Changes of groundwater recharge at different global warming levels: A global-scale multi-model ensemble approach

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Billions of people rely on groundwater that is an accessible source for drinking water and irrigation especially in times of drought. This importance will likely increase with a changing climate. It is still unclear, however, to what extent climate change will globally impact groundwater systems and thus the availability of this important resource. Groundwater recharge is a central indicator for groundwater availability but projections vary. In this talk we will present global-scale results of a multi-model ensemble approach incorporating eight global hydrological models and four global circulation models to show the impact of global warming (GW) on global groundwater recharge. Preindustrial and current (at 1 °C GW) groundwater recharge is compared with recharge for different GW levels as a result of different representative concentration pathways (RCPs). Results suggest that the uncertainty range is large and predictions with confidence can be only made for specific regions worldwide. Furthermore, because most hydrological models do not include CO₂ driven vegetation processes we investigate how including the effect of changing CO₂ into the calculation of future groundwater recharge impacts the results. In some regions, inclusion of these processes leads to differences in groundwater recharge changes of up to 100 mm/yr in case of 3 °C GW.