JunoCam images at PJ68

John Rogers (2025 Jan.5)

Perijove-68 was on 2024 Dec.27. Perijove was at 57.5ºN, with the usual altitude of 3500 km, and equator crossing occurred 25 min later at L3 = 132. This was only 8º from the longitude of the PJ67 track, so the same features were imaged again.

As always, this report is based on work by the NASA JunoCam team (Drs Candy Hansen, Glenn Orton, & Tom Momary), with image processing and map projections by Gerald Eichstädt. Conventions & abbreviations are as in previous reports.

A large new eruption on Io

Juno's inbound trajectory still passes close to Io on every alternate orbit, although further away every time, and with a separation of 75,000 km on the approach to PJ68, we did not expect much. However, the images reveal a huge new eruption close to the south pole, which has happened since PJ66 (Figures 1 & 2). It is a conspicuous black spot, surrounded by a large irregular annulus of brown (not red) material, which masks underlying features. It is centred just 'below' the mountain Crimea Mons on these images, at approx. 73°S, 220°W (coordinates from Jason Perry). The old NASA/USGS map shows faint traces of possible lava flows in this region, and the hi-res PJ60 image seems to show dark lava flows there, but the black spot and surrounding deposits are new since PJ66.

Signs of two eruptions seen at earlier perijoves, e.g. PJ62, can still just be made out (not shown here): the plume of Seth in image 11, and the red ring around Nusku on the dark side in image 19.

Jupiter: Global maps

Figure 3 is a ground-based map spanning the time of PJ68, for comparison with our JunoCam map in Figure 4. Since PJ67, two of the long-lived NEBn white ovals (WS-Z & WS-E) have become rather dull, as is WS-1; WS-Z and WS-1 are visible on the JunoCam map. The mid-SEB outbreak has developed considerably since PJ67. The main complex of the South Equatorial Disturbance (SED) was still drifting with DL1 ~ +1 deg/day until approx. Dec.21-24, when it was passing the mid-SEB outbreak; it then emerged less distinct than before, but it may well recover.

Figures 5 & 6 are the north and south polar projection maps.

Northern circumpolar cyclones (CPCs)

Figure 7 shows the polar polygon, as compared with PJ67. Both maps show the previously tracked features, with some interesting changes. As well as the CPCs (yellow arrows), there are three anticyclonic vortices or AWOs (red arrows, here labelled a & b & c), which have shifted small distances but not shown any systematic movement over the past several perijoves. CPC-8 has been the most chaotic over the past year, and now appears weaker than ever, barely recognisable . Its remnant is adjacent to anticyclonic vortices b & c, and particularly seems to be interacting with c, perhaps dragging in turbulence from CPC-7. In CPC-1, the typical antcyclonic 'core' is still notably off-centre, as it has been for several perijoves. The cyclonic oblongs labelled 'FFR' could be the same one seen over the past few perijoves, or they might just be successive short-lived ones.

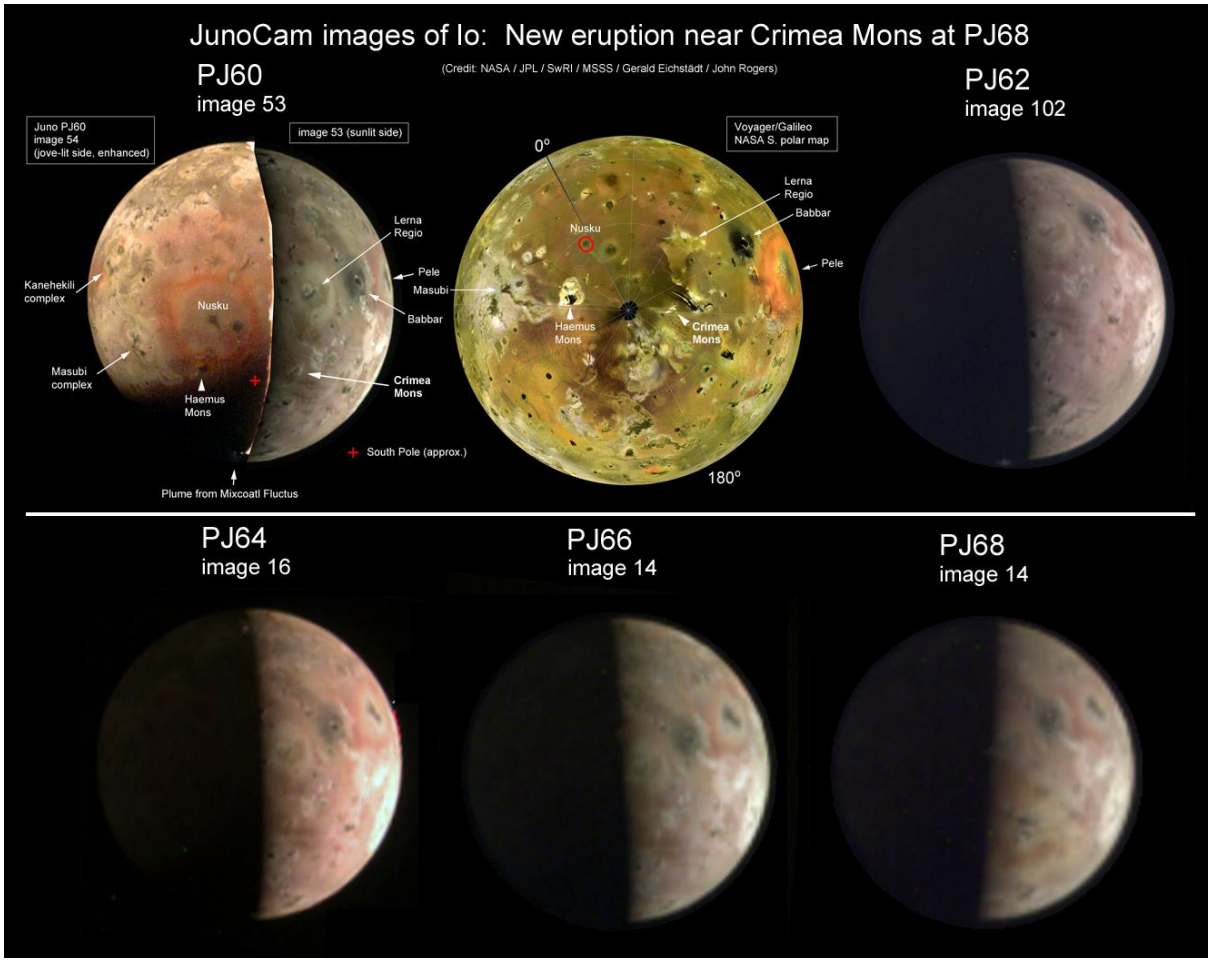

Figure 1. Images of Io from PJ60 to PJ68. These images are all from Gerald's processing, selected samples from either the 'draft' or 'reprojected' versions. In the NASA/USGS map, the region of the new eruption is from Galileo Orbiter images; it was in darkness in Voyager 1 images which showed Crimea Mons at the terminator.

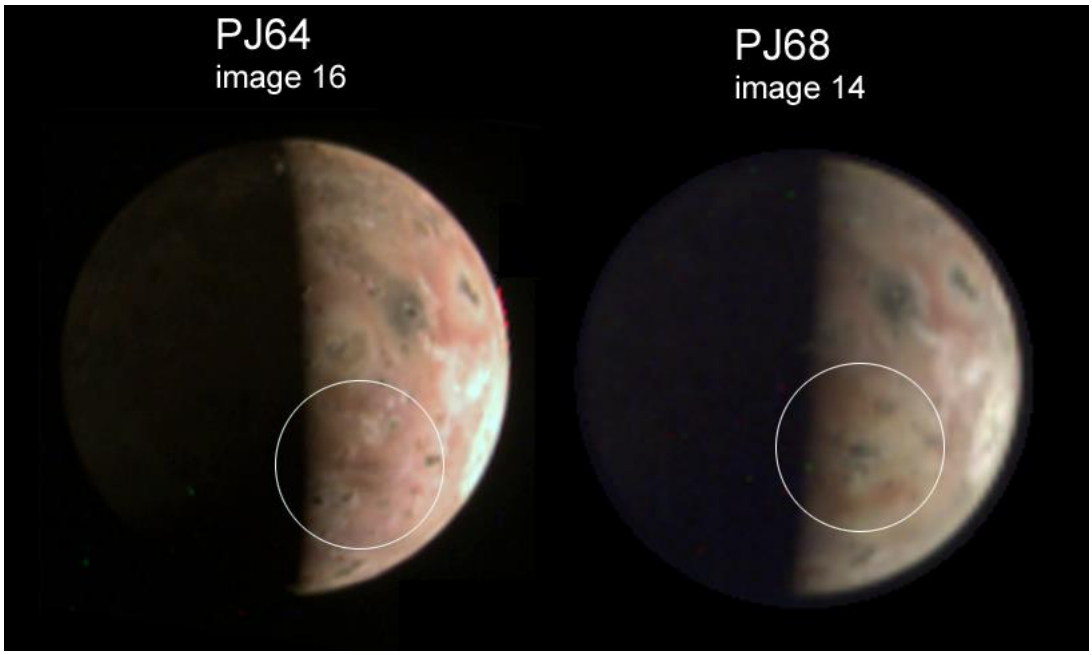

Figure 2. Images of Io from PJ64 and PJ68, with the new eruption deposits circled.

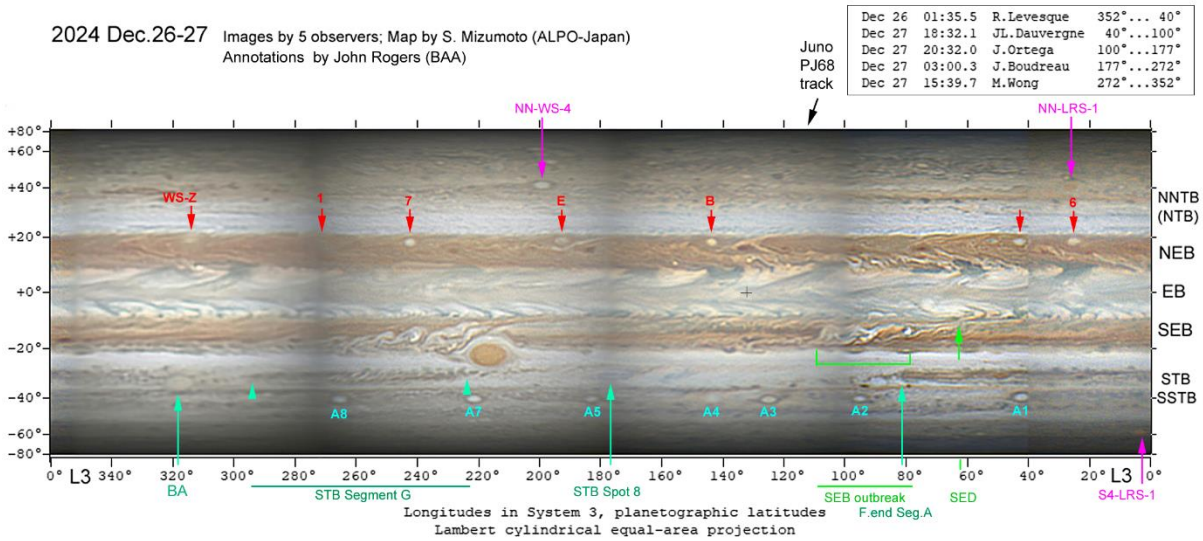

Figure 3. Ground-based map from amateur images.

Figure 4. JunoCam map at PJ68: inbound (northern hemisphere) and outbound (southern hemisphere). The shadow of Europa produced the very dark spots on STBn at right.

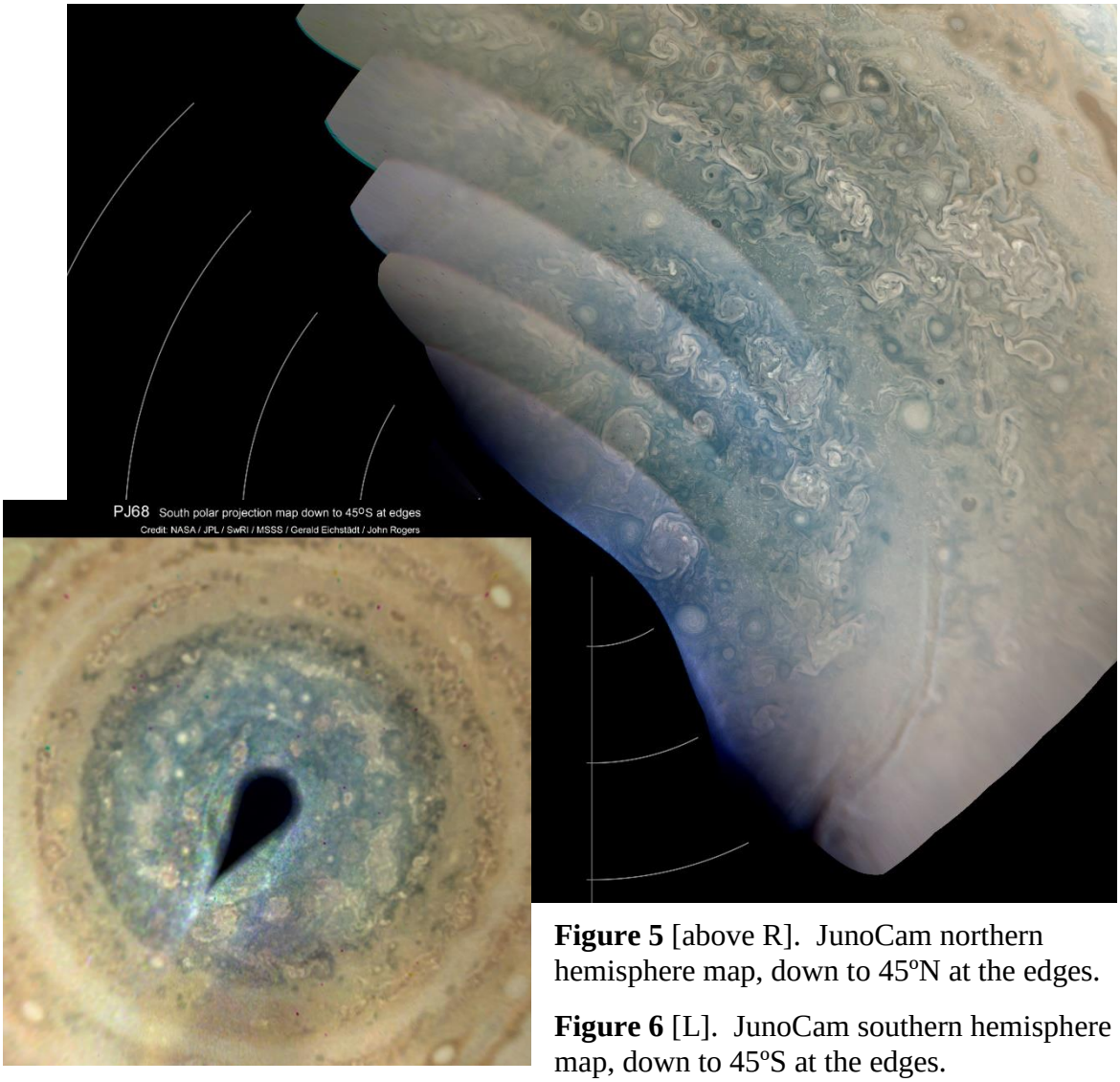

Figure 5 [above R]. JunoCam northern hemisphere map, down to 45ºN at the edges.

Figure 6 [L]. JunoCam southern hemisphere map, down to 45ºS at the edges.

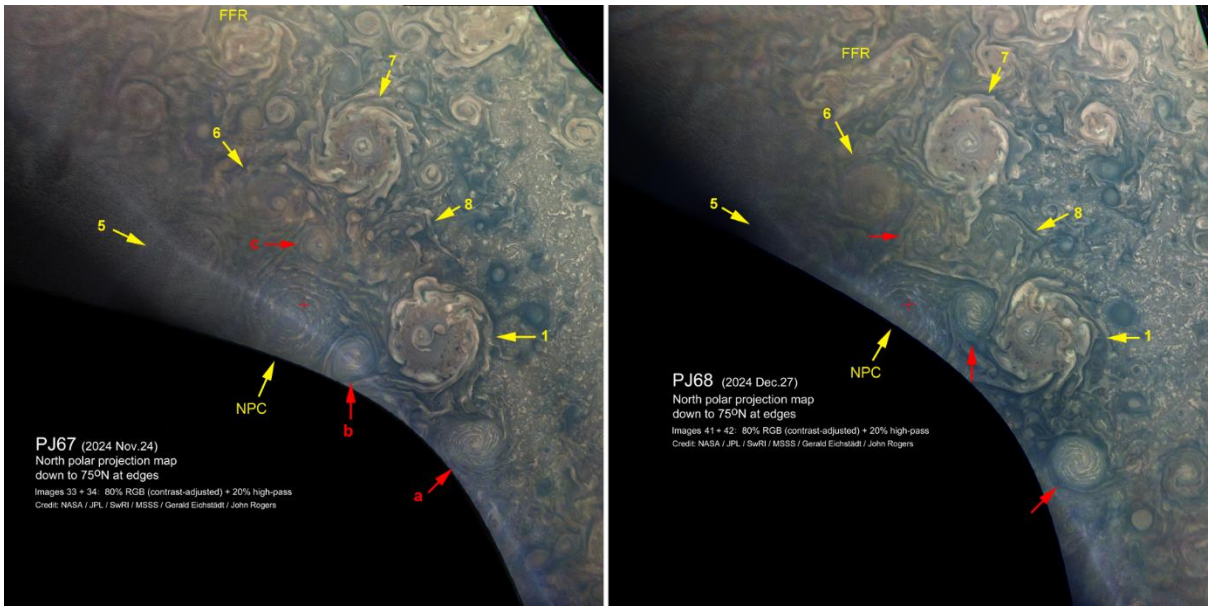

Figure 7. Map of the north polar region, down to 75ºN at the edges, compared with the PJ67 map, with the circumpolar cyclones (CPCs) and other circulations labelled. (An unlabelled, full-scale version of the PJ68 map is in the ZIP file.)