Geophysical Research Abstracts
Vol. 21, EGU2019-6212-3, 2019
EGU General Assembly 2019

Understanding each other's models: a standard representation of global water models to support intercomparison, development, and communication

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Multi-model ensembles have become a standard tool for assessing global climate change impacts. Interpretation of such ensembles is complicated because each model group has a different modeling concept and framework. For example, global scale land surface, water and vegetation models have been widely applied to understand the complex hydrological cycle of the Earth and to assess associated past and future changes. Additionally to this purpose, land surface models assess energy and biogeochemical cycles while vegetation models assess vegetation and carbon cycles. Therefore, all these models differ with respect to the specific processes of the hydrological cycle included in their structure. In this study, we demonstrate how the similarities and differences between models can be better understood and illustrated by using a standard representation of the main model features. We analyze twelve models from the global water sector of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) phase 2b: six land surface models (LSMs), five global hydrological models (GHMs) and one dynamic global vegetation model (DGVM). The majority of the models are run with a daily temporal resolution and with a spatial resolution of 0.5°. Part of these models include a reservoir scheme and water use sectors. The heuristic mappings of the models are designed to ensure the opportunity to choose a model at the initial stage of the analysis, based on the most important qualities, relationships and characteristics, which provide users with significant time saving. Therefore, the review study will provide the basis for: (i) achieving further model (inter)comparison; (ii) selecting the right model(s) output(s) for specific applications; and (iii) assessing the similarities and differences among the models. The models characteristics will be presented in three levels of complexity allowing to reach a large audience. The target audience includes the modeling community, the stakeholder community, and the general public interested in understanding large-scale models, simulating climate change and its impacts. Additionally, stakeholder insights, gathered mostly in Eastern Europe and West Africa, have been considered in the study design. Stakeholders were identified according to their need for climate-impact information provided within the ISIMIP framework and in-

cluded academics, government officials, employees working in international organizations, NGOs, consultancies, and private companies. In conclusion, the presentation describes the study approach and preliminary results, with particular emphasis on the standard model diagram, differences between the models, and the stakeholder engagement.