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Recent JunoCam Revelations About Discrete Features in Jupiter's Atmosphere

Glenn Orton¹, Candice Hansen², Thomas Momary¹, Michael Caplinger³, Michael Ravine³, John Rogers⁴, Gerald Eichstaedt⁵, Shawn Breushaber¹, Michael H. Wong⁶, Tristan Guillot⁷, and Andrew Ingersoll⁸

¹Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA (glenn.orton@jpl.nasa.gov)

²Planetary Science Institute, Boulder, CO, USA

³Malin Space Science Systems, San Diego, CA, USA

⁴British Astronomical Association, London, UK

⁵Independent scholar, Stuttgart, Germany

⁶University of California, Berkeley, CA, USA

⁷Observatoire de Cote d'Azur, Nice, France

⁸California Institute of Technology, Pasadena, CA, USA

JunoCam, the visible imager on the Juno mission's payload that was designed primarily for public-outreach purposes, continues to produce images of Jupiter that provide unexpected scientific benefits. Juno's polar orbits enable observing regions of the planet that have not previously been detected at such high resolution by any previous spacecraft. JunoCam has a single CCD detector with an integral color-strip filter that enables the instrument to image in four color bands—blue, green, red and an 889-nm methane band. JunoCam maps a field of view of 58° across the width of the detector, perpendicular to the spacecraft scan direction. We will describe characteristics and likely origins of bright white compact (~50 km) clouds, informally dubbed “pop-up” clouds by the JunoCam team. We used the length of shadows of these and other features to determine the relative heights of clouds and assigned a provisional chemical classification based on relative altitudes from equilibrium-chemistry predictions. We tracked the continued interactions of small anticyclonic ovals with Jupiter's Great Red Spot (GRS) that drew off high-altitude reddish haze into strips (commonly called “flakes”) on its western edge. A lightning flash was detected in one of the compact circumpolar cyclones in late December. Observations of the south-polar circumpolar cyclones showed that the original unequally sided pentagon becoming a hexagon – with a cyclone filling in an open area, then a pentagon again over the course of 110 days. In a collaboration with amateur astronomer Clyde Foster (S. Africa), we observed the morphology of an unexpected upwelling in late May of 2020, now known as “Clyde's Spot”, and tracked its evolution in concert with several ground-based observations. We also measured ~40-50 m/s winds around the sinuous jet bounding the South Polar Hood, an upper-level haze generated by auroral-related chemistry. Lightly processed and raw JunoCam data continue to be posted on the JunoCam webpage at <https://missionjuno.swri.edu/junocam/processing>. Citizen scientists download these images and upload their processed contributions.

