

PEM035-12

Room: 303

Time: May 26 16:45-17:00

Planetary Atmosphere studied with Millimeter/Submillimeter Wave Band Telescope

Hiroyuki Maezawa^{1*}

¹Hiroyuki Maezawa

Millimeter/submillimeter-wave band (0.1 - 10.0 mm) heterodyne spectroscopy is a powerful tool to observe rotational lines emitted from minor molecular constituents in planetary middle atmosphere thanks to its high sensitivity and highly spectral resolution ($f/df=10^6$). The vertical profiles of the temperature and molecular mixing ratio can be derived from the observed spectral lines by retrieval analysis. The abundance and distribution of molecular species and its isotopes in planetary atmospheres give us various information for a better understanding of the formation processes of the solar system, photochemistry, hydrogeochemistry, volcanic activity, biological sources, dynamical meteorology and climatology, evolution and dissipation of atmosphere, exogenous sources like comet impact, and so on.

At present we are carrying out the observations toward Venus, Mars, Jupiter, Saturn, Neptune, and their satellites by using Atacama Submillimeter Telescope Experiments (ASTE), NRO 45m-telescope and Nobeyama Millimeter Array of National Astronomical Observatory of Japan and NANTEN2 telescope of Nagoya University. The ASTE (10m) and NANTEN2 (4m) are operated at Atacama desert in Northern Chile (alt.4860m). These ground based single dish and interferometer telescopes will play significant roles in systematic monitoring of various short and long term atmospheric phenomena. Additionally the Atacama Large millimeter/submillimeter Array (ALMA) will start the early science operation in 2011 and the full-fledged operation in 2012. High sensitivity, high spatial (0.1-0.01") and spectral resolution, and ultra-wide band characteristics realized by the ALMA enable us to achieve deep spectral line survey observations and spectacular two-dimensional imaging of molecular species and velocity fields of planetary middle atmosphere, which provide ever more fruitful information to address various issues about methane sources detected recently toward Mars, inhomogeneous zonal structures of Jovian planets, atmospheric environment of satellites, and so on.

In this meeting the current status on the observations of the planetary atmospheres studied with the millimeter/submillimeter-wave band Japanese telescopes will be presented.

Keywords: Planetary Atmosphere, Radio Telescope, Heterodyne Sensing, ALMA, Middle Atmosphere, Atmospheric Chemistry