

Stationary waves in Jupiter's Equatorial Zone in 2020 (& 2021)

John Rogers & Christopher Go

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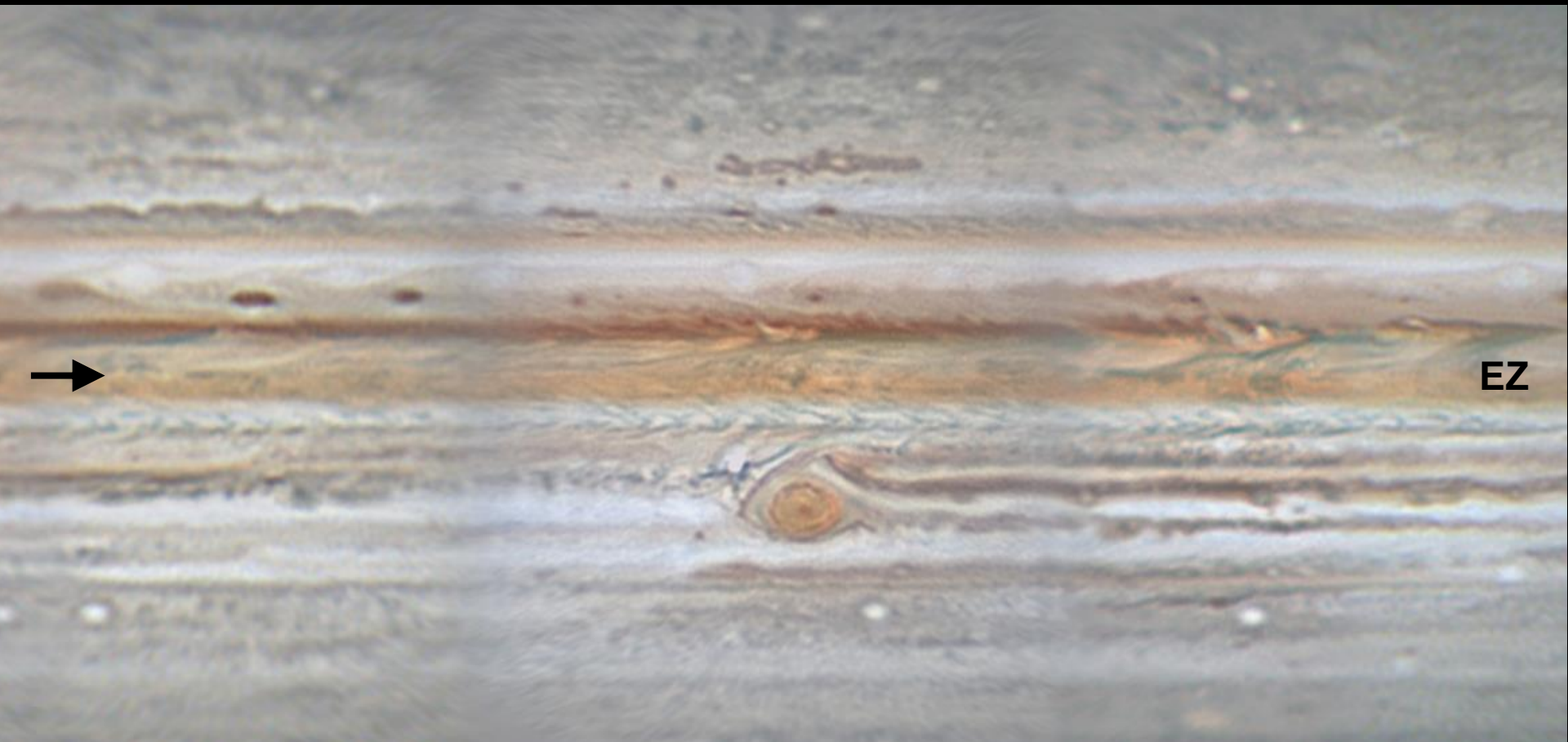
Jupiter's winds

Map movie from NASA Cassini flyby (2000)



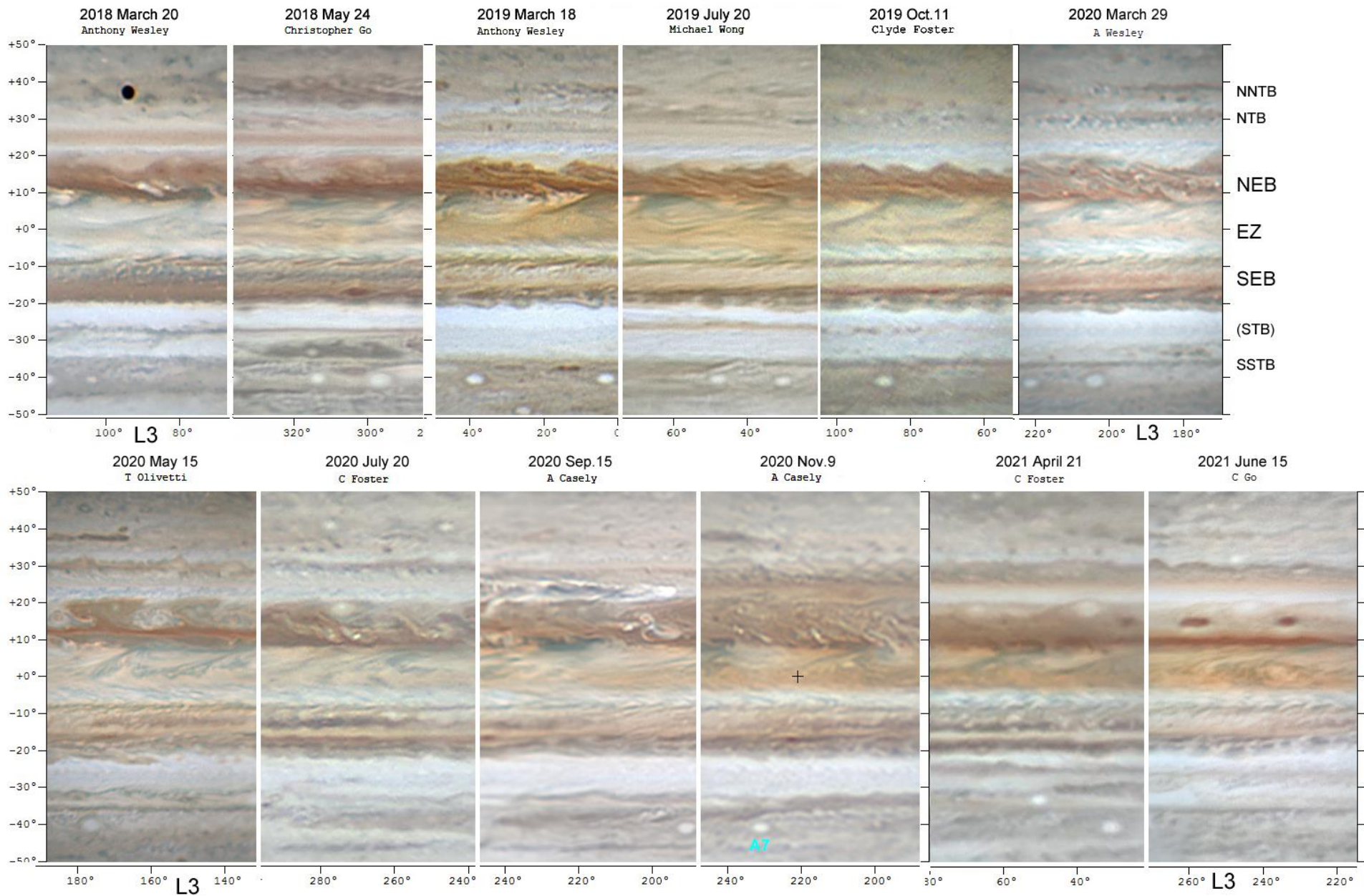
Equatorial Zone: Coloration event

These occur at intervals of several years
(variably associated with cloud clearance at 5 microns).
This one began in spring, 2018,
& is the most intense & prolonged since 1989-91.



Belts & zones, 2018-2021

All maps by JUPOS team members: Marco Vedovato up to 2019 July & Rob Bullen from 2019 Sep.
Intensities and colour balance have been adjusted in some maps to reduce artefactual variations between maps.



Methane-band images (889 nm), 2018-2021

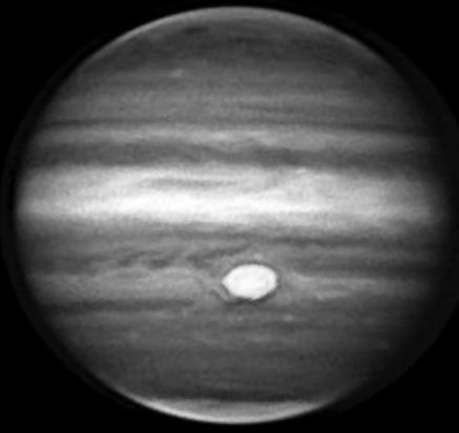
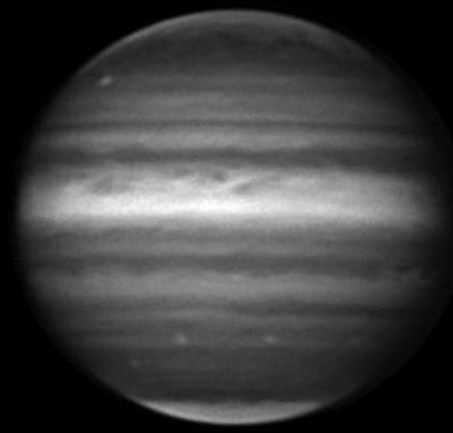
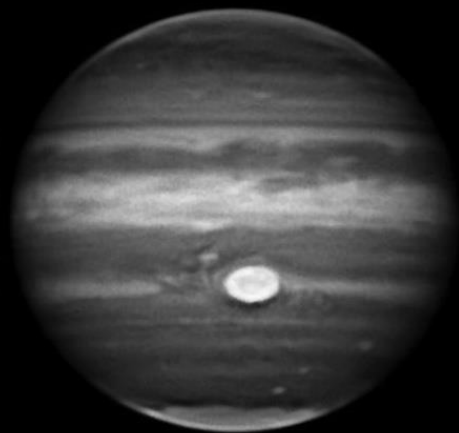
All by Christopher Go

2018: April 24

April 21

2019: April 18

April 20

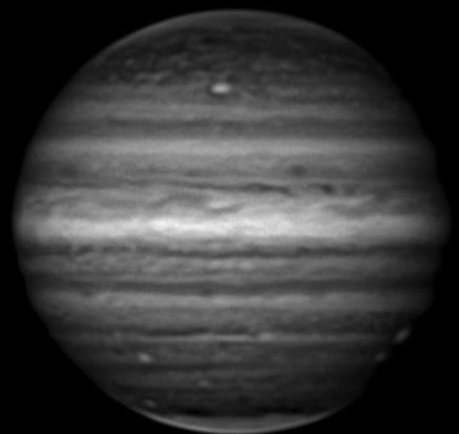
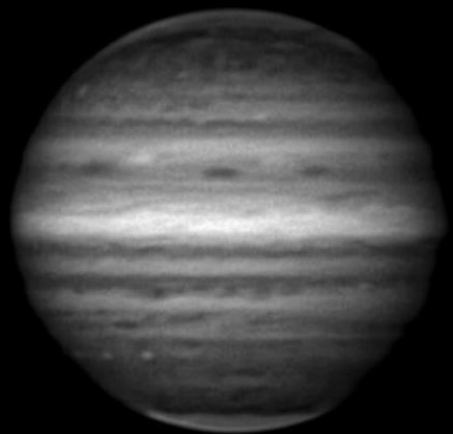
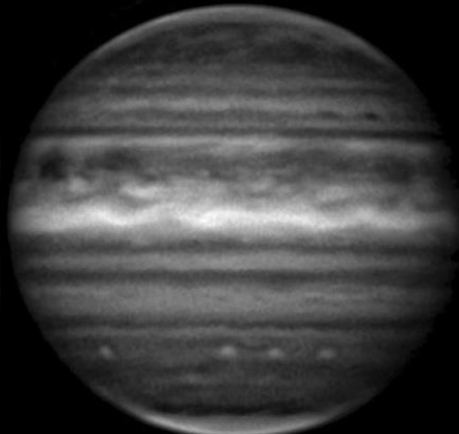


2020: May 1

June 2

2021: June 15

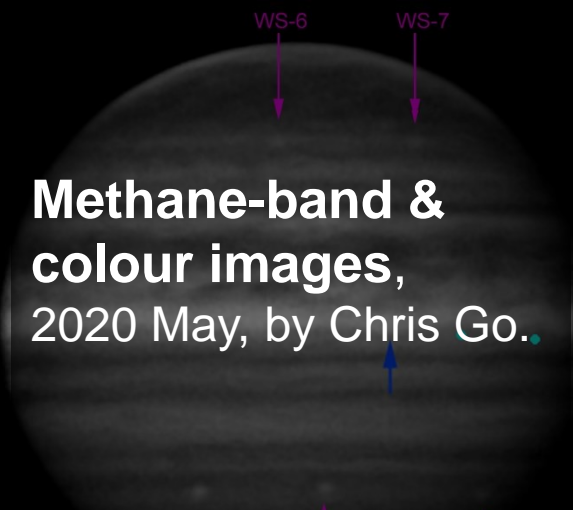
June 16



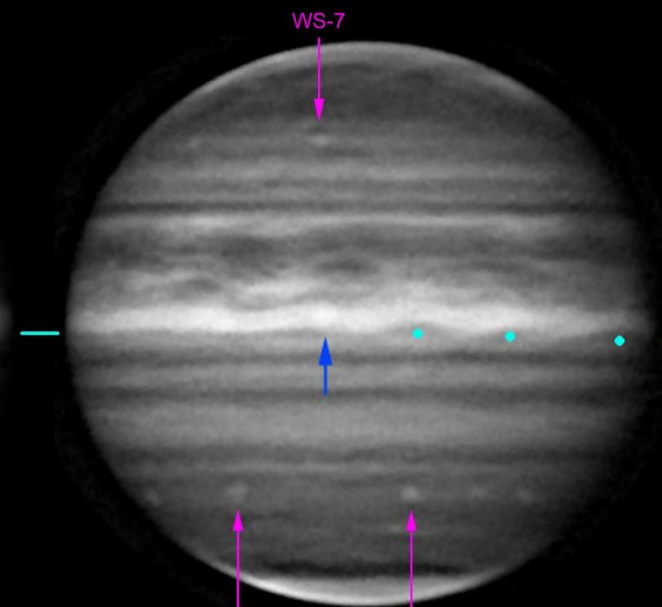
Methane-band & colour images, 2020 May, by Chris Go.

The orange-tinted Equatorial Band is very methane-bright, i.e. elevated.

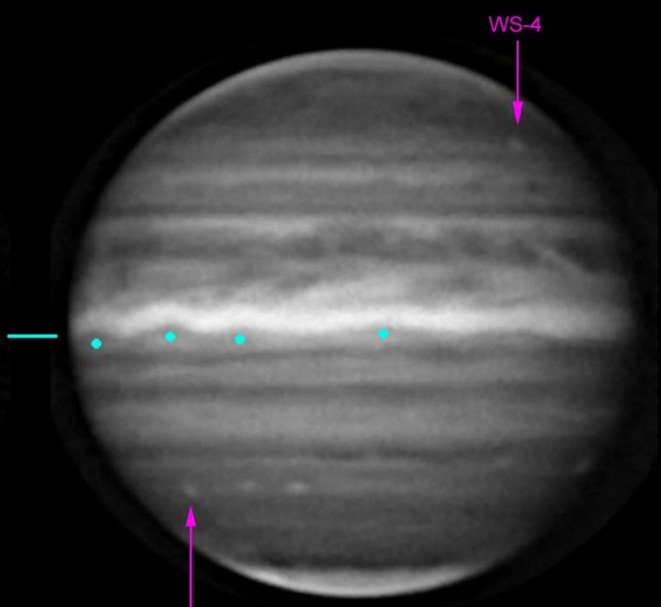
The methane-bright band has waves along its S edge that are not moving with the equatorial current, but are stationary in L3!



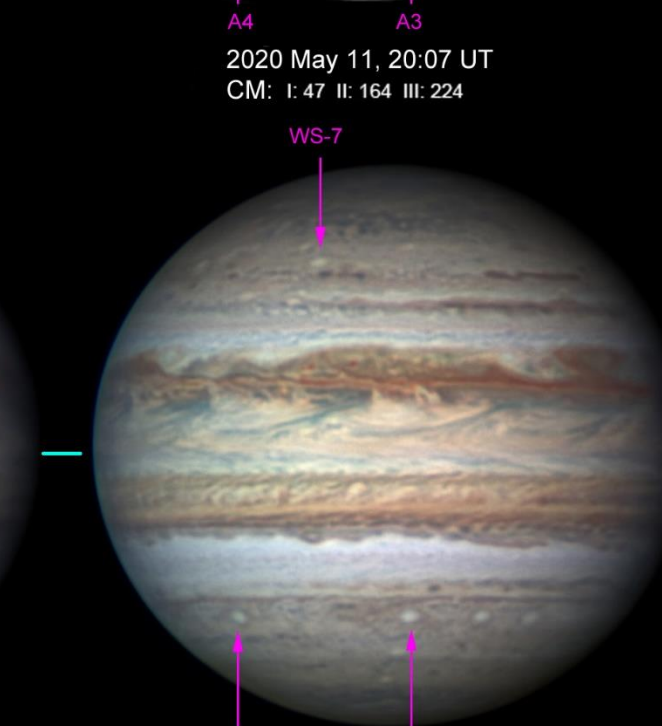
2020 May 9, 19:28 UT
CM: I: 67 II: 200 III: 259



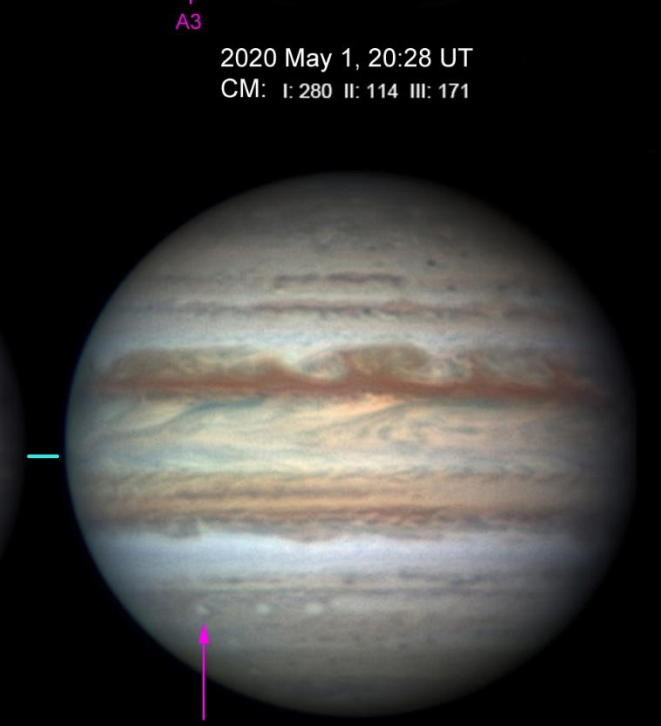
2020 May 11, 20:07 UT
CM: I: 47 II: 164 III: 224



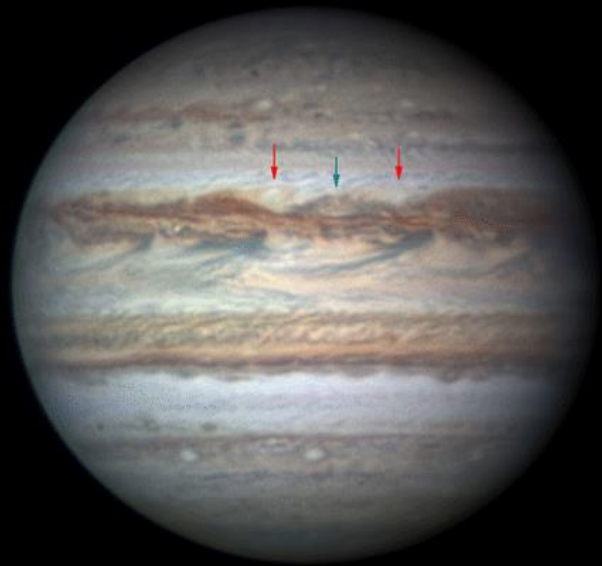
2020 May 1, 20:28 UT
CM: I: 280 II: 114 III: 171



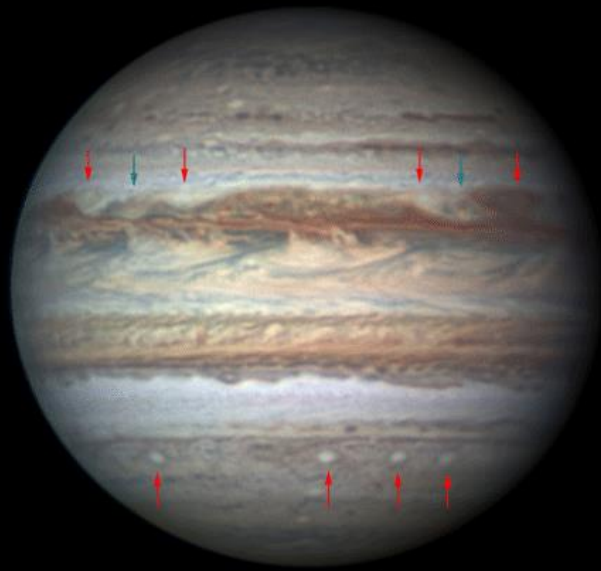
2020 May 11, 19:54 UT
CM: I: 39 II: 156 III: 216



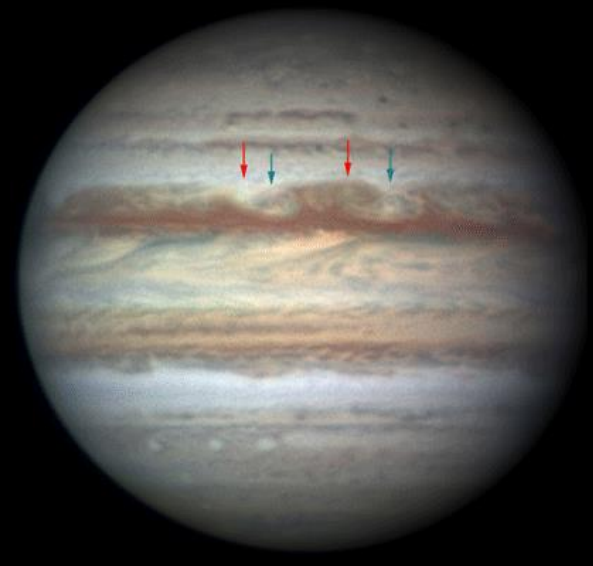
2020 May 1, 20:36 UT
CM: I: 285 II: 119 III: 176



May 9, CM3=259



May 11, CM3=216



May 1, CM3=176

Chart of waves on S edge of the methane-bright EB, in L3

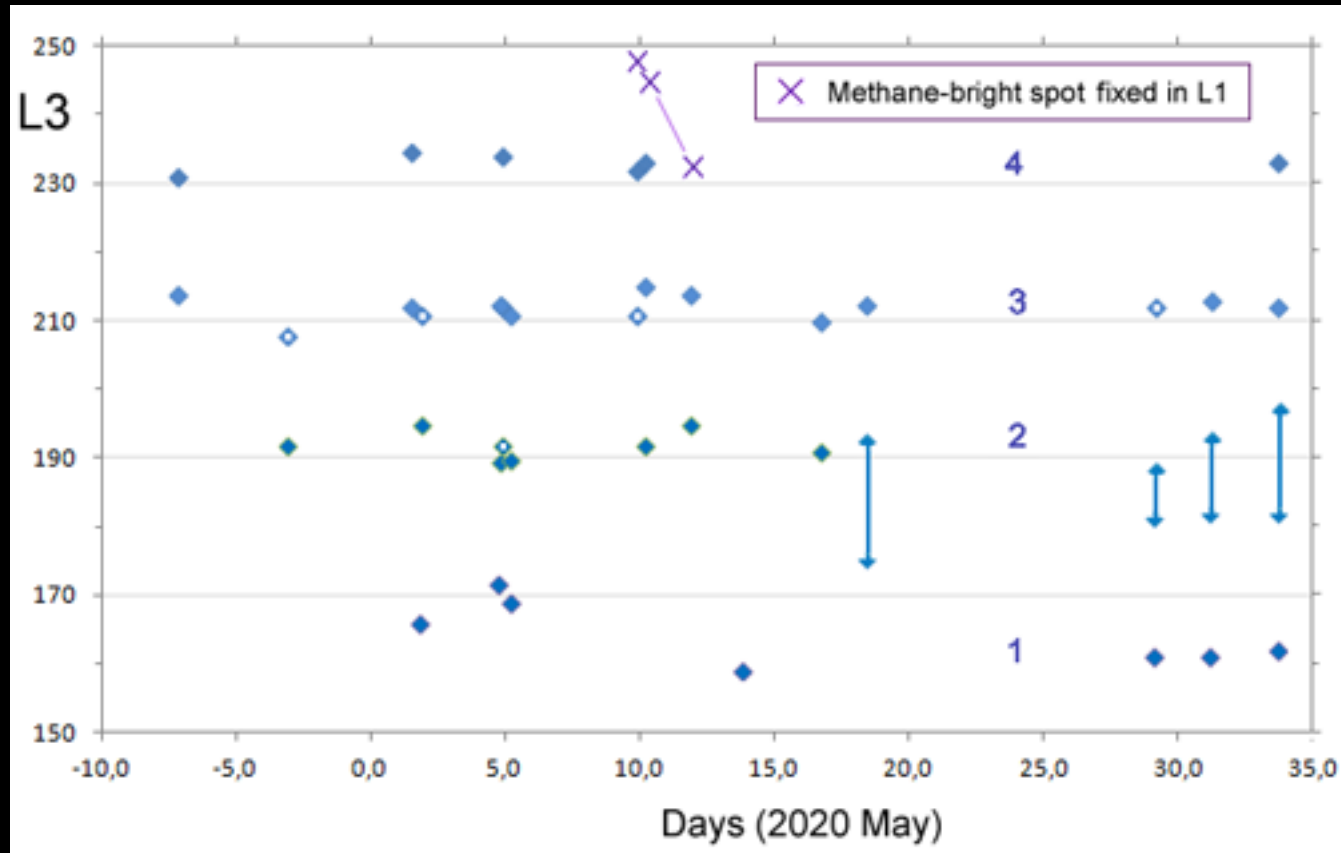
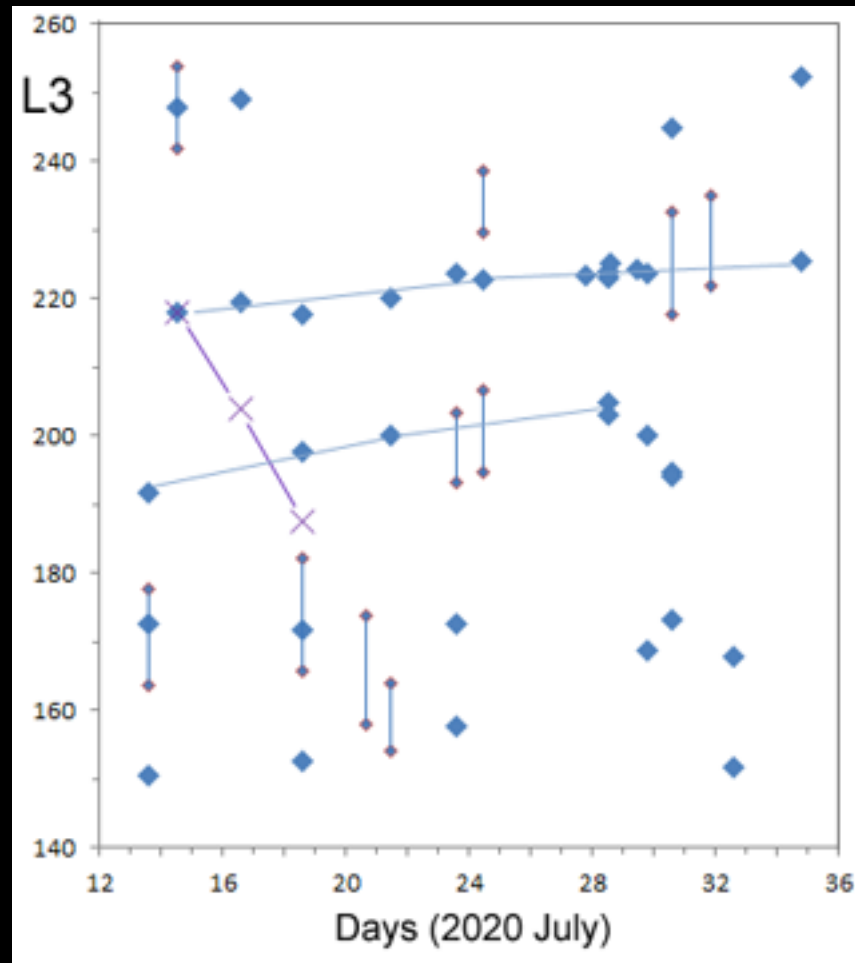


Chart of waves on S edge of the methane-bright EB, in L3



A methane-bright patch spanning the EZ in 2021,
along with waves again, all near-stationary in L3.

(Maps & animation by Shinji Mizumoto, ALPO-Japan)

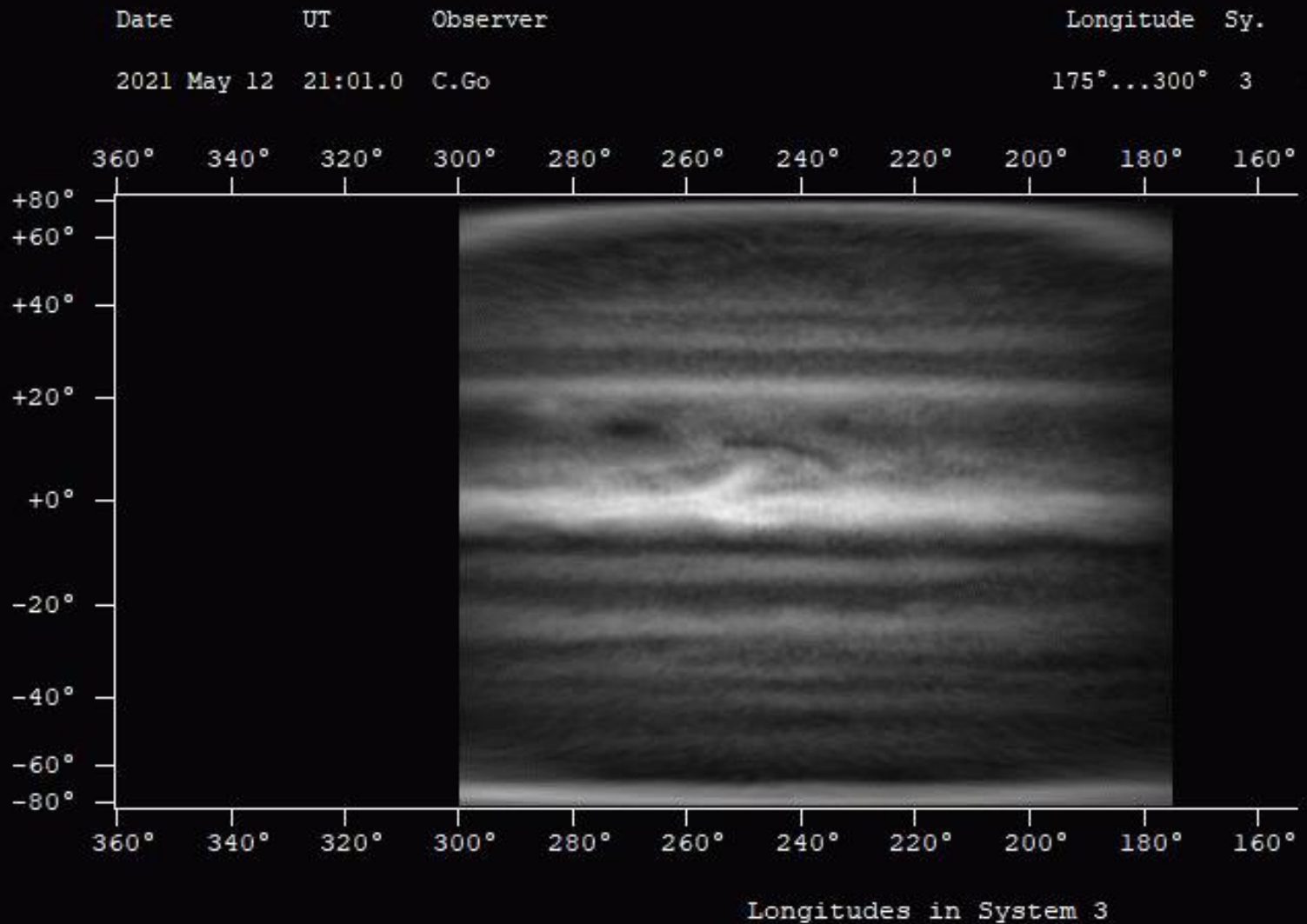
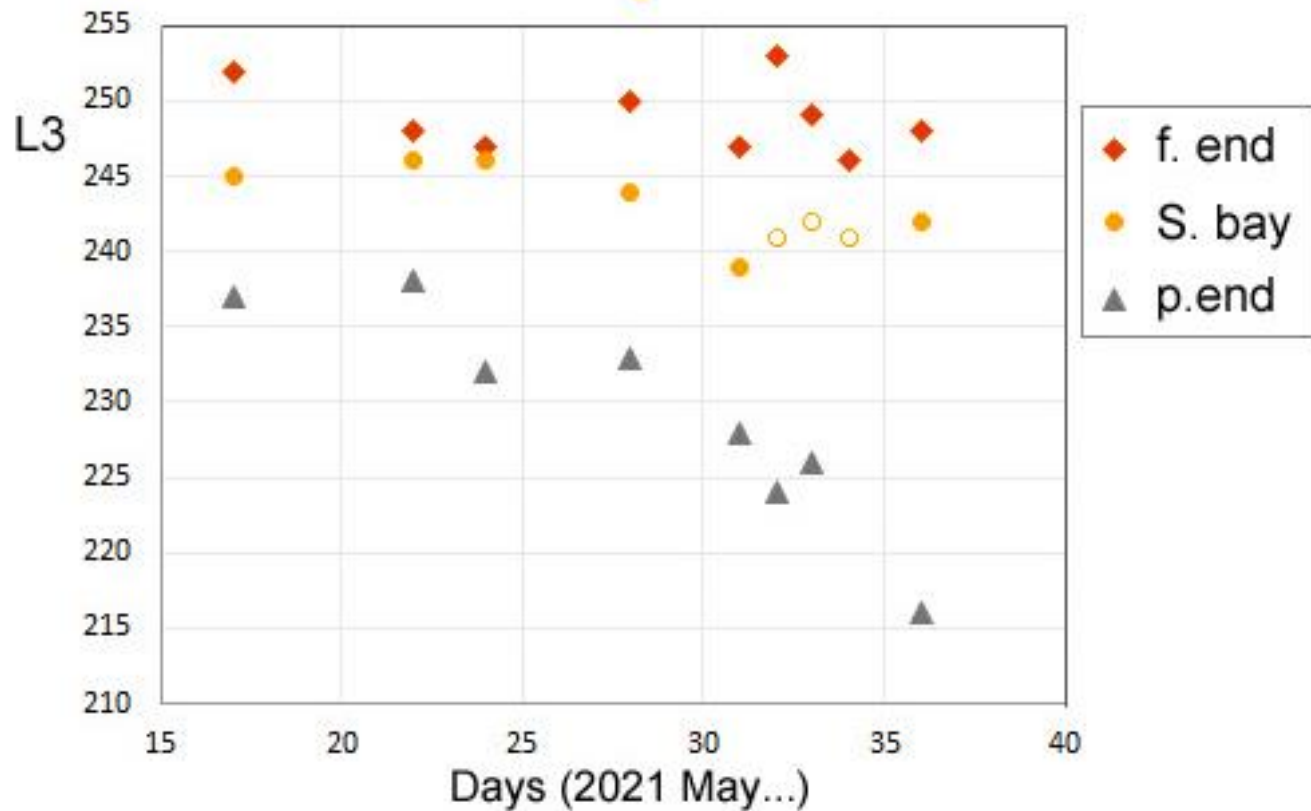
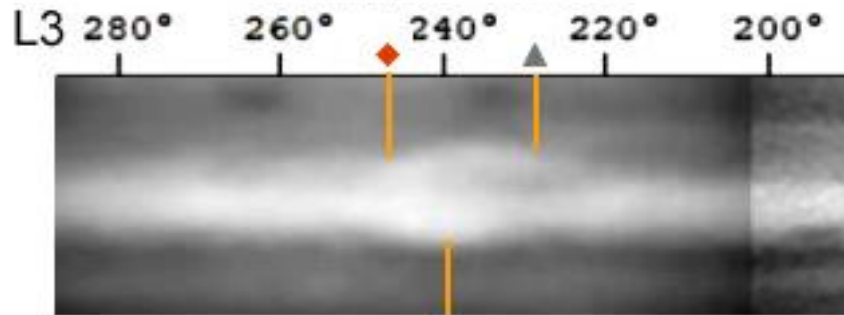


Chart of the methane-bright patch over EZ in 2021

Key to measured points: Map by S. Mizumoto
2021/05/31 C. Foster

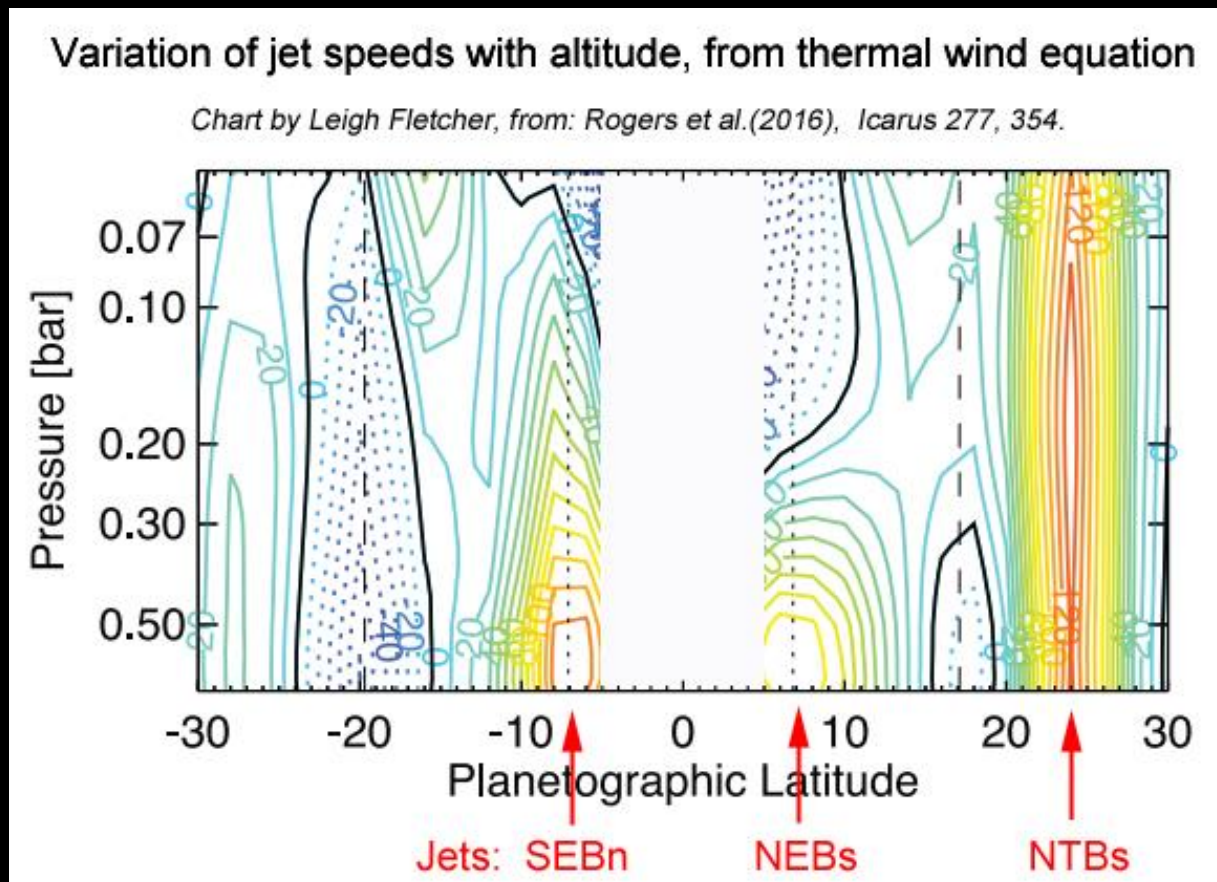


Possible explanations for these near-stationary features?

1. Forcing by near-stationary features in higher latitudes? –No candidates nearby.
2. Forcing by the planet's magnetic field? – unlikely and unsupported.

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3. Aerosols at very high altitude where equatorial jet decays to zero?



Possible explanations for these near-stationary features?

Do near-infrared images confirm high altitude for these aerosols?

Do mid-infrared images show thermal patterns aligned with the waves?

What is the physics of the wave pattern?

What is the orange aerosol and why does it appear episodically?

