The Stable Water Isotope Intercomparison Group (SWING) - evaluation of 3 different isotope GCMs

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For more than four decades the isotopic composition of water stored in various archives (e.g. ice cores, ground water) has been used to study changes in the hydrological cycle on timescales from glacial-interglacial to short term variations. However, the interpretation of isotopic variations in terms of climate change is often handicapped by a lack of other relevant observational climate parameters (e.g. temperature, relative humidity, precipitation) both in space and time.

Modeling the isotopic composition of water within the hydrological cycle of general circulation models (GCM) may help to overcome this deficit on available climate data. Isotope GCMs simulate the $^{18}O/^{16}O$ (and/or $^2H/^1H$) relation as an independent quantity within a closed "model world" where all other relevant climate parameters are known, too. This enables an improved analysis of (simulated) isotope variability in terms of climate change.

In our presentation we give an overview and first results of the SWING project, founded in 2004. This initiative serves as a community platform for experts from the various isotope research groups. Among others it has the objective to define and perform common GCM isotope simulation experiments of the various research groups enabling a rigorous comparison of simulated versus observed isotope data (model-data-intercomparison). In addition, artifacts in isotope simulations based on a specific GCM model parameterization or set-up can be identified by comparing simulation results of several different isotope GCMs (model-model intercomparison). First analyses focus on one climatological and one transient simulations of the present-day climate and the representation of the hydrological cycle in 3 different isotope GCMs: the GISS ModelE, the MUGCM, and the ECHAM4 model.