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High-resolution isotopic simulations from ECHAM6-wiso nudged with ERA5 reanalyses: new products for isotopic model-data comparisons

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For several decades, the comparison of climate data with results from water isotope-enabled Atmosphere General Circulation Models (AGCMs) significantly helped to a better understanding of the processes ruling the water cycle, which is one of the main drivers of the climate variability. For the modern period, the use of AGCMs nudged with weather forecasts reanalyses is a powerful way to obtain model outputs under the same weather conditions than at the sampling time of the observations.

Here we present new isotopic simulations results from ECHAM6-wiso [1] nudged with the last reanalyses dataset from the European Centre for Medium-Range Weather Forecasts (ECMWF), ERA5 [2], at different spatial resolutions over the period 1979-2018. Model results are evaluated against isotopic data compilations, including GNIP (Global Network of Isotopes in Precipitation [3]), speleothems [4], ice cores datasets and water vapor measurements. To quantify the impact of these reanalyses on our simulations, we also performed nudged simulations with the previous model version ECHAM5-wiso [5] by using ERA5 data and its predecessor ERA-Interim [6].

These new simulation products could be a useful contribution to the isotopic data community for the interpretation of their water isotope records and for the exploration of the mechanisms controlling the variability of the surrounding water isotopic composition.

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