

Jupiter in 2024/25, Report no.5: The NTBs outbreak

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2025 April 15

Appendix 2: Zonal Wind Profiles by Grischa Hahn

Zonal wind profile (ZWP) were derived by G. Hahn from hi-res amateur images in 2024 Nov. and in 2025 Feb., as listed below. The N. Temperate region is presented in the main report. Here we post the complete ZWPs across all latitudes, deferring further comment to a later report.

Method:

ZWPs are derived in WinJUPOS, from hi-res amateur images taken one or two jovian rotations apart (~10 hours or ~20 hours separation), using one or two images per rotation. The images are projected as cylindrical maps and correlation analysis is used to measure the east-west displacement between them at each latitude (every 0.1°; no interpolation). The drift values are measured with longitude resolution 0.1° and averaged over 120°, and converted into wind speeds in System 3 (u_3) in m/s.

Because there may be inaccuracies in timing and limb-fitting, the resulting draft ZWP is compared with a standard ZWP from spacecraft (in this case, one made by Hahn from Hubble images on 2012 Sep.20), and the baseline may be adjusted by up to 15 m/s to improve the fit across multiple mid-latitude domains where large correlated shifts are physically unlikely. At these latitudes, adjustment of the observation time-span by 0.5 min corresponds to a change in u_3 of +10 m/s over 10 hr, or +5 m/s over 20 hr. (Any such offsets are noted on the ZWPs.)

In most cases, the analysis was done separately for different colour channels (red, green, blue, and/or white light).

Uncertainties are contributed by (i) minimum technical uncertainty due to scale and time separation of the images (error bars on the charts); (ii) scatter between results from different colour channels (although the red channel should usually be preferred); (iii) error in timing or limb-fitting requiring an offset to the baseline.

Images used:

2024 Nov:

- (1) 2024-11-03, P. Casquinha_J-P. Oger_20hr. No offset. [To be omitted from statistics as there is evidently a systematic error in latitude and wind speed in northern hemisphere, suggesting limb inaccuracy.]
- (2) 2024-11-03/04, M. Morita_V. Mirabella_10hr. Offset +15 m/s.
- (3) 2024-11-03/04, T. Tsurimi_M. Morita_20hr. Offset -10 m/s.
- (4) 2024-11-04/05, M. Morita_V. Mirabella_10hr. Offset +10 m/s [changed to +12 m/s in main article]

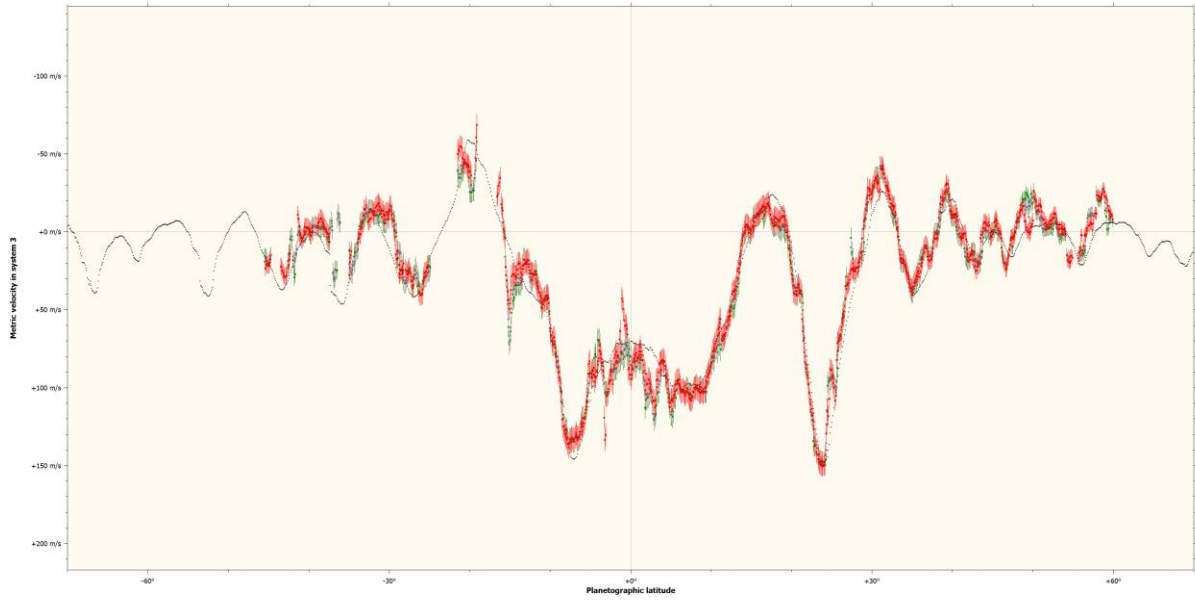
2025 Feb:

- (1) 2025-02-04, T. Kumamori_M. Karrer, 10 hr. Offset +15 m/s, replacing earlier +10 m/s.
- (2) 2025-02-08, E. Sussenbach_C. Go, 10 hr. No offset after time fixed by Europa position.
- (3) 2025-02-10, E. Sussenbach_M. Portillo, 20 hr. Offset = +5 m/s.
- (4) 2025-02-16/17, E. Sussenbach_I. Miyazaki, 10 hr. No offset.

2024 Nov:

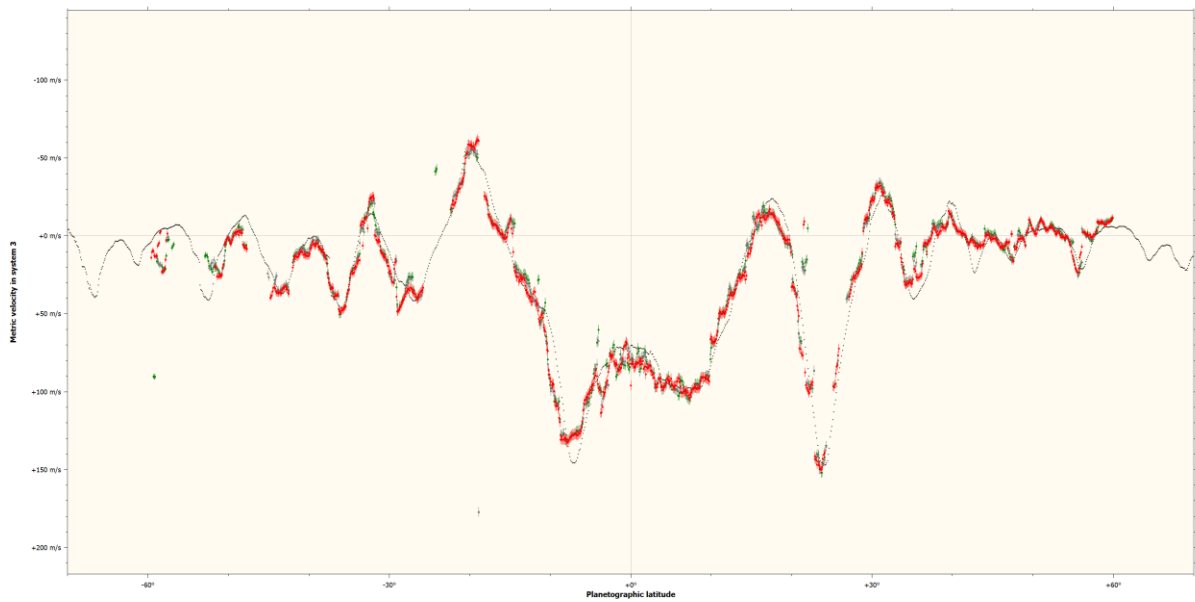
ZWP Jupiter 2024-11-03/04, 10h time span
Morita (Nov 03, 1459.6 - 1712.7 UT) versus Mirabella (Nov 04, 0152.6 - 0223.0 UT)

- 2012-09-20-0407.3_1642.9+GST_WFC3-UVIS_F783M_HAP.dsf
- 2024-11-03_04-Morita_Mirabella_10h_Green.dsf (SD = +15,000 m/s for B = 0°)
- 2024-11-03_04-Morita_Mirabella_10h_Grey.dsf (SD = +15,000 m/s for B = 0°)
- 2024-11-03_04-Morita_Mirabella_10h_Red.dsf (SD = +15,000 m/s for B = 0°)



ZWP Jupiter 2024-11-03/04, 20h time span
Tsunimi (Nov 03, 1702.6 - 2049.0 UT) versus Morita (Nov 04, 1511.4 - 1711.6 UT)

- 2012-09-20-0407.3_1642.9+GST_WFC3-UVIS_F783M_HAP.dsf
- 2024-11-03_04-Tsunimi_Morita_20h_Green.dsf (SD = +10,000 m/s for B = 0°)
- 2024-11-03_04-Tsunimi_Morita_20h_Grey.dsf (SD = +10,000 m/s for B = 0°)
- 2024-11-03_04-Tsunimi_Morita_20h_Red.dsf (SD = +10,000 m/s for B = 0°)



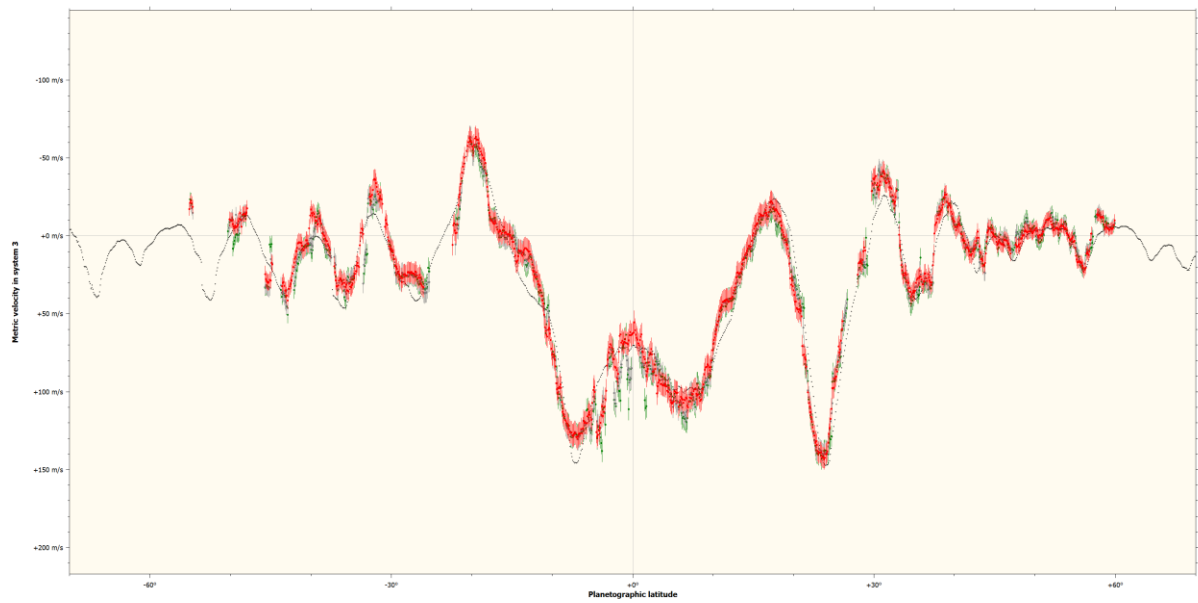
ZWP Jupiter 2024-11-03, 20h time span
 Casquinha (map 0221.6, 0309.9 UT) versus Oger (map 2255.7, 2305.6 UT)

- 2012-09-20-0407.3_1642.9+GST_WFC3-UVIS_F783M_HAP.dcf
- 2024-11-03-Casquinha_Oger_20h_Green.dcf
- 2024-11-03-Casquinha_Oger_20h_Red.dcf
- 2024-11-03-Casquinha_Oger_20h_Grey.dcf



ZWP Jupiter 2024-11-04/05, 10h time span
 Morita (Nov 04, 1511.4 - 1711.6 UT) versus Mirabella (Nov 05, 0033.0 - 0058.9 UT)

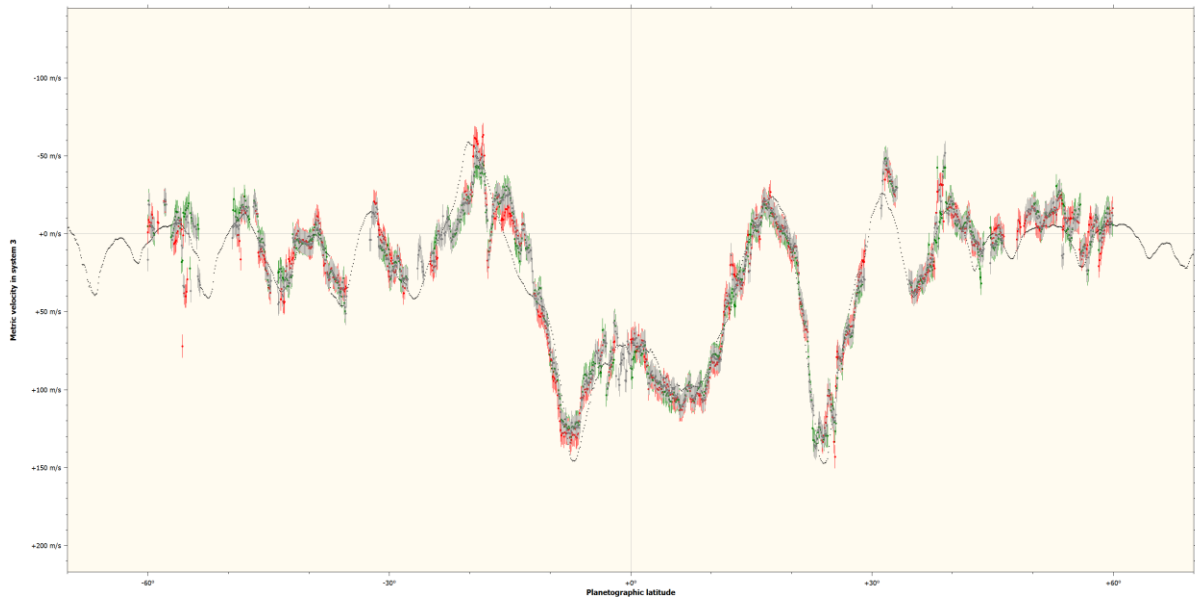
- 2012-09-20-0407.3_1642.9+GST_WFC3-UVIS_F783M_HAP.dcf
- 2024-11-04-05-Morita_Mirabella_10h_Green.dcf (SD = +10,000 m/s for B = 0°)
- 2024-11-04-05-Morita_Mirabella_10h_Grey.dcf (SD = +10,000 m/s for B = 0°)
- 2024-11-04-05-Morita_Mirabella_10h_Red.dcf (SD = +10,000 m/s for B = 0°)



2025 Feb:

ZWP Jupiter 2025-02-04, 10h time span
Kumamori 0919.0 UT versus Karrar 1859.0 UT

- 2012-09-20-0407.3_1642.8-HST_WFPC-UVIS_F712M_HAP.dcf
- 2025-02-04_Kumamori_Karrar_Green.dcf (SD = +15,000 m/s for $\theta = 0^\circ$)
- 2025-02-04_Kumamori_Karrar_Red.dcf (SD = +15,000 m/s for $\theta = 0^\circ$)
- 2025-02-04_Kumamori_Karrar_Grey.dcf (SD = +15,000 m/s for $\theta = 0^\circ$)



ZWP Jupiter 2025-02-07/08, 10h time span
Sussenbach 2025-02-07 2353.5 UT versus Go 2025-02-08 map of Images 1010.0 UT and 1041.0 UT

- 2012-09-20-0407.3_1642.8-HST_WFPC-UVIS_F712M_HAP.dcf
- 2025-02-07_08_Sussenbach_Go_Green.dcf
- 2025-02-07_08_Sussenbach_Go_Blue.dcf
- 2025-02-07_08_Sussenbach_Go_Red.dcf



ZWP Jupiter 2025-02-10, 20h time span
 Sussenbach 0006.5 UT versus Portillo 2009.5 UT

- 2012-09-20-0407.3_1642.9+ST_WFC3-UVIS_F783M_MAP.dcf
- 2025-02-10_Sussenbach_Portillo_Blue.dcf (SD = +5,000 m/s for $\theta = 0^\circ$)
- 2025-02-10_Sussenbach_Portillo_Green.dcf (SD = +5,000 m/s for $\theta = 0^\circ$)
- 2025-02-10_Sussenbach_Portillo_Red.dcf (SD = +5,000 m/s for $\theta = 0^\circ$)



ZWP Jupiter 2025-02-16/17, 10h time span
 Sussenbach 2327.0 UT versus Miyazaki map of images 0934.1 UT and 1030.3 UT

- 2012-09-20-0407.3_1642.9+ST_WFC3-UVIS_F783M_MAP.dcf
- 2025-02-16_17_Sussenbach_Miyazaki_Red.dcf

