Atmos. Chem. Phys. Discuss., 5, S4982–S4984, 2005
www.atmos-chem-phys.org/acpd/5/S4982/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Conceptual study on nucleation burst evolution in the convective boundary layer – Part II: Meteorological characterization" *by* O. Hellmuth

O. Hellmuth

Received and published: 11 January 2006

1. General remarks

See response to RC1

2. Response to specific comments of Michael Boy (RC2)

1. RC2: Page 11493, line 14: High water vapour favouring/ disfavouring NPF
   AC: Page 11493, line 14:
   The following sentences are added to line 14:
   "This dependency is only valid for the 'anorganic' nucleation scenarios considered here, which are based on the classical nucleation theory. As hypothesised and experimentally confirmed by laboratory and field measurements, high water vapour concentrations can also disfavour NPF, especially in boreal forests, where organic chemistry is supposed to play a key role (Bonn et al.,2002a; Bonn et al., 2002b; Bonn et al., 2003; Bonn et al., 2004; Boy et al., 2002a; Boy, 2003; Hyvoenen et al., 2005). This issue will be discussed in more detail in technical note prepared for Atmos. Chem. Phys. Discuss."

2. RC2: Page 11505, line 7: Prandtl layer parameterisation, energy flux partitioning scheme
   AC: Page 11505, line 8: Here, the reference is added as follows:
   ". . . to the diurnal variation of the sensible heat flux (Holtslag, 1987, p. 23-46)(flux partitioning scheme in the Prandtl layer parameterisation, see part I, paragraph 3.2.1 and appendix D2.2.)."
   AC: Part I, page 11422, line 3-6:
   The following paragraph has to be added:
   ". . . by a simplified Penman-Monteith approach. This scheme was originally developed for daytime estimates of the surface fluxes from routine weather data. The scheme is designed for grass surfaces, but it contains parameters, which take account of surface properties in general. In the scheme, both the surface radiation budget (incoming solar radiation, reflected solar radiation from the surface, incoming longwave radiation from the atmosphere, outgoing longwave radiation from the surface) (Holtslag, 1987, p. 31–39, section 3) and the surface

ACPD
5, S4982–S4984, 2005

energy budget (sensible heat flux, latent heat flux, soil heat flux, surface radiation budget) (Holtslag, 1987, p. 39–47, section 4) are evaluated. The soil heat flux is parameterised in terms of the net radiation. The partioning of the surface energy flux (minus soil heat flux) between the sensible and latent heat flux is based on the Penman-Monteith approach (Monteith, 1981). Both fluxes are parameterised in terms of net radiation and soil flux using semi-empirical parameters, adapted from observations (Holtslag, 1987, p. 40–41). Knowing the heat flux, the Monin-Obukhov length scale and the surface momentum flux or shear stress is determined (Holtslag, 1987, p. 47–50). This way, the Prandtl layer parameterisation is closed, i. e., the required fluxes can be calculated from gridscale variables. Even if this scheme is highly parameterised, it was found to be suitable for the present purposes. Alternatively, the model can be forced by prescribed lower boundary conditions from observations."

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 11489, 2005.