Monitoring Observations of Millimeter-Wave Band Spectral Lines of Carbon Monoxide in the Middle Atmospheres of Venus with the SPART Telescope

*Daiki Haraguchi[1], Kazunori Morimae[1], Naruaki Tanekura[1], Kosuke Saito[1], Yuji Nishida[1], Kazutoshi Ohnishi[1], Hiroyuki Maezawa[1], Kazuyuki Handa, Tomio Kanzawa, Masaaki Oya, Jun Maekawa, Hiroyuki Iwashita, Masao Saito, Hideo Sagawa, Munetoshi Tokumaru, Akira Mizuno

1.Osaka Prefecture University

For understanding of influences of solar activities and space weather on the middle and lower atmospheres of the terrestrial planets in the solar system, we have been carrying out the monitoring observations of the millimeter-wave band spectral lines of carbon monoxide (^{12}CO *J*=1-0 115.2712018 GHz, *J*=2-1 230.538 GHz, ^{13}CO *J*=2-1 220.3986765 GHz) of the middle atmospheres of Mars and Venus with a 10m-telescope, SPART (Solar Planetary Atmosphere Research Telescope) since it was launched in 2011. The SPART employed highly sensitive 100 and 200 GHz double band superconducting SIS heterodyne detectors and 1 GHz band digital fast Fourier transfer spectrometer with the frequency resolution of 67 kHz. This highly frequency-resolved heterodyne spectroscopy is powerful tool to trace the weak and narrow spectral lines of minor constituents in planetary middle atmosphere.
The results observed with SPART showed the disk averaged mixing ratios of CO derived at the altitude of around 80 km in case of Venus were around 60 ppmv during 2011 to 2015. This observing period corresponds to the solar cycle 24 maximum phase according to the 1 GHz band flux data observed with the Nobeyama Radio Polarimeters (NoRP). The mixing ratios of CO seem to be lower than those observed during the solar cycle 22 maximum phase. These suggest that solar activities might have no small effect on the abundance variations of CO.

Keywords: Venus, Ground-based Radio Telescope, Solar Activity

©2016. Japan Geoscience Union. All Right Reserved.