Geophysical Research Abstracts, Vol. 9, 02826, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02826

Comparison between conventional stochastic Lagrangian and LES based Lagrangian modelling of footprints

T. Markkanen (1), G. Steinfeld (2), N. Kljun (3), S. Raasch (2) and T. Foken (1)

(1) Abteilung Mikrometeorologie, Universität Bayreuth, Germany, (2) Institut für Meteorologie und Klimatologie, Universität Hannover, Germany, (3) Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland (Contact Email tiina.markkanen@uni-bayreuth.de)

In this study we compare the performance of Lagrangian stochastic (LS) footprint models that use parameterised flow field characteristics with results of a Lagrangian trajectory model embedded in LES framework. The two Lagrangian models follow the particles in forward and in backward in time while the trajectories in LES only evolve in forward. We assess their performance in unstably stratified boundary layer at observation levels covering the whole depth of the convective layer. The Lagrangian stochastic model embedded in PALM was modified in order to consider even the influence of the non-resolved, parameterized subgrid-scale turbulence on particle movement. This modification is of special importance nearby the surface, where the scalar sources are located and where a huge amount of the turbulent kinetic energy in the LES is contained in subgrid-scale eddies. The forward LS model used in comparison was originally developed for surface layer flow conditions but was recently extended to consider the convective layer flow as well. As the third model for comparison the backward LS LPDM-B was used. We found out that for lowest observation heights the results are comparable for all the three models. At higher levels the results are similar at close distances from the measurement point, whereas at further distances the differences grow considerably.