AOGS 2005

Studies of the Martian meteorology using General Circulation Models ~ Radiative effects of Martian dust ~

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The atmospheric general circulation model of Mars based on CCSR/NIES AGCM could reproduce the atmospheric states of Mars which have been observed by the Mars Global Surveyor and Viking, using time- and latitude-dependent dust opacity scenarios which are made to be consistent with the past observational results[1]. The observed dust distribution during spring and summer in south hemisphere varies largely at each year, and it is indicated in the model results that the radiative effects of dust play important roles in Martian meteorology, which change the results of thermal tides and baroclinic waves largely according to the dust concentrations in the atmosphere. In thinking about radiative effects of dust, refractive indices and size distribution are important factors. Refractive indices showed in Ockert-bell et al. (1997) (in visible wavelength) and Toon et al. (1977) (in infrared wavelength) are known as the standard optical properties of Martian dust[2,3]. Some observational results of size distribution also exist[3,4,5], though there are still uncertainties because of the uncertainties of the visible-to-infrared ratio of total extinction opacity, which may become larger than the well-known value 2-2.5[4,6] possibly due to submicron ice particles[7]. In this presentation I will introduce how to calculate the radiative effects of dust in the general circulation models, and show the results obtained with the scheme using some hypothetic size distributions.

Keywords: Dust radiation; Atmospheric dynamics; Mars; General Circulation Model.

References

[1] Kuroda et al., *J. Meteorol. Soc. Japan* **83**, in press (2005)
[2] Ockert-Bell et al., *J. Geophys. Res.* **102**, 9039 (1997)
[3] Toon et al., *Icarus* **30**, 663 (1977).
[4] Clancy et al., *J. Geophys. Res.* **100**, 5251 (1995)
[5] Tomasko et al., *J. Geophys. Res.* **104**, 8987 (1999)
[6] Martin, *Icarus* **66**, 2 (1986).
[7] Toigo and Richardson, *J. Geophys. Res.* **105**, 4109 (2000)