JunoCam images at PJ18: II. Polar regions

--John Rogers (2019 March 7).

North polar region

Circumpolar cyclones (CPCs):
Juno obtained beautiful views of the northern CPCs at PJ18 (e.g. Figure N1). PJ18 was at similar longitude to PJ16 and the appearances of the CPCs are remarkably similar. The PJ18 map (Figure N2B) can be compared with the PJ16 map (Fig.2 in my PJ16 report), and a composite quartet (Figure N2A, which follows on from Figure A8 in our new draft paper on the CPCs). [But from now on I am numbering the CPCs as in that paper and Adriani et al.(2018), not as in previous sets.]

The only notable difference is the appearance of a new, unusually large AWO on the outer edge of CPC-6 (formerly CPC-8).
The anticyclonic oval inside the ditetragon, north of CPC-7, is still present.
CPC-7 is still unusually far S, at 81.5°N, and CPC-6 still unusually far N, at 84.4°N.
CPC-6 is one of the 'chaotic' quartet, and looks almost exactly the same at PJ16 and PJ18: its inner 2/3 is a pale disk with little visible cloud texture, bounded by a ring of small white clouds. Within the disk (but off-centre and rotating with the disk in an animation) is a small distinct ring, present at both perijoves. **CPC-5** (formerly CPC-1) is still the largest of the 'filled' quartet, and clearly shows counter-spiral structure within its reddish disk. Both of the filled CPCs have a dark (clear?) patch at the centre, surrounded by a 'wall' of white clouds, and with a smaller white cloud patch inside it. Although this structure resembles the 'eye' of a terrestrial hurricane, it is presumably different, because its counter-spiral and/or counter-rotation pattern indicates that it has high pressure.
I have made an ***animation*** of the N. polar (75°N) maps, showing the rotation of the CPCs. In CPC-5, we can see counter-rotation of the white cloud streaks that surround the eye (the eye-wall?).

Haze bands and the Bland Zone:
The hemispheric north polar maps (Figure N3: RGB; terminators; methane) cover only a restricted longitude range but confirm impressive haze features. The methane map shows large, well-defined bright areas between ~40-65°N, their boundaries representing multiple wavy edges to the N. Polar Hood. Some of these edges coincide with high-contrast bright or dark haze bands in the 'terminators' map. In the Bland Zone, there is a typical long bright band on the dawn side, and a very short one on the dusk side, but no long dark bands; however the methane map does show a long dark band on the afternoon side.

The Bland Zone exhibits exemplary blandness around much of the PJ18 map (60-65°N), and this sector was viewed particularly well in closeup images, though there is also a shorter disrupted sector.

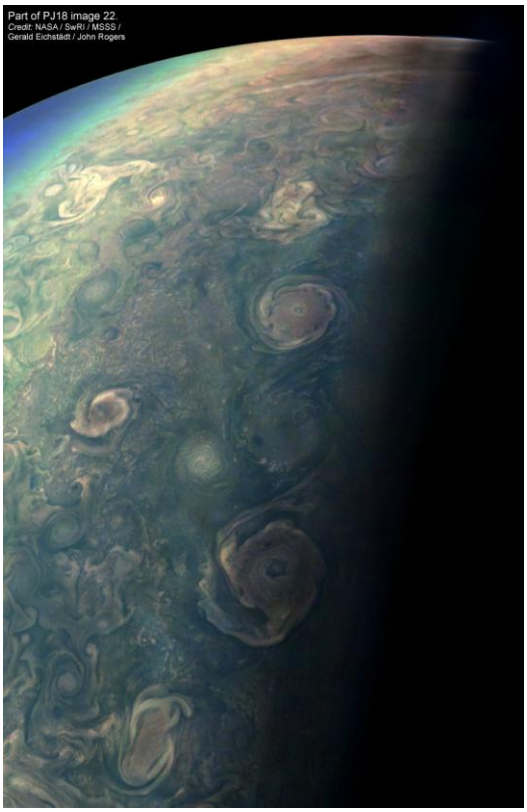

Figure N1.

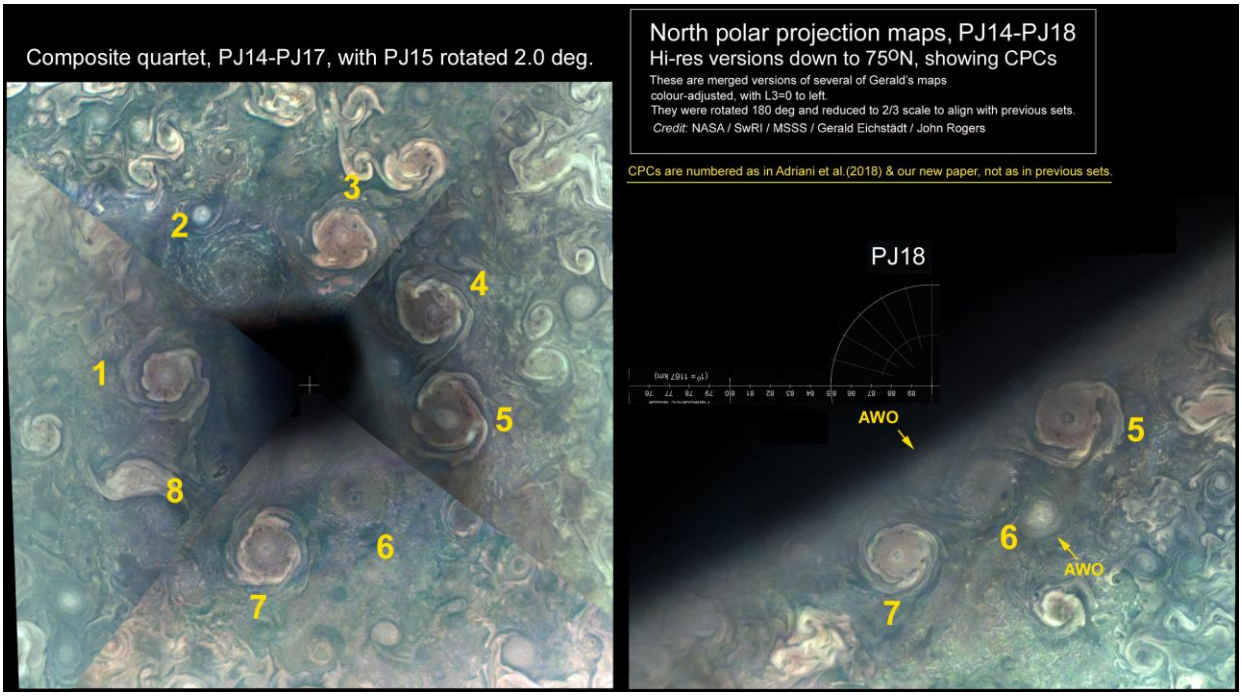

Figure N2.

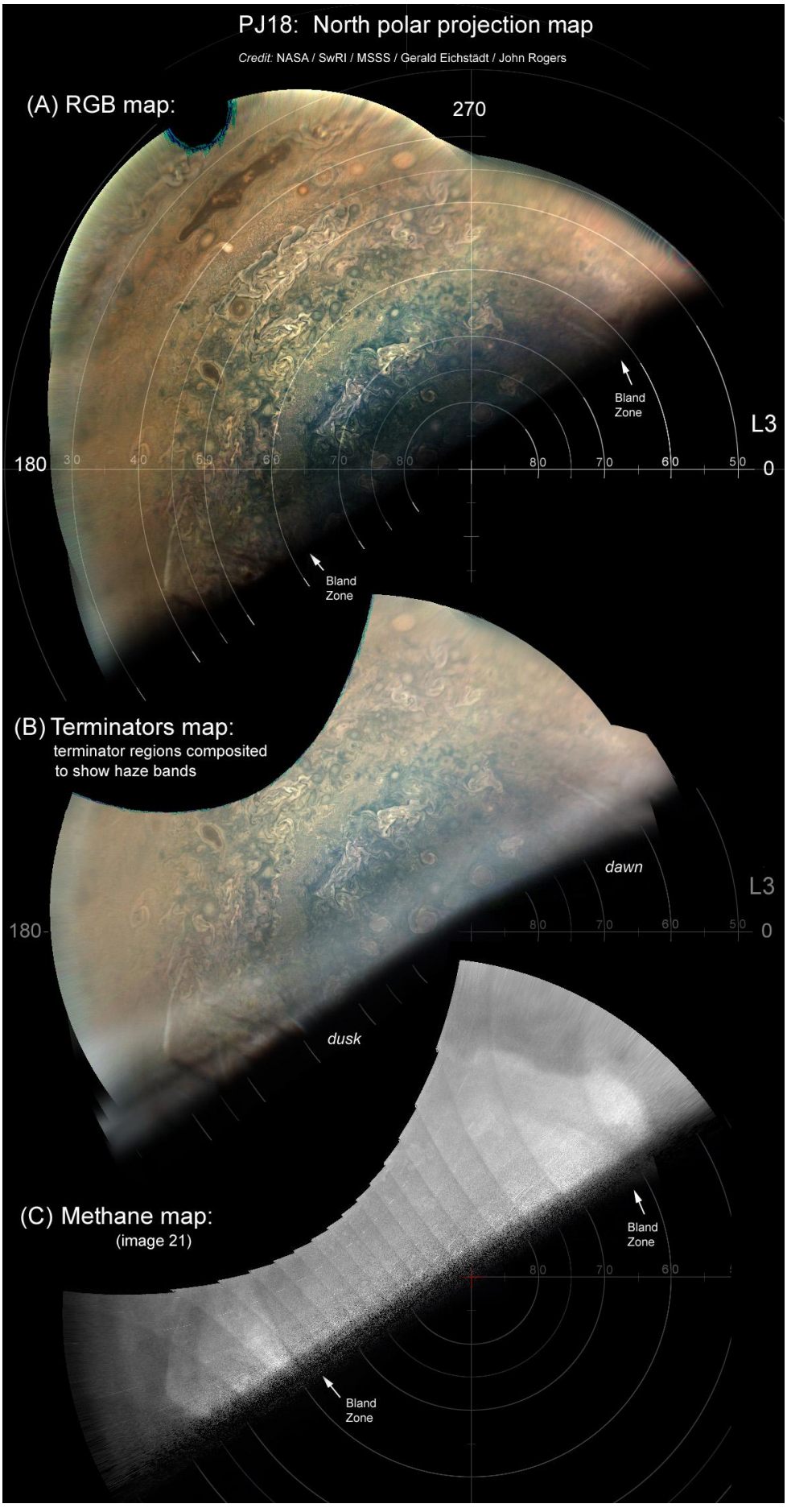
PJ18: North polar projection map
Credit: NASA / SwRI / MSSS / Gerald Eichstädt / John Rogers
(A) RGB map:
270
Bland Zone
L3
180
0
Bland Zone
(B) Terminators map:
terminator regions composited to show haze bands
dawn
L3
180
0
dusk
(C) Methane map:
(image 21)
Bland Zone
Bland Zone

Figure N3.

South Polar region

Figure S1 presents composite maps of the S. polar region (RGB and terminators) down to 60°S.
Figure S2 presents the composite map in methane, down to lower latitudes.
Figure S3 indicates the positions of the CPCs on five original images of the S. polar region.
Figure S4 presents the RGB map of the CPCs (excerpt from Fig.S1B).
To assess the uncertainty in pole position, the pole positions from 7 images (from images 50-64) are plotted as red dots after aligning on the SPC, and enlarged 5x in Figure S4B with the image number indicated nearby. All pole positions are within 0.10 deg of the consensus position (defined by images 52, 54, & 56=MEA).

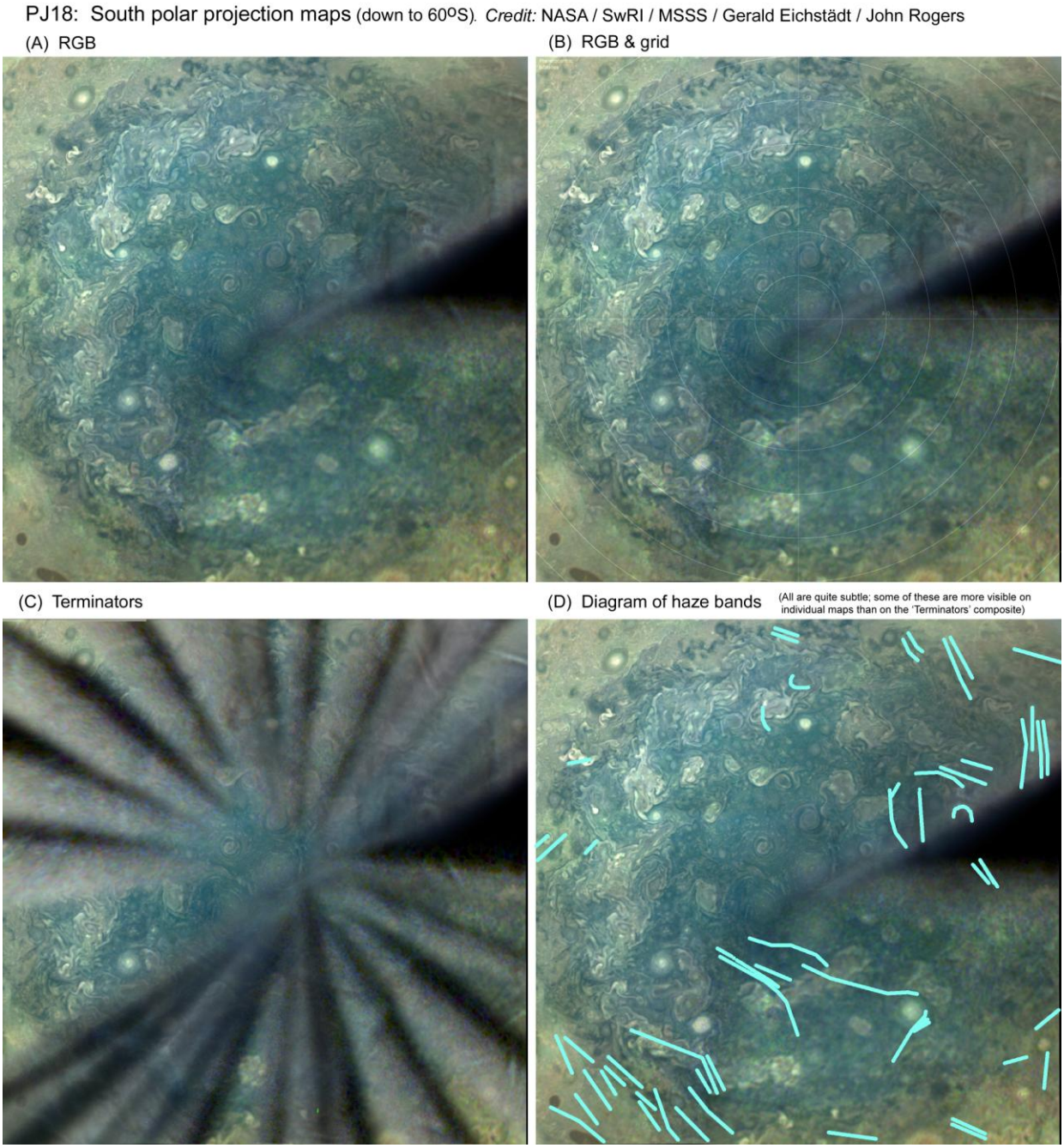

Figure S1.

Haze bands:
In the PJ18 'terminators' map (Figure S1C&D), haze bands are sparse and low-contrast as compared with many earlier perijoves. There is once again a long bundle of bands in the position that was occupied by the Long Band from PJ5 to PJ12. This bundle is faint, mostly a narrow dark band that is seen most clearly under high sun; we wait to see whether this represents a return of the formerly prominent Long Band.

In the methane map (Figure S2), as usual, we see the wavy edges to the SPH and SPB, and methane-bright strips in FFRs within the SPH. A visibly very bright point in one FFR is also very methane-bright, presumably a newly erupting plume.
In the S1 to S3 domains, notable features include: the very long, methane-dark STB Spectre; the methane-bright S2-AWOs and S3-AWO; and some small, methane-dark spots, esp. in latitudes of the STB and S3TB. These need to be identified in visible-light maps.

An animation of images 52 and 59 shows motions beautifully: the rotations of the CPCs; diverse and sometimes rapid currents in and around the FFRs; and the rapid S6 jet which in some places is obviously following the visible large-scale waves around FFRs.

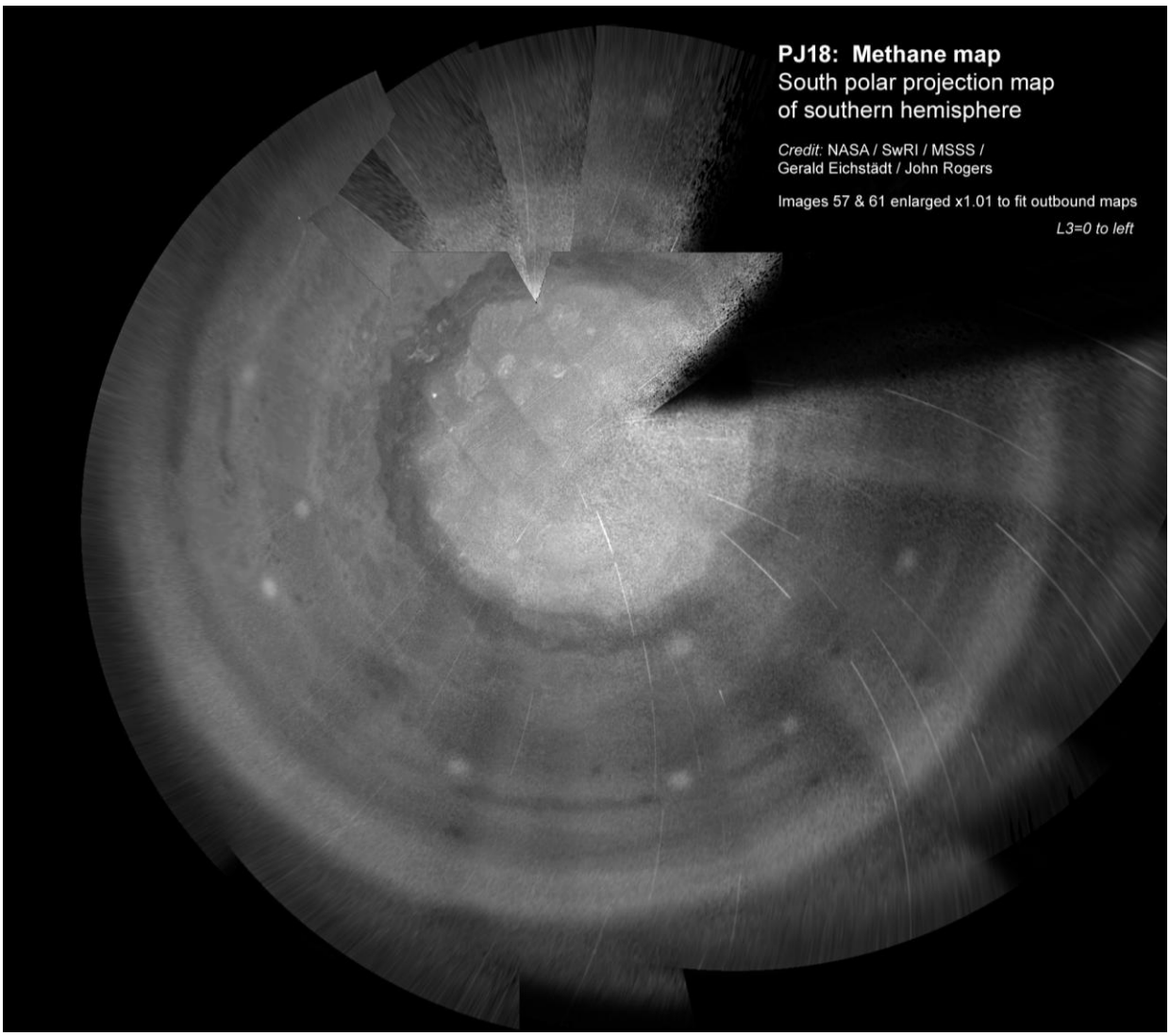

Figure S2.

CPCs:

The SPC has moved outwards again, and is now at approx. its furthest position from the pole (87.9°S), in the same place as at PJ13 (Figures S4C & S5). This is consistent with resumption of the ~11-month cyclic motion, except that the SPC remained far from the pole from PJ12-PJ16 and only briefly approached it at PJ17.

Meanwhile, the gap between CPC-1 and -2 has widened suddenly: the angle between them is 118 deg, measured from the centre of the SPC. (At PJ17 it was 100 deg.) And something strange is happening in the gap, as was also the case at PJ17. At PJ17, the gap was narrow, and appeared to have lines of clouds associated with different cyclones crossing each other, and a big FFR intruding. At PJ18, two FFRs are intruding and, again, clashing with the spiral arms of a CPC. (Unfortunately the gap could not be not imaged for long enough to trace any motions in it.)

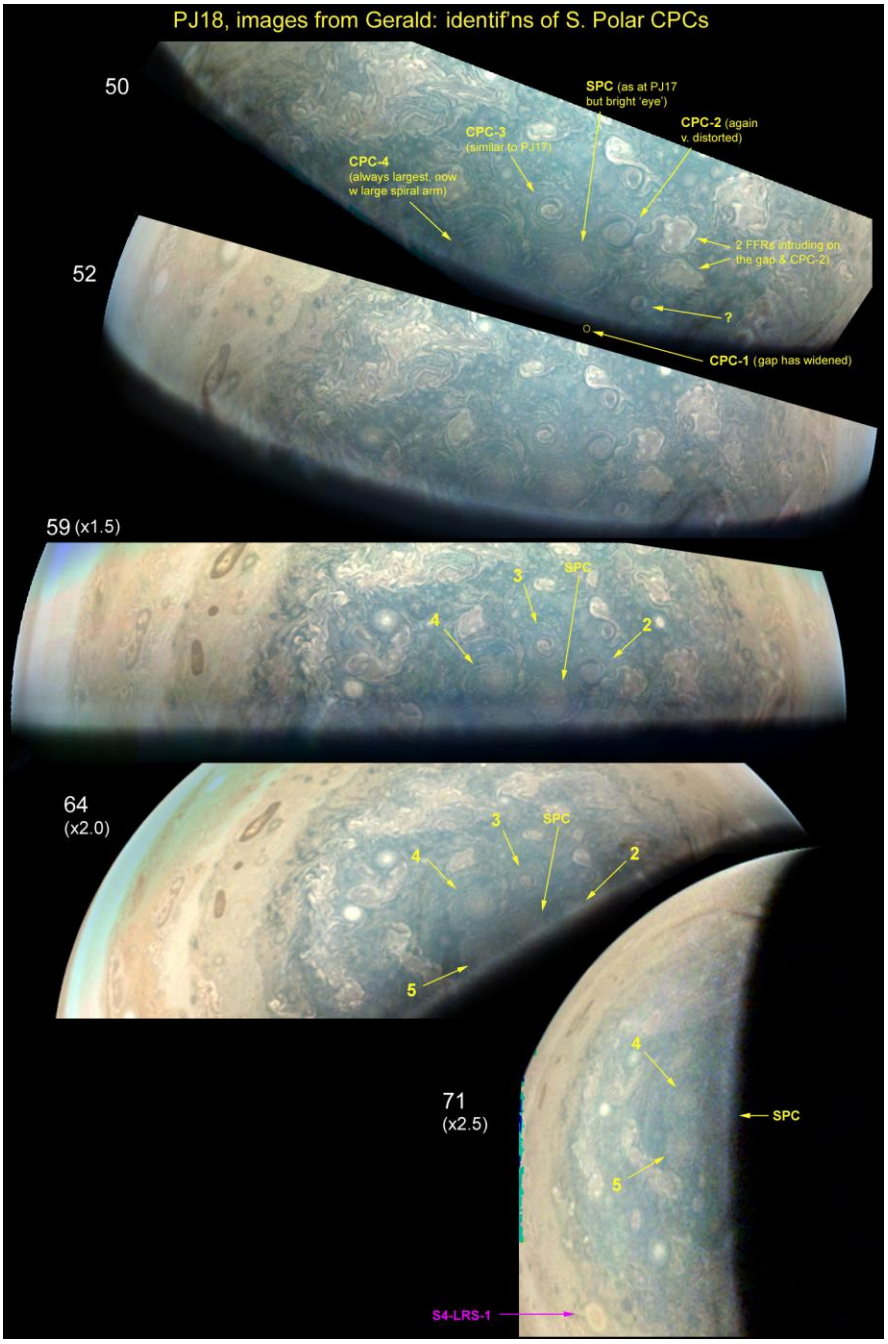

Figure S3.

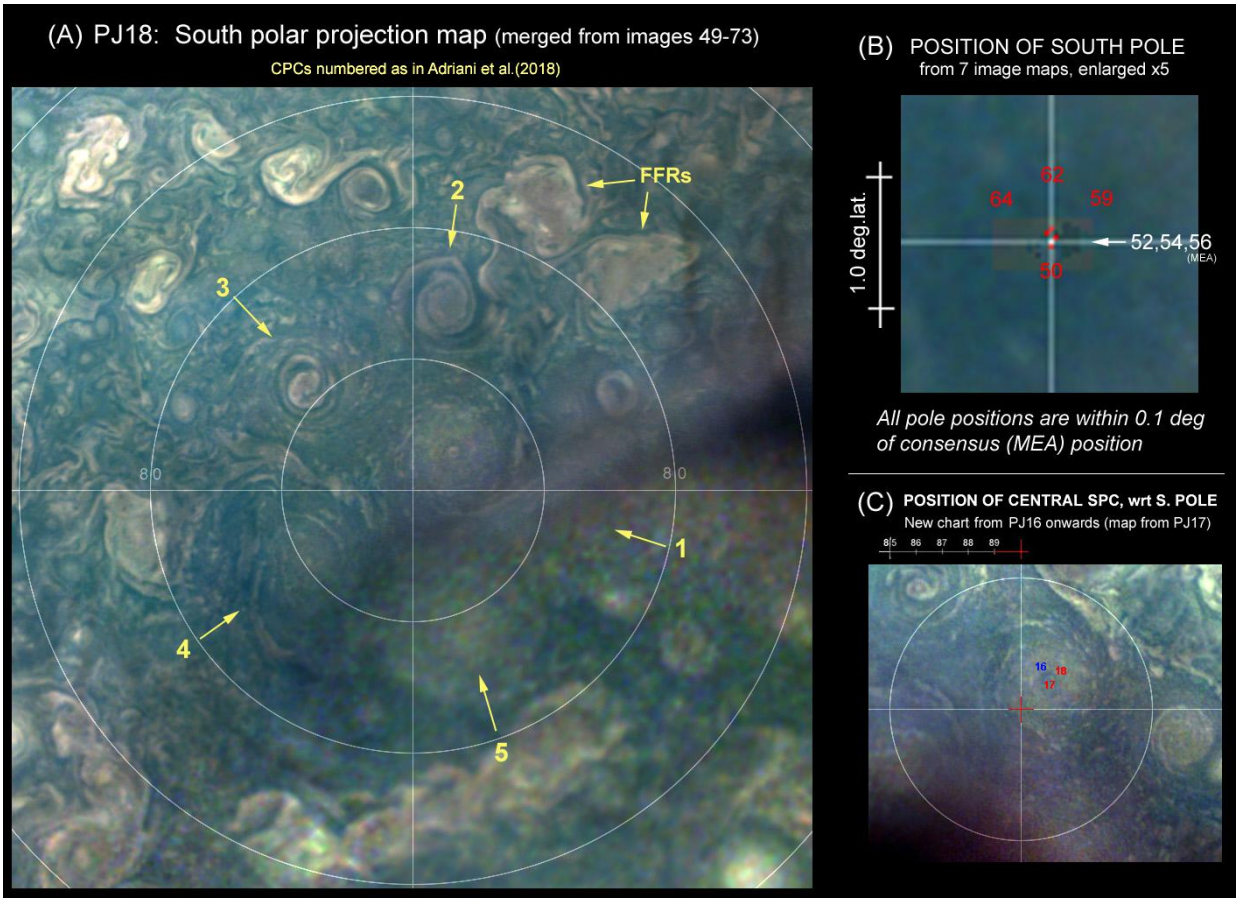

Figure S4.

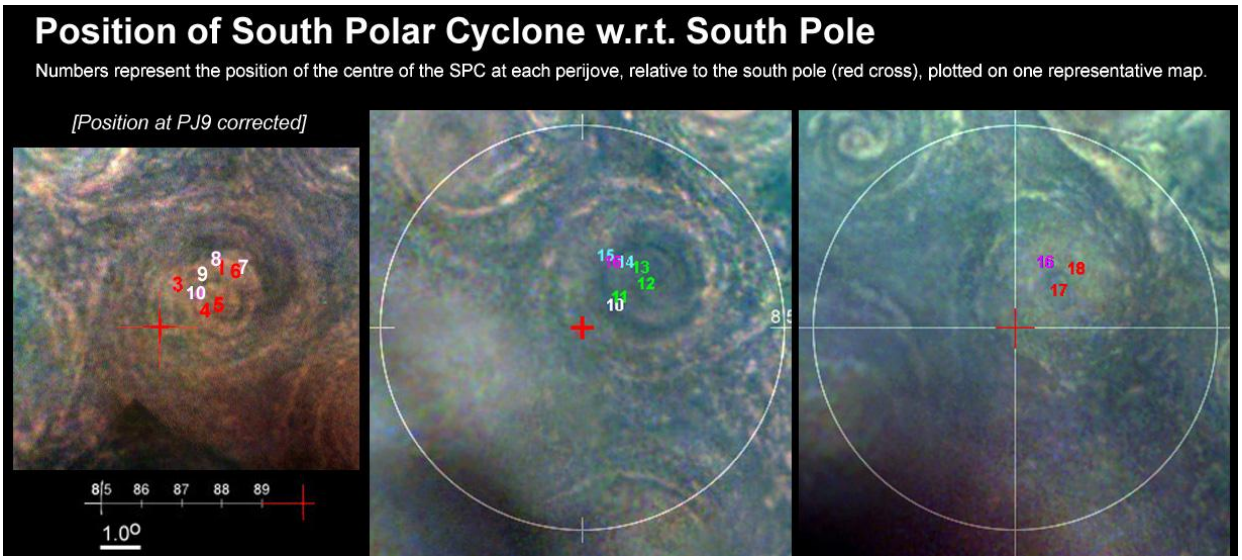

Figure S5.