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Temperature inversion during the 2001 global dust storm on Mars: Observation with SWAS and modeling with MAOAM

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The Earth-orbiting Submillimeter Wave Astronomy Satellite (SWAS) can observe the global-mean surface and atmospheric temperature structure as a function of altitude. In contrast to the infrared, submillimeter observations of the Martian surface and atmospheric temperature are not deteriorated by atmospheric dust. During the 2001 global dust storm on Mars SWAS provided these data for an aerocentric longitude from L_s=166° to 233°[1]. These observational results indicate a ~20 K decrease of the average surface brightness temperature and a significant increase of atmospheric temperature of up to 40 K below the altitude of 45 km. We will present the results of simulation with the General Circulation Model of the Martian Atmosphere (MAOAM), which includes the radiative transfer of an atmospheric dust. The dust scenario depends on time and latitude which is consistent with the observed dust opacity by MGS-TES[2,3,4]. Comparison of the model results with the SWAS observations will be shown.

Keywords: Mars; submillimeter observation; SWAS; dust storm; radiative transfer of dust; General Circulation Model; MAOAM

References

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