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Collaborative experiment on intercomparison of regional-scale hydrological models for climate impact assessment

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The Inter-Sectoral Impact Model Intercomparison Project (ISI-MIP) is a community-driven modelling effort bringing together impact modellers across sectors and scales to create more consistent and comprehensive projections of the impacts of climate change. This project is aimed in establishing a long-term, systematic, cross-sectoral impact model intercomparison process, including comparison of climate change impacts for multiple sectors using ensemble of climate scenarios and applying global and regional impact models. The project is coordinated by the Potsdam Institute for Climate Impact Research.

An overview of this project and collaborative experiment related to the regional-scale water sector model intercomparison in ISI-MIP will be presented. The regional-scale water sector modelling includes eleven models applied to eleven large-scale river basins worldwide (not every model is applied to every of eleven basins). In total, 60-65 model applications will be done by several collaborating groups from different Institutions. The modelling tools include: ECOMAG, HBV, HBV-light, HYPE, LASCAM, LISFLOOD, mHM, SWAT, SWIM, VIC and WaterGAP. Eleven river basins chosen for the model application and intercomparison are: the Rhine and Tagus in Europe, the Niger and Blue Nile in Africa, the Ganges, Lena, Upper Yellow and Upper Yangtze in Asia, the Upper Mississippi and Upper Amazon in America, and the Murray-Darling in Australia. Their drainage areas range between 67,490 km2 (Tagus) to 2,460,000 km2 (Lena). Data from global and regional datasets are used for the model setup and calibration. The model calibration and validation was done using the WATCH climate data for all cases, also checking the representation of high and low percentiles of river discharge. For most of the basins, also intermediate gauge stations were included in the calibration. The calibration and validation results, evaluated with the Nash and Sutcliffe efficiency (NSE) and percent bias (PBIAS), are mostly satisfactory. As the next task, climate scenarios from five GCMs driven by four RCPs will be applied, and model outputs intercompared.

The presentation will focus on coordination and communication problems, designing the modelling procedure, creating a modelling protocol, and data supply.