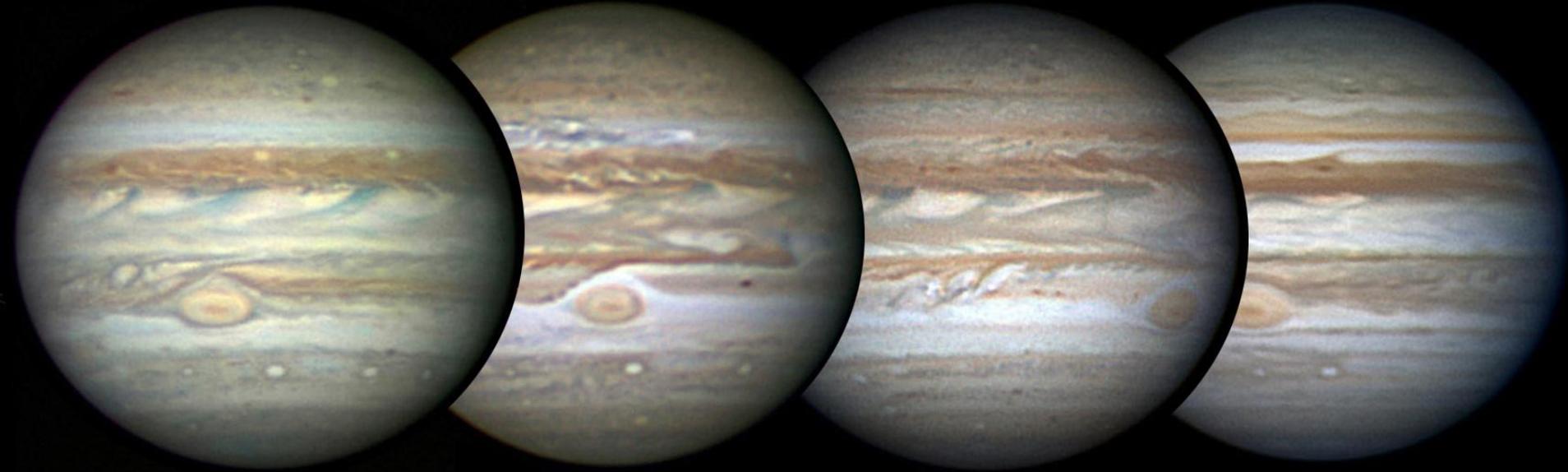


Towards a new three-year weather forecast for Jupiter



John Rogers

(British Astronomical Association)

< jrogers11@btinternet.com >

Cycles of large-scale disturbance

NTB: Jet outbreak
NEB: Expansion event
EZ: Coloration
SEB: Fade and Revival
STB: (Structured sectors)

2006 April 12 (D. Peach)

2007 April 18 (Z. Pujic)

2007 June 8 (C. Go)

2008 May 25 (M. Salway)

The NTB, NEB, and SEB cycles appear different but all:

- recur at periodic intervals of 3-5 years;
- involve vigorous convective outbreaks,
- leading to darkening (cloud clearance) of a latitude band;
- may be accompanied by EZ coloration.

North Temperate Domain:

NTBs jet outbreaks (NTB Revivals):

NTB: Jet outbreak

2006 April 12 (D. Peach)

2007 April 18 (Z. Pujic)

2007 June 8 (C. Go)

2008 May 25 (M. Salway)

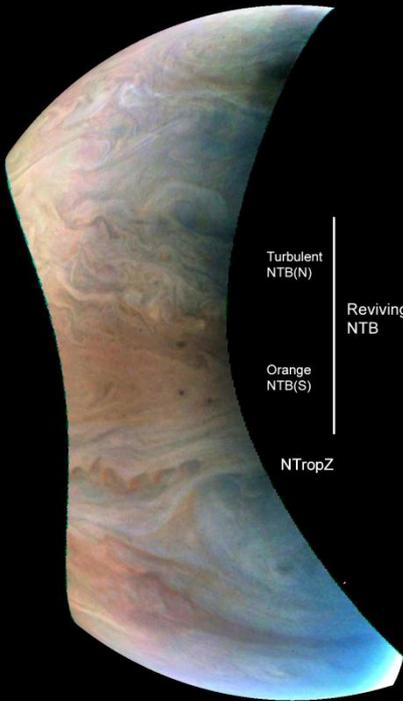
Occurring every ~5 years since 2007. Last in 2016.

Aftermath of the NTB jet outbreak in 2016-17 (JunoCam images)

The developing NTB ('Big Red Stripe')

JunoCam images, processed & projected by Mike Caplinger (JunoCam team), enhanced & labelled by John Rogers.

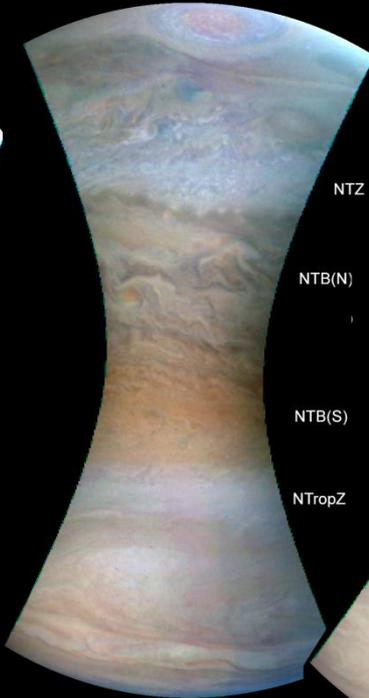
2016
PJ-3 (Dec.11)
Image 109 (25.5°N)



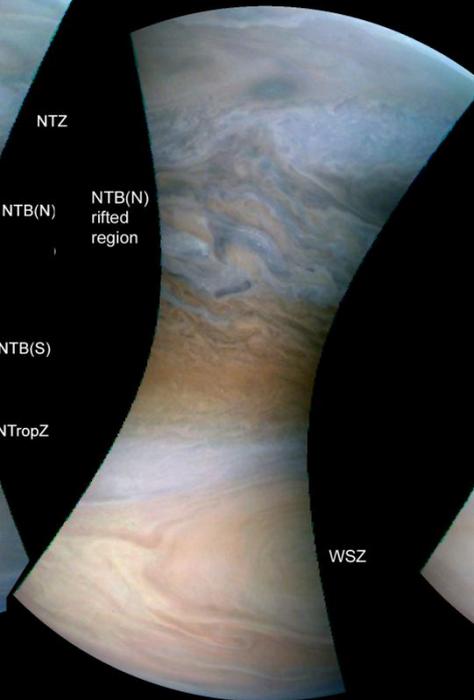
2017
PJ-4 (Feb.2)
Image 102 (26.1°N)



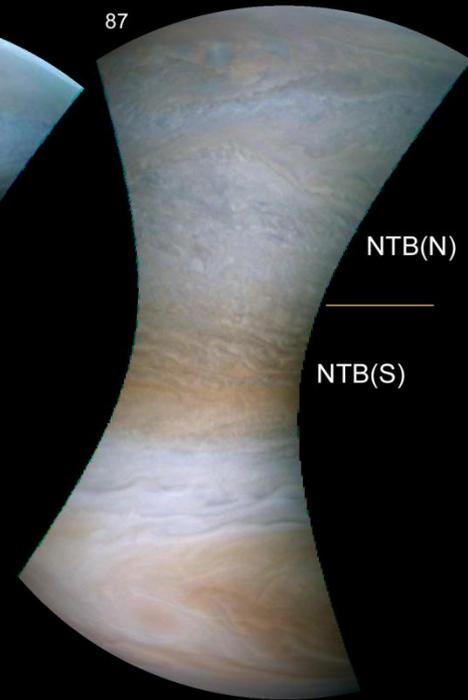
PJ-7 (July 11)
Image 54 (26.5°N)



2017
PJ-9 (Oct.24)
Image 82 (26.3°N)



2018
PJ-12 (April 1)
Image 87 (25.9°N)



Evolution of NTB & NEB, 2017–2018

Maps by Marco Vedovato. Equirectangular projection, planetographic latitudes. North up.

2016 Dec.9
Chris Go

2017 Jan.10
Phil Miles

2017 Feb.19
Damian Peach

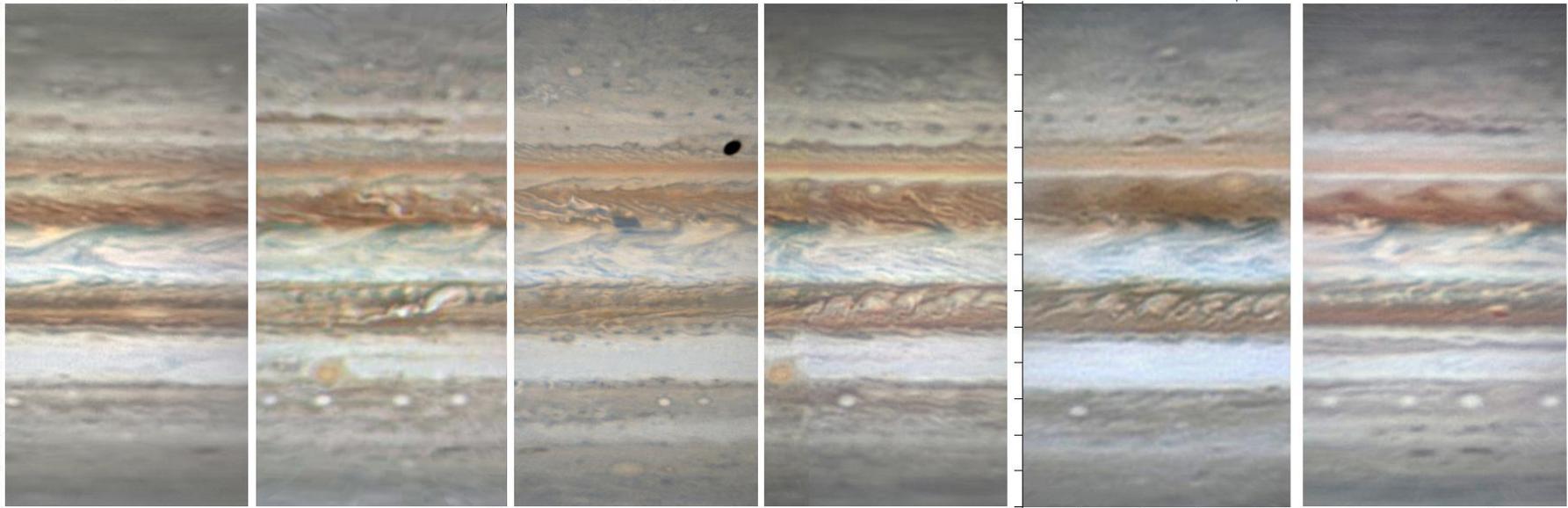
2017 May 30
Chris Go

July 24
F.&G. Carvalho

WSZ
↓

2018 Jan.11
C. Go

NNTB
NTB(N)
NTB(S)
NTropZ
NEB
EZ
SEB
STropZ
SSTB



2018 Mar 20
Anthony Wesley

2018 Apr 20
Avani Soares

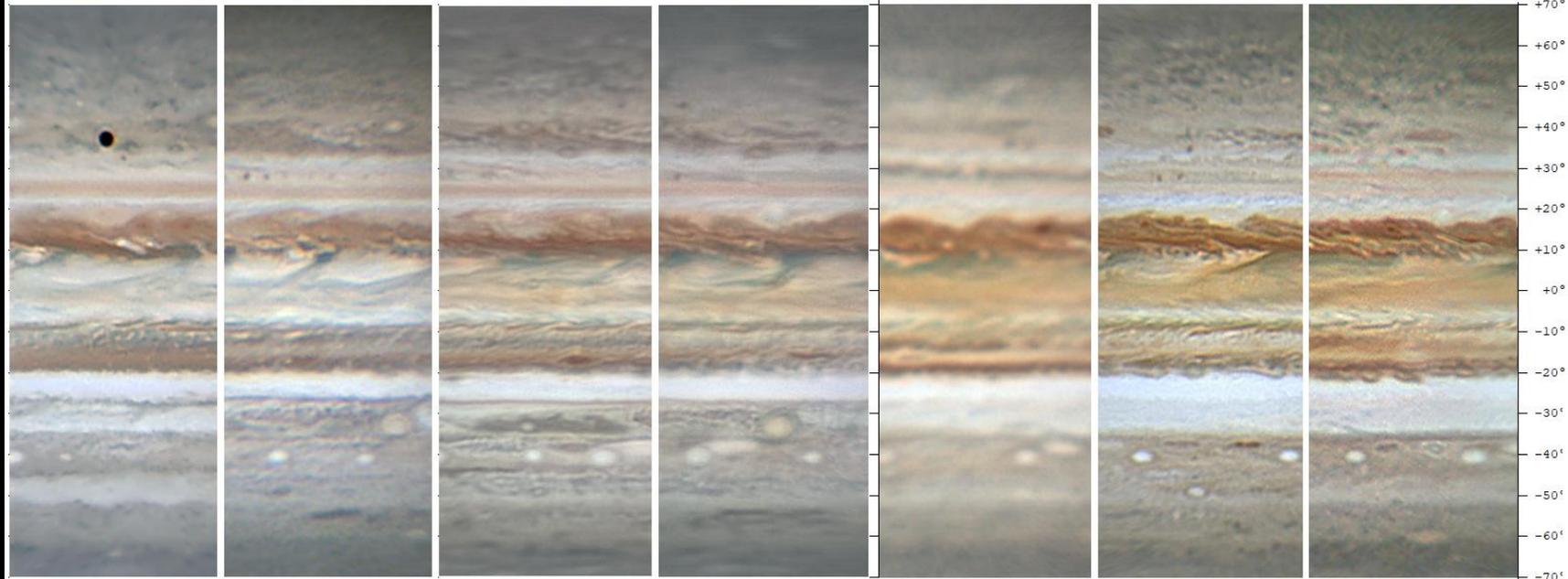
2018 May 24
Christopher Go

2018 Jun 29
Christopher Go

2019 Feb 03
Tiziano Olivetti

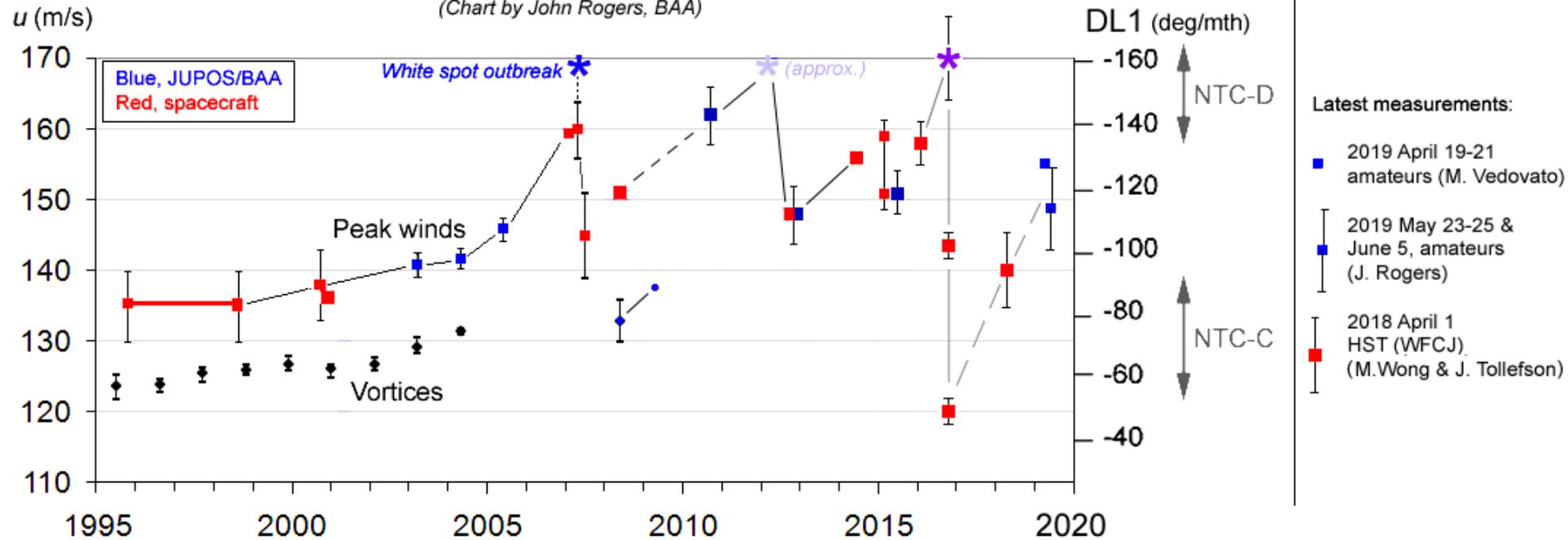
2019 Mar 18
Anthony Wesley

2019 Apr 09
Clyde Foster



Speed of NTBs jet (1995-2019)

(Chart by John Rogers, BAA)



- A new NTBs jet outbreak is likely because
- they typically recur at 5-year intervals;
 - the NTB is now faded;
 - the jet has recovered to an intermediate speed.
- > **Expect a new NTBs jet outbreak in 2021.**

North Tropical Domain:

NEB expansion events:

Typically occur every 3-5 years. Most recently:

(1) late 2015—early 2016; but stalled & regressed;

(2) early 2017: rapid & complete.

Accompanied by methane-dark waves throughout, which became impressive visible waves in 2017-18.

Sequels = appearance of barges & AWOs....

Evolution of NTB & NEB, 2017–2018

Maps by Marco Vedovato. Equirectangular projection, planetographic latitudes. North up.

2016 Dec.9
Chris Go

2017 Jan.10
Phil Miles

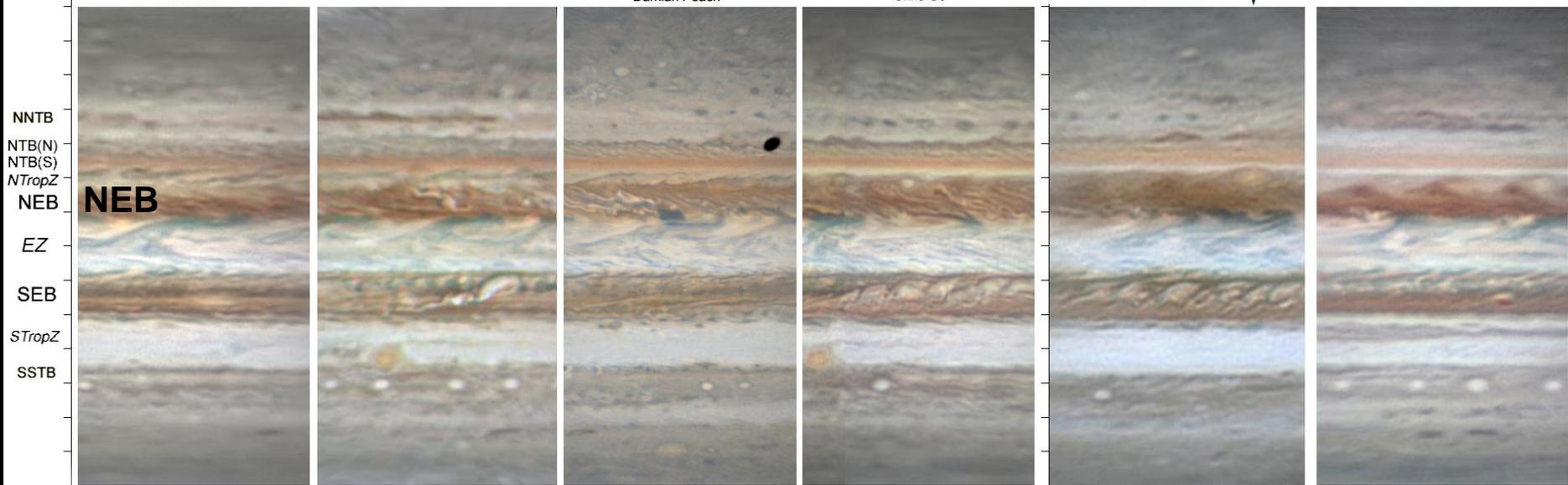
2017 Feb.19
Damian Peach

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Chris Go

July 24
F.&G. Carvalho

WSZ
↓

2018 Jan.11
C. Go

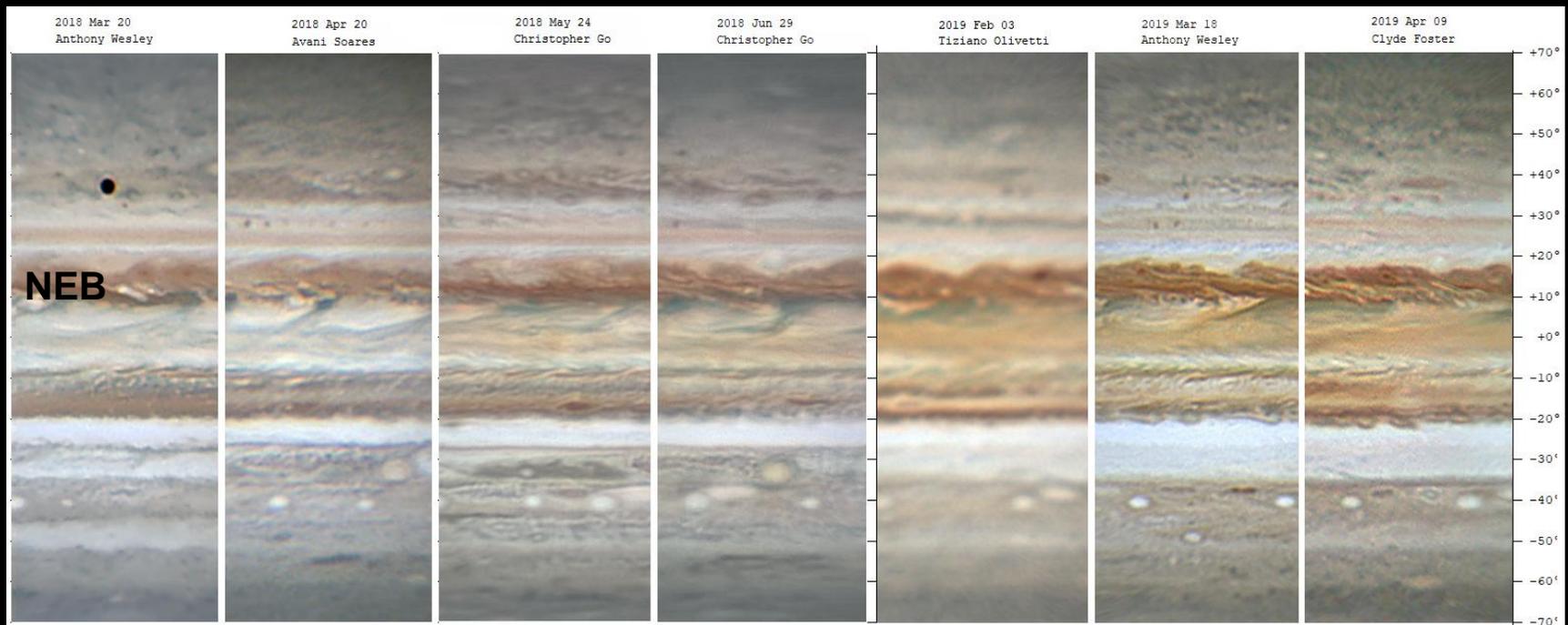


North Tropical Domain:

NEB expansion events:

The belt has now retreated again.

A new expansion event could begin in the next 2 years,
or the series may have finished.



Equatorial Zone:

Coloration event [& 5-um clearance] --

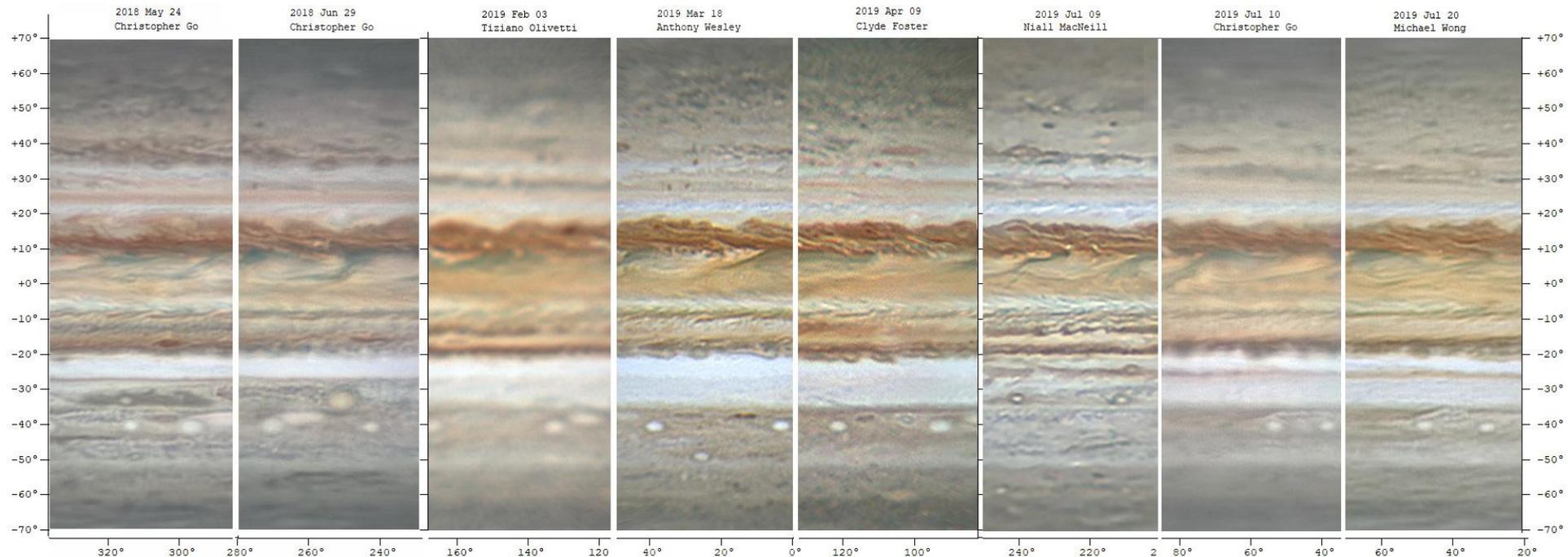
The most intense since 1989-91. Previous intense episodes like this one have lasted between ~2.5 and 5 years.

This episode began in spring, 2018. Maximal in 2019.

Possibly starting to fade?

Jupiter's belts & zones, 2018-2019

All maps by Marco Vedovato (JUPOS team)
Compilation by John Rogers. North up.



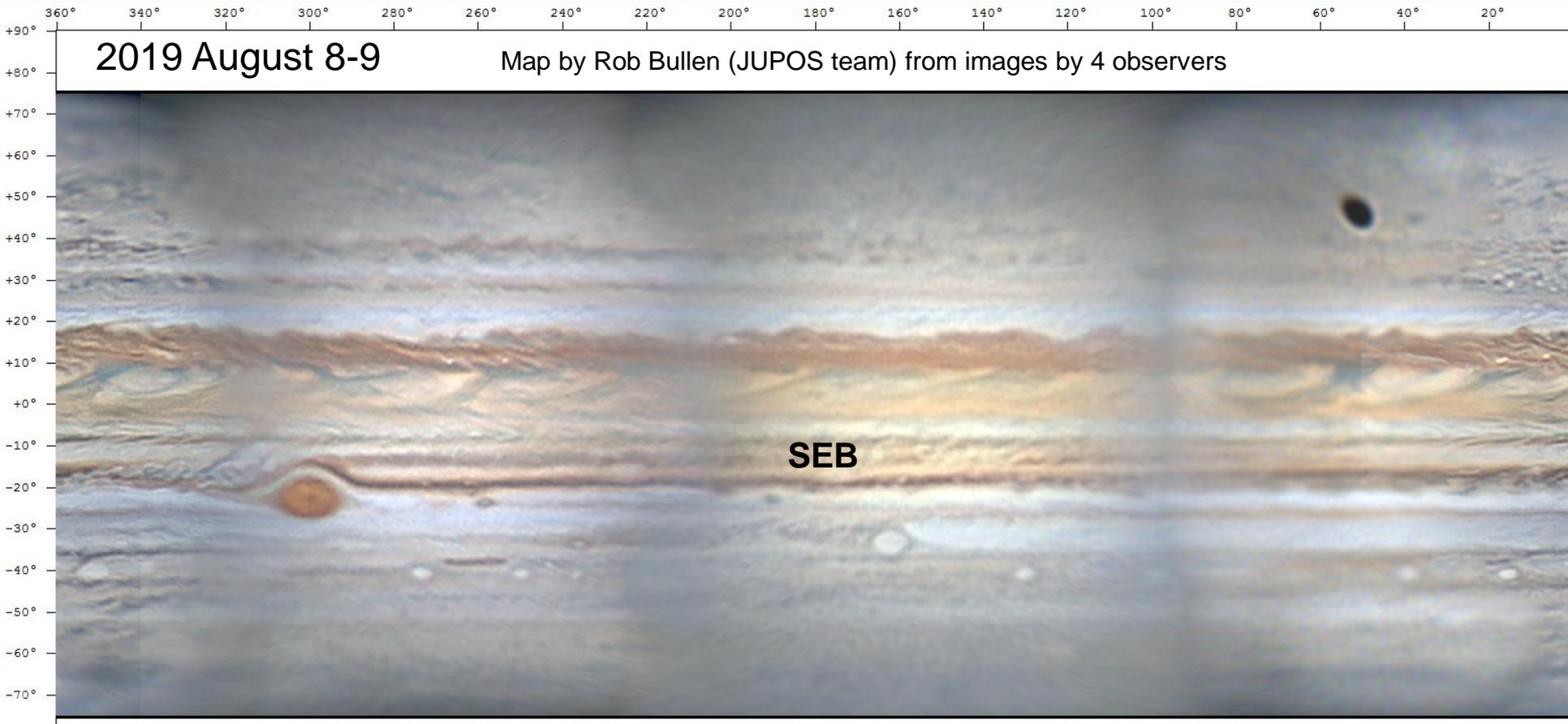
South Tropical Domain:

SEB Fade/Revival? --

The last was in 2010. SEB is unusual at present:

N is partly whitened, but S shows normal convective and jet activity.

No sign of a new Fade but it could develop with only a few months warning.



South Tropical Domain:

SEB Fade/Revival? --

The last was in 2010. SEB is unusual at present:

N is partly whitened, but S shows normal convective and jet activity.

No sign of a new Fade but it could develop with only a few months warning.



2019 Aug.30, 08:45 UT
Michael Wong (Australia)



2019 Sep.1, 10:17 UT
Niall MacNeill (Australia)

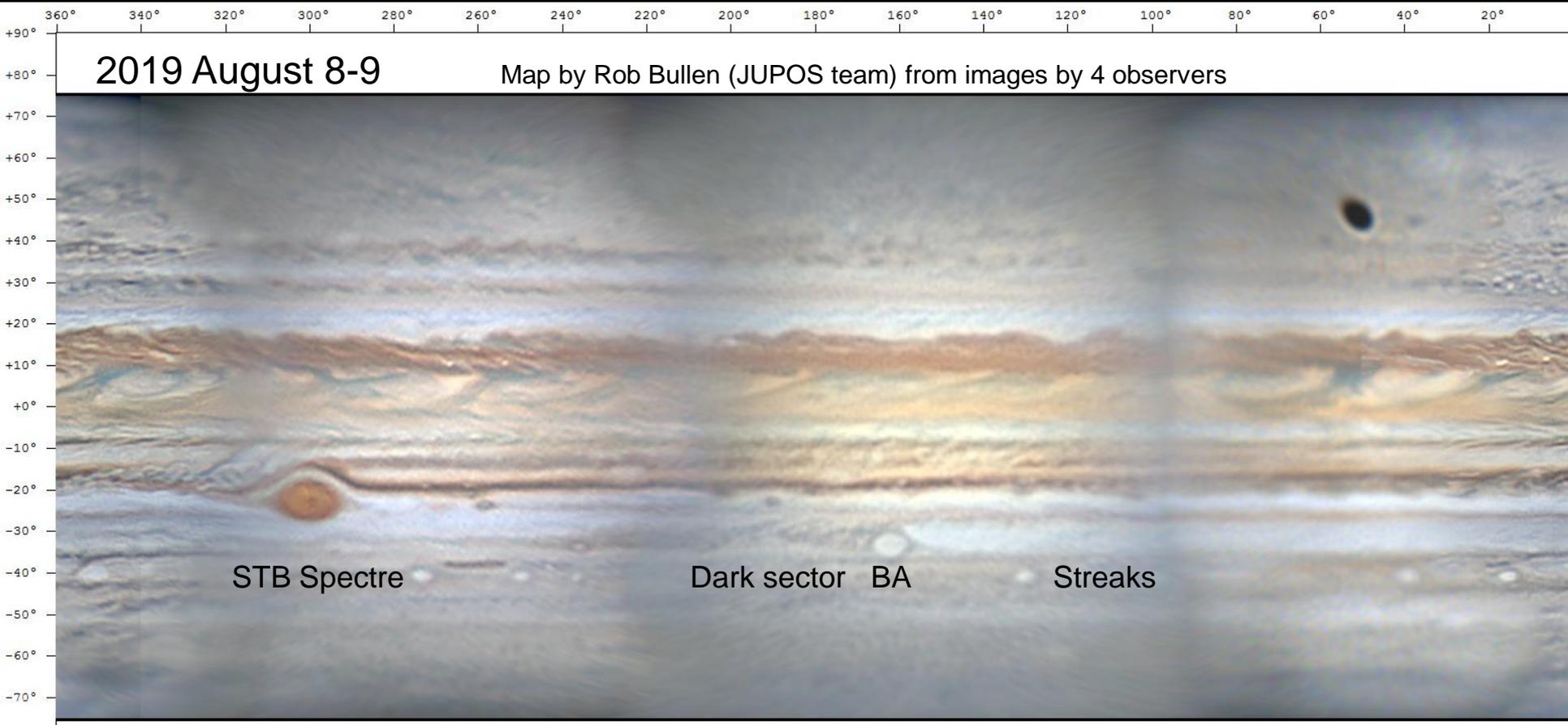
South Temperate Domain:

STB structured sectors.....

STB Ghost collided with oval BA in 2018; now a dark segment.

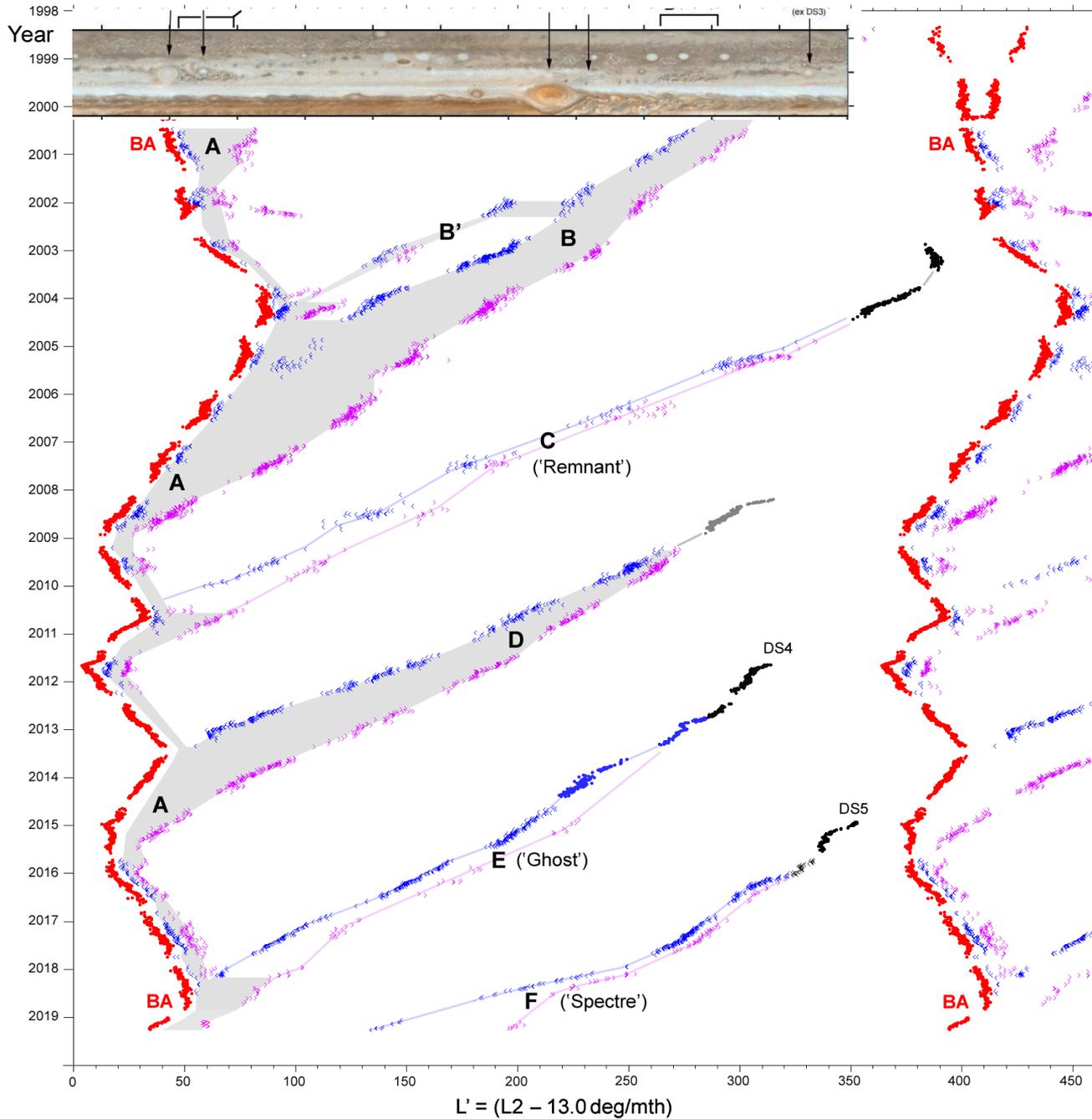
STB Spectre is now passing GRS, v. elongated & low-contrast; it will catch up with the dark segment f. oval BA in 2020 (April-May?).

A new structured sector is expected....



Oval BA & STB structured segments, 1998-2018

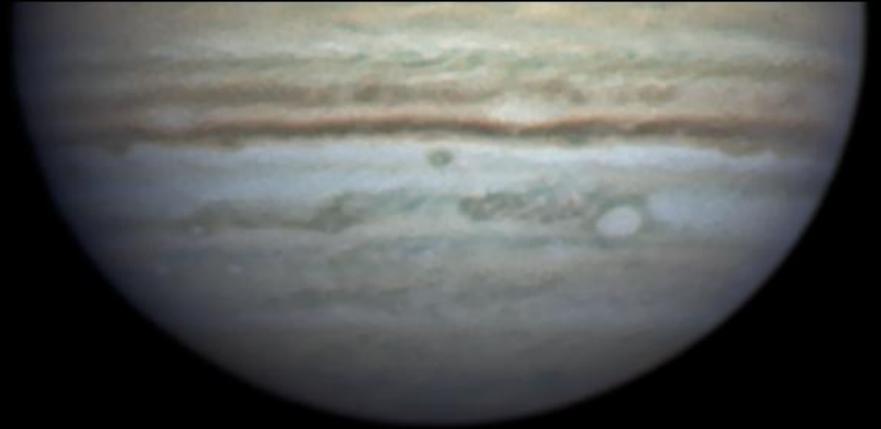
(JUPOS chart produced by G. Adamoli & J. Rogers)



Oval BA & STB dark segment, 2019 August



2019 Aug.14, 11:10 UT
© Niall MacNeill (NSW, Australia)



2019 Aug.19, 10:26 UT
Anthony Wesley, QLD Australia

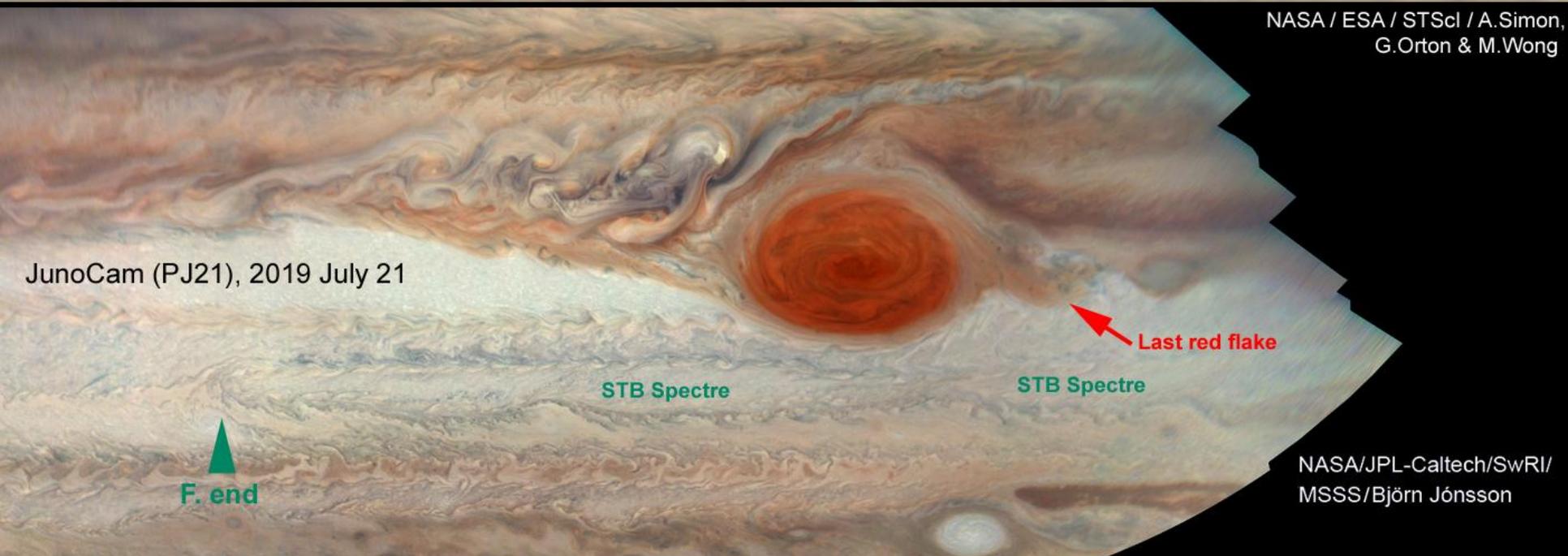
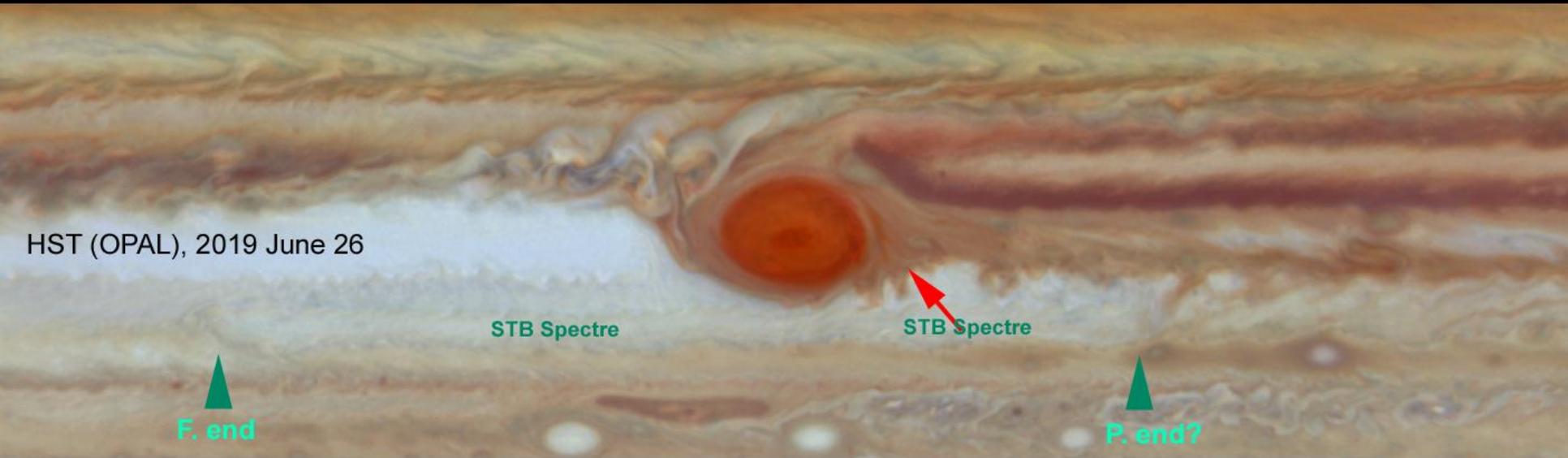


2019 Aug.22, 17:51 UT
Clyde Foster , South Africa



2019 Aug.30, 23:18 UT
Jose Luis Pereira (Brazil)

The STB Spectre, now ~85 deg long, passing the GRS



Perijove-19 (2019 April 6):
JunoCam image 1

**Will a new
structured
segment
appear?**

Oval BA

Whitened STB

3 vortices in white STB

S2 domain

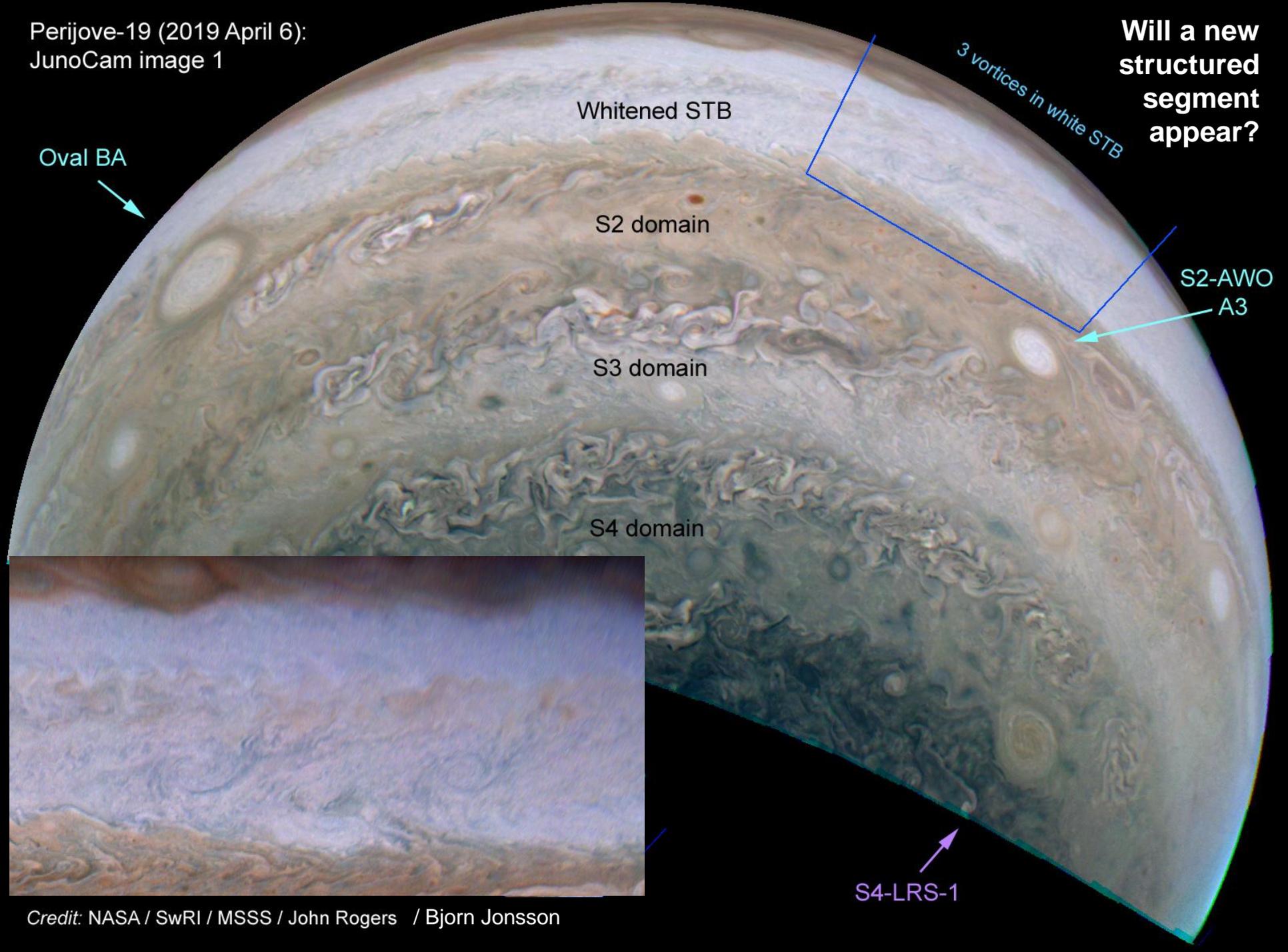
S2-AWO
A3

S3 domain

S4 domain

S4-LRS-1

Credit: NASA / SwRI / MSSS / John Rogers / Bjorn Jonsson

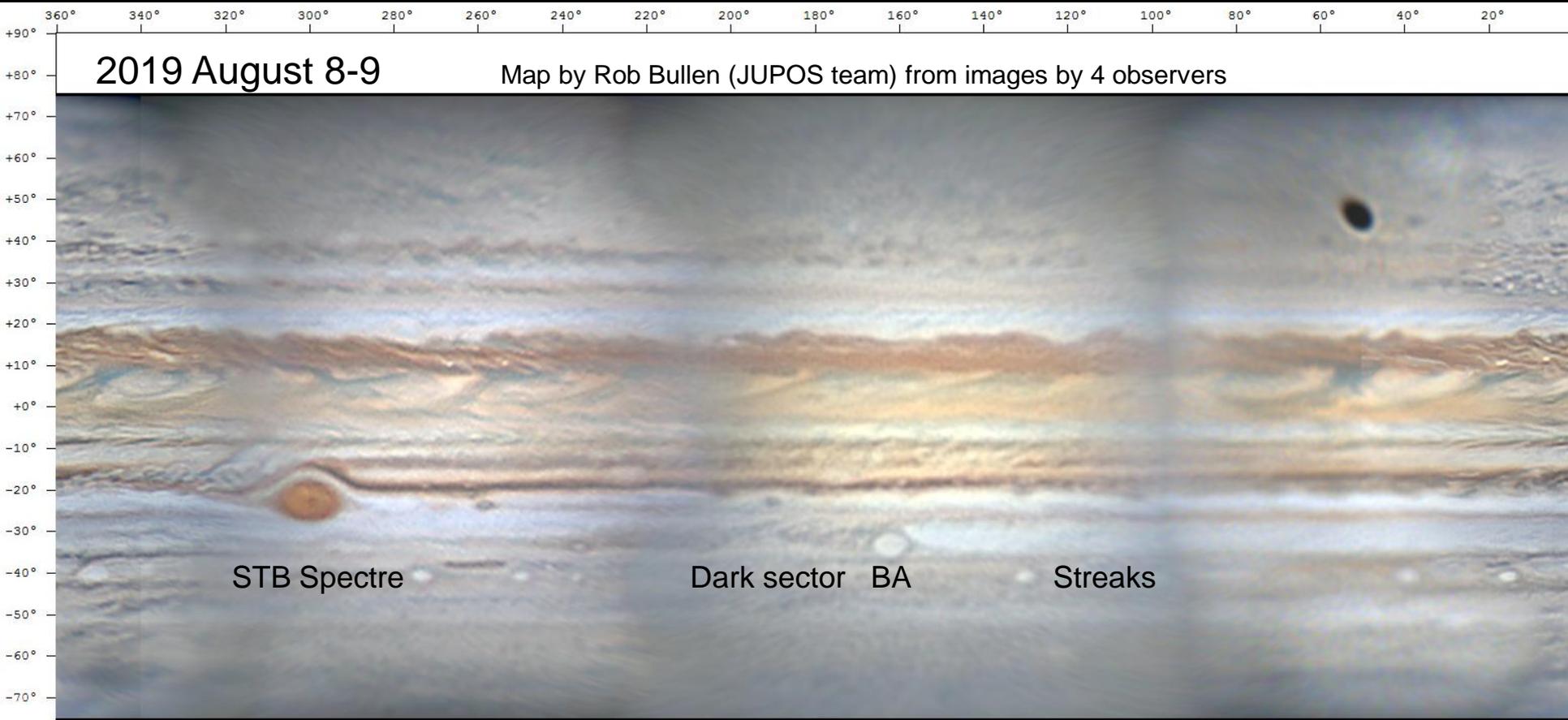


South Temperate Domain:

STB structured sectors:

STB Spectre will catch up with the dark segment f. oval BA in 2020 (April-May?) & may transform turbulently into a dark STB segment.

A new structured sector is expected.



The End

- 2019Aprile_20r2.ddf 2019-04-20-0341.0-Clyde Foster + 2019-04-21-1815.0-Christopher Go
- 2019Aprile_20.ddf 2019-04-19-1527.6-Troy Tranter + 2019-04-20-2035.8-Tiziano Olivetti

