

Ground-based Observations of the Venusian Mesospheric Wind Using Millimeter/Submillimeter Interferometers

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Heterodyne spectroscopy at the millimeter/submillimeter domain is a powerful tool to study the atmospheric dynamics in the Venus mesosphere. Its high spectral resolving power enables one to detect the Doppler shift of molecular emission lines, which provides the direct measurements of the mesospheric winds (as a line-of-sight velocity). Using the ground-based interferometers makes a disk-resolved mapping of wind field in a real possibility.

In this paper, we present our works on the ground-based observations of Venus atmosphere using the Combined Array for Research in Millimeter-wave Astronomy, CARMA, carried out on 14 March, 2009. At this observation date Venus was close to the inferior conjunction, and we obtained a line-of-sight wind velocity map over the nearly full night hemisphere of Venus. Our obtained wind map suggests the presence of intense spatial variability in the Venus mesospheric dynamics which is difficult to explain by conventional combinations of the retrograde zonal flow and the subsolar-antisolar flow.