

JunoCam at PJ54: What the pictures show

John Rogers (BAA) (2023 Oct.12)

Juno's Perijove-54 was on 2023 Sep.7. It crossed the equator (on the night side) at $L3 = 204$.

Changes in camera sensitivity

For the last couple of years, it has been evident that JunoCam's images were becoming redder: specifically, the green and especially the blue channels were becoming less sensitive. Apparently either the camera optics have become less transparent, or the detector less sensitive, to short-wavelength light, very possibly due to cumulative radiation exposure. This trend was noticed by both Björn Jónsson and Gerald Eichstädt, and they now correct their processed images for it, though it impairs the quality since the blue channel is so dark. Gerald's measurements of the effect since PJ19 are shown in [Figure 1](#). (Björn's results are very similar.)

This figure shows a surprising reversal of the reddening trend after PJ48. That was when JunoCam suffered an anomaly, and since then it has been kept powered up to prevent a recurrence; the team suspect that this warming fortuitously led to the improvement. However, at PJ53 and PJ54 the reddening has resumed. Indeed, Gerald notes that it got obviously worse within the last 2 hours of the PJ54 approach phase, when Juno was passing through Jupiter's intense radiation belt ([Figure 2](#)). We just hope that the reddening will remain within manageable limits.

Global maps

As usual, JunoCam covered the last two planetary rotations in its inbound phase, allowing Gerald to produce global and north-polar maps; versions of these are in [Figures 3,5,6, & 7](#). (In the ZIP file of full-size figures, unlabelled versions of [Figures 3 & 5](#) are provided.) A ground-based map 2-3 days later is in [Figure 4](#). There were no substantial changes since PJ53.

North polar region

[Figure 5](#) is our map of the circumpolar cyclones. All are in their usual places, but there are particularly strong interactions involving the 'filled' CPCs, including a white cloud band from CPC-1 that lies over the less regular CPC-8. The centre of the N. Polar Cyclone is displaced in the usual direction but by only 0.4° , less than usual. The AWO north of CPC-4 is particularly large. The AWO south of CPCs 1&2, which prograded slowly from PJ49 to PJ52, has retrograded slightly since PJ53.

[Figures \(small copies\)](#) are on the following pages:

JunoCam's varying linear white-balancing radiometric factors

Update PJ54: Global reddening accelerates again

[Gerald Eichstädt]

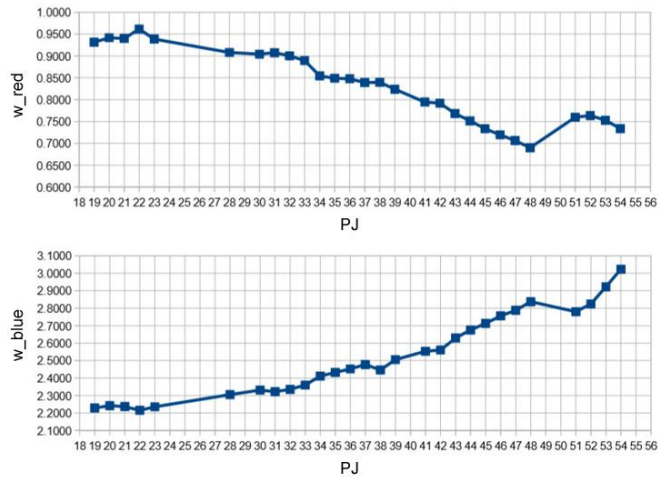


Figure 1. Measurements of the reddening of JunoCam's images from PJ18 to PJ54, by Gerald Eichstädt. The graphs show the factor by which the brightness of the red image (top) or blue image (bottom) had to be multiplied, relative to the green image, to give a consistent white balance over much of the planet, esp. the N. or S. Tropical Zone.

Looking into detail of PJ54

overall reddening during flyby

[Gerald Eichstädt]

stop time	2023-09-07T09:15:16	stop time	2023-09-07T10:50:18
latitude	11.327°N	latitude	38.0313°N
longitude	275.7804°	longitude	336.8263°
s/c altitude	246215.4 km	s/c altitude	97400.0 km
JNCE_2023250_54C00117_V01		JNCE_2023250_54C00131_V01	

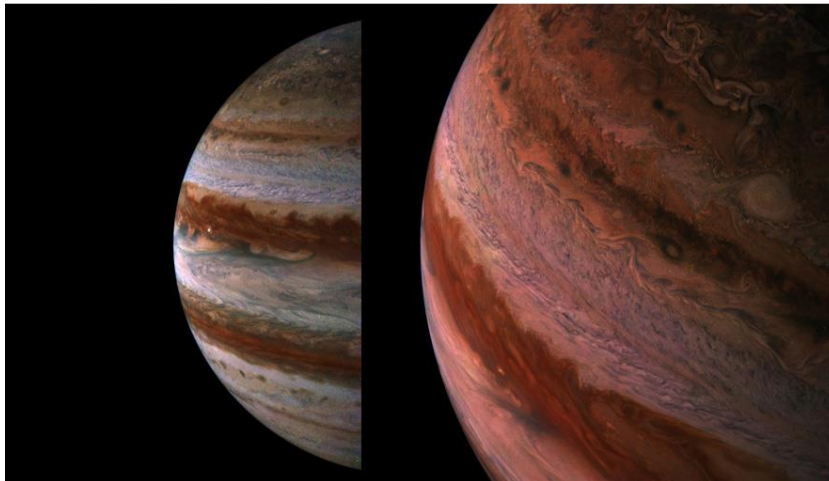


Figure 2. The renewed reddening during PJ54 is obvious from comparing these two images from the approach phase, identically processed. Figure from Gerald Eichstädt.

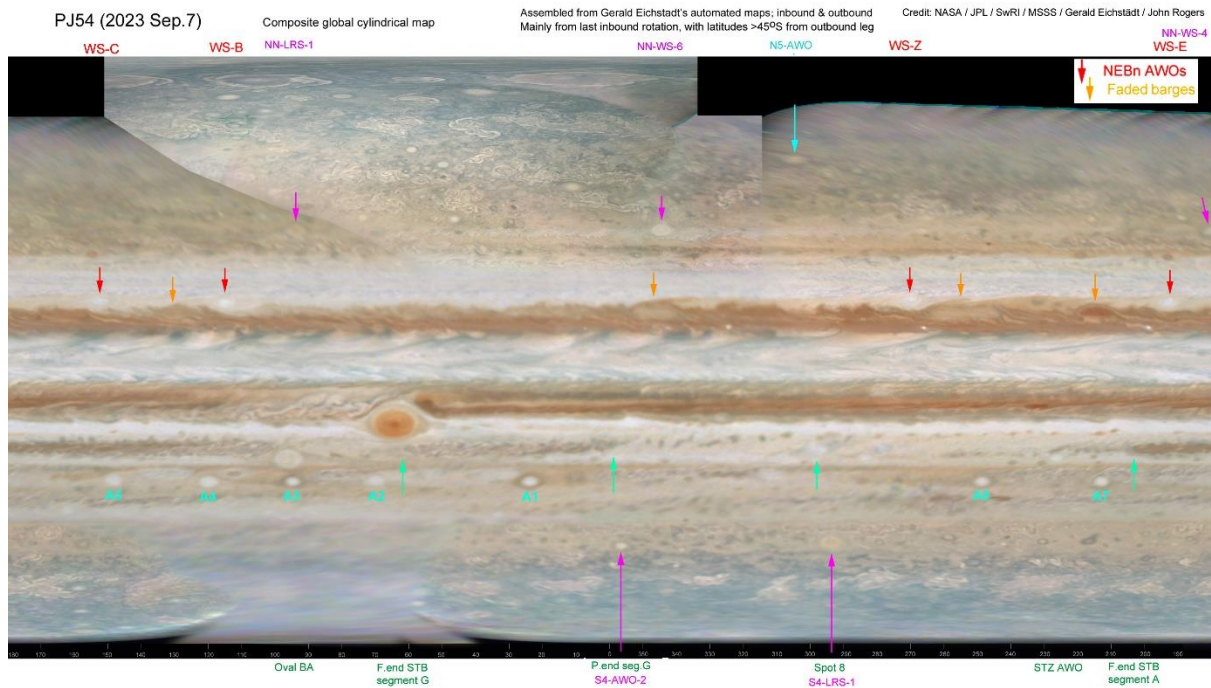


Figure 3. (An unlabelled full-size version is in the ZIP file.)

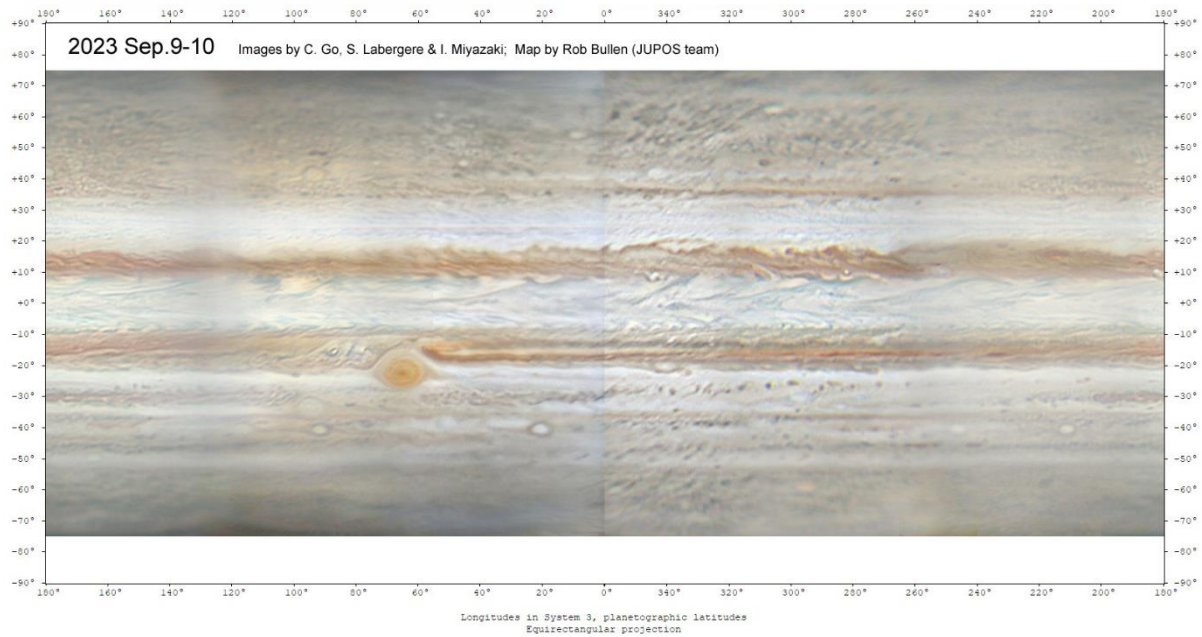


Figure 4.

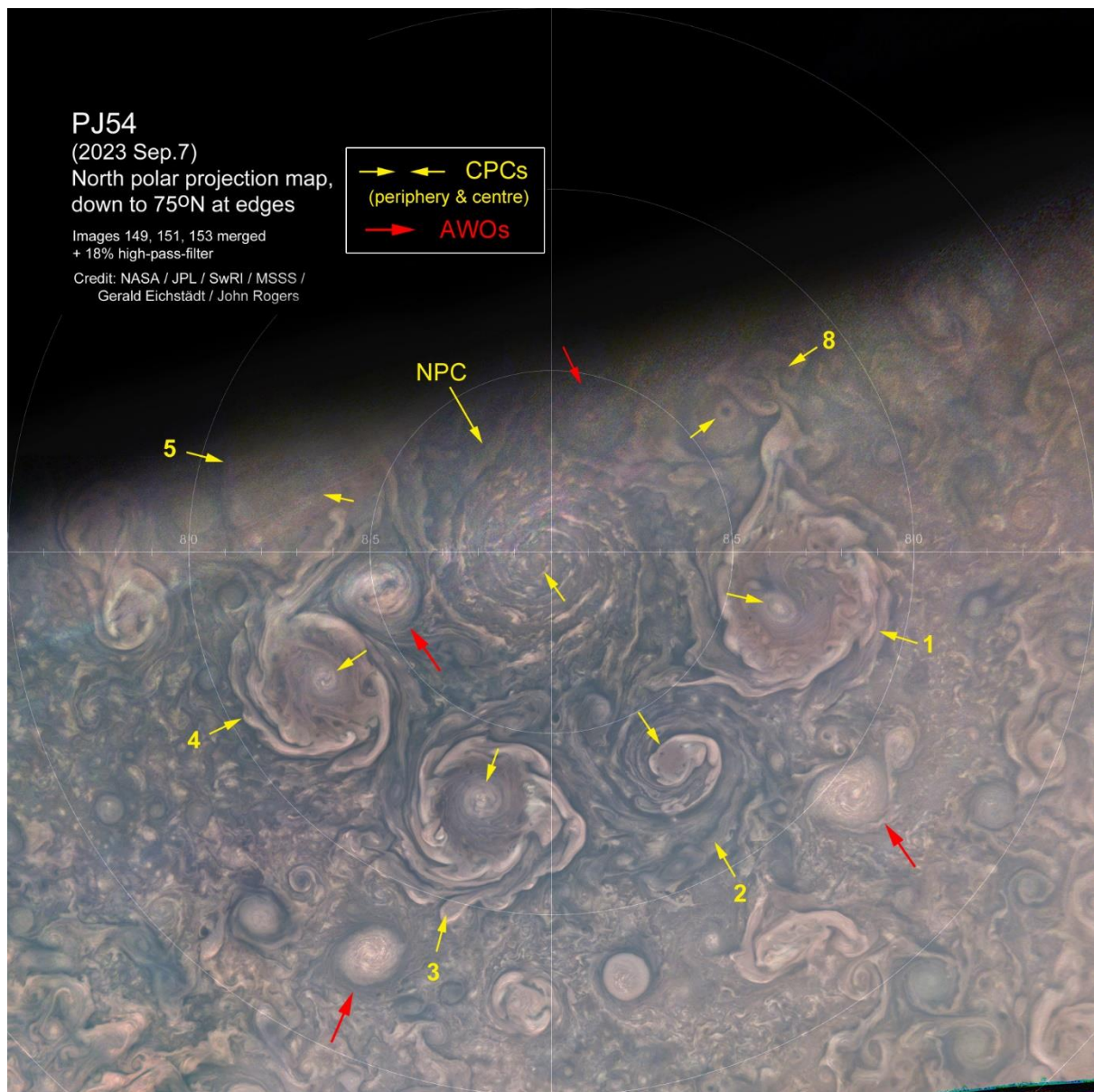


Figure 5. (An unlabelled full-size version is in the ZIP file.)

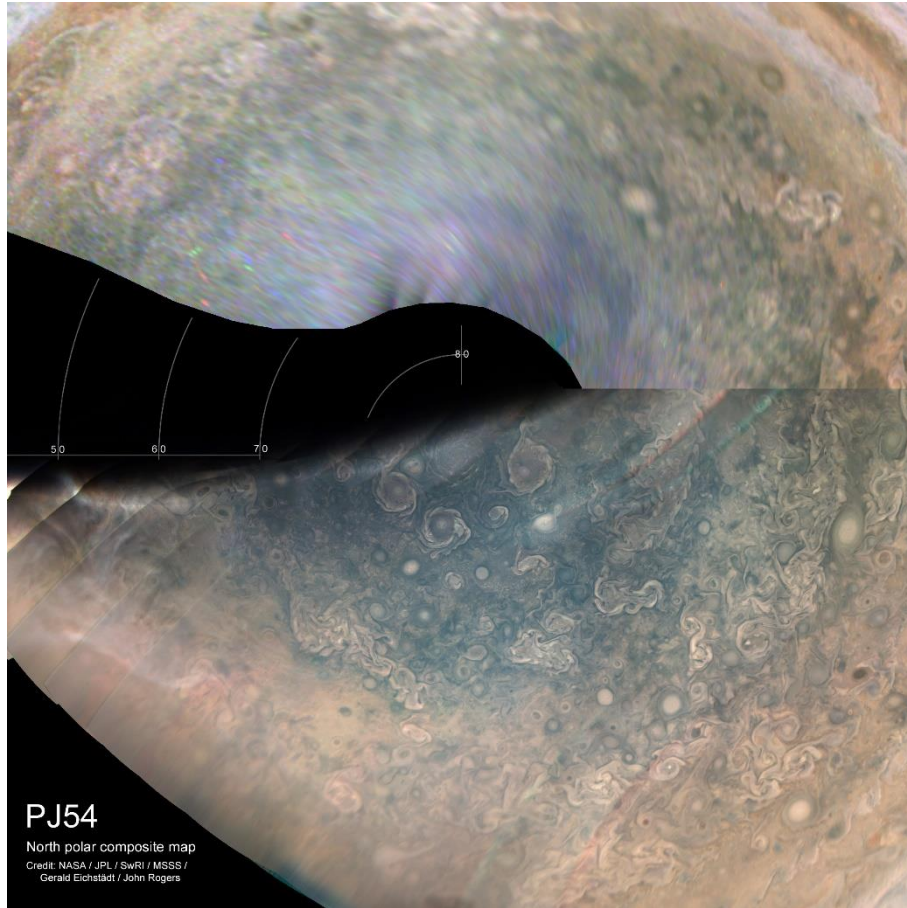


Figure 6.

PJ54 South polar composite map, down to 45°S at edges (outbound images) Credit: NASA / JPL / SwRI / MSSS / Gerald Eichstädt / John Rogers

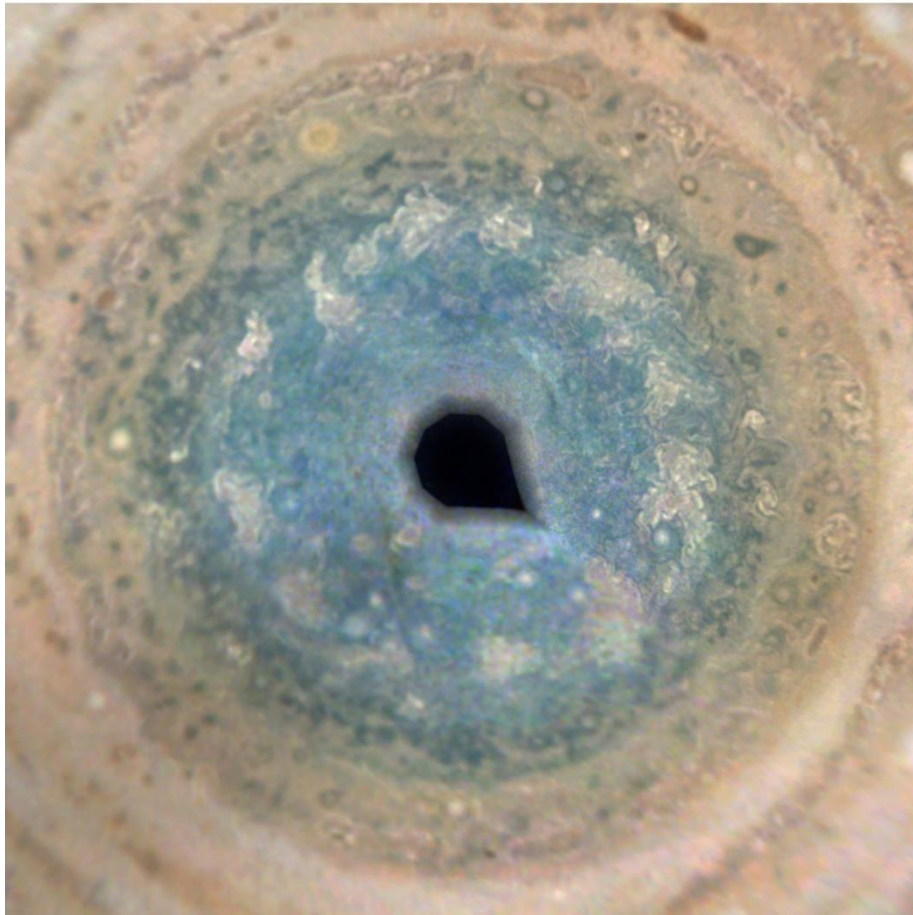


Figure 7.