes of these expert workshops will be presented.