Geophysical Research Abstracts
Vol. 20, EGU2018-6886, 2018
EGU General Assembly 2018

First estimate of winds in Jupiter's polar regions from JIRAM-Juno images

Davide Grassi and the JIRAM-Juno wind team
INAF, IAPS, Roma, Italy (davide.grassi@iaps.inaf.it)

We present estimates of wind speeds at $\sim$ 1 bar level over both Jovian polar regions inferred from the 5-μm infrared images acquired by the Jupiter InfraRed Auroral Mapper (JIRAM) instrument on the NASA Juno spacecraft during its fourth periapsis (February 2nd 2017).
We adopted the criterion of minimum mean absolute distortion (described in Gonzalez and Woods, 2008) to quantify the motion of cloud features between pairs of images.
The associated random error on our wind speed estimates is 12 m/s in the Northern polar region and 9.8 m/s at the Southern pole.
Most of the polar cyclones previously described by Adriani et al. (2018) present azimuthal asymmetries in wind speeds with respect to the System III coordinate system. However, these asymmetries can often be removed by assuming a rigid motion (with wind speeds on the order of a few tens of m/s) of an entire vortex with respect to the System III grid.
Once this correction is introduced, the interior of the vortices presents tangential speeds that increase linearly with distance from the vortex center. The annulus of maximum speed for the main circumpolar cyclones is located at approximatively 1000 km from their centers, with peak speeds of 80 to 110 m/s. In at least two cases at the Northern polar region, peak speeds are significantly lower ($\sim$50 m/s). Beyond the annulus of maximum speed, tangential speed decreases inversely with the distance from the center within the Southern Polar Cyclone and somewhat faster within the Northern Polar Cyclone.
A few areas of anticyclonic motions are identified within both polar regions, but more intense and of more regular shape in the Northern hemisphere.

Adriani et al., 2018, doi:10.1038/nature25491
Gonzalez and Woods, 2008, isbn: 978-0-13-505267-9