Geophysical Research Abstracts
Vol. 15, EGU2013-12103, 2013
EGU General Assembly 2013

Simulation of idealized warm fronts and life cycles of cirrus clouds

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One of the generally accepted formation mechanisms of cirrus clouds is connected to warm fronts. As the warm air glides over the cold air mass, it cools through adiabatic expansion and reaches ice supersaturation that eventually leads to the formation of ice clouds.
Within this work, the EULAG model (see e.g. Prusa et al., 2008) was used to study the formation and life cycles of cirrus clouds in idealized 2-dimensional simulations. The microphysical processes were modelled with the double-moment bulk scheme of Spichtinger and Gierens (2009), which describes homogeneous and heterogeneous nucleation.
In order to represent the gradual gliding of the air along the front, a ramp was chosen as topography. The sensibility of cloud formation to different environmental conditions such as wind shear, aerosol distribution and slope of the front was analyzed. In case of cirrus cloud formation its persistence after the front was studied as well as the change in microphysical properties such as ice crystal number concentrations.

References:

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