Appendix 1: Complex speed patterns in S. Tropical Band and SEBs (2011 June-Sep.)

The S.Tropical Band (STropB) in part consisted of dark grey streaks or contained dark condensations, and along its interface with the reddish-brown SEB(S) there were various dark humps and small white spots which appeared to form wave patterns. They showed a great range of speeds, which fitted closely with the normal zonal wind profile at latitudes >21ºS, but showed a remarkable dual speed pattern on the peak of the retrograding jet at 19-21ºS. We initially defined seven sets of features from their appearance, location, and drift rates, in July and August. Fig.S1 shows these features as initially defined on a series of strip-maps, and Fig.S2 shows small-scale excerpts from JUPOS charts to illustrate the drift rates. We then tracked them individually from closer examination of the JUPOS data (G. Adamoli & JHR), with the following results.

Sets 1-5 were in the range 21-26ºS, and their speeds and latitudes all agreed closely with the usual wind gradient across the STropZ as observed by spacecraft (Fig.S4).

Sets 1,2,3 were all features of the massive dark grey S. Tropical Band, and were not entirely distinct from each other. Dark patches at the p. edge (set 1) were stationary in L2; features further f. had faster speeds and higher latitudes (set 2, dark condensations within the STropB; set 3, humps on its S edge). The tracks were consistent with the STropB having originated at the GRS in late Feb., as previously suggested, with speed similar to set 3, but the p. portions of it decelerated and shifted slightly north to produce sets 2 and 1.

Set 4 comprised just 3 unconnected small white ovals retrograding inside the STropB.

Set 5 consisted of very dark grey patches or humps comprising a series of waves (12º spacing) on the SEBs edge, alongside the turbulent SEB f. the GRS. Although these looked like STropB, they were retrograding and slightly further north. These features also had speeds matching the usual zonal wind profile (Fig.S4).

Sets 6 and 7 were more remarkable. They both consisted of small white spots on SEBs, at 20-21 ºS, the latitude of the retrograde jet; and yet set 6 were modestly retrograding with DL2 = +39, while set 7 were retrograding with full jet speed, DL2 ~ +132. Moreover, during August, the two sets overlapped each other, within longitudes ~15-75º p. the p. edge of the GRS (Figs. S3 & S5). Set 6 consisted of waves on the SEBs, with white spots interspersed with dark humps on SEBs (spaced 10º apart), while set 7 was a series of discrete white spots (spaced ~12º apart). Where they co-existed, the white spots of set 7 were drifting relative to the wave pattern of set 6 and perhaps crossing humps of set 6 to shift from one trough to the next. In Fig.S5, one can see several instances of this behaviour, most clearly on Aug.15-16 when W7 of set 7 squeezes over hump d4 of set 6.

Thus for the third time in one year – as in the SEB Fade and in the SEB Revival (Fig.S6) – we have discovered a modestly-retrograding train of small bright spots on SEBs coinciding with other features that have the full jet speed!

*After mid-Sep., the JUPOS chart **(JUPOS_S0)** shows:*
Set 1 (stationary dark features near p. edge of S.Trop.Band) did not persist as visible spots, but was represented by a stationary convergence zone at L2 ~ 260 which marked the boundary between sets 2-3 (prograding dark features in S.Trop.Band) and set 5 (modestly retrograding dark features on SEBs).
Set 2 was overtaken by set 3, but sets 3 and 5 both remained active until the end of Nov.
Set 4 (a few modestly retrograding white spots) was not seen after Sep., except for one white spot with DL2 = +11 in Nov. [at L2 ~320-->330].
Set 5 (dark grey spots f. the GRS, modestly retrograding) remained prominent at least to Nov.
Set 6 (waves on SEBs p. GRS, modestly retrograding) was no longer evident after Aug.
Set 7 (white spots on SEBs, retrograding with full jet speed) remained active to the end of Nov., still with DL2 = +135 for several more white spots; and 3 such spots were also recorded in 2012 Jan. with DL2 ~ +127.

Table A1

2011 June-Sept. SEBs & STropB				
(JUPOS data - analysis by G.A.)				
Mean speeds and latitudes:				
(excluding uncertain values; outliers listed individually)				
spot		***ΔL2(°/30d)***	***lat.***	**N**
D. features near p. end of STropB (Set 1)				
	Mean:	**1,6**	**-22,8**	**4**
	SD:	5,72	0,33	
D. features in STropB (Set 2)				
	Mean:	**-15,8**	**-23,6**	**5**
	SD:	1,31	0,48	
D. features on S. edge of STropB (Set 3a)				
	Mean:	**-49,8**	**-25,1**	**5**
	SD:	4,78	0,24	
D. features on S. edge of STropB (Set 3b)				
	Mean:	**-34,1**	**-24,7**	**5**
	SD:	4,89	0,66	
	& ds	*-11,8*	*-24,2*	*1*
	& ws	*-8,5*	*-23,5*	*1*
	& ds	*12,6*	*-22,2*	*1*
STropB slow w. spots (Set 4)				
	Mean:	**25,3**	**-22,7**	**2**
	SD:	1,13	0,14	
D. spots on SEBs edge f. GRS (Set 5)				
	Mean:	**31,5**	**-22,2**	**9**
	SD:	6,4	0,46	
	& ds	*48,8*	*-22*	*1*
SEBs jet slow d. humps (Set 6d)				
	Mean:	**38,3**	**-19,7**	**6**
	SD:	0,95	0,3	
SEBs jet slow w. spots or bays (Set 6w)				
	Mean:	**38,6**	**-20,4**	**4**
	SD:	0,29	0,21	
SEBs jet fast w. spots (Set 7)				
	Mean:	**131,2**	**-20,7**	**12**
	SD:	5,19	0,25	
	& ds	*119,4*	*-21,2*	*1*

Figures for Appendix 1:

Fig.S1. Maps of the S. Tropical domain, 2011 July-August. The seven sets of features are identified.

Fig.S2. JUPOS charts, 2011 July-August, for (a) the STropZ, in L2, and (b-d) the SEBs, in 3 different longitude systems, tracking the seven sets of features.

Fig.S3. Enlarged JUPOS chart for the SEBs showing intersections of sets 6 and 7.

Fig.S4 = Fig.18 [in main report]. ZDP for the STropZ and SEBs.

Fig.S5. Images showing the coexistence of sets 6 and 7 in 2011 August.

Fig.S6 = Fig.19 [in main report]. Images showing the SEB in 3 different epochs, showing how a slowly retrograding spot-chain or wave-train (purple marks below) co-exists with rapidly retrograding features in the same latitude (black arrows above).