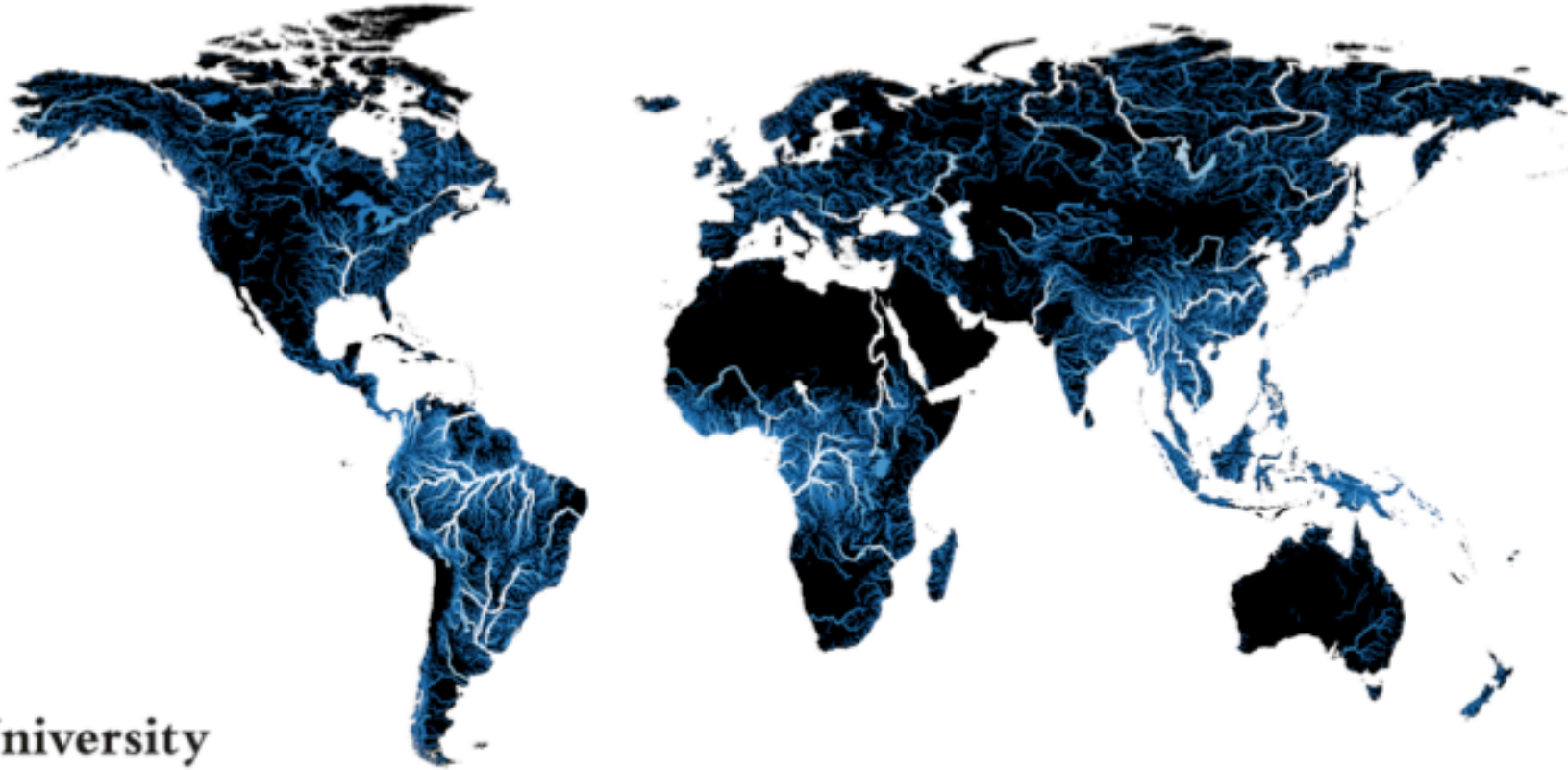


The global hydrological and water resources model PCR-GLOBWB 2



Utrecht University

Niko Wanders

Edwin H. Sutanudjaja, Rens van Beek, Yoshihide Wada, Joyce H. C. Bosmans, Niels Drost, Ruud J. van der Ent, Inge E. M. de Graaf, Jannis M. Hoch, Kor de Jong, Derek Karssenberg, Patricia López López, Stefanie Peßenteiner, Oliver Schmitz, Menno W. Straatsma, Ekkamol Vannamettee, Dominik Wisser, and **Marc F. P. Bierkens**

Hydrology as in most global hydrological models



Hydrology in reality

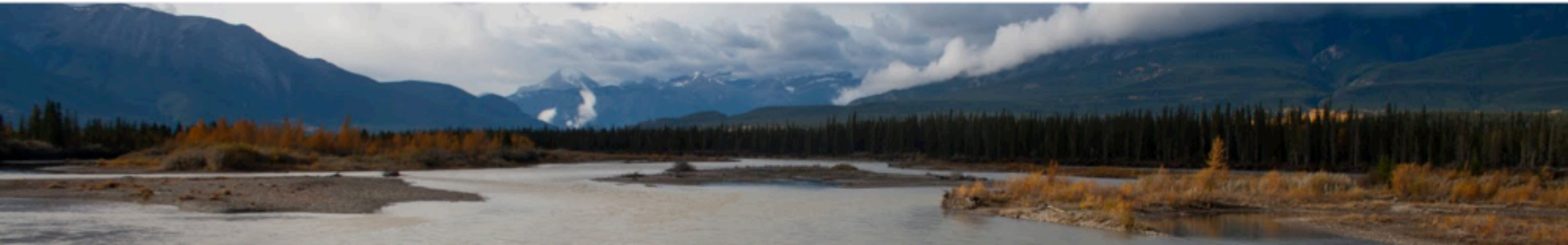


Research objective

Develop a high-resolution water resources model

- That is accurate, both in quantity and quality
- Can attribute to scenario studies
- Includes human-water interaction
- Is publicly available

Globally available locally relevant



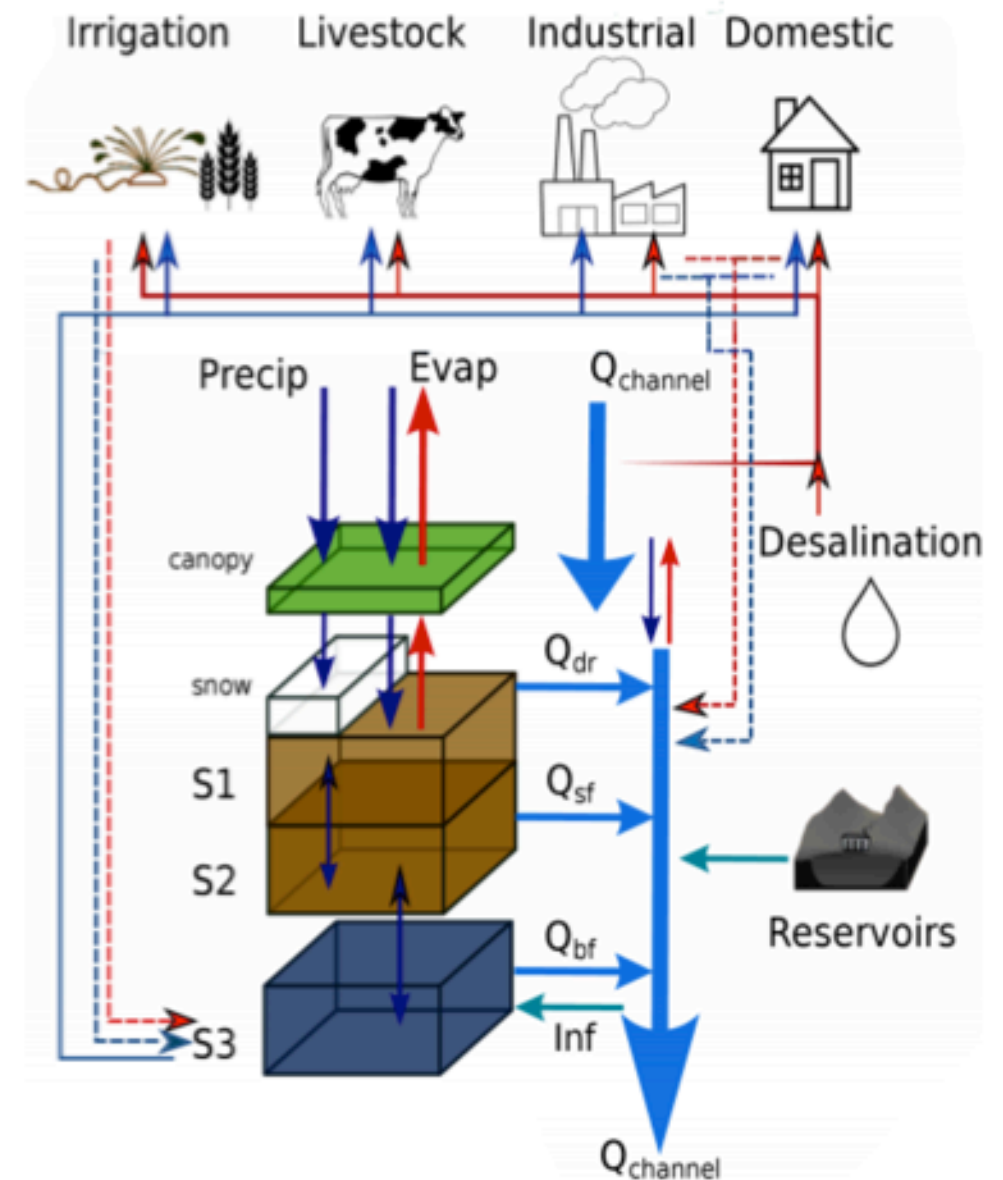
Model structure

Model resolution:

- Regular grid of 0.5° (50 km) and 0.1° (10 km)
- Daily time step

Model includes:

- Human water interactions
 - Groundwater pumping
 - Irrigation
 - Surface water abstraction
 - Lakes and reservoirs
- Flood plains
- 2D groundwater flow
- Coupling with hydrodynamic models
- Water temperature



Included in PCR-GLOBWB 2



Reservoirs



Irrigation



Industrial water use

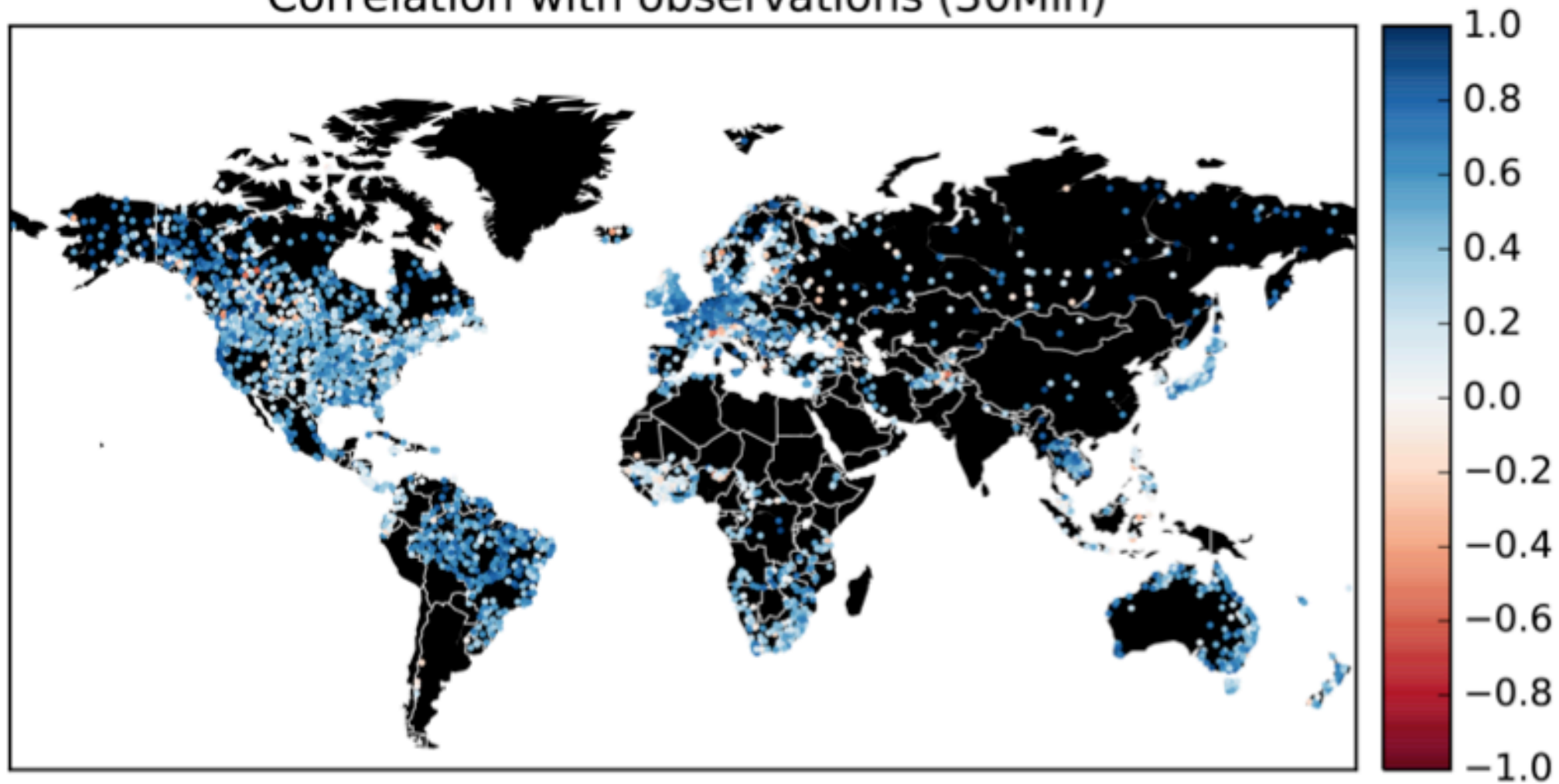


Livestock water use

Domestic water use

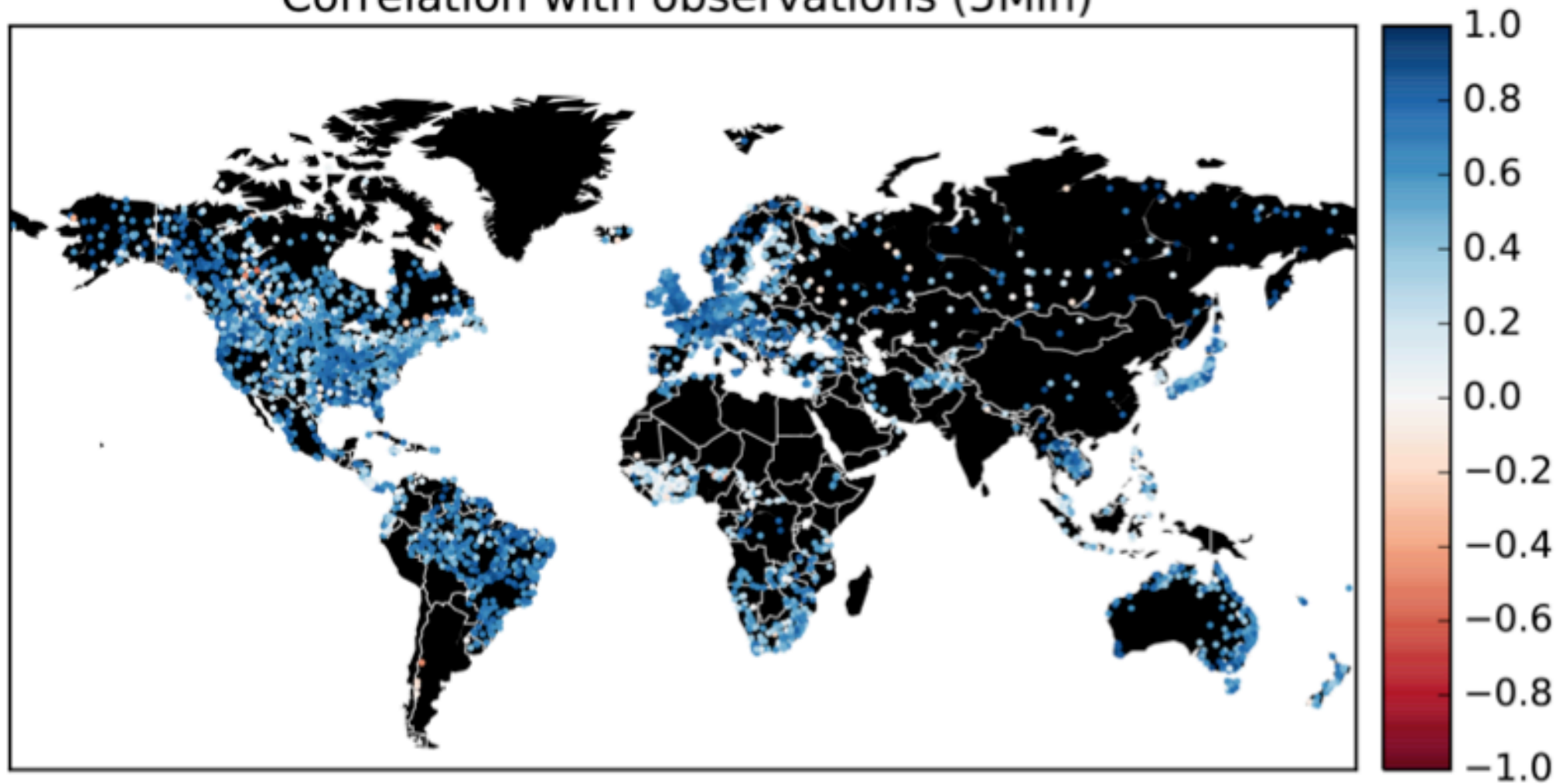
Evaluation discharge

Correlation with observations (30Min)

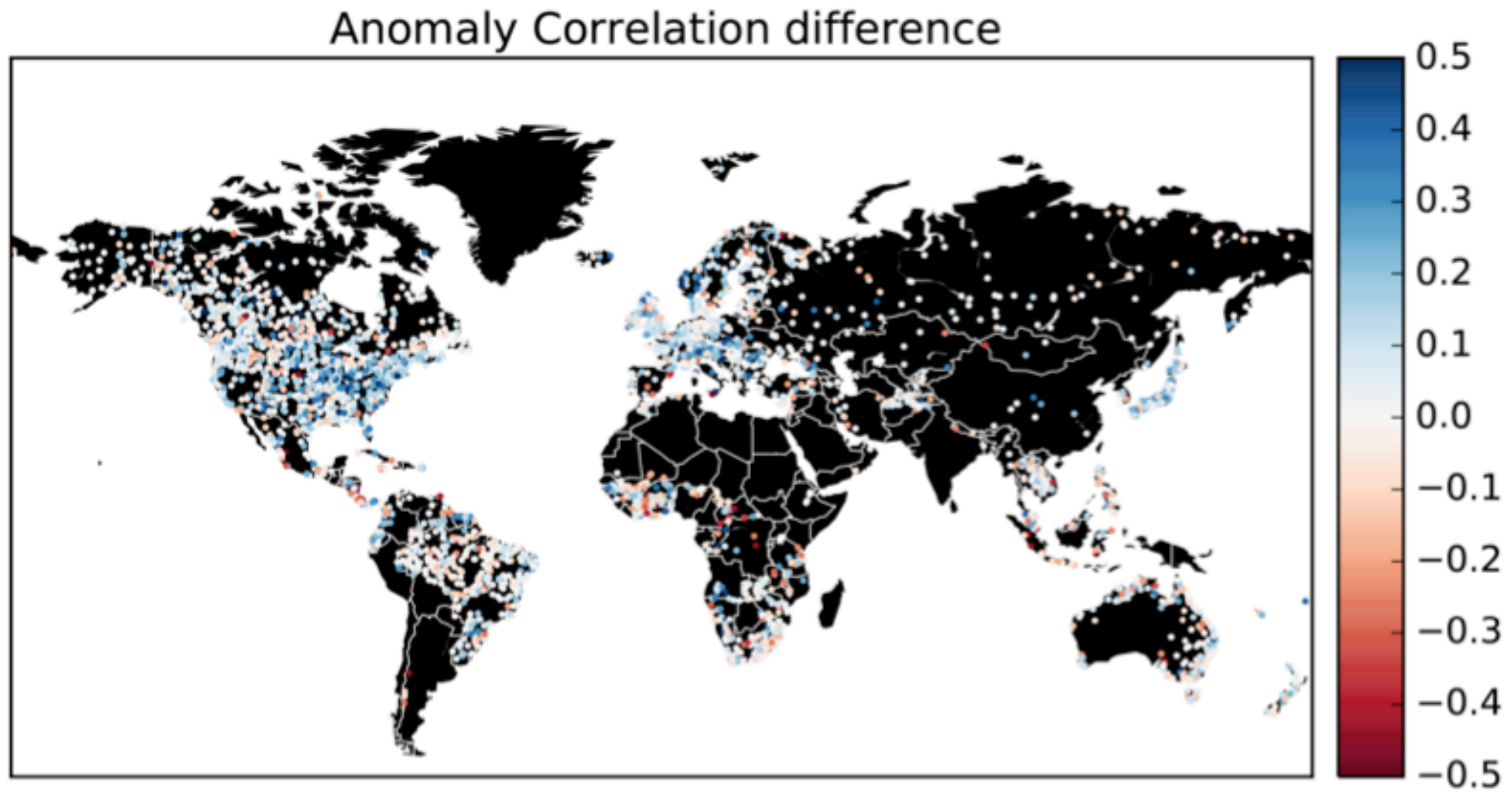


Evaluation discharge

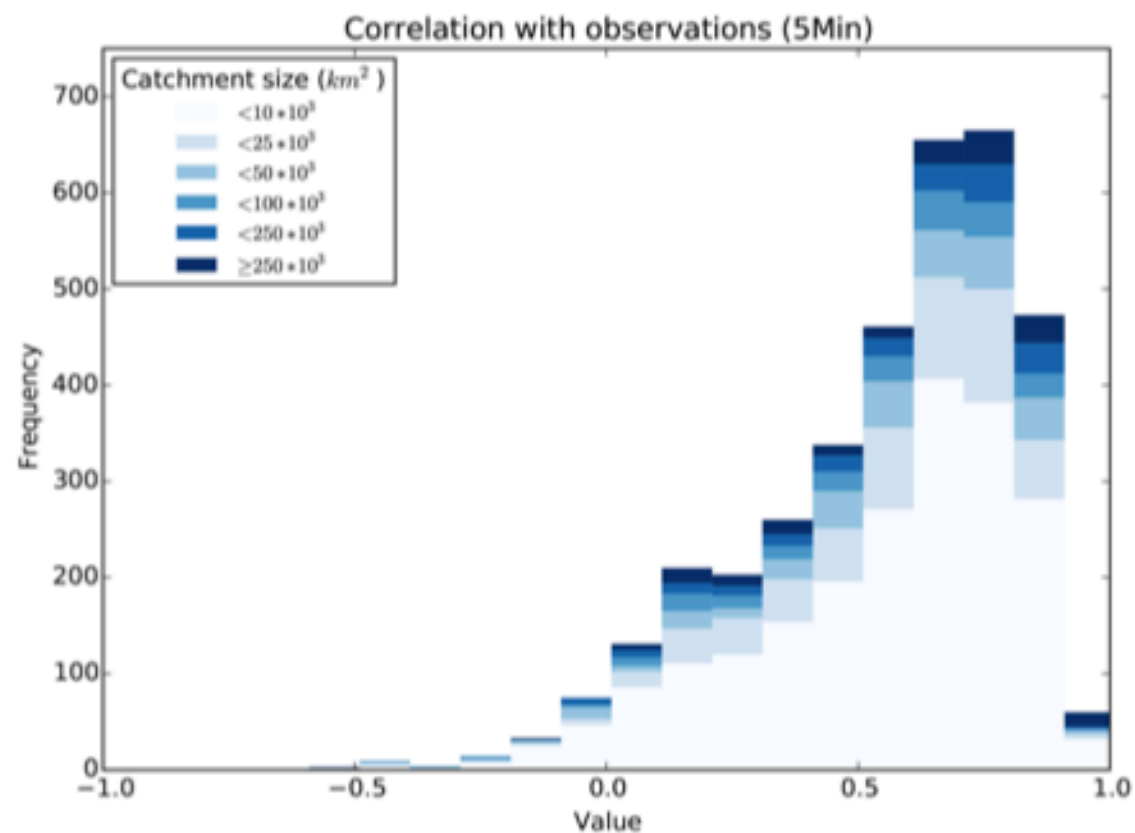
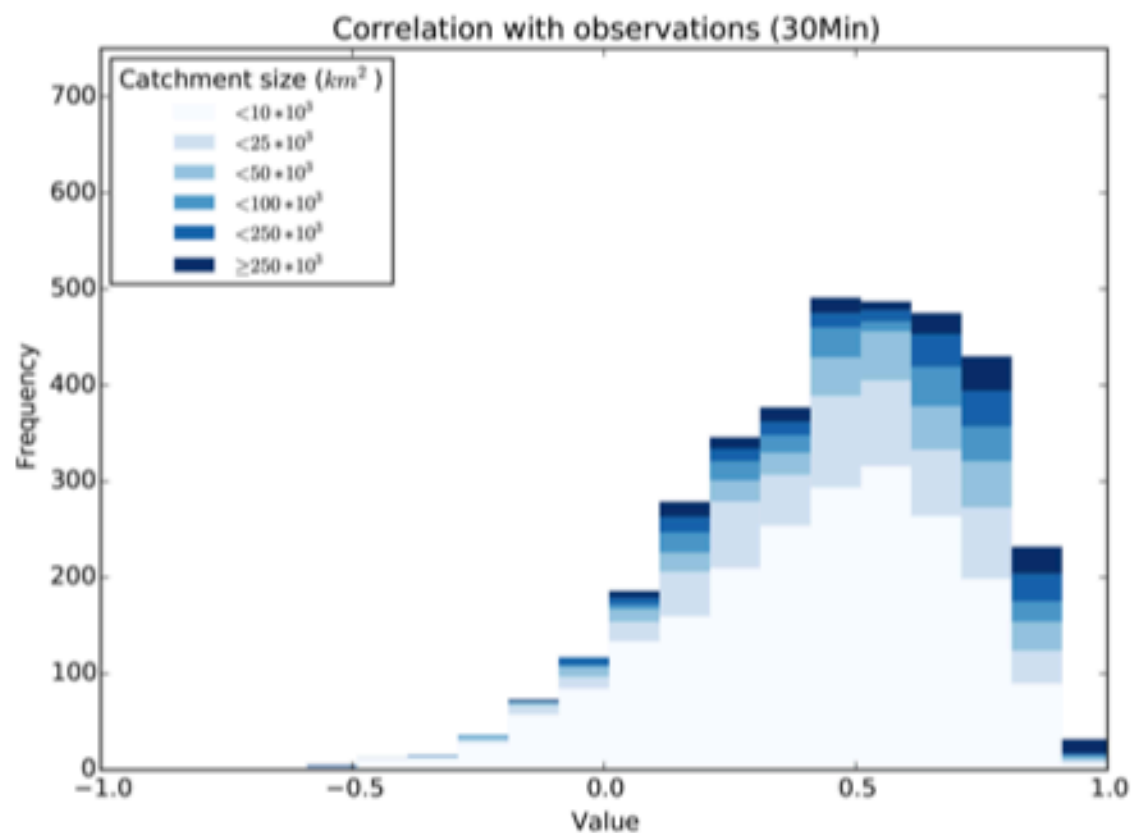
Correlation with observations (5Min)



Evaluation discharge

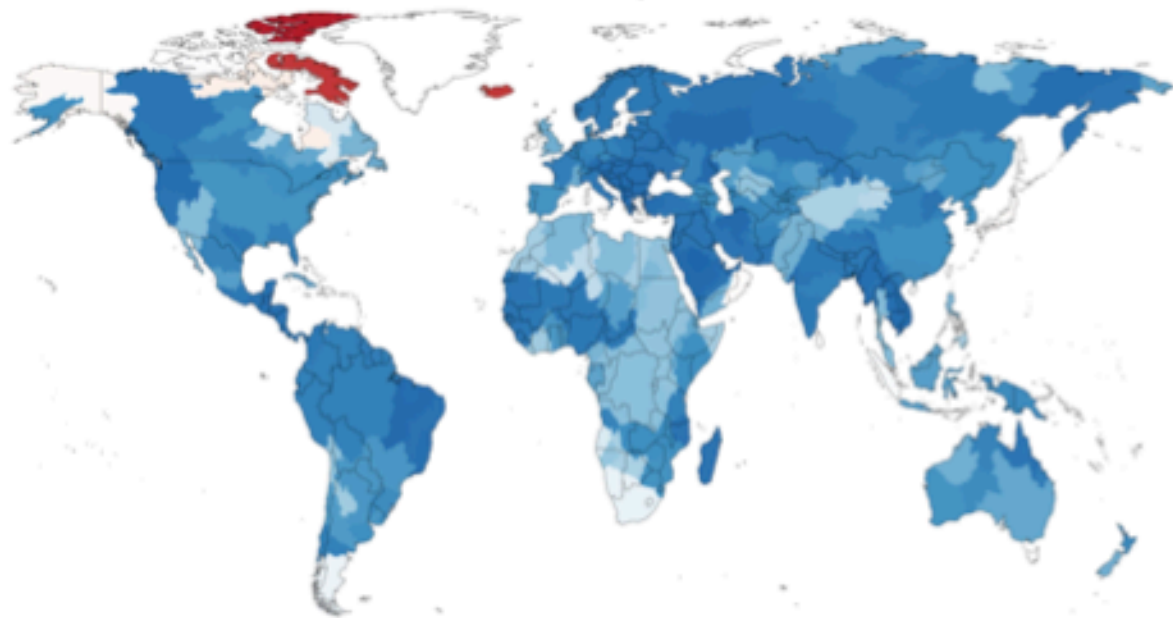


Evaluation discharge

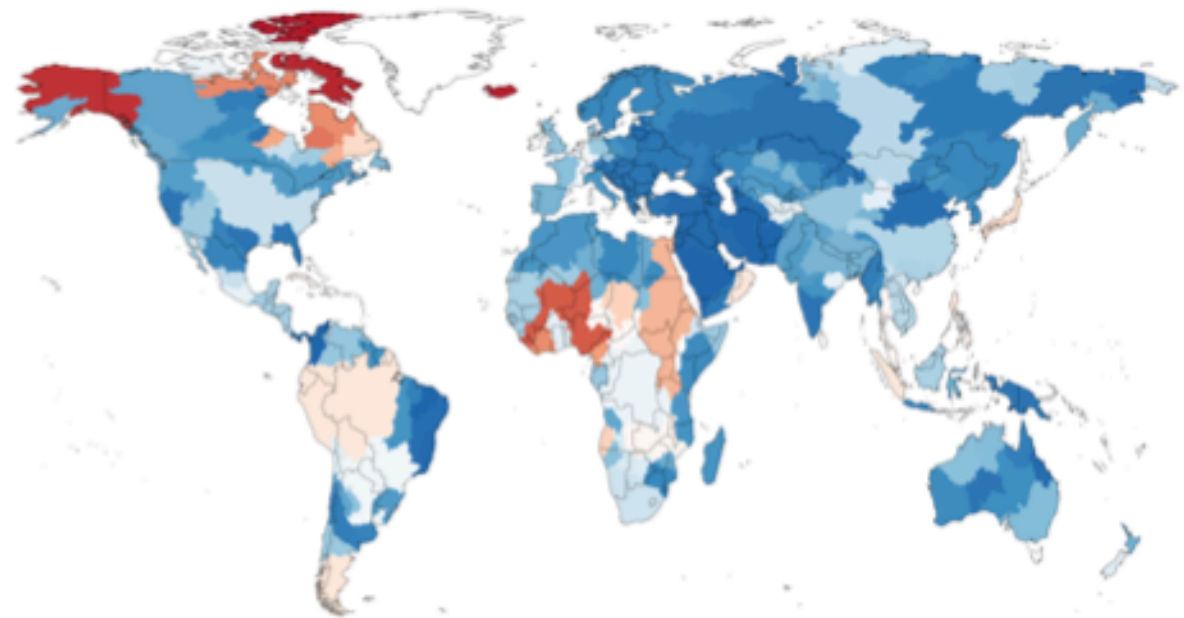


Evaluation of groundwater

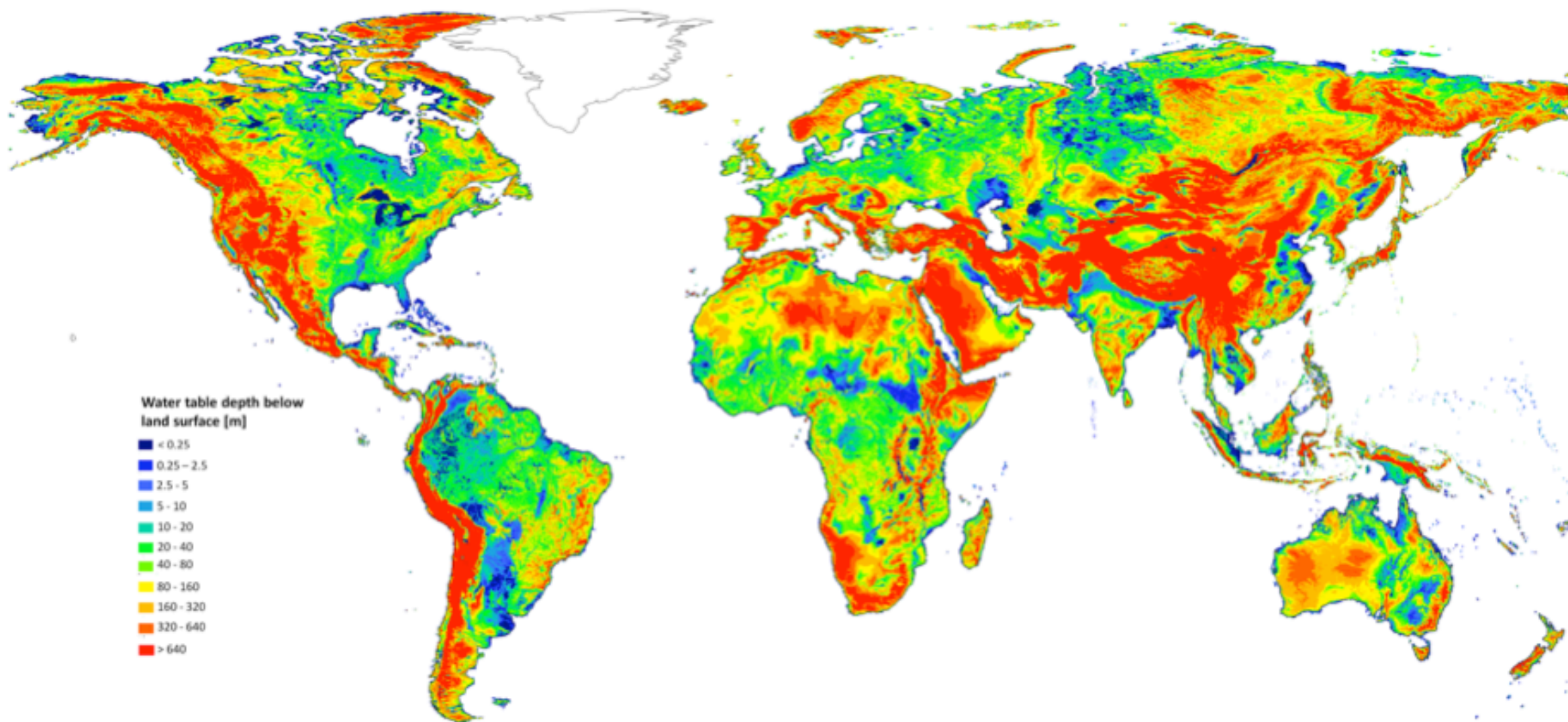
Monthly



Annual



PCR-GLOBWB extensions - MODFLOW



PCR-GLOBWB extensions – Dynamic routing

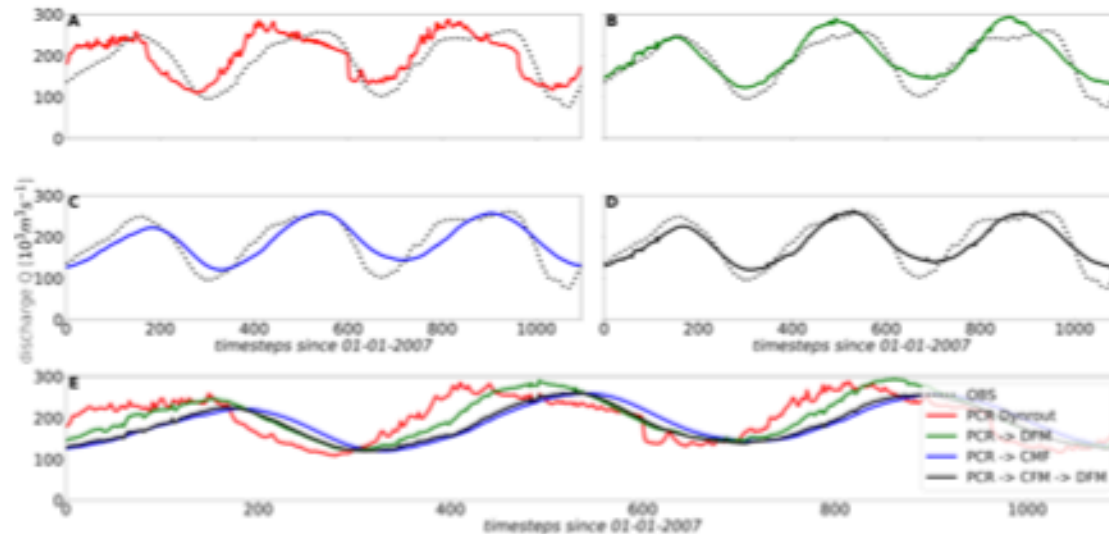
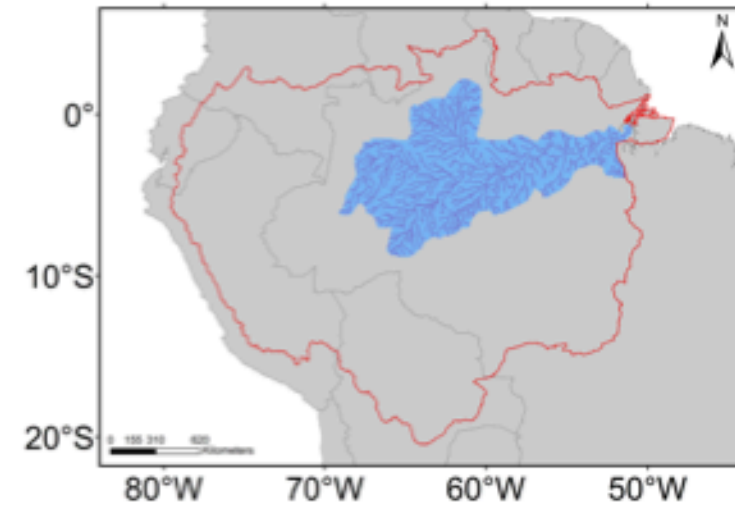
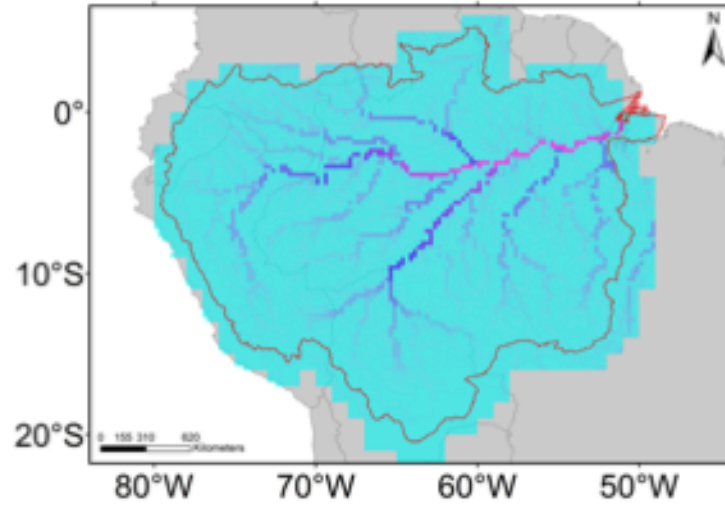
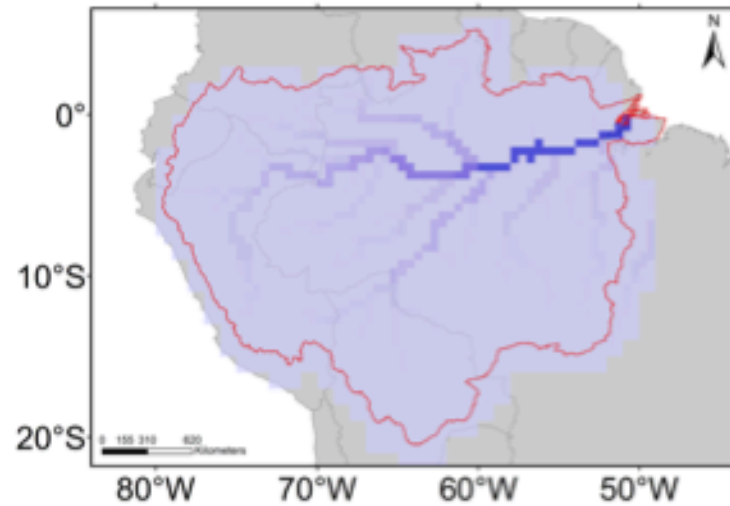
PCR-GLOBWB
hydrology



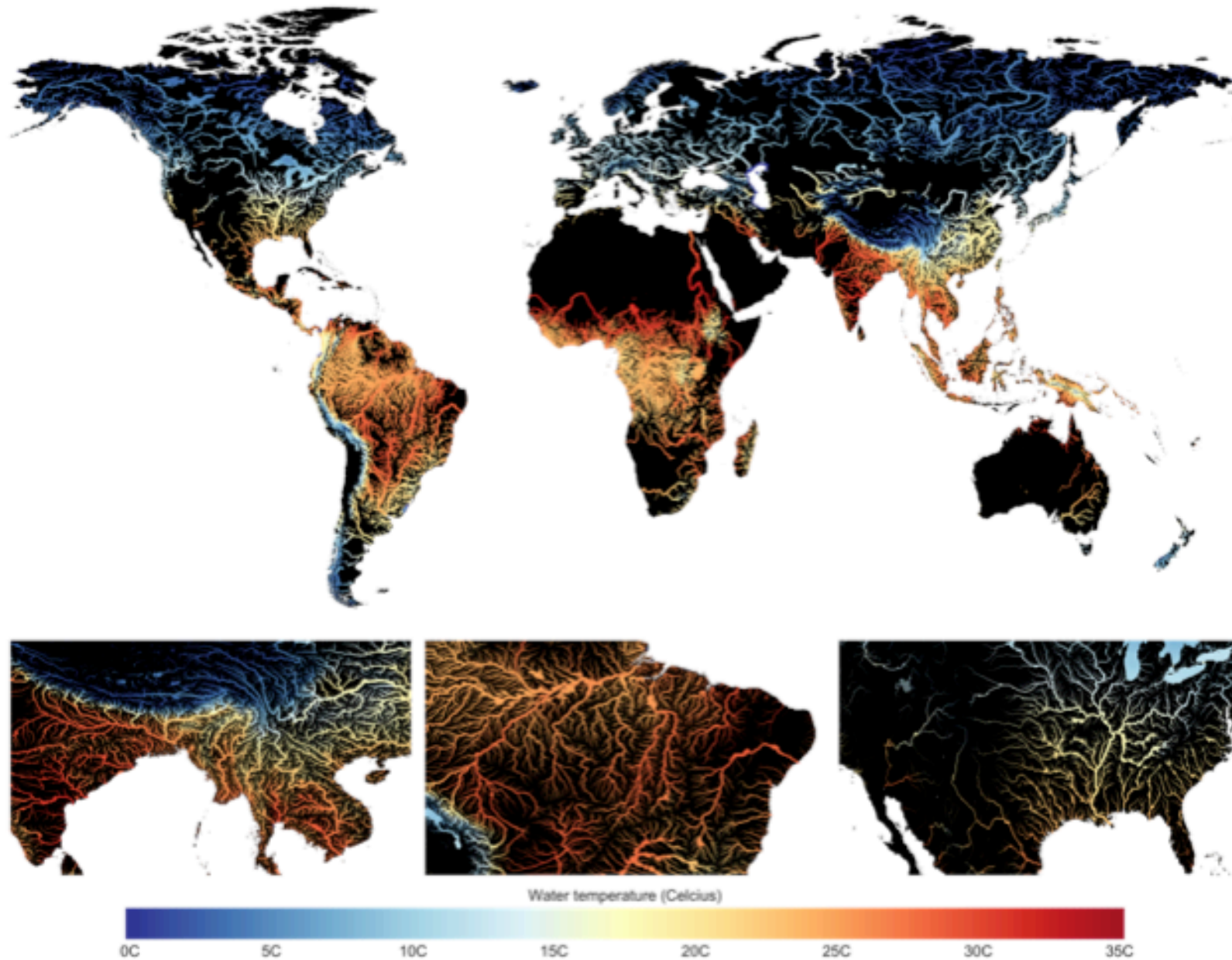
CaMa-Flood
1D routing



Delft3D FM
1D/2D hydrodynamics

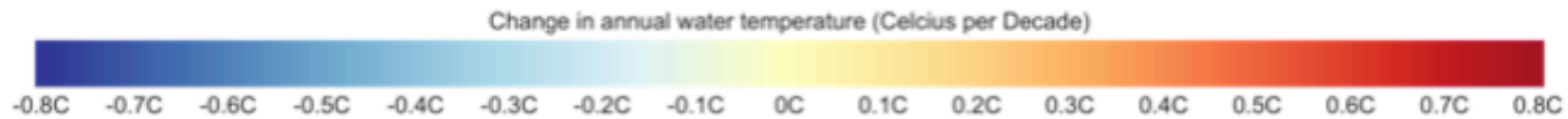
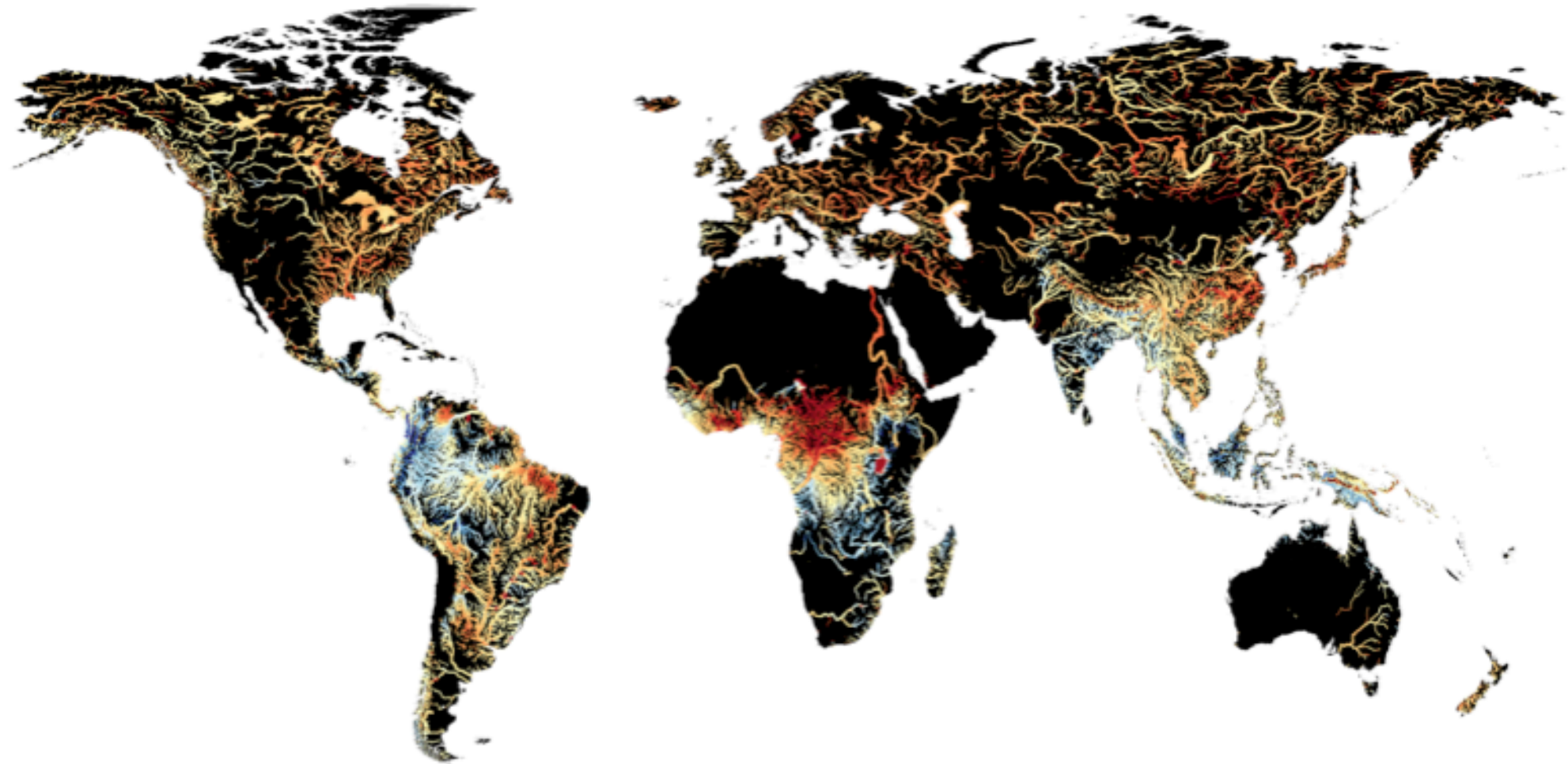


PCR-GLOBWB extensions – Water temperature



Wanders *et al.* (2018),
submitted WRR

PCR-GLOBWB extensions – Water temperature



Wanders *et al.* (2018),
submitted WRR

PCR-GLOBWB Applications – Global Flood Analyzer



AQUEDUCT Global Flood Analyzer

10 year protection

Type or select a country, basin or state, and start to assess flood risks

Flood Risk in United States

Urban Damage

Affected GDP

Affected Population

2010



Annual Expected Urban Damage

\$237.1B

Annual Avoided Urban Damage

\$312.5B

2030

Scenario A

Scenario B

Scenario C



Current Annual Expected Urban Damage

\$237.1B

Increased Impact Due To Socio-economic Change

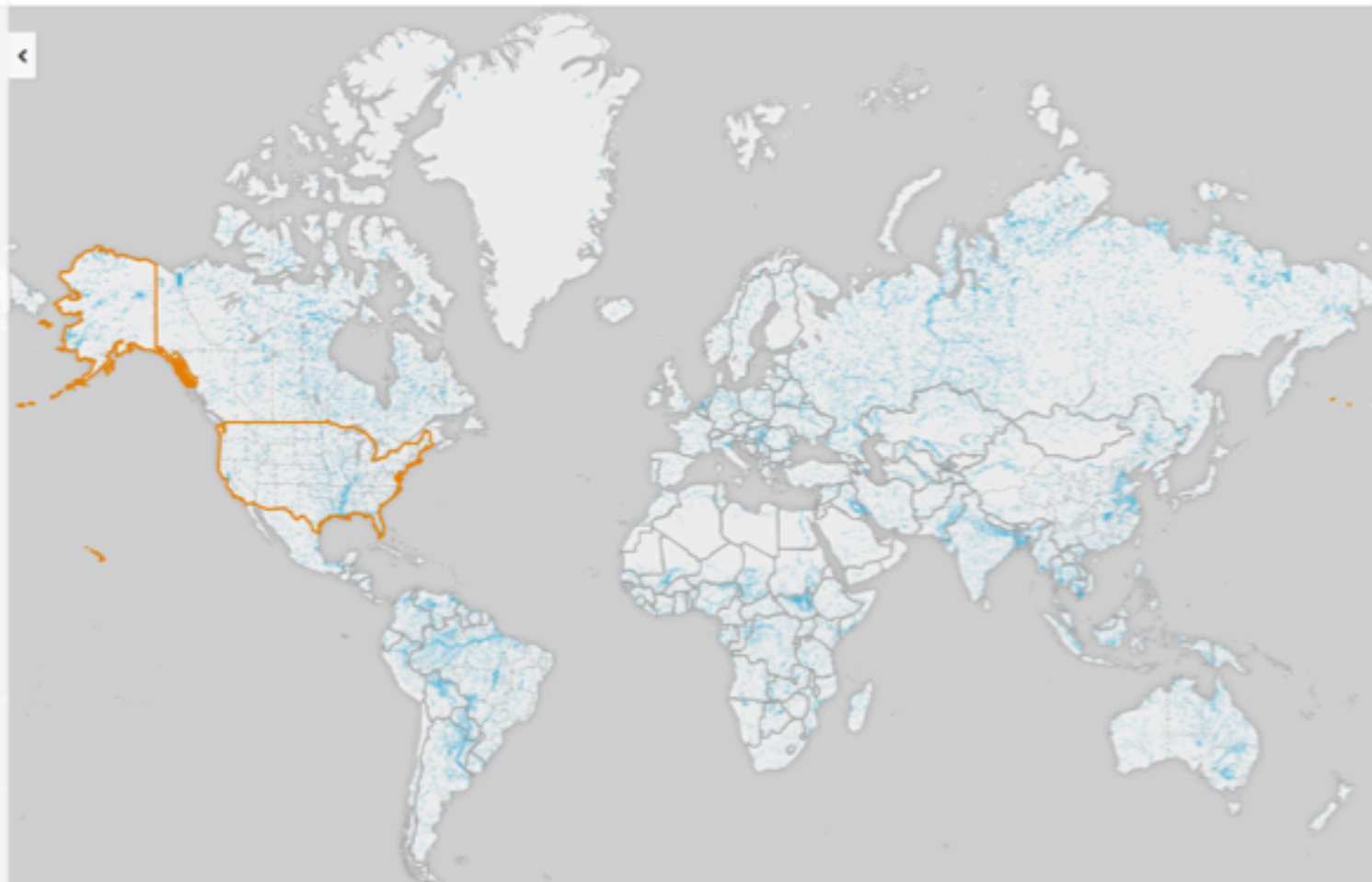
\$129.1B

Increased Impact Due To Climate Change

\$102.9B

2030 Annual Expected Urban Damage

\$469.2B

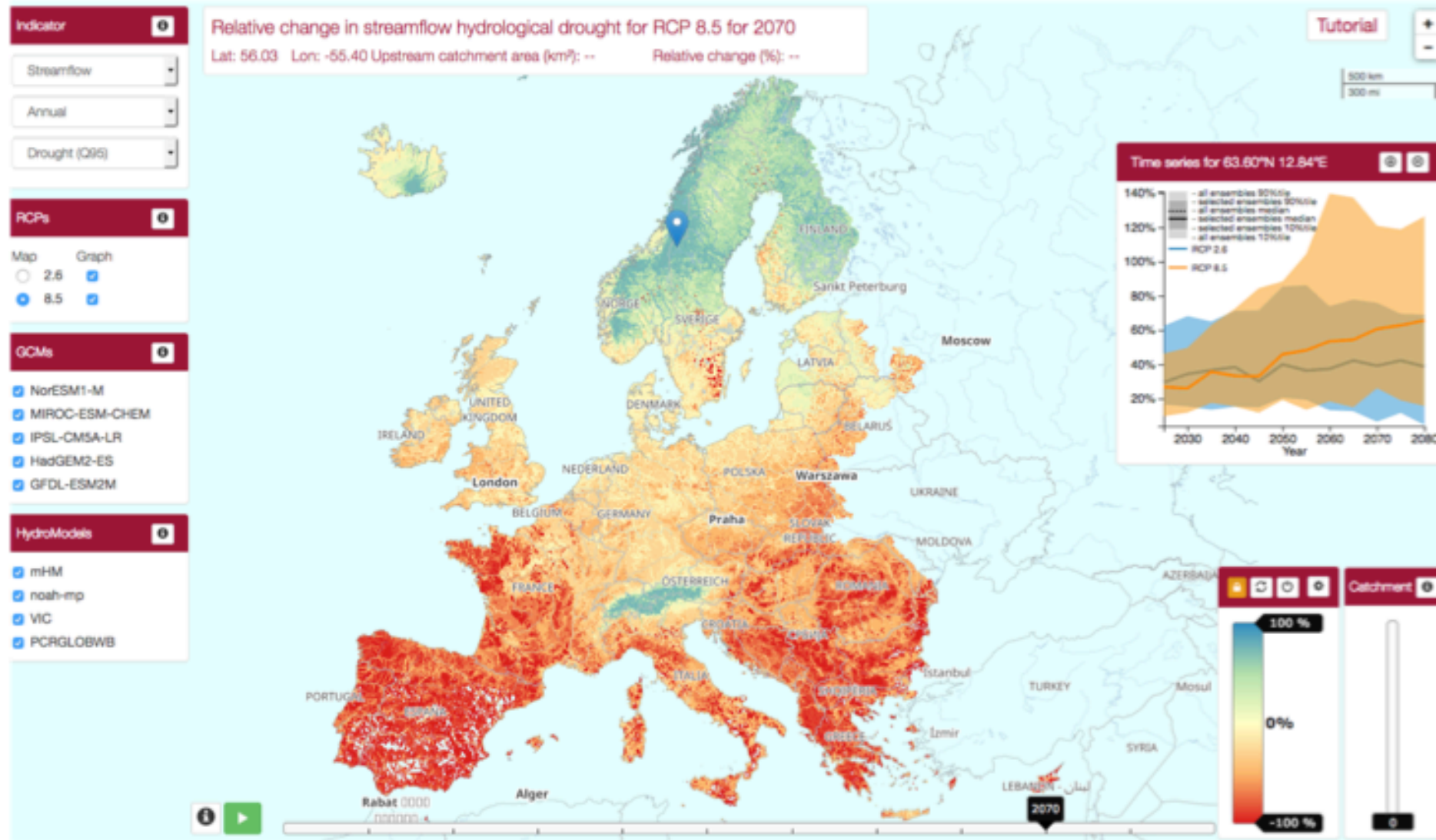


<http://floods.wri.org/>

PCR-GLOBWB Applications – Water2Invest



PCR-GLOBWB Applications - EDgE



<http://edge.climate.copernicus.eu/Apps/#climate-change>

PCR-GLOBWB open source

 UU-Hydro / PCR-GLOBWB_model

 Watch 10  Star 17  Fork 23

[Code](#) [Issues 0](#) [Pull requests 0](#) [Projects 0](#) [Insights](#)

PCR-GLOBWB (PCRaster Global Water Balance) is a large-scale hydrological model intended for global to regional studies and developed at the Department of Physical Geography, Utrecht University (Netherlands). Contact: Edwin Sutanudjaja (E.H.Sutanudjaja@uu.nl).

 3,987 commits  1 branch  2 releases  3 contributors  GPL-3.0

Branch: **develop** [New pull request](#) [Find file](#) [Clone or download](#)

 **edwinkost** Merge pull request #3 from UU-Hydro/for_public_release_16_jan_2017 Latest commit ffd2b53 on Jan 16, 2017

 config	Updating files.	a year ago
 model	Updating files.	a year ago
 .gitignore	Ignore cartesius output job files.	3 years ago
 LICENSE	replaced user agreement with GPL-3 License	2 years ago
 README.md	Updating README and add LICENSE	2 years ago
 README.txt	Updating README and add LICENSE	2 years ago
 known_issues.txt	Adding the files from the pcrglobwb git server (v2.0.2_beta).	4 years ago

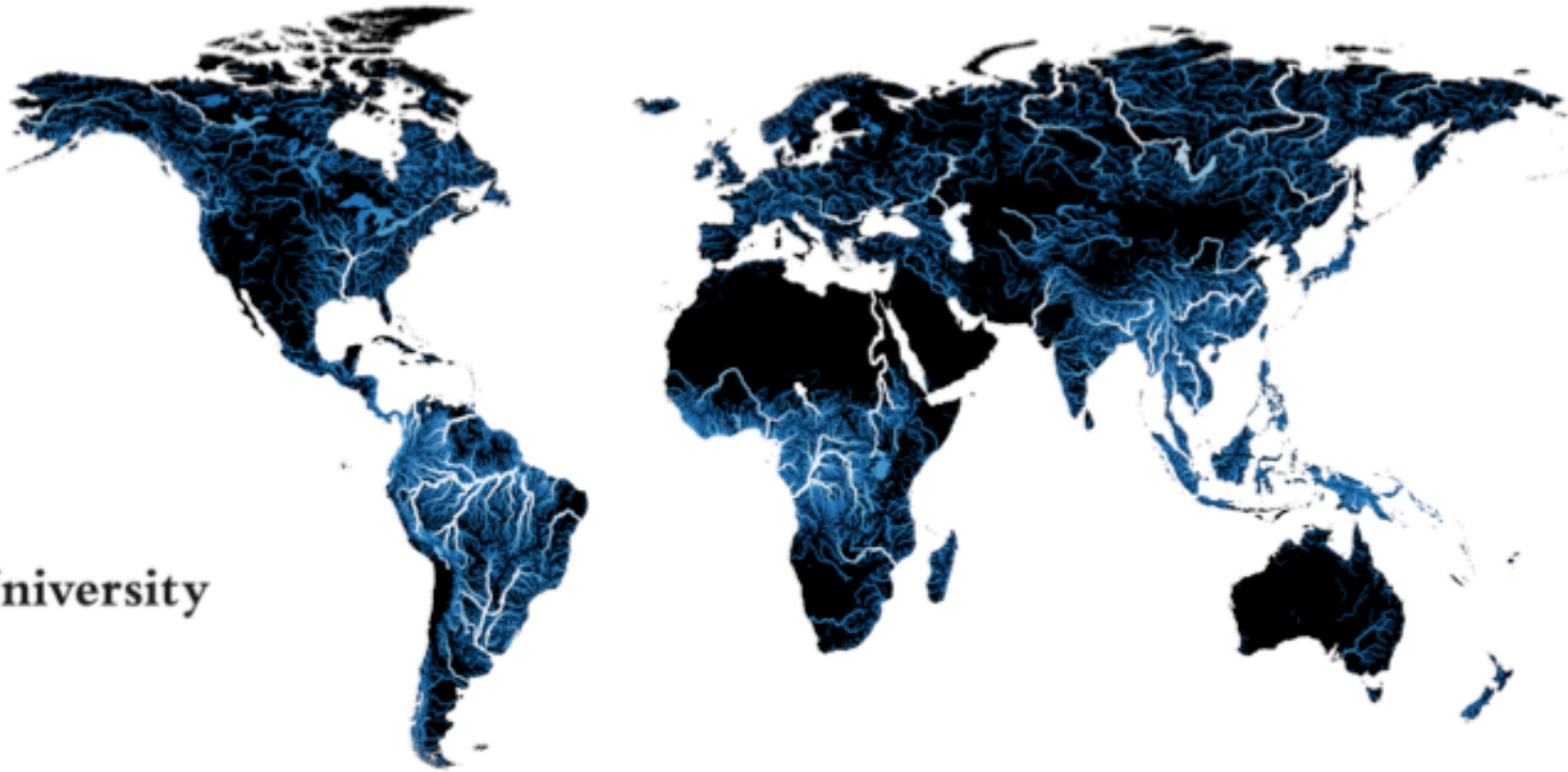
 [README.md](#)

PCR-GLOBWB

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https://github.com/UU-Hydro/PCR-GLOBWB_model

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