

Near-infrared spectroscopic observation of H₂O ice clouds on Mars

Marie Kanno[1]; Masato Kagitani[2]; Takeshi Sakanoi[3]; Shoichi Okano[4]; Eiji Nishihara[5]

[1] Planet. Plasma Atmos. Res. Center, Tohoku Univ.; [2] PPARC, Tohoku Univ.; [3] PPARC, Grad. School of Sci., Tohoku Univ.; [4] PPARC, Tohoku Univ.; [5] Gunma Astronomical Observatory

H₂O ice cloud on Mars is thought to be an important reservoir of water, and is expected as a useful tracer for understanding of water circulation on Mars. In order to distinguish H₂O ice cloud from CO₂ ice cloud in the polar regions, spectroscopic observation in near- to mid-infrared range is useful because extinction wavelength is different between H₂O and CO₂ ice clouds.

We carried out near-infrared spectroscopic observation of Mars at Gunma astronomical observatory using a 150cm telescope and an infrared camera from August to November 2003. In addition, near-infrared image data of Mars taken at NAO Hawaii observatory using SUBARU telescope and IRCS on May 23, 2003 were provided to us and these data were also analyzed. The period from May to November 2003 corresponds to Martian season of Ls=190 degree to 300 degree.

Following results were obtained from observation.

1) Equatorward edge of H₂O ice cloud clearly observed in the southern polar region in spring of southern hemisphere shifted southward as the season progressed from spring to summer.

2) H₂O ice clouds were detected at low latitude mountainous regions in all season.

3) H₂O ice cloud belt was recognized at low latitudes at Ls=300 degree. This was not seen in the data obtained by Thermal Emission Spectrometer on board the Mars Global Surveyor in 1999-2001. Large dust storm did not take place in 2003 while it existed in the period of MGS observation. Temperature in low latitudes in 2003 was much lower than that in 1999-2001 as evidenced by MGS/TES data. Such difference in temperature condition may explain appearance of H₂O ice cloud in low latitude in 2003.