Geophysical Research Abstracts
Vol. 12, EGU2010-3706, 2010
EGU General Assembly 2010

Validation of vertical velocities using in situ measurements

Felix Ploeger, Paul Konopka, Cornelius Schiller, Gebhard Günther, Jens-Uwe Grooss, and Rolf Müller
ICG-1, Forschungszentrum Juelich, Juelich, Germany (f.ploeger@fz-juelich.de)

We use a conceptional backward trajectory approach to reconstruct water vapor and ozone mixing ratios in various diabatic or kinematic vertical velocity scenarios to validate vertical velocities in the upper TTL. Therefore, backward trajectories are initialized along the flight tracks of the tropical SCOUT-O3 campaign in Northern Australia/2005 and are calculated in either a diabatic or a kinematic vertical velocity scenario. Here, diabatic denotes a scenario with vertical coordinate potential temperature and vertical cross-isentropic motion deduced from diabatic heating rates (radiative or total). Kinematic denotes a scenario with vertical coordinate pressure and pressure tendency as vertical velocity.

First, we find a large sensitivity of certain transport characteristics, like timescales, dispersion and subsidence in the upper TTL, to the choice of vertical velocities. The kinematic trajectories show much higher dispersion and frequent regions of subsidence, compared to the diabatic trajectories. The different fractions of subsiding versus ascending trajectories above the maritime continent in the kinematic and diabatic scenario cause differences in the reconstructed water vapor and ozone mixing ratios. Finally, by comparing to high-resolution in situ measurements from SCOUT-O3 we validate the vertical velocities, quantify their impact on tracer reconstructions and try to answer the question, whether a diabatic or a kinematic scenario represents the real atmosphere best.