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Polygonal Cyclonic Structures over the Jupiter's Poles

Alberto Adriani (1), Alessandro Mura (1), Maria L. Moriconi (2), Davide Grassi (1), Giuseppe Sindoni (1), Francesca Altieri (1), Federico Tosi (1), Raffaella Noschese (1), Andrea Cicchetti (1), Scott J. Bolton (3), John E.P. Connerney (4), Andrew Ingersoll (5), Glenn S. Orton (6), Sushil K. Atreya (7), Jonathan I. Lunine (8), Steven M. Levin (6), and the JIRAM team

(1) INAF-Istituto di Astrofisica e Planetologia Spaziali, Roma, Italy (alberto.adriani@iaps.inaf.it), (2) CNR-Istituto di Scienze dell'Atmosfera e del Clima, Bologna e Roma, Italy, (3) Southwest Research Institute, San Antonio, Texas, USA, (4) NASA Goddard Space Flight Center, Greenbelt, Maryland, USA, (5) California Institute of Technology, Pasadena, California, USA, (6) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA, (7) University of Michigan, Ann Arbor, Michigan, USA, (8) Cornell University, Ithaca, New York, USA

Jupiter's polar regions are not visible from Earth due to Jupiter's low axial tilt and were not seen from any previous space missions prior to Juno [1,2]. The great advantage of Juno relative to the all previous missions to our solar system's largest planet is its mission strategy, namely a polar orbiting spacecraft. Thus, Juno is the first mission ever able to reveal the dynamical structures of Jupiter's polar regions, at latitudes above 80°.
Juno discovered the peculiarities of complex structures of the polar atmospheric circulation and the differences existing between the two poles. Eight circumpolar cyclones have been observed about a single polar cyclone in the North, while in the South, a larger polar cyclone is encircled by another five larger cyclones. The cyclonic structures, organized in quasi-regular polygonal shapes, have been observed with the highest spatial resolution occasionally down to 10 km at the top level of the clouds tops.
Some of the cyclones present very turbulent cloud patterns while others appear characterized by a quasi-laminar flow along spirals converging to the cyclonic centers and complex inner structures. Cyclone diameters range between 4000 and 6000 km while cyclonic winds range from 150 to 350 km/h (42-97m/s). Observed brightness temperatures vary as a function of the of the optical thickness, i.e. the cloud coverage of the atmosphere below 1 bar, and range between 190-260K.
Results discussed in this presentation are based on the polar observations taken at 5-μm infrared wavelength with JIRAM [3], the Jovian Infrared Auroral Mapper, when Juno flew over Jupiter's poles during different orbits.

1. Bolton S.J. et al. (2017) Science 356, 821-825, doi: 10.1126/science.aal2108.
2. Connerney J.E.P. et al. (2017) Science 356, 826-832, doi: 10.1126/science.aam5928.
3. Adriani A. et al. (2014) Space Sci. Rev., doi: 10.1007/s11214-014-0094-y.