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Title: A 140-year long historical water isotope simulation with the 20th century reanalysis and its comparison with climate proxy data

Abstract: 30-year Reanalysis-"nudged" isotope enabled GCM simulation was successfully carried out in Yoshimura et al. [2008]. In their method, large scale forcing was taken from NCEP/DOE Reanalysis 2, and water isotopes were fully predicted, including their sources and sinks, without utilizing any water isotope observations. Several direct comparisons between the dataset and isotope measurements revealed that the dataset is accurate enough to serve as an alternative to water isotope assimilation analysis. Moreover, Stott et al. [in prep] has shown that the model simulates the history of decadal variability during the late 20th century as reconstructed from δ18O of cellulose extracted from the annual rings of the long-lived Bristlecone Pine from White Mountain in Southern California. The close match between the simulated and measured isotope records is a further validation of the model's ability to accurately simulate regional-scale atmospheric behavior over the Southwestern US. This is particularly important because tree ring chronologies from these long-lived trees have been used previously to reconstruct recurrent decadal-length drought throughout 20th century and beyond. Using the new isotope enabled GCM allows us to investigate questions such as how isotopically distinct sources of atmospheric moisture have changed in the past and whether such changes arise from similar and recurrent ocean/atmospheric variability. The initial simulation is however, too short to investigate longer-term variability. Therefore, in the present study we begun to extend the model simulations to include AD1871 to AD2008, using the so-called "20thC Reanalyasis" atmospheric dataset [Compo et al., 2010]. One of the preliminary results includes a simulation of sea surface δ18O, which can now be compared to coral records. The preliminary results indicate the simulated surface water δ18O closely matches coral-based reconstructions from the Philippine Sea. Additional details of this investigation and its potential implications will be presented at the meeting.