

*Jupiter in 2016-17, Report no.9 (2017 April 26)*

**Interactions of ovals in high northern latitudes, 2017 March-April**

*Summary:*

There is currently much interest in the behaviour of features in the high northern latitudes, as these are shown in spectacular detail in the JunoCam images; close pairs of white ovals in the N4 and N5 domains were noticed in the Juno PJ-5 images and in images by Chris Go and others. Are they merging? Here I report on 3 such pairs, from the best amateur images and the JUPOS charts. In summary:

- 1) A trio of ovals in the N4 domain (51-55°N), named a,b,c: a overtook b then possibly merged with c, reversing its drift on March 17; but then b converged on a in turn, and they were nearly in contact on April 21, so they may now be merging, or changing places again.
- 2) A pair of ovals in the N4 domain: one (d) caught up the other (e) and they apparently merged on April 8-10, at 54°N.
- 3) A pair of ovals in the N5 domain (~62°N): they probably merged on April 11.

Given the chaotic nature of these domain, such events may well be common, but this is an exceptional opportunity to study them in detail.

--John Rogers.

*[Full text on next page]*

*Jupiter in 2016-17, Report no.9 (2017 April 26)*

## **Interactions of ovals in high northern latitudes, 2017 March-April**

--John Rogers

There is currently much interest in the behaviour of features in the high northern latitudes, as these are shown in spectacular detail in the JunoCam images, and we are also able to track many features here from the best amateur images and JUPOS analysis. (In addition, there have been several complete pairs of maps from the Hubble S.T. since the Juno mission started. When these are publicly available, and we have also generated full maps from each Juno peri-jove, and analysed the full amateur data set, it will be possible to track these regions in almost as much detail as during the Voyager missions.) We already know that many features have drifts consistent with the classical currents, but also that anticyclonic white ovals (WOs) in high latitudes often have rapid and variable drifts with unpredictable sudden changes of speed and latitude. The high northern latitudes generally show more chaos than pattern. So I suspect that the events described herein are common.

Current interest is focussed particularly on close pairs of white ovals in the N4 and N5 domains that were noticed in the Juno PJ-5 images (March 27) and in the best amateur images (as pointed out by Chris Go and Zac Pujic). Are they merging? I have investigated 3 such pairs, from the best amateur images and the JUPOS charts, as described below.

(In the following, 'N4TC' means the classical N4 Temperate Current, referring to white spots which are retrograding with mean DL2 = +6.9 deg/mth ( $\pm 2.6$ , SD), according to the current JUPOS chart. Two much more rapid WO's (a & d) are described below. Latitudes are preliminary estimates from JUPOS maps, planetographic.)

(1) N4 domain (near L2 ~ 80, L3 ~ 200): There are actually 3 ovals involved in this interaction, initially as follows: WO-a, rapidly prograding (DL2 = -33.5 deg/mth), 55°N; WO-b slow-moving in N4TC, 51°N; WO-c, very small, also in N4TC, 53°N. WO-a passed WO-b without interaction; but then on March 17 WO-a suddenly reversed its drift, possibly merging with WO-c, which was never seen again. WO-a then had typical N4TC drift, and shifted down to 51°N over the next 10 days. But by April 9, WO-a and WO-b had reversed their original difference in latitude and speed; by April 16, WO-b was at 53°N and catching up with WO-a at 51°N. (The pair are shown in many excellent images from April 9-19, by C. Go, C. Foster, G. Walker, D. Peach/Chilescope, and Z. Pujic.) Go's image of April 21 shows them nearly in contact, so they may be either merging, or changing places again.

(2) N4 domain (near L2 ~ 295, L3 ~ 55): Here too there was a rapidly prograding oval, WO-d (DL2 = -31 deg/mth), which caught up with a slow-moving oval in the N4TC, WO-e. They appeared to be merging on April 8-10, producing a single oval at 54°N which still had variable shape from April 15-20, but was a simple oval on April 22 (C. Go).

(3) N5 domain (near L2 ~ 120, L3 ~ 240): The JUPOS tracking is incomplete here, showing only one oval (DL2 ~ -17 deg/mth, Dec-Feb, with oscillations; ~62°N); but it was close to a second oval in late March, and the two probably merged on April 11 (although a small faint spot could be a remnant of the faster oval having passed the slower one).

### ***Figures (in a ZIP file, 6.5 MB):***

JUPOS chart of N4 domain.

Animated GIF of north polar maps in March-April.

North polar maps (Marco Vedovato) from Feb.18-19, March 25, & April 9-10, labelled.

North polar map (JunoCam, PJ-5, March 27) – copied from our PJ-5 report.

Sets of images for each of the 3 pairs of ovals.

[Note: Different conventions are used in our analysis and in the Juno project. We have always used L2 longitude and planetographic latitudes, and JUPOS charts with longitude increasing to the right, consistent with south-up images. Juno uses L3 longitude and planetocentric latitudes, and north-up images. To enable comparisons, we now produce image sets with north up, and sometimes refer to L3, so discordances are unavoidable and confusion is easy. Please inform JHR if you notice any mistakes.]