README: ISIMIP3b Data on DKRZ HPC (/pool/data/ISIMIP3b), Date: 2025-02-05

[1] TITLE OF THE DATA COLLECTION The Inter-Sectoral Impact Model Intercomparison Project (ISIMIP)

[2] PATH TO THE DATA COLLECTION /pool/data/ISIMIP3b

[3] CONTACT PERSON FOR THE DATA COLLECTION Leonard Borchert, CEN-UHH, leonard.borchert@uni-hamburg.de (long-term responsible contact)

[4] DATA USAGE LICENSE AND CITATION REQUIREMENTS ISIMIP3 model output is published with a CC0 1.0 license. Details on the terms of use of ISIMIP3b data are contained in https://www.isimip.org/gettingstarted/terms-of-use/terms-use-publicly-available-isimip-data-after-embargo-period/.

The ISIMIP3b model outputs are DOI data publications which have a predefined citation format (https://data.isimip.org/doi/). The citation for the provided atmospheric data is “Stefan Lange, Matthias Büchner (2021): ISIMIP3b bias-adjusted atmospheric climate input data (v1.1). ISIMIP Repository. https://doi.org/10.48364/ISIMIP.842396.1”.

[5] DESCRIPTION OF THE DATA COLLECTION The Inter-Sectoral Impact Model Intercomparison Project (ISIMIP, https://www.isimip.org/) is a collaborative research initiative that aims to provide a consistent framework for the collation of a consistent set of climate impact data across sectors and scales. ISIMIP consists of successive rounds of simulations connected to the phases of the Coupled Model Intercomparison Project (CMIP), developing and providing climate and socioeconomic forcing datasets for cross-sectorally consistent climate impact modelling. To that end, the ISIMIP simulations are carefully downscaled and bias-corrected to reflect future climate changes as accurately as possible within the framework of the respective climate model. This enables using this climate model output in impact models. The current generation of ISIMIP simulations is ISIMIP phase 3a for reanalysis (Cucchi et al., 2020) and phase 3b for climate models (Lange, 2019). ISIMIP also curates impact model output data and provides modelling protocols to integrate climate impacts across sectors and scales. Several sectors are included in ISIMIP, including agriculture, terrestrial biodiversity, health, energy, groundwater, and fisheries, among others. In /pool/data/ISIMIP3b, we only store the ISIMIP climate model output on Levante, not the impact model output. Phase 3a (https://www.isimip.org/outputdata/?simulation_round=ISIMIP3a) consists of several historical climate forcing datasets. These data sets resemble several data sets already available on Levante (i.e. ERA5), which is why they are not provided here.

Phase 3b (https://www.isimip.org/outputdata/?simulation_round=ISIMIP3b) consists of climate model datasets obtained from the 5 different climate models (GCMs) GFDL-ESM4, IPSL-CM6A-LR, MPI-ESM1.2-HR, MRI-ESM2.0, and UKESM1-0-LL for the 3 Shared Socioeconomic Pathways (SSPs) 126, 370 and 585, as well as historical and pre-industrial control runs. The model simulation output is carefully bias-corrected and downscaled to provide bias-free regional climate information. On Levante, the variables tas, tasmax, tasmin, pr, ps, and hurs are provided for all GCMs at daily resolution.

The spatial resolution of ISIMIP3b simulations is 0.5 degrees. We only provide the last 200 years of each piControl simulation.

The directory structure on /pool/data/ISIMIP3b/ is as follows: <model_id>/<experiment_id>/<variable_id> with:
model_id=GFDL-ESM4,MRI-ESM2-0,UKESM1-0-LL,IPSL-CM6-LR,MPI-ESM12-HR
experiment_id=historical,piControl,ssp126,ssp370,ssp585 variable_id=hurs,pr,ps,tas, tasmax,tasmin

The file name nomenclature is:
<model_id>_<ensemble_member>_<input_data>_<experiment_id>_<variable_id>_<spatial_coverage>_<frequency>_<start_year>_<end_year>.nc
with: model_id=gfdl-esm4,ipsl-cm6a-lr,mpi-esm1-2-hr,mri-esm2-0,ukesm1-0-ll
ensemble_member=r1i1p1f1,r1i1p1f2 input_data=w5e5
experiment_id=historical,picontrol,ssp126,ssp370,ssp585
variable_id=hurs,pr,ps,tas,tasmax,tasmin spatial_coverage=global frequency=daily
start_year=1850,1851,1861,1871,1881,1891,1901,1911,1921,1931,1941,1951,1961,1971,1981,1991,2001,2011,2015,2021,2031,2041,2051,2061,2071,2081,2091
end_year=1850,1860,1870,1880,1890,1900,1910,1920,1930,1940,1950,1960,1970,1980,1990,2000,2010,2014,2020,2030,2040,2050,2060,2070,2080,2090,2100

[6] DATA USAGE SCENARIO ISIMIP provides a consistent, downscaled, and bias-corrected framework of climate model simulations to assess climate impacts across sectors and spatial and temporal scales. These data can be used to answer questions about the impacts of climate change on human and natural systems today and in the future under different scenarios, as well as the interactions between these impacts. Notably, the ISIMIP3b simulations differ from other climate model simulations in that they can be readily compared to observational data due to the bias correction.

[7] DATA CREATION METHODS Climate model simulations were provided by the respective climate modeling centres. The observational reference dataset used for bias adjustment is W5E5 v2.0 (Cucchi et al. 2020, Lange et al. 2021). The method used for bias adjustment is ISIMIP3BASD v2.5.0 (Lange 2019b, Lange 2021). For more details see the ISIMIP3 protocol paper (Frieler et al. 2021).

[8] DATA FORMAT The file format is netCDF.

[9] DATE STORAGE PLAN The currently requested ISIMIP data has a volume of a little less than 4 TB. Since ISIMIP is an ongoing initiative with future simulation rounds that will lead to new possibly increasing data requirements in the future, a long-term commitment to storing this data at DKRZ is required to enable its continued and seamless use. The storage resources are currently granted until 2029-12-31.

[10] ISSUES – none –

[11] REFERENCES Cucchi, M., Weedon, G. P., Amici, A., Bellouin, N., Lange, S., Müller Schmied, H., Hersbach, H., and Buontempo, C.: WFDE5: bias-adjusted ERA5 reanalysis data for impact studies, Earth Syst. Sci. Data, 12, 2097–2120, 2020. https://doi.org/10.5194/essd-12-2097-2020 Frieler, K., Volkholz, J., Lange, S., et al.: Scenario setup and forcing data for impact model evaluation and impact attribution within the third round of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP3a), Geosci. Model Dev., 17, 1–51, https://doi.org/10.5194/gmd-17-1-2024, 2024. Lange, S.: Trend-preserving bias adjustment and statistical downscaling with ISIMIP3BASD (v1.0), Geosci. Model Dev., 12, 3055–3070, 2019. https://doi.org/10.5194/gmd-12-3055-2019 Lange, S. and Büchner, M.: ISIMIP3b bias-adjusted atmospheric climate input data (v1.1). ISIMIP Repository. 2021. https://doi.org/10.48364/ISIMIP.842396.1

[12] ACKNOWLEDGEMENT OF THE USAGE OF DKRZ RESOURCES

When you used data from DKRZ /pool/data/ISIMIP3b in publications, please add the following acknowledgement:

ISIMIP3b datasets provided by CEN-UHH via the DKRZ data pool were used.

For details on how to acknowledge the usage of DKRZ resources, please see https://docs.dkrz.de/doc/getting_started/benutzungsrichtlinien.html#how-to-acknowledge-granted-resources-at-dkrz.