

CO millimeter and sub-millimeter observations of Martian atmosphere

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Pioneering works of the millimeter-wave spectral observations of planetary atmosphere has been carried out since 1970s by Clancy et al. and other groups, whereas such millimeter-wave observations has been scarcely made in our country.

ALMA (Atacama Large Millimeter/sub-millimeter Array) whose initial scientific observations are planned to start in 2007 will provide very high quality images of planetary atmosphere in molecular spectra with smaller than 0.1 arcsec angular resolution. It is of vital importance to gain experience of the mm/sub-mm spectral observations of planetary atmosphere before starting the ALMA operation.

We improved the observation program of the NANTEN radio telescope in order to observe Martian atmospheric CO(J=0-1) in September 2003. The apparent diameter of Mars was 24.2 arcsec at that time, while the beam size of the telescope is 2.6 arcmin. The bandwidth of the spectrometer was 40MHz, and the frequency resolution was 40kHz. We observed in position switching mode throwing the antenna by 20 arcmin in the azimuth direction. We obtained a good absorption CO spectrum with an antenna temperature of 1.0K with an rms noise of 40mK by 140min integration. We are currently developing the inversion analysis program to retrieve the vertical profile of CO mixing ratio and atmospheric temperature. In this presentation, we will present the data analysis results and we would like to additionally mention the CO(J=2-3) observational results obtained with ASTE 10m telescope operated by NAOJ and inter-university collaboration.