

Improving agricultural resilience with higher spatial resolution

Jannis M. Hoch, Edwin H. Sutanudjaja, Rens van Beek, Marc F.P. Bierkens

✉ j.m.hoch@uu.nl

Chances

Applications

By ‘going hyper-resolution’, the area of application for hydrological models increase greatly.

It is now better possible to simulate processes at scales relevant for decision-making.

One example is the simulation of crop yield dynamics with a coupled crop growth model at the smallholder scale.

An important variable here is soil moisture as shown in the next slide.

Input data

Also, the input resolution of input data sets increases – it is now possible to make optimal use of this refinement.



GOES

HYPER-RESOLUTION

Results

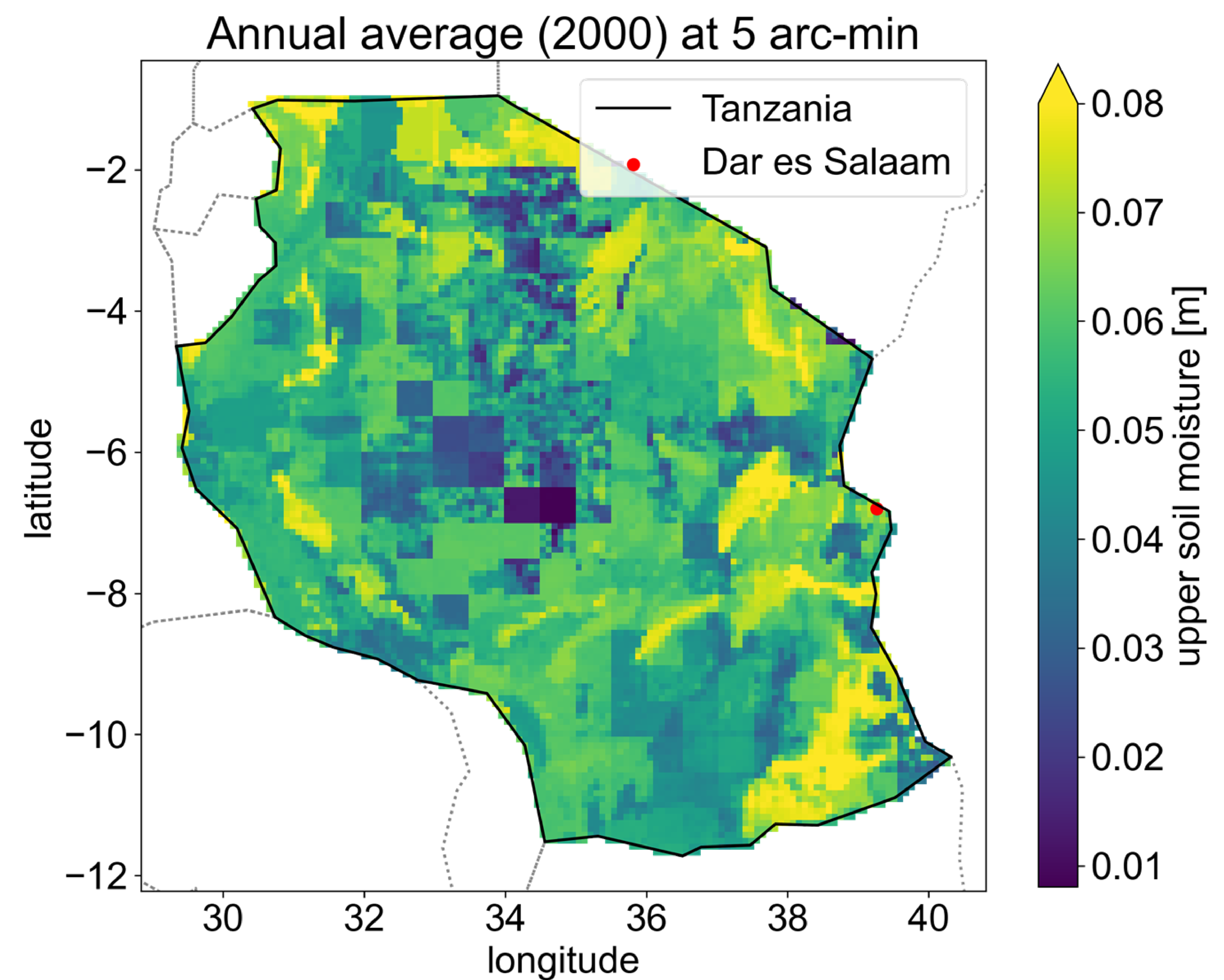
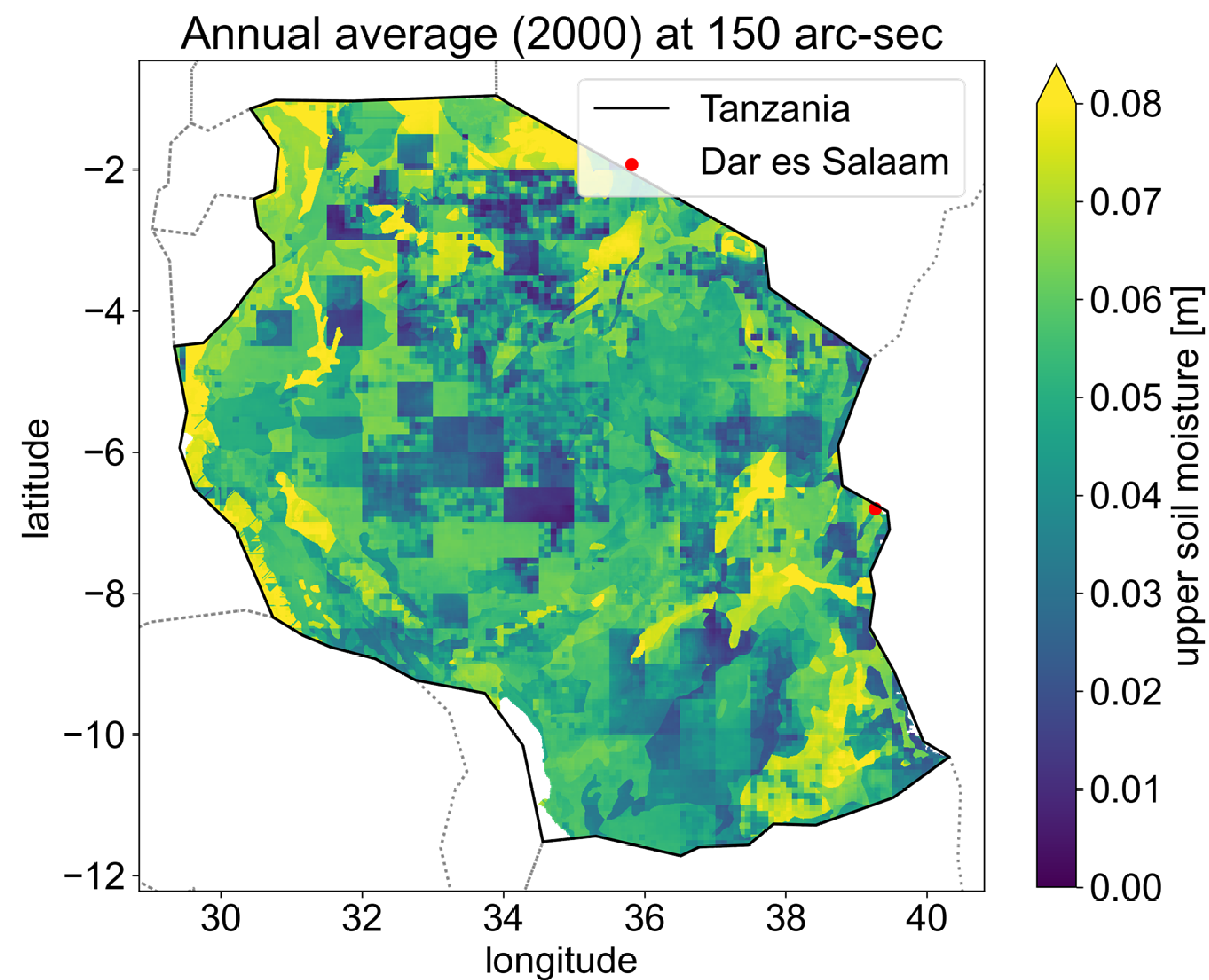
- This is all very much work in progress!
- Soil moisture can be simulated at much finer scale but validation is still pending
- With a more detailed river network, simulated discharge improves as well.

Challenges + to-do's

- Run-time is still an issue
- This is particularly true for more sophisticated routing schemes
- Not all input data sets are ready to be used at hyper-resolution
- There are still data sets and parameterizations that need to be downscaled or resampled to 1 km scale
- Meteorological forcing still challenging, even at finer spatial resolutions
- Matching observation station with correct corresponding cell

References:
Sutanudjaja, E. H., van Beek, R., Wanders, N., Wada, Y., Bosmans, J. H. C., Drost, N., van der Ent, R. J., de Graaf, I. E. M., Hoch, J. M., de Jong, K., Karssenberg, D., López López, P., Peßenteiner, S., Schmitz, O., Straatsma, M. W., Vannamettee, E., Wisser, D., and Bierkens, M. F. P.: PCR-GLOBWB 2: a 5 arcmin global hydrological and water resources model, Geosci. Model Dev., 11, 2429–2453, <https://doi.org/10.5194/gmd-11-2429-2018>, 2018.

Comparison simulated upper soil moisture



Discharge benchmark and validation

