Appendix 1:

PJ17: Circulation in oval BA

Using Gerald's maps of oval BA at PJ17, I have made measurements manually of its internal rotation. To get the best averages over various sectors, the maps were stretched (x1.45 vertically) to make oval BA appear circular, so that angular rotation between the maps could be estimated. (This is the same method that I have used for the CPCs, and for the GRS with ground-based and Hubble images.) This was done with images 34 & 39, separated by 1640 secs (27.4 mins) (and I've also done a rough check with image 36).

One map is shown on the next page, and the attached animated GIF shows the two maps blinked to show the rotation, and an overlay showing the sectors within which the rotation was measured, as follows. The derived wind speeds apply on the minor axis, and the radii are calculated from the longitudinal extent on the major axis.

	Inner	Outer	Angular		Wind speeds:				
	radius	radius	motion	+/-	inner	**mean**	outer	+/-	+/-
	(km)	(km)	(deg)	(deg)	(m/s)	**(m/s)**	(m/s)	(m/s)	(m/s)
A	0	2100	4,5	0,4	0		101	0	9
B	2100	3020	4,0	0,3	89	**109**	129	7	10
C	2100	3020	5,2	0,3	116	**142**	167	7	10
D	3370	4050	2,8	0,2	100	**111**	121	7	9
E	3370	4050	2,2	0,2	79	**87**	95	7	9

So the central part has the fastest angular rotation (9.9 deg/hr), as the spiral streaks suggest, except for a strip just south of it. The fastest wind speeds are (as before) in the formerly-orange annulus, averaging 109 (±8) m/s in the north and 142 (±8) m/s in the south. If the outer edge of the annulus is rotating at the same angular speed (which is difficult to establish given that the features are extended streaks), the speeds there are as high as 129 (±10) m/s in the north and 167 (±10) m/s in the south. By way of comparison, Hubble and New Horizons images in 2006 and 2007 showed speeds of ~87 m/s on the north edge and ~120 m/s on the south edge [see our long-term report on the S. Temp. domain, http://www.britastro.org/jupiter/stemp2013.htm, Appendix 3].

I also measured direct east-west linear displacements of three dark spots in the northern part and three in the southern, and obtained speeds in the same range, but with considerable scatter. The method of rotating the map to optimise pattern alignment visually seems to be more reliable as it minimises the effect of pixel noise. Meanwhile, Gerald is working on automated stream-function measurement, and this manual approach can serve as a check on the results.

I get the visual impression that the three concentric regions (A = central region; B & C = very-pale-orange annulus; D & E =white outer rim) really are separate dynamical units with distinct angular speeds, rather than lying on smooth radial gradient, but this would need to be tested objectively.

--John Rogers (2019 Feb.17)

JunoCam at PJ17: Internal rotation of oval BA (images 34 & 39)
Cylindrical projection maps (G.E.), stretched x1.45 vertically (JHR) and blinked
Credit: NASA / SwRI / MSSS / Gerald Eichstädt / John Rogers