

JunoCam at PJ36: What the pictures show. Part II: Polar regions

John Rogers (2021 Oct.10)

This report presents our polar projection maps from the PJ36 RGB images. The results can be compared with those in our PJ35 report. As at PJ34 and PJ35, Gerald has produced composite polar projection maps by an automated technique, and I have adjusted the intensities in part or all of the maps to produce a more even result. Gerald also produced hi-res maps from individual images, and I have assembled some of these for the south polar region to produce a more complete map of the CPCs, as some terminator regions did not appear using the automated technique. All these maps were at high resolution and extended down to 30° latitude at the edges, though most of the figures here are reduced or cropped.

North polar region

Figure N1 shows the northern circumpolar cyclones (CPCs). (The map has been sharpened by merging it with Gerald's high-pass-filtered version.) The central North Polar Cyclone (NPC) is still displaced from the pole in the same direction, by 1.1° latitude. (The displacement of up to ~0.5° reported by the JIRAM team at PJ4 & PJ5 [Adriani et al., 2018] was much less and in a different direction.) The AWO north of CPC-3 is still present, and a smaller anticyclonic eddy is seen north of CPC-1 (marked 'A' in red). One of the supernumerary 'filled' cyclones that has existed for several perijoves past, labelled IX, has been displaced and distorted, and looks as if it is being torn apart, perhaps involving interactions with other CPCs to the north and two small AWOs to the south.

Figure N2 is a complete map of the north polar polygon from PJ35 and PJ36. The two perijove maps were combined with no offsets as the CPCs did not move much.

Below: Figures N1 (L) & N2 (R).

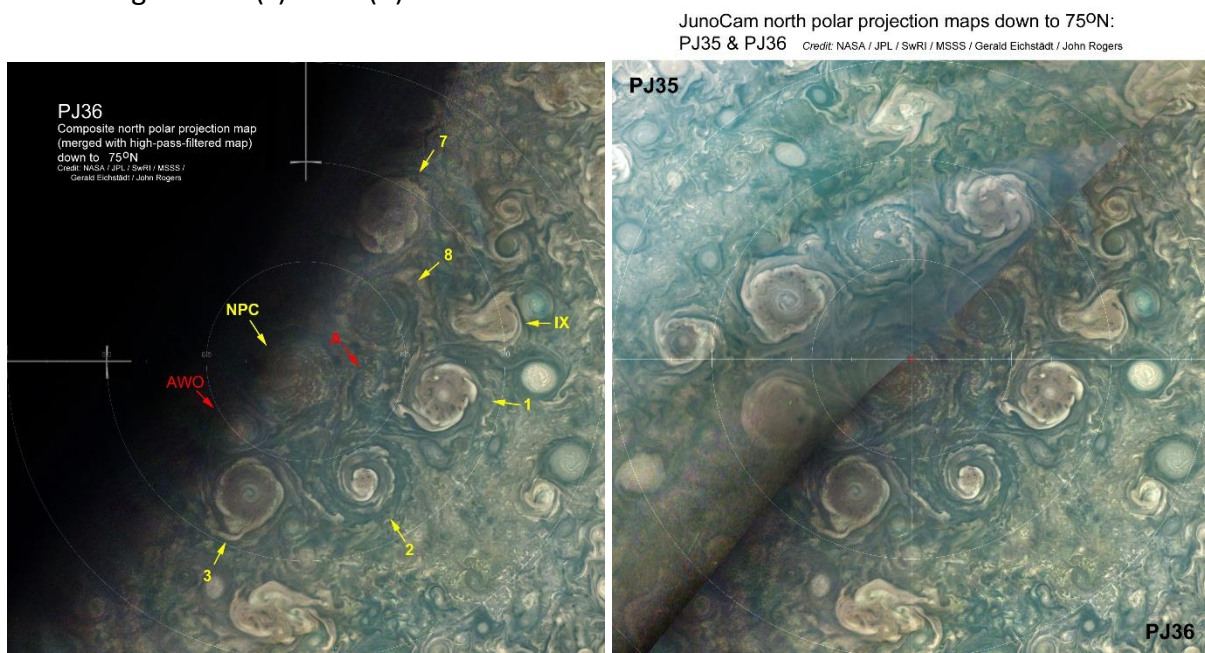
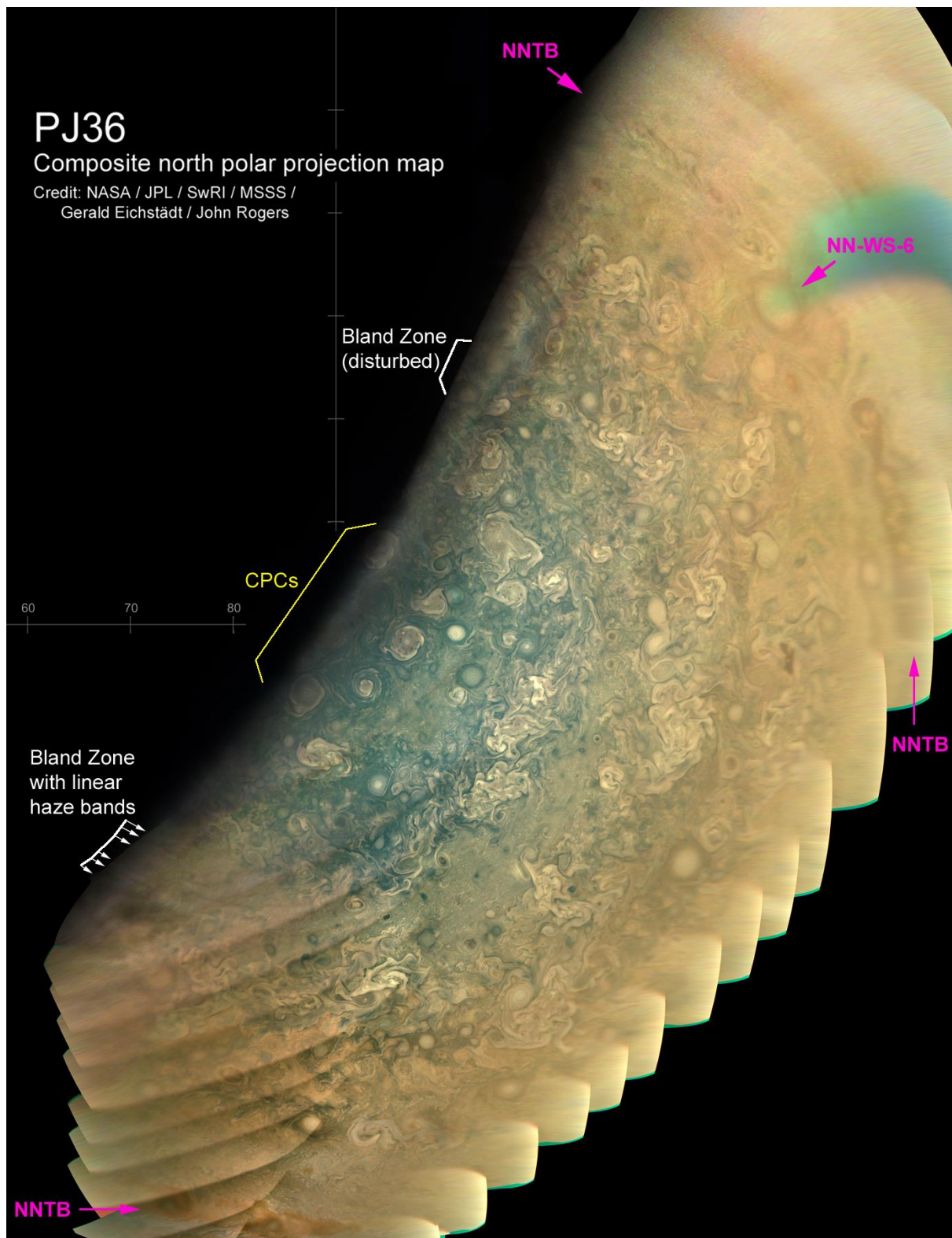


Figure N3 is the northern-hemisphere map, down to 30°N:



- We also have a methane-band map of high northern latitudes (not shown here), which shows:
- No sign of the main North Polar Hood'
 - The linear bands in the Bland Zone are also visible in methane near the terminator;
 - Extensive diffuse methane-bright patches near the terminator from ~40-64N;
 - Detailed mapping of mid-latitudes.

South polar region

Figure S1 is Gerald's 'automated' map of the south polar region (reduced and cropped to $\sim 50^\circ\text{S}$). In the lower part of the map, south of S4-LRS-1, there is a large AWO at 70°S which has drifted $+37.3^\circ$ in L3 in the 43.6 days since PJ35, a rate of $+0.855^\circ/\text{d}$. The FFRs at $\sim 64\text{--}73^\circ\text{S}$ on the left side of the map could also have been preserved since PJ35 with the same drift rate (though the FFRs on the right side cannot be identified). This is very close to the mean drift rate of $+0.80^\circ/\text{d}$ for AWOs ($\sim +0.9^\circ/\text{d}$ for FFRs) in these latitude ranges, as reported in our long-term study (submitted for publication).

Fig.S1. PJ36: South polar projection map down to $\sim 50^\circ\text{S}$

Credit: NASA / JPL / SwRI / MSSS / Gerald Eichstädt / John Rogers

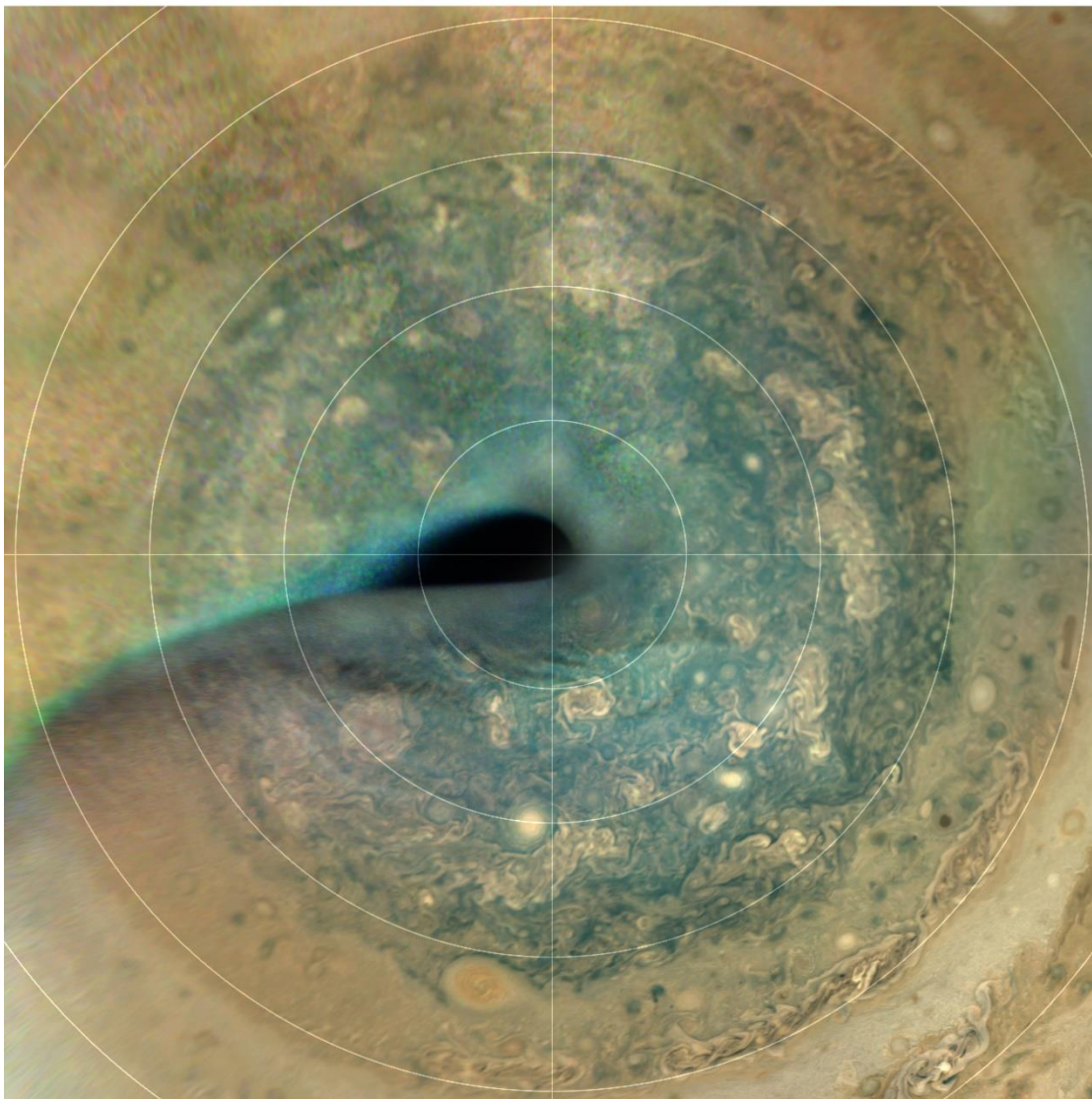


Figure S2 is our map of the polar pentagon, produced by merging single-image maps with terminator enhancement. Unfortunately, due to the deteriorating illumination and resolution, it is now becoming difficult to chart the CPCs. The central South Polar Cyclone (SPC) is not clearly located so I have not continued the long-term chart of its position, though it may be close to the pole consistent with its long-term cyclicity. Three or four of the five CPCs can be detected.

Fig.S2. PJ36: South polar projection map down to $\sim 75^{\circ}\text{S}$ with CPCs labelled

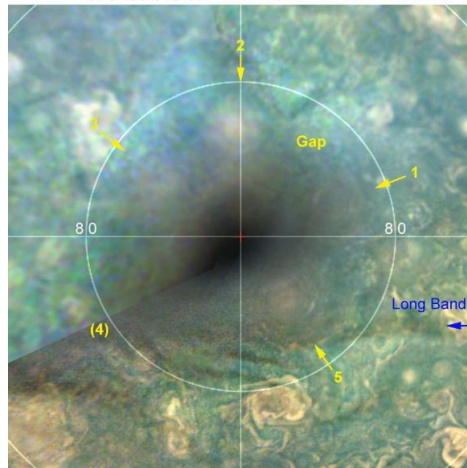


Figure S3 is a pair of maps of the near-terminator regions, at dusk and dawn, cropped to $\sim 50^{\circ}\text{S}$ as there were no haze bands visible at lower latitudes. The revived Long Band is prominent. We also have a methane-band map of the south polar region (not shown here).

In Figs. S1 & S2, with the sunlight transverse to the Long Band, it appears as a long broad dark band, overlapping CPC-5 and the presumed position of CPC-4. In Fig.3, we see its f. end in its familiar form as a very bright \supset -shaped band on the dusk terminator, which marks the north edge of the dark band. This is also methane-bright (images 68-81).

North of the Long Band, Figs.S1 & S2 show a series of parallel dark bands, and north of these, at $\sim 65\text{-}72^{\circ}\text{S}$, the Fig.3 dusk map shows a broad 'rainbow band'. (The dawn map does not cover the region of the Long Band, and the broad rainbow band is not visible at dawn, which may be due to the angle of sunlight as explained in my PJ35 report.)

Further north, the series of aligned streaks over the S4 domain and the S5 jet, described in my PJ35 report, can again be seen, as follows. The dawn map in Fig.S3 (upper right & lower left quadrants) shows some bundles of bright haze bands at $\sim 55\text{-}62^{\circ}\text{S}$ (much less distinct in the dusk map), and some of them correspond to weakly methane-bright wisps outside the SPH. The dawn map (upper left quadrant) also shows several \supset -shaped features in the S4 domain, while the dusk map shows an isolated bright \supset -shaped bundle on the p. edge of S4-LRS-1. These features confirm the consistent pattern of haze bands over the S4 domain and the S5 jet.

Fig.S3. PJ36: South polar projection maps down to $\sim 50^{\circ}\text{S}$: Near-terminator regions: (L) dusk, (R) dawn.

