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 as accessible source for drinking water.

Its importance will increase with a changing climate.

To what extent will climate change impact the availability of groundwater?

Groundwater recharge is a central indicator but hard to measure and simulate.
Methods

- 8 Global Hydrological Models (GHMs)
- 4 Global Circulation Models (GCMs)
- Warming levels: 1°, 1.5°, 2°, 3° C
- Representative concentration pathways (RCPs): 2.6, 6.0, 8.5

= Ensemble of 96 models
! less for 2° C and 3° C because not all RCPs reach level

Analysis of 30 year yearly mean around warming level

Results

Groundwater recharge change

3 °C compared to present day (1 °C)

Results

Discussion

Limitations
• Limited number of GCMs
• Large uncertainties
• Only yearly mean analyzed
• Assumption of a stabilized warming level
• Limited number of observations for comparison

Conclusions
• Only 4 out of 8 models simulate effect of changing CO2 levels on vegetation (change in stomatal conductance) -> possibly large effect on groundwater recharge
• Recharge is most difficult to simulate in GHMs (uncertainties accumulate) -> improvements are necessary
• Better estimates together with global groundwater models (e.g., globalgroundwatermodel.org) can improve our understanding of groundwater under climate change
Thank you for your attention!

www.waterandchange.org

globalgroundwatermodel.org

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