Geophysical Research Abstracts, Vol. 9, 00628, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00628

Ion–neutral collisions and macroparticle charging in Earth's "dusty" ionosphere

Yu.N. Besedina, S.I. Kopnin, S.I. Popel

Institute for Dynamics of Geospheres RAS, Moscow, Russia (besedina_yn@mail.ru / Fax: +7 495 137 6511)

Ion–neutral collisions in macroparticle charging process in Earth's "dusty" ionosphere are taken into account. These collisions can result in a charge exchange between a fast ion and a slow neutral. As a result a microscopic ion current on the dust grains increases significantly in comparison with the case when ion–neutral collisions are not taken into account in the dust grain charging process. The parameters of Earth's dusty ionosphere are found when ion–neutral collisions in macroparticle charging process are important. The dynamics of the dust grain charges at the altitudes of 70–130 km is determined. It is shown that the ion–neutral collisions at these altitudes can lead to a significant decrease in the absolute value of a negative charge of a dust grain in comparison with the case when the charge of the grain is calculated on the basis of the standard orbit limited probe model where these collisions are not taken into account. In some cases the ion–neutral collisions can result in an appearance of positively charged dust grains. We discuss also the influence of the ion–neutral collisions in the dust grain charging on the processes of condensation and dust grain growth in the summer polar mesosphere as well as on a possibility of formation of observed layers of negatively and positively charged dust grains in the regions of polar mesospheric clouds. This work was carried out within the Program of Fundamental Investigations of the Division of Earth Sciences of the Russian Academy of Sciences "Nanoparticles in Natural and Technogenic Systems". It was supported by the Russian Foundation for Basic Research, project no. 06-05-64826-à, and by the Grant of the President of the Russian Federation for State Support of the Leading Scientific Schools in Russia (grant no. 5648.2006.5). Yu.N.B. and S.I.K. acknowledge financial support of the Dynasty Foundation. S.I.P. is grateful to the Russian Science Support Foundation, grant in the nomination "Doctors of Science of the Russian Academy of Sciences".