Geophysical Research Abstracts, Vol. 8, 00025, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00025
© European Geosciences Union 2006

Meso- and microstructure of frontal mixed cloud and precipitation systems over Ukraine

V. Bakhanov (1) , O.Manzhara (1) , B. Dorman (1)

(1) Ukrainian Hydrometeorological Research Instiyute (v_bakhanov@rambler.ru/ +380 44 525 5363

The paper presents results of numerical simulation of the meso- and microstructure of frontal winter mixed cloud and their precipitation systems over Ukraine. The two-dimensional time-dependent numerical models with detailed microphysics and parameterized dynamics were constructed.Microphysics was described using equations for distributions of droplets and crystals on dimensions. Initial cross-sections of frontal systems were based on rawinsondes and aircraft data concerned to one moment. The following microphysical processes were taken into account: drop and ice crystal nucleation, particle growth through condensation and sublimation, sedimentation, drop freezing, and riming. Only one type of of ice nuclei ("condensation-freezing") was considered. Investigatons have shown that the fronts under study exhibit a complex system of large-scale whirls occuppying lower layers of trophosphere and connected with them updraft and downdraft parcels.The micro- structure and precipitation formation efficiency are to large extend controlled by mentioned dynamic structure of fronts and characteristics of ice nuclei (IN). When updraft parcels are located at small hights ($z< 3...4$ km) the ice nucleation and precipitation formation have insufficient efficiency, the total liquid content can reach 1 mm. Such clouds have a considerable potential for artificial enhancement. In a case of hight updraft parcels ($z>5$km)and great concentration of IN the precipitation formation ("seeder-feeder" mechanism) is very intensive.After 4...5 hours of cloud evolution the complete crystallisation takes place.The precipi- tation rate can reach tens mm/h. We have realized also the numerical simulation of solar radiation transfer in mixed clouds and calculations of satellite signal (cloud albedo). Investigations have shown that comparison of satellite signals for wave lenghts 0.5;1.6;3.6 mkm gives possibility to distinguish regions with thick liquid water content layers and regions of highly developed crystallization and precip-

itation.