Jupiter in 2007: Multispectral imaging

John Rogers (British Astronomical Association), 2012 Sept.

Here are posted two montages of images in various wavebands from ultraviolet (UV) to infrared (IR), especially in the methane absorption waveband at 889 nm (CH_4). These add to the portions of methane images previously included in our montages of the NTBs outbreak and SEB Revival. Below I note some of the most interesting features, and suggest what the appearances mean in terms of changes in the cloud layers.

The red anticyclonic ovals – the GRS, oval BA, and NN-LRS-1 – were all very dark in UV and very bright in methane, as usual, indicating their dense high reddish haze caps.

SEB: In methane images, the SEB partially faded as it did in visible light.
At the Revival source, visibly bright spots were modestly methane-bright in images on May 23-27 (but not May 30). However, one spot imaged on its first rotation by the Hubble Space Telescope was extremely bright in both methane and far-UV bands, indicating that it was a dense cloud plume erupting to high altitude. The lack of such brilliant spots in ground-based images suggests that any very bright phase was short-lived.
The visibly dark spots retrograding on the SEBs were extremely methane-dark (May 27 onwards), i.e. they comprised clearings of the upper haze.

The S. Equatorial Disturbance (SED), and the stormy sector of EZ(S) p. it, included some remarkably methane-dark streaks. These coincided with visibly blue streaks and fainter light grey areas adjacent to them.

EZ: The massive grey-brown EB was very UV-dark, and methane-bright (along with most of the EZ), consistent with this being a coloration event involving high-altitude reddish haze. However, the coloration was very weak in visible wavelengths, and accordingly it was quite dark in the red and infrared continuum. This suggests that deeper clouds cleared, even if thin overlying reddish haze accumulated.

NTB: In methane images, a dark NTB was still present in its usual latitudes in 2007 March, as it had been throughout the years when the NTB was visibly whitened.
In April-May, after the NTBs outbreak, the methane-dark NTB did not change much: it still spanned 23-30 deg.N, approximately the canonical latitudes of the NTB (Table 1), even though the strongly reddish NTB(S) developed at 23-26 deg.N, overlying its south edge. But by early June, the reddish NTB(S) was all methane-bright (best resolved in HST images), and on the other side of the planet, even a narrow pinkish strip within the otherwise grey NTB was methane-bright. The brightening had progressed further by September.
All this confirms that the new reddish NTB(S) comprised a high-altitude (thus methane-bright) orange haze from June onwards; but this was not the case when the reddish belt first appeared, suggesting that the orange haze might have been thinner or deeper at that stage.
The revived reddish NTB(S) was, of course, very dark in UV.

FIGURES:
Fig.1 {Multispec_2007_SEBO_methane_labeld.jpg}
Fig.2 {Multispec_2007...final.jpg}

Table 1: Latitudes of the NTB.
Latitudes of the edges of the NTB(S) and NTB(N) in different wavebands, 2007 April 5 to June 9, measured by Gianluigi Adamoli on 5 image sets by Akutsu, Pujic, Parker, & Peach:

	RGB			**UV**			**CH4**		
	av.lat.	st.dev.	N	av.lat.	st.dev.	N	av.lat.	st.dev.	N
NTB(S)s	23,1	0,7	5	22,6	0,1	2	23,2	0,5	4
NTB(S)n	26,8	0,5	3	25,5	0,2	2			
NTB(N)s	29,0		1	29,2	0,5	2			
NTB(N)n	31,0	0,3	2	31,9		1	30,3	0,7	4

[The NTB is defined as lying between the jets at 23.8ºN (NTBs) and 31ºN (NTBn).]

John H. Rogers, Ph.D.
Jupiter Section Director,
British Astronomical Association

<jhr11@cam.ac.uk>
http://www.britastro.org/jupiter/
