Present and future water scarcity hotspots for rainfed and irrigated agriculture under climate change: a global study

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EGU
Outstanding Student & PhD candidate Presentation contest

1 Surface water supply (SWS)

CMIP6 GCM x RCP – SSP (15 scenarios)

- **CWatM: Hydrological Model**
  - Surface water supply
  - Non-agricultural sectors water demand
- **EPIC-IIASA: Crop Model**
  - Crops yields
  - Water and fertilizer requirements

GLOBIOM – WAT: Agroeconomic Model

Cropland informed surface water supply
Hydrological Model CWatM

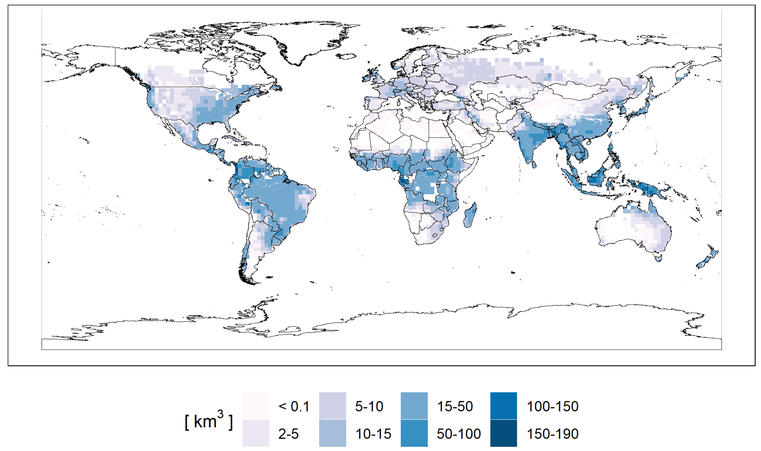
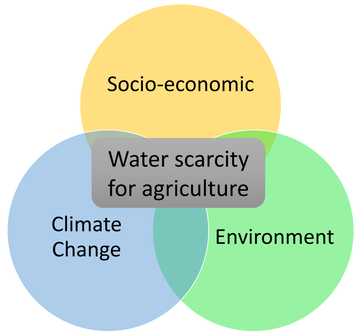


Figure 1:Cropland informed surface water supply in 2050 under UKESM1-0-LL RCP8.5-SSP5

Non-agricultural sectors water demand (OTHDEM) 2



Copland informed water domestic and industrial demand
Hydrological Model CWatM

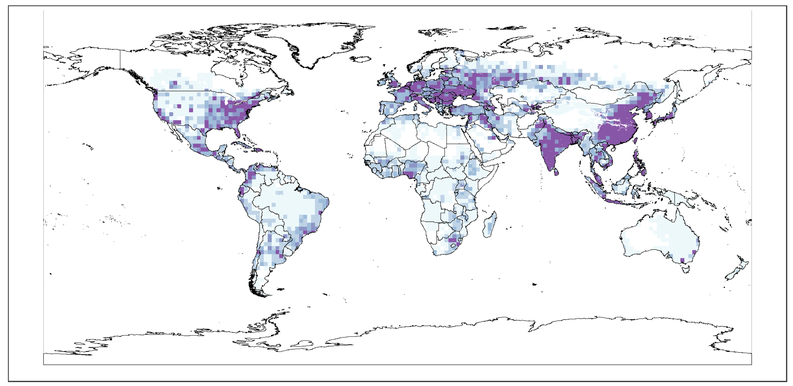


Figure 2:Copland informed non-agricultural sectors demand in 2050 under UKESM1-0-LL RCP8.5-SSP5

Integrated Global Change Impact $IGCI = SWS - OTHDEM - AGDEM - EFR$

Local indicators of spatial association (LISA) → Water scarcity hotspot identifcation for agriculture

Water scarcity hotspots for agriculture
No land use changes and including EFR

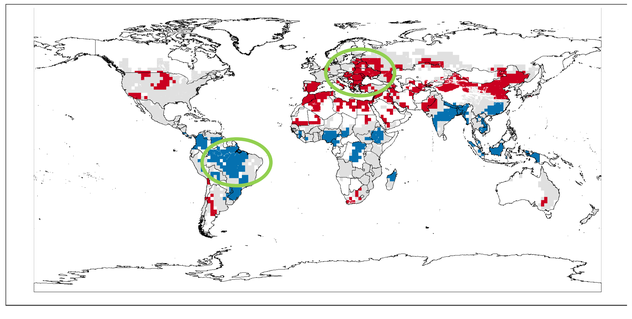


Figure 4: Water scarcity hotspots for agriculture in 2050 under UKESM1-0-LL RCP8.5-SSP5

Water scarcity hotspots for agriculture
Supply-side adaptations and no EFR

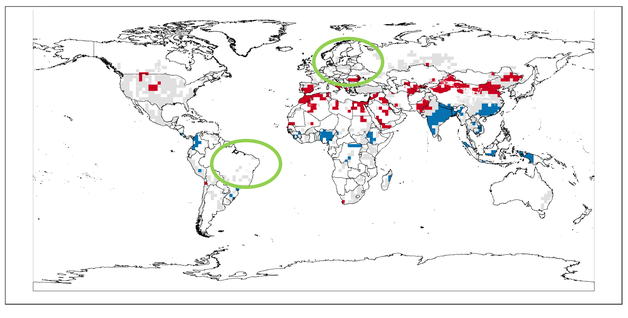


Figure 5: Water scarcity hotspots for agriculture in 2050 under UKESM1-0-LL RCP8.5-SSP5

4 Water scarcity hotspot for agriculture

GLOBIOM – WAT: Agroeconomic Model

- Competition of land use – based sectors (agriculture, forestry and bioenergy)
- Market and international trade representation of agricultural commodities
- Supply-side adaptations:
  - Area allocation to crops in a region
  - Change management system of existing crop
  - Changing the crops in the cropland

Irrigation water withdrawals
Agroeconomic Model GLOBIOM and Crop Model EPIC-IIASA

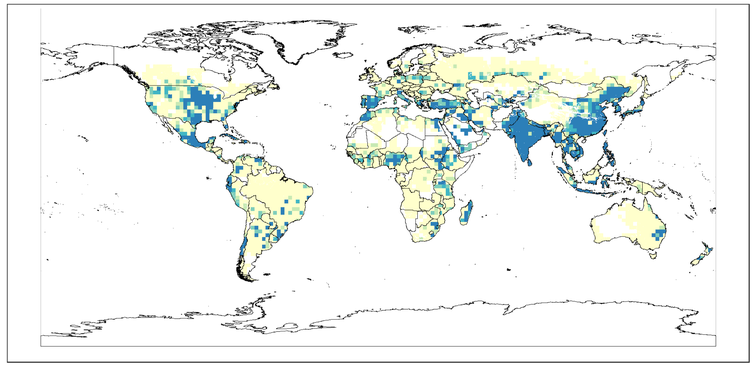


Figure 3: Irrigation water withdrawals in 2050 under UKESM1-0-LL RCP8.5-SSP5

Agricultural water demand (AGDEM) 3

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Get in touch

Abstract

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