Long term changes in the band/zone pattern of Jupiter

Jupiter’s atmosphere is generally organized in dark belts and bright zones the presence, latitudinal limits, color and intensities of which are changeable [1]. The study of these changes may reveal some secrets of the atmosphere of the giant planet. We have developed two different methodologies (AFO [2] and AFMO [3]) in order to track these long-term changes in the banded pattern. The philosophy of both is to make average images of Jupiter from short term observing periods that smear details and reveal the general banding pattern. Of course we avoid the presence of Great Red Spot.

In the AFO method a Jupiter observer captures static images or continuous videos with the camera on the telescope for some hours. Then he stacks all the images/videos without derotating them:

Although AFO methodology produce very smooth results it can’t be used to compare past observations since it is based on a specific video capturing methodology. Moreover, requires that someone is continuously following this procedure in different wavelength bands.

In the second method (AFMO), we download from PVOL as many as possible regular observations made in a short period of time. We than stack them as they were made in a specific date-time. It is time-consuming with a lower quality result than AFO but it takes advantage of an already existing database going back

many years. In this page AFMO method will be used.

Long-term changes in Jupiter’s banded pattern will systematically monitored in this page in the following ways:

a) Presentation of color vs 0.89 μm methane absorption band average images through an observing year (Fig.1).

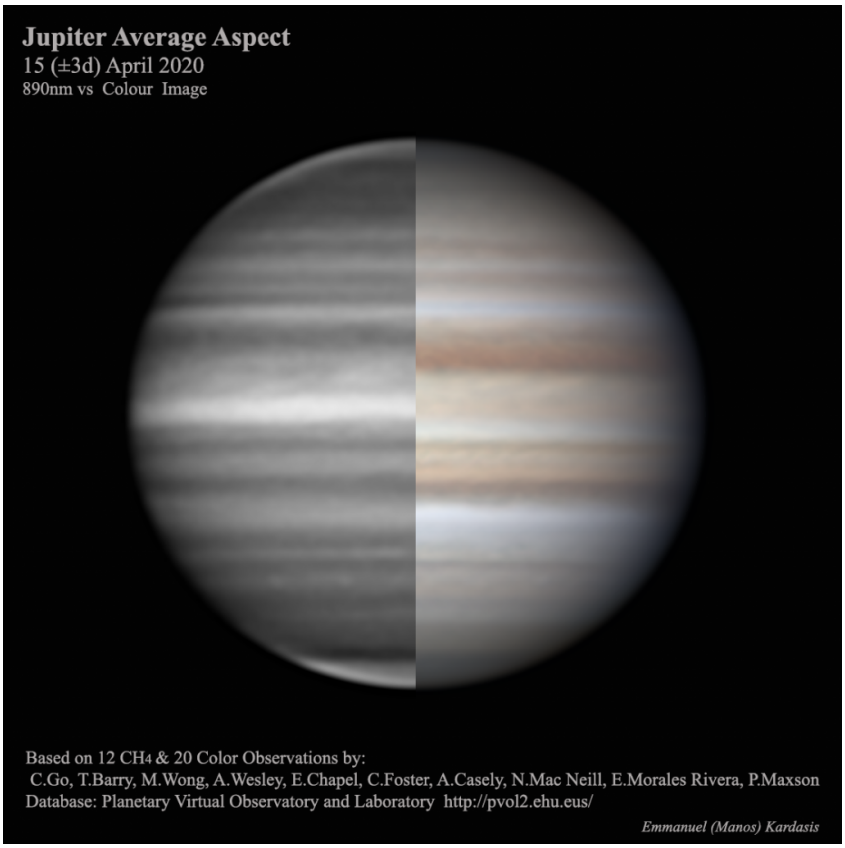

Figure 1. Average aspect of Jupiter on April 2020 in the visual and 890nm methane absorpton band

b) Tracking long term changes by presenting-comparing average images (in the days around every opposition) in different wavelength bands from year to year (Fig.2)

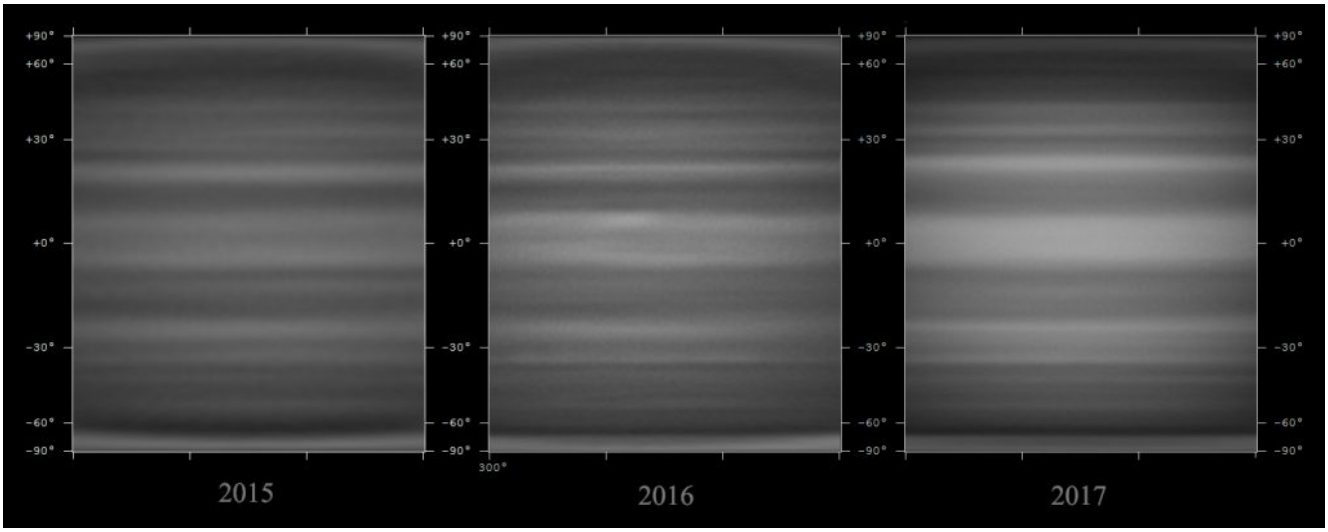

Figure 2. Average aspect of Jupiter banding in *890nm methane absorpton band near 2015-2016-2017 oppositions*

c) Measurements of the band/zone latitude limits (Fig.3)

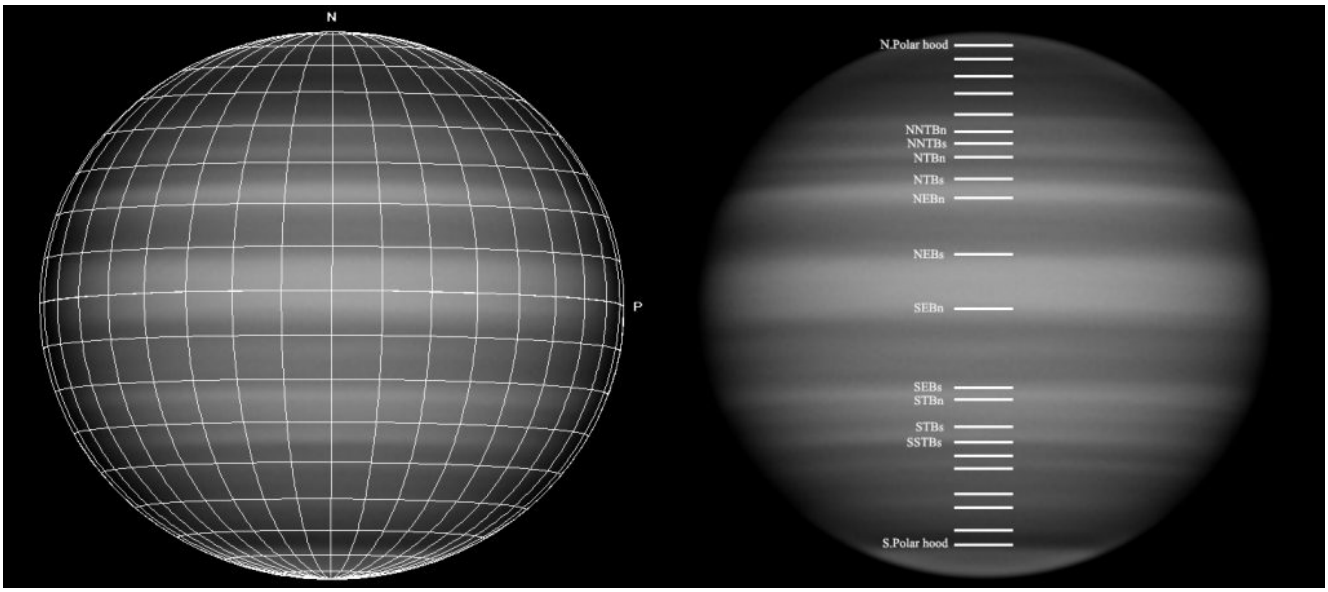

Figure 3. The Latitudinal limits of the bands that are measured with the use of WinJupos software

d) Reports on the results/changes observed

The first preliminary results of the method were presented in [3] and from time to time some more results will be published in this page as new posts at the bottom of the page.

The method is using WinJupos software [5]. Observations are downloaded from PVOL Database [6].The list of contributing observers will be presented separately in all cases. The work is supported by J.Rogers (Director of BAA Jupiter Section [7]) and Grigoris Maravelias (HAAA, NOA). Measurements are made by the author (HAAA) and Alexia Takoudi (HAAA, Student in Astronomy, Saint Petersburg State University). Use of data presented here may used elsewhere with appropriate referencing. Any researcher interested in making comments or request data may communicate with the author at *astromanos2002_at_yahoo.gr*

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[2] 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. Available at: http://meetingorganizer.copernicus.org/EPSC2017/EPSC2017-236-1.pdf

[3] Kardasis, E. & Takoudi A. 2018, "Simplified measuring of belt/zone structure", RAS-Juno 2018EuroPlanet 2020 Workshop in London, 10-11 May 2018: 'New Views of Jupiter: Pro-Am Collaborations during and beyond the NASA Juno Mission', Presentation 3-20 available at : https://www2.le.ac.uk/departments/physics/research/projects/ras-juno-europlanet-meeting-2018

[4] Kardasis, E. & Takoudi A. 2018, "Jupiter's banded pattern changes in the 0.89μm band ", EPSC 2018, 16 – 21 September 2018, Berlin, Germany. Available at: https://meetingorganizer.copernicus.org/EPSC2018/EPSC2018-270.pd

[5] Grischa Hahn,WinJupos SW, *http://www.grischa-hahn.homepage.t-online.de/*

[6] PVOL, Planetary Virtual Observatory and Laboratory, Database of ground-based observations of solar system planets *http://pvol2.ehu.eus/pvol2/*

[7] British Astronomical Association, Jupiter section, *https://www.britastro.org/section_front/15e*