Future irrigation water demand under climate change: regional variability and uncertainties arising from GHMs and CMIP5 climate projections



Ensemble coefficient of variation (All)

Coefficient of variation = the ratio of the standard deviation to the mean

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2090s

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1. INTRODUCTION

3. RESULTS



1971-2005.

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The ensemble projections among the different GHMs, GCMs, and RCPs vary between -30% and +35% for India, between -25% and +28 for the U.S., between -20% and +28% for Mexico, between -22% and +26% for Pakistan, and between -22% and +24% for China. **Universiteit Utrecht**

The model uncertainty among the different GHMs dominates the uncertainty in the irrigation water demand projections by ≈2025. However, afterwards the uncertainty of the climate projections, or specifically in the precipitation projections derived from different RCPs from different GCMs, substantially increases. Thus, the dominant sources of the uncertainty lie both in the GHMs and in the climate projections.

2090s



GHMs used:

The GHMs calculate irrigation water requirement per unit crop

area from daily soil water balance under four Representative Concentration Pathways (RCPs) from five Global Climate Models (GCMs) respectively.

RCPs used: RCP2.6, RCP4.5, RCP6.0, RCP8.5 GCMs used: HadGEM2-ES, IPSL-CM5A-LR, GFDL-ESM2M, MIROC-ESM-CHEM, NorESM1-M

Output used: Potential irrigation water demand Simulation period: 1971-2099 (Irrigated areas remain constant)

CMIP5 climate projections in the Model Intercomparison Project (ISI-MIP; http://www.isi-mip.org/).

production and the livelihood of millions of people. The global area of irrigated land is not expected to expand dramatically in the coming decades. Future irrigation water demand is, however, subject to large uncertainties due to anticipated climate change, i.e. warming temperature and changing precipitation variability, in various regions of the world.

2. METHODS – MODEL and DATA



We employed a set of seven global the impact of climate change on regional

uncertainties arising from newly available

framework of the Inter-Sectoral Impact

projections over the period 2005-2100, relative to the period the