Longitudinal Variation and Waves in Jupiter's South Equatorial Wind Jet

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SUPPLEMENTAL ONLINE FIGURES

Fig. S1. Strip maps of Jupiter's 7° S region over time.
Longitude strip maps from complete rotations of Jupiter. Each map is centered on 7° S planetographic latitude, and spans +/- 5° degrees of latitude and 360° of longitude. For each date, continuum red to near-IR wavelength images are shown (orange for Voyager) to maximize cloud deck opacity contrast between chevrons and thick clouds. The position of the SED is marked on each map, when present.

Fig. S2. History of the SED from 2004-2010.
(a) JUPOS measurement chart summarizing chevrons and spot measurements. The track of the SED (purple and blue lines) is overlaid on the JUPOS chart of longitude vs. time for all features between latitudes 5.0° to 8.0° S. The longitude scale moves at +1.0 °/day relative to System I (-6.36 º/day relative to System III, or +91 m/s for 7.3° S). The faint diagonal light blue line indicates 0° longitude in Sys. I. Both dark and bright features are shown: black = dark (mostly chevrons); red = white; + = spot; <-- > = streak; < > = W and E ends. The track of the SED is either from visual identification when conspicuous (purple line), or from the W end of the blue-grey streak as tracked by JUPOS in other years (dark blue line). Dashed purple lines connect up the SED track between apparitions. In 2006 and 2007, the SED several times shifted ~30 deg. to the E; in 2007, the double features persisted for a few months (mauve bands), before the new one expanded W to return to the original track.
(b) Images of the SED in each year, including spacecraft images where available. Green arrows indicate the SED. When active and conspicuous, a single large arrow marks the edge of the rift into the SEB. When quiescent, 4 or 5 arrows mark its approximate extent, including the W end of the blue-grey streak and the E end of the long bright white strip, denoted by one or two curving projections. In 2007 the SED was double and both features are marked.
(c) Diagrams of the typical aspect of the SED in its active and quiescent states.
(A similar chart and image set covering 1999-2005 were shown in Rogers and Mettig 2008).

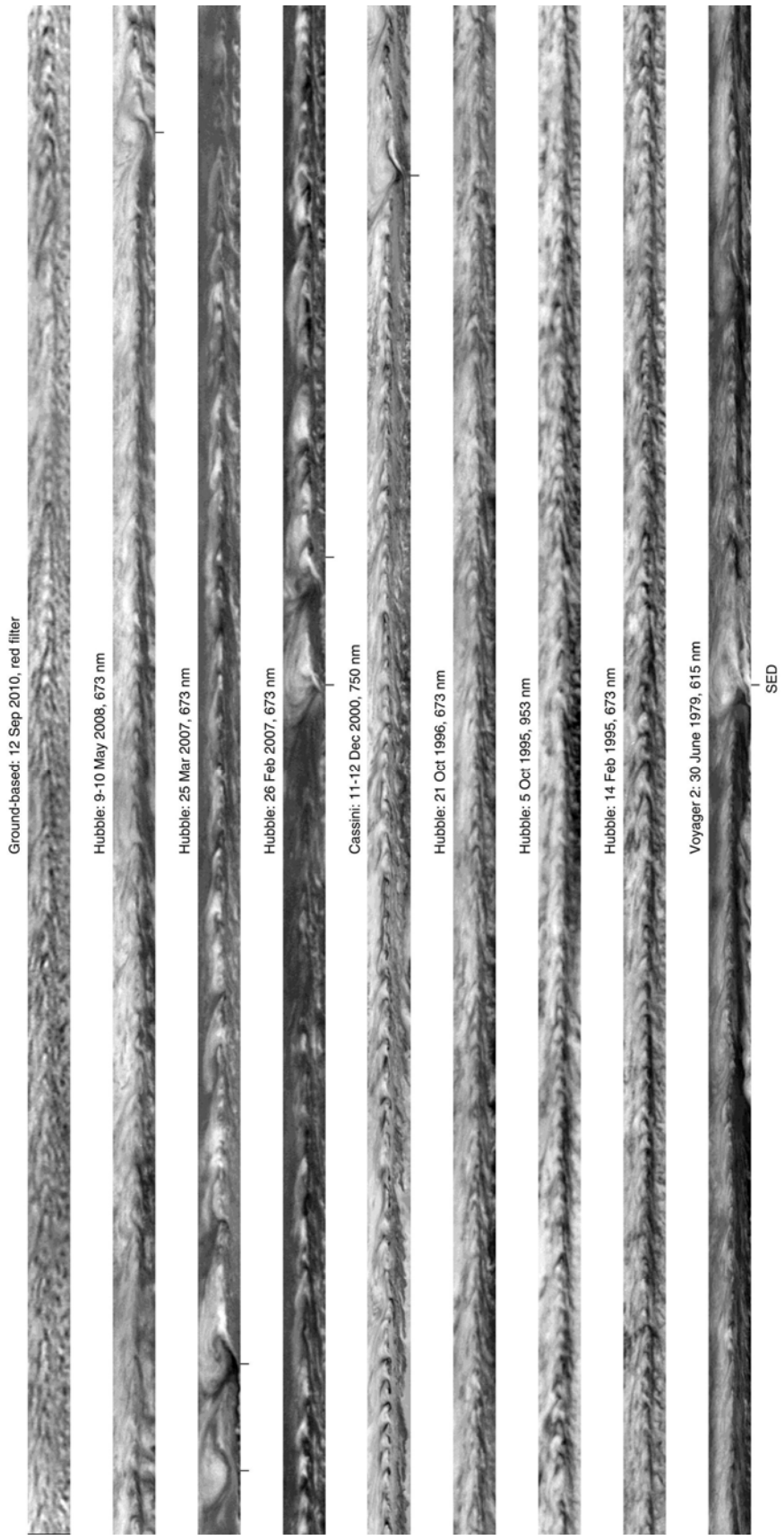
Ground-based: 12 Sep 2010, red filter
Hubble: 9-10 May 2008, 673 nm
Hubble: 25 Mar 2007, 673 nm
Hubble: 26 Feb 2007, 673 nm
Cassini: 11-12 Dec 2000, 750 nm
Hubble: 21 Oct 1996, 673 nm
Hubble: 5 Oct 1995, 953 nm
Hubble: 14 Feb 1995, 673 nm
Voyager 2: 30 June 1979, 615 nm
SED

Fig. S1

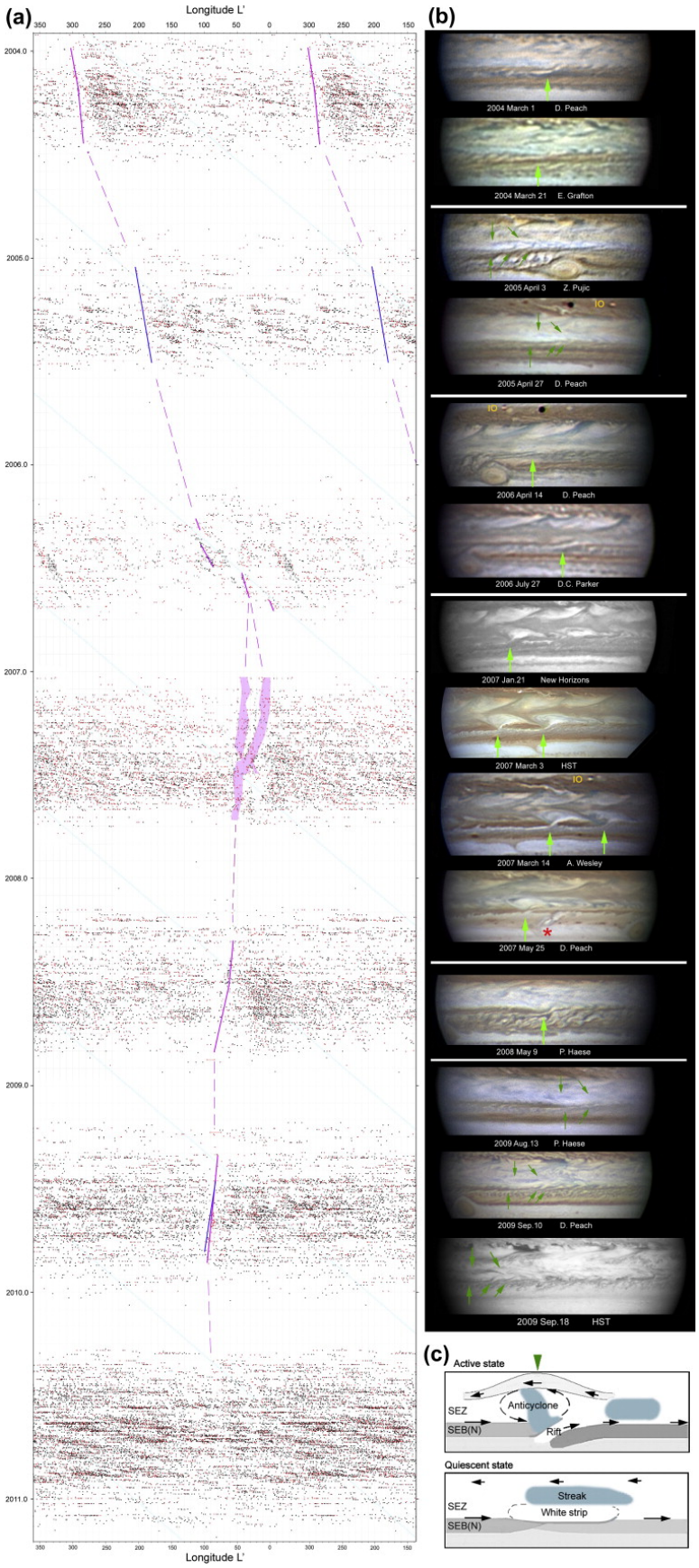
(a)
Longitude L'
350 300 250 200 150 100 50 0 300 250 200 150
2004.0
2005.0
2006.0
2007.0
2008.0
2009.0
2010.0
2011.0
(b)
2004 March 1 D. Peach
2004 March 21 E. Grafton
2005 April 3 Z. Pujic
IO
2005 April 27 D. Peach
IO
2006 April 14 D. Peach
2006 July 27 D.C. Parker
2007 Jan.21 New Horizons
2007 March 3 HST
IO
2007 March 14 A. Wesley
2007 May 25 D. Peach
2008 May 9 P. Haese
2009 Aug. 13 P. Haese
2009 Sep. 10 D. Peach
2009 Sep.18 HST
(c)
Active state
SEZ
Anticyclone
SEB(N)
Rift
Quiescent state
SEZ
Streak
White strip
SEB(N)

Fig. S2

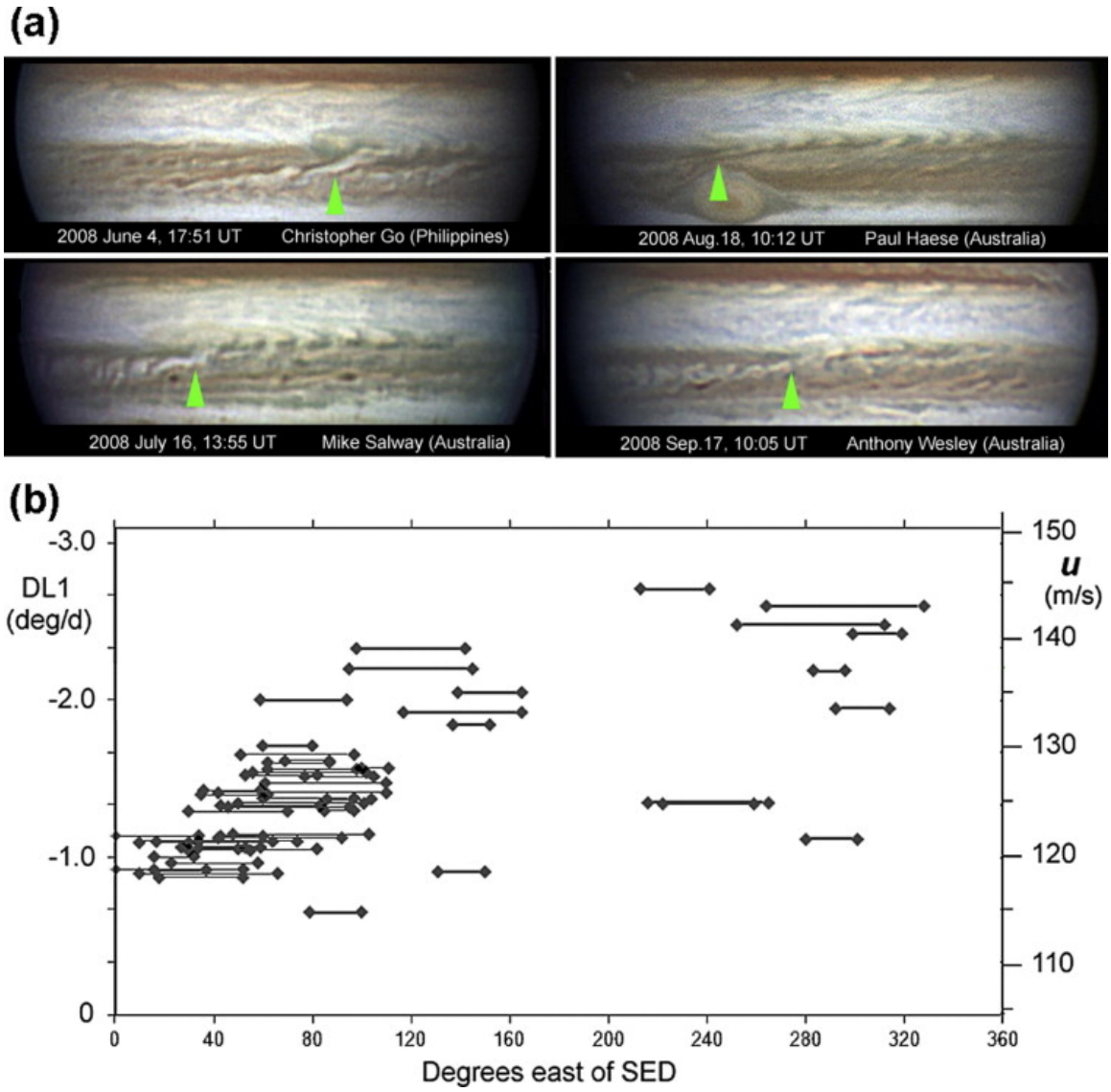

Fig. S3. Results from ground-based imaging in 2008.
(a) Four images of the SED (indicated by green arrowhead). They include several dates on which it was connected by a bright streak ('rift') to the convective turbulent regions in the SEB. For measurement purposes, the longitude of the SED was defined as that of the preceding end of the darker segment along the northern SEB; its mean speed was 87.9 +/- 0.2 m/s from July to Nov. 2008.
(b) Variation of speed with longitude relative to the SED. Speed scales are in m/s in System III (right) and in degrees per day in System I (left). Each horizontal line indicates the extent of a measured track segment and its mean speed. The speed gradient is best shown by the start points of the tracks (left ends), and closely matches the gradient found in 2000 and 2004 (Rogers & Mettig 2008). Means from these data are in Table 2.

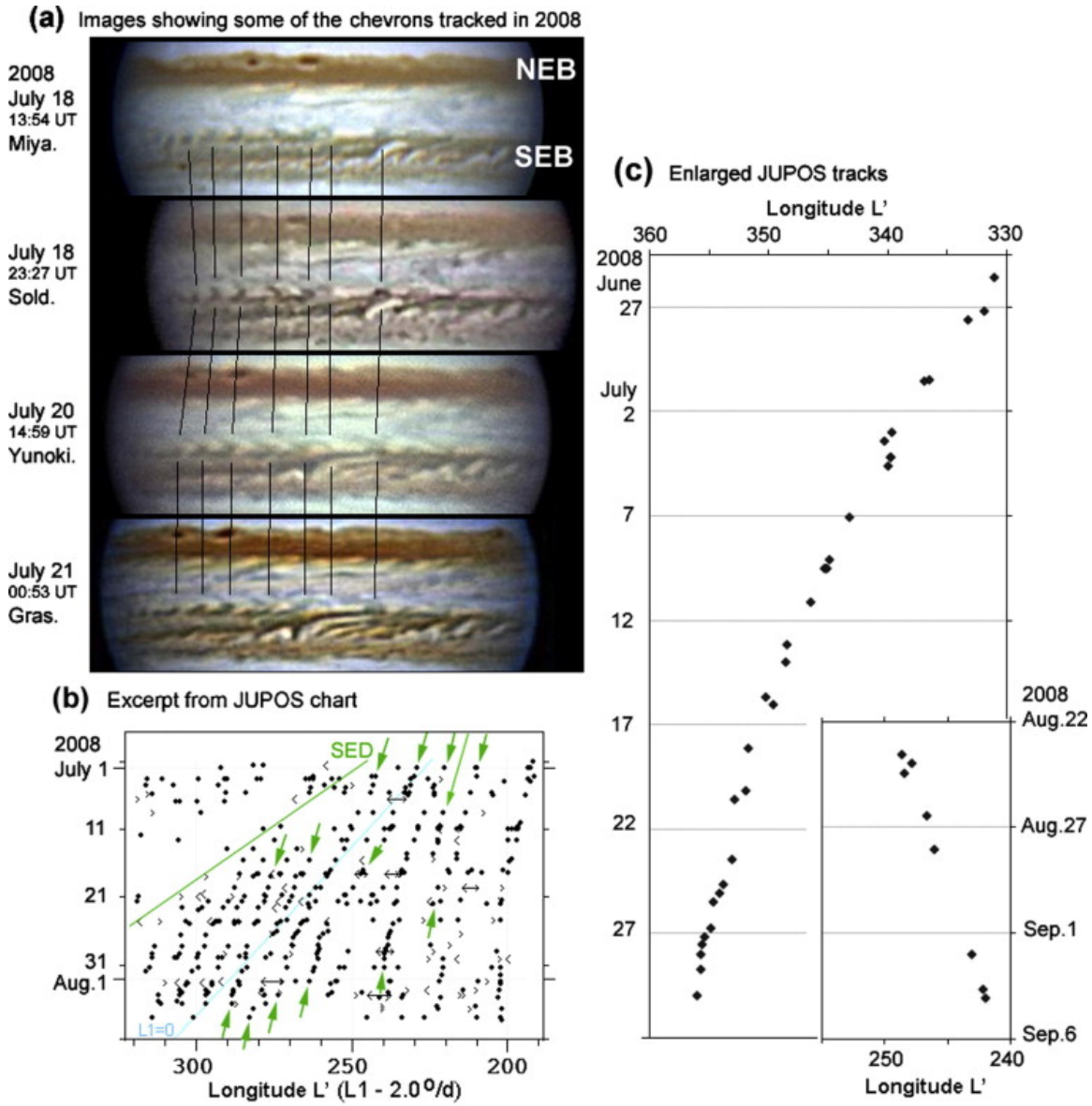

Fig. S4. Example of tracking of chevrons in 2010 from ground-based images.
(a) Images showing a train of chevrons in 2008 July. (Aligned on small NEBs projections which were moving rapidly at ~ -2 °/day in System I.) Observers: I. Miyazaki (Japan), J.A. Soldevilla (Spain), K. Yunoki (Japan), G. Grassmann (Brazil).
(b) Excerpt from the JUPOS chart (Fig.6) showing the same region. Green arrows indicate tracks of the 7 chevrons marked in the images. L', longitude in a system moving at -9.37 °/day in System III (u = 134 m/s for lat. 7.3° S; this is -2.0 °/day in System I); the zero point in each panel is arbitrary.
(c) Enlarged track of one of these chevrons, accelerating from u = 119 m/s to 128 m/s over one month. Inset, for comparison: Enlarged track of a faster-moving chevron remote from the SED, with u = 143 m/s.

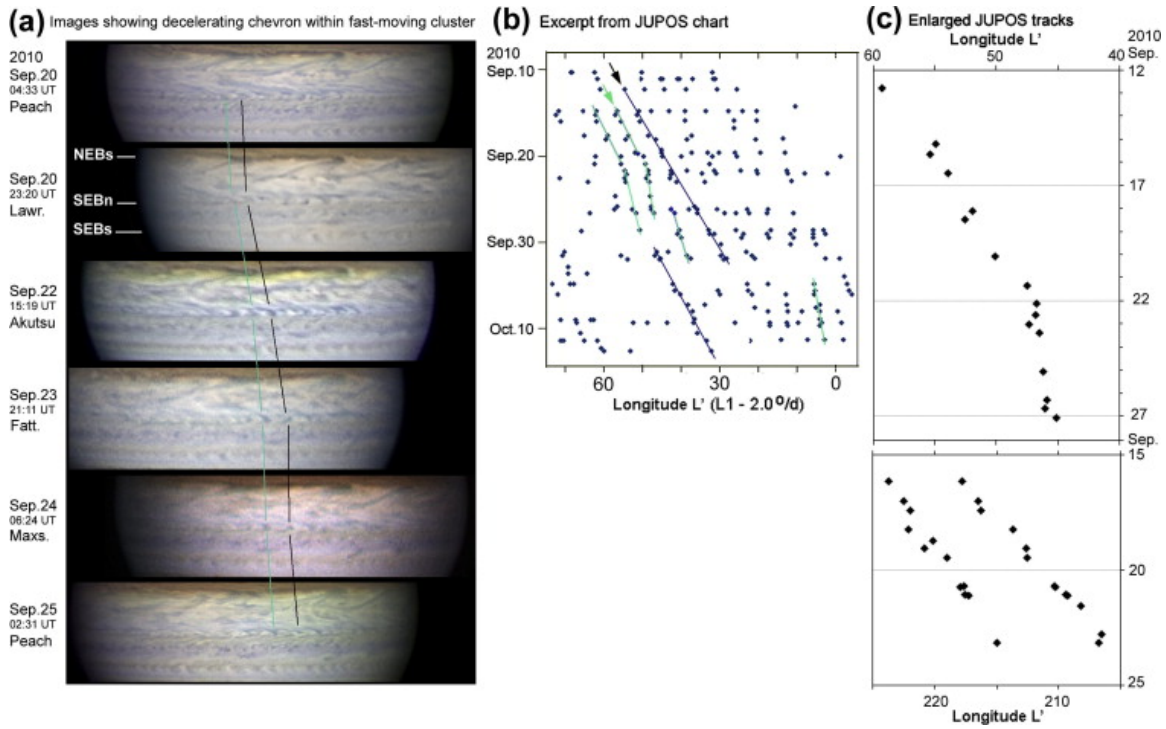

Fig. S5. Example of tracking of chevrons in 2010 from ground-based images.
(a) Images showing a chevron within a fast-moving cluster in September which suddenly decelerated on Sep. 21 (cyan line), alongside a chevron which persisted with rapid drift (black line). The images are aligned on typical dark projections on NEBs, which were almost stationary in System I. At this time the SEB was whitened; positions of belt edges are indicated. Observers: D. Peach (Barbados), P. Lawrence (U.K.), T. Akutsu (Philippines), C. Fattinnanzi (Italy), P. Maxson (AZ, USA).
(b) Excerpt from the JUPOS chart (Fig.7), showing the same cluster. Longitude scale as in Fig. S4. Arrows indicate the tracks of the chevrons marked in (a). The chevron immediately following (west of) these also seems to have decelerated at the same time, as indicated, although its appearance was more variable and its track less secure.
(c) Enlarged track of the same decelerating chevron; speed changed from 151 to 139 m/s. Below, for comparison, enlarged tracks of a pair of chevrons elsewhere which maintained steady fast motion at 153 and 158 m/s.