

Estimation of wind velocity and disturbance of Venus atmosphere by tracking cloud feature motions and statistical error evaluation

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Venus atmospheric circulation is characterized by westward and high speed zonal winds, called the super rotation. At most latitudes, the velocity of the winds increases monotonously from the ground level to the cloud top level. The maximum velocity exceeds 100 m/s, which is about 60 times faster than the rotational speed of Venus. While there are many studies of the super rotation, the mechanism to maintain the super rotation has not been understood clearly yet. The Combination of meridional circulation and horizontal viscosity is one of the possible mechanisms to maintain the super rotation. This mechanism introduces poleward flows together with disturbances dependent on latitudes at the cloud top level. Several authors have evaluated the poleward flows by tracking cloud feature motions taken by satellites' imagers. Their results showed that the poleward flows were identified. However their evaluation could not discuss the disturbances dependent on latitudes because they estimated errors relatively large. In this study, to reduce the relatively large estimation errors, we develop the new error estimation method based on statistical theory. We applied this method to Venus cloud feature motions from Galileo SSI Images.