Convective transport of HDO at TTL levels from the mass flux perspective

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Most representations of convective transport in large scale numerical models rely on the concepts of convective mass flux and quasi-equilibrium of convection with the forcing. In the TTL, these notions might not be as well defined as in the troposphere, and the ability of convective parameterizations to accurately represent transport up to the tropopause must be examined. We have designed a mass flux representation of convective transport that makes use of a spectral ensemble of entraining plumes and have implemented in-cloud isotopologue physics for all three phases of water. This model is used to reconstruct equilibrium profiles of the isotopic composition of water vapor in the tropics. We discuss how this approach may be used to constrain poorly known parameters in representations of convective transport at TTL levels, especially the detrainment of ice.