



## Sensitivity of Cross-Tropopause Convective Transport to the Choice of Numerical Model Resolution

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Deep extratropical convection that overshoots the altitude of the tropopause is a phenomenon that has important implications both for chemistry-climate interactions through stratosphere-troposphere exchange and for hazardous weather at the Earth's surface. Notably, convective injection of copious amounts of water vapor into the lower stratosphere has direct and significant impacts on the radiation budget and consequently, climate. In this study, the sensitivity of troposphere-to-stratosphere transport and stratosphere-to-troposphere transport in extratropical convection to the choice of numerical model resolution in simulations of explicitly-resolved convection (i.e. no convective parameterization) is examined. For an observed case of overshooting convection, the Advanced Research Weather Research and Forecasting (ARW-WRF) model is run for all possible combinations of three horizontal (3-km, 1-km, 333-m) and vertical (600-m, 300-m, 150-m) resolutions. Although the model is successful in simulating overshooting convection and cross-tropopause transport in each case, the depth and magnitude of transport varies significantly with changes in both the horizontal and vertical resolution. Recommendations for future modeling studies of transport in extratropical convection will be given.