

Developing a toolbox for running and visualizing 100 m resolution global groundwater model based on PCR-GLOBWB and GLOBGM

Department: Physical Geography

Research group: Hydrology, water resources and global change; and Computational geography

Supervisor: Dr. Ir. Edwin H. Sutanudjaja

Email address: e.h.sutanudjaja@uu.nl

Telephone number: +31 (0) 30 253 2988

Project description

PCR-GLOBWB (https://github.com/UU-Hydro/PCR-GLOBWB_model; Sutanudjaja, et al., 2018, <https://doi.org/10.5194/gmd-11-2429-2018>) is a global hydrology and water resources model developed at the Department of Physical Geography. Currently we are the first one developing a 1 km resolution global hydrological model including its extension to a MODFLOW-based groundwater model GLOBGM (<https://github.com/UU-Hydro/GLOBGM>; Verkaik et al., 2024, <https://doi.org/10.5194/gmd-17-275-2024>).

In this work, we aim to further develop a 100 m resolution groundwater model. While running this model at this high resolution may still not be feasible for the global extent (e.g. due to limited computer power), we intent to develop an efficient toolbox for running a groundwater model for a limited region that can be selected and defined by users. The toolbox will facilitate to prepare and clip the global datasets used in PCR-GLOBWB and GLOBGM to smaller extent model input files for any areas in the world; and use them for model runs at 100 m resolution. We also aim to equip the toolbox with some evaluation and visualization kits for conducting local assessment of groundwater-related problems (e.g. declining groundwater heads in megacities and irrigation areas). Together with us, you will develop the toolbox in python jupyter notebooks. You will be involved in writing scientific publications resulting from this work. We will also explore the opportunity for you to present this work on scientific conferences (subject to funding).

The project is mainly study desk for doing computer modelling. In the first part of the project, there will be weekly regular meetings (either in person or online), and this frequency may reduce when you become more independent within this project. You will be involved in writing scientific publications resulting from this work. We will also explore the opportunity for you to present this work at scientific conferences (subject to funding).

Job requirements

We are looking for a student who has followed courses in hydrology and knows scientific programming, e.g. Python, R or Matlab. Knowledge of PCR-GLOBWB, GLOBGM, MODFLOW, or PCRaster is **NOT** a prerequisite.