Jupiter's banded pattern changes in the 0.89μm band

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Abstract

Jupiter's atmosphere is generally organized in dark belts and bright zones the presence and intensities of which are changeable. Long-term variations in this banded pattern are not systematically measured especially in the 0.89 μm methane absorption band. The methodology presented at *[1]* can be used only for future observations.

In this work we present a method of measurements from a single average image, made from the best observations (0.89μm band) in the days around every recent opposition. Some results from these measurements are displayed in Figures 2,3 & 4.

A comparison of annual images of the latest apparitions reveal changes in the banded pattern during JUNO *[2]* and prior to JUNO years.

Methodology

- Selection of the best observations around (+-15 days) every opposition epoch in the 889nm band from PVOL *[3]*. Avoid the presence of the *Great Red Spot*.
- Creation of an average image for every apparition
- Adjustmentmeasurement of the average image in WinJupos *[4]*
- Measurement of band edges latitude and creation of maps *(Figures 1 & 4)*

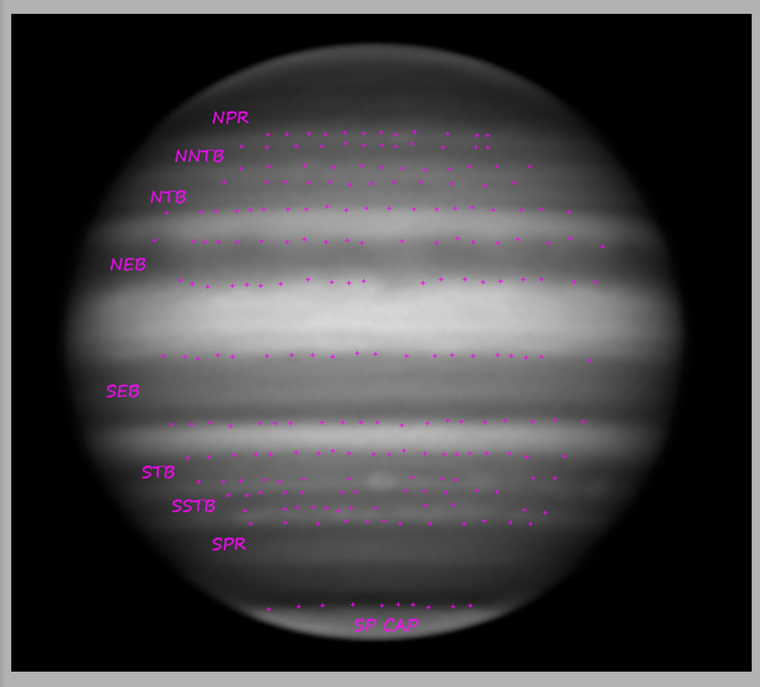

Figure 1. *Average image of Jupiter from observations around opposition of 2018 (9th,May) with the measurements in the edges of the main belts*

Observers

There are many amateur observers of Jupiter around the world but very few of them use the CH_4 absorption filter in the 889nm band.

In this work we used the following number of observations of each observer for every Jupiter apparition:

Observer	No of obs	2018	2017	2016	2015	2014
Christopher Go	17	3	5	5	3	1
Paul Maxson	17		3		7	7
Manos Kardasis	11	4	3	2		2
Christophe Pellier	7	4		1	2	
Don Parker	1					1
Marc Delcroix	2			1	1	
Matic Smrekar	2		1	1		
Andy Casely	1	1				
TOTALS	58	12	12	10	13	11

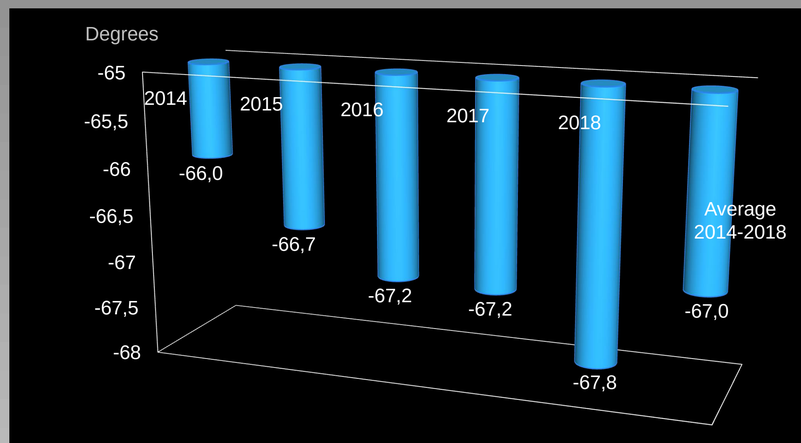

Figure 2. *The South Polar Cap maximum northern latitude extend 2014-1018*

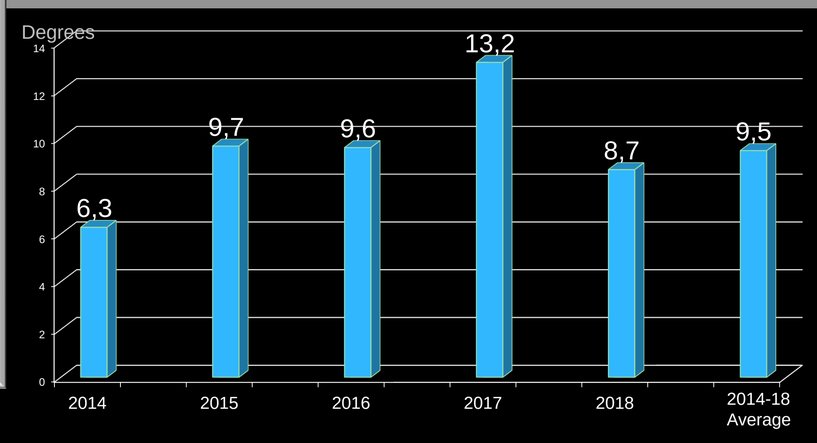

Figure 3. *North Equatorial Belt Width 2014-1018*

….some Results

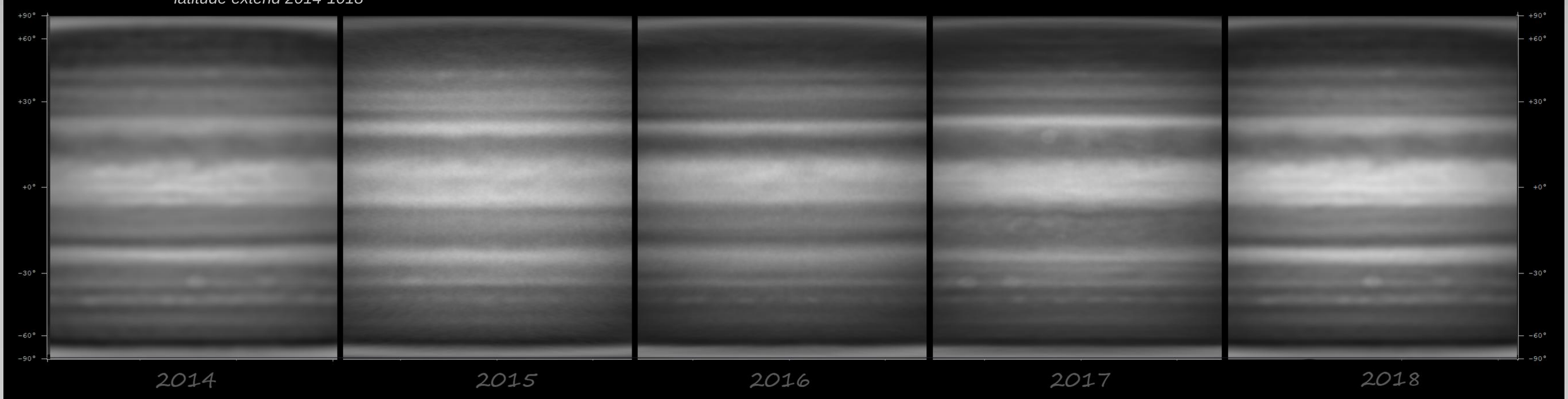

Figure 4. *Jupiter average maps in the 889nm band (methane absorption) made from observations around every opposition during 2014-18 A comparison of annual average images made with this methodology can easily show significant long-term changes in the belt/zone pattern.*

Future work

The main contribution of our work is to propose a simple and fast method to present long term latitudinal changes in Jupiter's atmosphere.

Additional measurements and past archived observations before 2014 are scheduled to be done in the future.

Future work will focus on deeper analysis of Jupiter belt changes with graph illustrations that may reveal interesting phenomena, especially if compared with the visual band.

References

[1] Kardasis, E. 2017, "A simplified method to track long-term changes in Jupiter's belt/zone structure " , EPSC 2017, 17 – 22 September 2017, Riga, Latvia.

[2] JUNO mission to Jupiter : https://www.nasa.gov/mission_pages/juno/main/index.html

[3] Planetary Virtual Observatory and Laboratory, searchable database of ground-based observations of solar system planets: http://pvol2.ehu.eus/pvol2/

[4] Hahn, G. 2018, WinJUPOS software, online: http://www.grischa-hahn.homepage.t-online.de/

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