

Aerosol charging processes in planetary and terrestrial atmospheres

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Abstract

Interactions between the ions and aerosols cause charge exchange, which can lead to substantial aerosol charge and ion removal in the atmosphere. Aerosol charging plays an important role in various processes such as aerosol scavenging by droplets and aerosol growth by affecting aerosol-aerosol coagulation rates. Ions are removed in regions with abundant aerosol, which may modify charge flow in an atmosphere, such as that associated with an atmospheric electrical circuit. A review will be made of the charging processes and the consequences occurring in atmospheres of Mars, Venus and Titan and compared with terrestrial atmosphere [1], [2], [3], [4], [5]. Some recent results on charging of aerosols in the lower and upper atmosphere of Titan will be presented and consequences will be discussed.

References

- [1] Michael, M., S.N. Tripathi and S.K. Mishra, Dust charging and electrical conductivity in the day and night-time atmosphere of Mars, *Journal Geophysical Research - Planets*, 113(E7), E07010, doi:10.1029/2007JE003047, 2008.
- [2] Michael, M., S.N. Tripathi, P. Arya, A. Coates, A. Wellbrock and D.T. Young, High-altitude charged aerosols in the atmosphere of Titan, *Planetary & Space Sciences*, 59(9), 880-885, 2011.
- [3] Mishra, M., Marykutty Michael, S.N. Tripathi, Christian Béghin, Revisited modeling of Titan's middle atmosphere electrical conductivity, *Icarus*, 238, 230-234, 2014.
- [4] Renard, J.B., S.N. Tripathi et al., In situ detection of electrified aerosols in the upper troposphere and stratosphere, *Atmospheric Chemistry and Physics*, 13, 1-8, 2013.
- [5] Tripathi, S.N., M. Michael and R.G. Harrison, Profiles of ion and aerosol interactions in planetary atmospheres, *Space Science Review*, 137(1-4), 193- 211, 2008.