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A large, high-resolution image of the Earth as seen from space, showing the continents of Africa and Europe. The Earth is set against a dark, starry background. A white rectangular border frames the central text area.

ISIMIP Global Water Sector Update

Simon Gosling

Hannes Müller Schmied



ISIMIP3 Plans

- **10 models** plan to work on ISIMIP3.
- All but one will do 3a, 3b and attribution/counterfactual.
- **Past papers include around 6 models for ISIMIP2a.**
- **Models planning to run ISIMIP3:**
 - LPJmL version 5.
 - PCR-GLOBWB
 - WaterGAP2
 - CLM4.5
 - ORCHIDEE-MICT
 - HydroPy
 - MATSIRO
 - JULES-W1
 - H08
 - CWatM



Paper plans

- 2 recently published, five in review.
 - **Two recently published:**
 - Inne Vanderkelen: “Global heat uptake by inland waters” *GRL*. (Published).
 - Hong Do: “Historical and future changes in global flood magnitude—evidence from a model-observation investigation”. *HESS*. (Published).
 - **Five under review**
 - Yadu Pokhrel. “Global Terrestrial Water Storage and Drought Severity under climate change”. *Nature Climate Change* (revision submitted).
 - Valentina Krysanova & Jamal Zaherpour “How evaluation of global hydrological models can help to improve credibility of river discharge projections under climate change”. *Climatic Change*. (revision submitted).
 - Lukas Gudmundsson. “Globally observed trends in mean and extreme river flow attributed to man-made climate change”. *Science*. (revising).
 - Robert Reinecke: “Uncertainty of simulated groundwater recharge at different global warming levels: A global-scale multi-model ensemble study”. *HESS* (submitted).
 - Stefan Lange: “Projecting exposure to extreme climate impact events across six event categories and three spatial scales” *Earths Future* (submitted).



Paper plans

- 12 in preparation
- **1 Cross-scale study**
 - Yusuke Satoh and Yadu Pokhrel: uncertainty resulting from LAI and land use data (besides irrigation area). LAI is essential in estimating evapotranspiration but probably models have used different datasets and perhaps most models have used monthly-scale fixed values in future simulations. How hard is it to harmonize LAI (and other land use type data)? Biome sector might be able to share their LAI estimates/projections with us.
- **3 evaluation and model description papers:**
 - Anne Gaedeke “Performance of global hydrological models for climate change projections in Pan-Arctic river basins”.
 - Amit Kumar: “Cross-scale evaluation of droughts simulated by catchment and global-scale hydrological models across eight large river basins”.
 - Camelia Telteu: Model description paper.
- **2 global warming papers:**
 - Hannes Muller Schmied: Flow regime shifts at different warming levels (ISIMIP2b).
 - Yusuke Satoh: “The Timing of Unprecedented Hydrological Drought Emergence under Climate Change.”⁴



Paper plans

- **6 ISIMIP3 paper plans:**

- Jacob Schewe: “A simulation framework to estimate the risk of human displacement due to river floods”.
- Naota Hanasaki and Julien Boulange
- Hyungjun Kim and Yusuke Satoh: attribution study on water scarcity (this may include drought as well).
- Hyungjun Kim and Yusuke Satoh: water temperature modelling.
- Simon Gosling and Amit Kumar: propagation of droughts from met>hydro>agr and 3D structure.
- Simon Gosling and Qiuhong Tang: Climate change impacts on hydrological extremes.



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Lack of funding.

COVID-19 delays.

Other projects take
precedence.

Limited time for doing all
runs.

Challenges

Limited time for integrating
water use and
management data.

Dams and adaptation in
ISIMIP3

Water abstraction and
adaptation in ISIMIP3