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Lagrangian advective and convective transport of passive tracers within the ECHAM5/MESSy Chemistry Climate Model

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We introduce the extended and improved Lagrangian (LG) advection scheme ATTILA (Atmospheric Tracer Transport in a LAgrangian model, Reithmeier and Sausen, 2002), which was parallelised, modularised and rewritten as a submodel for EMAC (ECHAM/MESSy Atmospheric Chemistry Climate model, Jöckel et al., 2010). ATTILA is completed by a new infrastructure (random number generator, parallelisation, transformation and transposition methods), new physical (air parcel mixing, Lagrangian convection, diabatic vertical velocity) and new diagnosic submodels.

In a LG convection scheme parcel trajectories can follow convective up- and downdrafts. This is an advantage with respect to the diagnosis of the troposphere-stratosphere flux of parcels, that were subject to convective uplift. Addionally, a diabatic vertical velocity parameterisation was implemented, which improved the stratospheric age-of-air (a proxy for the stratospheric mean meridional circulation) remarkably.

We present the results of a comprehensive evaluation of simulated age-of-air, 222Radon, and stratosphere-troposphere fluxes.

References:

Jöckel, P., A. Kerkweg, Pozzer, A., Sander, R., Tost, H., Riede, H., Baumgaertner, A., Gromov, S., and Kern, B.: Development cycle 2 of the Modular Earth Submodel System (MESSy2), Geosci. Model Dev., 3, 717-752, doi:10.5194/gmd-3-717-2010, 2010.

Reithmeier, C. and Sausen, R.: ATTILA: Atmospheric Tracer Transport in a Lagrangian Model, Tellus, 54B , 278-299, 2002.