End of Apparition Report: Saturn 2011-2012

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Start of Observations: 2012 January 13th

Finish: 2012 May 22nd

Telescopes Used:

- 203mm Newtonian Refl. (Knighton Fields Observatory)
- 508mm DK Planewave (University of Leicester Observatory)

Opposition: 15th April 2012

Total Number of Observations: 10*

Total Number of Drawings: 11

*Badly hampered by very poor weather for much of the first part of the year along with the commitment for delivering Ph.D thesis 31st May, 2012.

<u>1 Introduction</u>

Presented here is a short end of apparition report summarizing observations made by the author during the 2011-12 apparition. During this time, Saturn was located in the constellation of Virgo and as a result, it did not achieve a high altitude. Consequently, this meant that observations of the planet were frequently hindered by poor seeing.

Only a small number of observations were made this year, and this was mainly due to the poor weather which effected much of the UK during the first quarter of 2012. The weather was frequently wet and cloudy, indeed many parts of the UK were plagued with severe flooding. Observations started on 2012 January 13th and concluded on 2012 May 22nd, but as a result of the adverse weather conditions, observations of the planet are distributed rather thinly throughout the apparition; e.g one observation in January 2012, nothing for February 2012, two in March, three made in April and four in May.

In general observations were made using the author's 203mm Newtonian reflector housed at Knighton Fields Observatory, Leicester. All observations were made visually either

in integrated light (IL) or with Wratten filters (filter number(s) stated when used). Field drawings were made in black and white at the telescope, and colour notes recorded . These notes and drwings were recorded in the observatory log book (Vol. III). Colour drawings were made after observing. Intensity estimates were made using the BAA scale with the range o (very bright) to 10 (black sky) used. The table of estimates made during the apparition can be found in section 5.

2. The Planet

During the 2011-12 apparition, the planet's northern hemisphere was tilted towards the Earth ranging in angle from B=13.60 to +14.40. As a result, very little of the planet's southern hemisphere was seen. The increased northerly tilt meant that some good views of the planet's rings were obtained when conditions were reasonable. We now summarize the various features of the planet starting in the south and moving northwards.

SPR: Visible in the extreme south as a greyish region. Owing the the northerly tilt of the planet, it was hard to observe the region in any detail.

STropZ: Normally a light yellowish region, the region showed some change in intensity.

SEB: The southern portion of the belt was visible just above the ring system, and seemed to be either greyish or greyish brown in colour. As the whole belt was not observed, it is impossible to say what changes occured within it, if any.

EZ(n): A bright region, usually the brightest zone on Saturn. At times it was light yellow, at other times it appeared to be a somewhat darker beige colour. On a number of occasions a darker EB was observed. The EZ(s) could be seen above, this was usually darker (see figure 1).

NEB: The north equatorial belt seemed to be rather broad this apparition. Usually, there were two distinct components; a NEB(s) and NEB(n) separated by a broad NEBz. When an EB was present, it gave the appearance that the NEB was triple. The NEB(n) and the NEBz exhibited a number of subtle phenomena; a number of times it seemed that the NEB(n) contained a number of dark irregular sections, while occasionally a number of lighter regions where observed in the NEBz (figure 2).

The darker section in the NEB(n) are rather reminiscent of those observed by A.S. Williams in the Spring of 1893 using a 6 inch reflector¹.

The colour of the NEB and NEBz seemed to be a brownish orange, and the whole feature seemed to be perhaps slightly darker than in the previous apparition.

NTropZ: Interestingly, this region seemed to contain a distinct greenish hue for most

of the apparition. During the last apparition, the region was host to the great storm of 2010-11, and it seemed that there were still remnants of the storm present since the zone contained some brighter regions, and both the NEB(n) and NTB still seemed a little disturbed in places.



Figure 1: Drawing of Saturn made by the author on 2012 May 11th-12th showing a faint EB, a light EZ(n) and a darker EZ(n) just visible under the C-Ring.

NTB: The north temperate belt seemed much fainter during this apparition and at times it seemed to be invisible. When it was present, it was normally a light brownish colour.

NTZ: A lightish zone sometimes yellow in colour, sometimes a greenish hue was present. There seemed to be little variation in intensity.

NPR: A Dark greyish region, sometimes some slight bluish colour seemed to be present. The NPC was not observed during this apparition.



Figure 2: Drawing made by the author on 2012 May 12th showing some interesting subtle features in the NEB: a number of dark irregular sections can be observed in the NEB(n), while the NEBz seemed to contain a number of brighter regions.

3 The Rings

The rings were open fairly wide during the 2011-12 apparition, with the northern face of the system on display. The value of B was between 120 and 13°. All three components of the ring system were seen along with the Cassini Division, we now discuss each ring:

A-Ring: The second brightest of the ring, sometimes greyish, but sometimes it took on a brownish hue. In the moments of steady seeing, the last outer 1/3 of the ring seemed darker than the inner 2/3.

Cassini Division: Always seen, although the degree to which it could be traced along the ansae depended upon seeing conditions. In good-reasonable seeing, the CD was black, in poor seeing it tended to take on a slightly light appearance.

B-Ring: The B1-Ring was the brightest of the rings and normally white in colour. The darker B2-Ring was observed, and normally greyish in colour.

C-Ring: The dark C-Ring was best seen at the ansae edges and was not always of uniform brightness. On 2012 May 22nd, it seemed that the C-Ring was brighter than usual.



Figure 3: Drawing of Saturn with the C-Ring brighter than usual. Drawing made by the author on 2012 May 22nd.

<u>4 Filter Work</u>

The planet was observed with a number of Wratten filters, namely:

- W#25A (red)
- W#80A(Light blue)
- ♦ W#47 (Violet)

It was found that the red W#25A filter helped to steady the view somewhat in the poorer seeing. A few other observations of note were made:

• 2012 April 29th (2305UT-2352UT) the planet was observed with the author's 203mm Newtonian, it seemed that the NTB which appeared t=somewhat elusive in IL was easier to observe with a W#80A.

• 2012 May 22nd (2242UT-2338UT), observing the planet with the same telescope, this time the NTB was absent in both IL and in the W#80A. The C-Ring appeared brighter in IL than in either a W#25A or W#80A.

<u>5 Intensity Estimates</u>

Intensity estimates were made in IL, and with a W#80A (light blue) and W#25A (red) filters. All estimates made with the author's 203mm Newtonian reflector.

INTEGRATED LIGHT:

Month	April	April	April	May	May	May		
DAY	5	11	29	12	21	22		
UT	01:49	01:50	23:38	01:58	23:21	23:27		
INSTRUMENT	203 Newt							
MAGNIFICATION	x167	x167	x167	x167	x167	x167		
FILTER	IL	IL	IL	L	IL	IL		
SEEING	Alli	AIII	AIV	AIII-IV	AIV	aiii-iv		
INTENSITY OBSERVATIONS							INTENSITY AVERAGE FOR THE APPARITION	NUM BER OF OBSERVATIONS
THE PLANET								
SPR	4	4	4	4	3.5	4	3.9166666667	6
STropZ	2	2	-	2	1.5	1.25	1.75	5
SEB	4	3.75	4.5	4.5	5	5	4.4583333333	6
EZ(n)	1	1	1	1	1	1	1	6
NEB(S)	6	5.5	4	5.5	5.5	5	5.25	6
NEBz	3	3.5		-	4	3.5	3.5	4
NEB(n)	5.5	5.5	5.5	5.5	6.5	6.5	5.83333333333	6
NTropZ	2	2	2	2.25	2.25	2.25	2.125	6
NTB	3.75	3.5	-	4.75	4.5	-	4.125	4
NTZ	2	2	-	2	-	2.25	2.0625	4
NNTB	-	-	-	-	-	-	#DIV/0!	0
NPR	4.5	4	3.25	4.25	4	3.5	3.9166666667	6
NPC							#DIV/0!	0
							#DIV/0!	0
THE RINGS							#DIV/0!	0
A-Ring	2	2	4	4	3.5	3	3.0833333333	6
Cassini Division	10	10	10	10	10	10	10	6
B1-Ring	0.75	0.75	0.75	1	1	1	0.875	6
B2-Ring	3	2	2	2.5	2.5	2.5	2.4166666667	6
B3-Ring	-	0	-	-	-	-	0	1
C-Ring	7.5	7.5	9	9	9	7	8.1666666667	6

W#80A (Blue Light):

Month	April	April	April	May	May	May		
DAY	5	11	29	12	21	22		
UT	00:54	01:58	23:43	01:16	23:27	23:33		
INSTRUMENT	203 New t	203 New t	203 New t	203 Newt	203 Newt	203 Newt		
MAGNIFICATION	x167	x250	x133	x167	x167	x312		
SEEING	All	AIII	AIV	AIV	AIV	AIII-IV		
INTENSITY OBSERVATIONS				4			INTENSITY AVERAGE FOR THE APPARITION	NUM BER OF OBSERVATIONS
THE PLANET								
SPR	4	3.5	4.5	4.5	4.5	4.5	4.25	6
STropZ	2	1.5	1.25	2.25	2	1.5	1.75	6
SEB	3	3	4.5	4	4.5	4	3.8333333333	6
EZ(n)	1.5	1	1	1	0.75	1	1.0416666667	6
NEB(S)	5	6	4.5	5	5	4	4.9166666667	6
NEBz	3	3.5	-	-	-	3.5	3.33333333333	3
NEB(n)	5	6	6.25	5	5	5	5.375	6
NTropZ	3	2.5	1.75	2	2.5	2	2.2916666667	6
NTB	4	3	3	4	-	-	3.5	4
NTZ	3	2.75	-	-	-	2	2.5833333333	3
NNTB	-	-	-	-	-	-	#DIV/0!	0
NPR	3.5	4	3	4	3	3.5	3.5	6
NPC							#DIV/0!	0
							#DIV/0!	0
THE RINGS							#DIV/0!	0
A-Ring	2	3.5	4	4	4	3.5	3.5	6
Cassini Division	10	10	10	10	10	10	10	6
B1-Ring	1	1.75	1.75	1.75	1	1.75	1.5	6
B2-Ring	3	3	3	3	-	3	3	5
B3-Ring	-	-	-	-	-	-	#DIV/0!	0
C-Ring	8.5	8	-	9	8	8	8.3	5

W#25A (Red Light):

Month	April	April	April	May	May	May		
DAY	5	11	29	12	21	22		
UT	00:57	01:58	23:46	01:09	23:33	23:38		
INSTRUMENT	203 New t	203 New t	203 Newt	203 Newt	203 Newt	203 Newt		
MAGNIFICATION	x167	x250	x133	x167	x167	x312		
SEEING	Alli	All	AIV	AIV	AIV	AIV		
INTENSITY OBSERVATIONS							INTENSITY AVERAGE FOR THE APPARITION	NUM BER OF OBSERVATIONS
THE PLANET								
SPR	3.5	3.5	3.5	4	4	4	3.75	6
STropZ	2.75	1.5	2.75	3.5	3.75	2	2.7083333333	6
SEB	3	3	-	4	5	4	3.8	5
EZ(n)	0.75	1	1	1	1	1.75	1.0833333333	6
NEB(S)	3.75	5	3.5	3.5	3.5	3.5	3.7916666667	6
NEBz	2	3	-	3	3	3	2.8	5
NEB(n)	3.5	5	3.5	3.5	3	3	3.5833333333	6
NTropZ	2.5	2.75	2.75	2.5	2.5	2.5	2.5833333333	6
NTB	3	3.25	3.5	3	-	-	3.1875	4
NTZ	2.5	2.75	-	2.5	-	2.5	2.5625	4
NNTB	-	-	-	-	-	-	#DIV/0!	0
NPR	3.5	4	4	4	3.5	3.5	3.75	6
NPC							#DIV/0!	0
							#DIV/0!	0
THE RINGS							#DIV/0!	0
A-Ring	3.75	3.75	3.75	4	4.25	4	3.9166666667	6
Cassini Division	10	10	10	10	10	10	10	6
B1-Ring	2	1.75	1.75	2	2	2.5	2	6
B2-Ring	4	3.25	-	-	-	2	3.0833333333	3
B3-Ring	-	-	-	-	-	-	#DIV/0!	0
C-Ring	7	7	9	9	9	7	8	6

6. Conclusions

Overall, it was a very disappointing apparition. Little could be done due to the poor weather. The weather continued to hamper observations throughout the rest of the year, and as a result. Observations by the author of Mars and Venus (and Jupiter at the time of writing) have all been reduced due to almost constant cloud cover.

The most interesting thing to be observed during the 2011-12 apparition was the apparent broadening of the NEB. There also seemed to be some remnants of to 2010-11 storm still visible in the Northern hemisphere. The author had hoped to investigate the colour of Titan along with David Gray, Alan W. heath and Gary Poyner. Poyner had made magnitude estimates of Titan which showed some slight change in magnitude, while Gray and Heath had observed some colour change in Titan during this apparition. Alas due to the poor conditions, the author was only able to make one definite observation of Titan so the results are still inconclusive at this time.

References:

1. "The Planet Saturn. A History of Observation, Theory and Discovery," A.F.O'D. Alexander, Faber and Faber, 1962.