Saturn During 2023-24 Apparition: Summary of Observations

Paul G. Abel

Start of Observations: 2023 July 30 **Finish:** 2023 November 16

Number of Observations: 9 (9 disk drawings)

B= 8° to: 10.5° Ls= 159° to: 163°

Opposition: 2023 August 27 (Aquarius)

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1. Introduction

For the last decade, Saturn has been at a very low altitude for UK based observers as the planet has been located well south of the celestial equator. During this time, the planet was very difficult to observe for the author as it could only be observed during a short window.

In the last few years, the planet has started to climb higher and more meaningful observations can be made. In particular, it has been possible to make intensity estimates and for the next apparition it is hoped that filter work can be undertaken once more.

The British weather did rather hamper observations towards the end of 2023- we had a lot of cloudy and wet weather from October onwards (and at the author's observing site, not a single clear night in December 2023). In the end, nine disk drawing were obtained and six intensity estimates- these are given in section 5. All observations this report is based on were made with the author's 12" (305mm) Newtonian reflector, the final neat observations can be found in the volume 5 Saturn observing book.

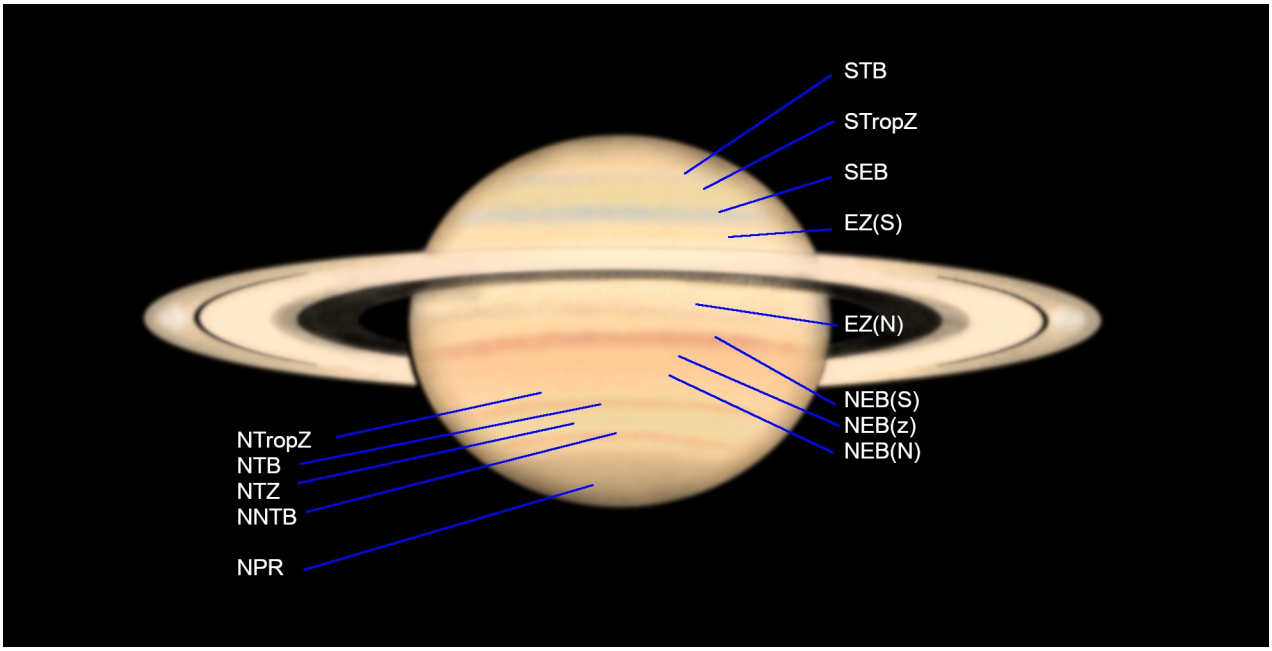

Figure 1: Nomenclature of the various belts and zones on Saturn used by the author

We now give a brief overview of the features observed on Saturn- for the disk we start in the south and move north, for the rings we start with Ring A and move inwards. The nomenclature adopted by the author is consistent to that adopted by the BAA Saturn Section and the nomenclature of features observed is given in figure 1.

2. Observations of the Globe

The tilt of Saturn is now considerably smaller compared to previous apparitions in the last five years. As a result much more of the southern hemisphere could be seen in this apparition.

Southern Polar Regions [SPR]: Only just visible due to the tilt- a vague greyish region.

South Tropical Zone [STZ]: A lighter zone which usually seemed to contain a distinctive greenish hue.

South Temperate Belt [STB]: A faint belt- initially this belt appeared to be grey but for most of the apparition the STB had a distinctive bluish cast.

South Tropical Zone [STropZ]: A bright zone which had a notable pale greenish hue

South Equatorial Belt [SEB]: This is the first apparition in which the SEB has been clearly visible since 2012 due to the tilt of Saturn. Observations from that period showed the belt to be a brownish colour with occasional darker, irregular sections present along the boundaries of the belt.

During this apparition the belt had a distinctly bluish-grey cast and no darker condensations were observed by the author. The bluish cast was quite distinctive and easy to observe for most of the apparition.

Equatorial Zone South [EZ(S)]: This zone was only partially seen due to the obscuration of the region by the rings crossing the disk. In general is was a bright zone with a yellowish colour. The shadow of the rings on the globe were visible in this zone prior to opposition. The shadow was always black in colour.

Equatorial Zone North [EZ(N)]: A bright , pale yellow zone and the brightest zone on the planet although it did show some small variation in intensity.

North Equatorial Belt [NEB]: This belt seemed to be composed of three distinct regions: a dark southern belt (the NEB(S)), a brighter zone (NEB(z)) and a lighter northern belt (NEB(N)).

The NEB(S) was the darkest component and was usually the darkest belt visible on the planet. Occasionally some darker condensations were observed within this belt. The NEB(S) was generally a brownish colour (with other warm tones detected) and showed some small variation in intensity. The NEB(z) was a lighter brownish colour and appeared as a featureless zone. Finally the northern component – the NEB(N) – was the faintest of the two belts, also brown in colour and was not always present.

North Tropical Zone [NTropZ]: A light zone, generally yellowish in colour but sometimes warmer tones were also detected in this region.

North Temperate Belt [NTB]: A light brown band- the belt showed some variation and was easier to see on some occasions while at other times it seemed more obscure.

North Temperate Zone [NTZ]: A brighter zone which seemed to contain a distinctive greenish hue very similar to that of the corresponding STZ. Like the STZ, this zone also showed some variation in intensity.

North North Temperate Belt [NNTB]: A dark brown belt which was easier to see than the NTB. At times the NNTB appeared to be as dark as the NEB(S).

Northern Polar Regions [NPR]: A light brownish/grey colour- usually featureless but occasionally a polar band could be seen.

3. Observations of the Rings

The next ring plane crossing is due to take place on 2025 March 23, and as a result the rings were at a much shallower angle in 2023 and will continue to close up as we approach the ring plane crossing.

As the rings start to close the details within the ansae naturally start to become harder to observe- the Cassini Division for example is only visible at the ansae edges. It does however become easier to see the shadow of the rings on the globe before opposition and provides the opportunity observe satellite transits.

A-Ring: A lighter ring, brownish in colour although sometimes greyish tones were also observed. The ring was not uniform in appearance; the outer third was darker than the inner two thirds of the A-Ring.

Cassini Division: Visible in all observations even in poor seeing. It could not be traced all the way along the ansae however and was best seen at the ansae edges. The division always appeared black in colour.

B1: Ring: A bright white ring which seemed to show no variation in intensity in observations made during the apparition.

B2: Ring: A darker ring, greyish in colour and could only be seen at the ansae edges.

C-Ring: A dark semi translucent ring which appeared to be particularly dark when it crossed the globe of the planet. The ring did appear to show some variation in intensity and was brighter and easier to see near to opposition.

4. Observations of the Satellites

As we start to approach ring plane crossing, the equator of the planet becomes aligned with the view from Earth and since the majority of the Saturnian satellites have bound orbits within the equatorial plane, it becomes possible to observe the satellites passing in front of Saturn in a phenomenon known as a transit. Unlike the four Galilean satellites of Jupiter, only Titan and its shadow are visible in smaller telescopes. The transits of the other major satellites of Saturn can be seen in larger telescopes.

There were a number of satellite transits during the 2023-24 apparition, alas due to the poor weather conditions none of them were observed by the author.

5. Intensity Estimates

Below are the intensity estimates made by the author during the apparition. The usual BAA Saturn Section scale was adopted (0: brilliant white, 10:bBlack sky). Also included in the table is the mean, standard deviation and variance. Some caution should be exercised with regards to thee variation and standard deviation as the data set is small.

British Astronomical Association: Saturn Section Intensity Estimates

Observer: Paul G. Abel **Year:** 2023

Instrument(s): A: 305mm Newtonian Reflector

Month	Aug	Aug	Sept	Sept	Sept	October			
Day	06	20	03	05	18	09			
UT	2358	2312	2223	2144	2053	1933			
Int & Power:	A, x230	A, x230	A, x230	A, x230	A, x230	A, x230			
Conditions:	3	2/3	2	2	2/3	2/3			
Definition:	Fair	Fair	Fair	Fair	Average	Average			
Class:	I	I	I	I	II	II			
FEATURE:							**Average**	**Stand Dev**	**Variance**
SPR	2.50	3.00	4.00	3.00	3.50	3.00	3.17	0.52	0.27
STZ	1.75	1.75	2.50	2.50	3.00		2.30	0.54	0.29
STB	3.75	3.00	3.75	3.50	3.50	3.50	3.50	0.27	0.08
STropZ	1.50	1.50	1.75	1.75	1.50	1.25	1.54	0.19	0.04
SEB	4.00	3.25	4.00	4.00	3.50	3.25	3.67	0.38	0.14
EZ(N)			1.50	2.00	1.00	1.50	1.50	0.41	0.17
ShRG	10.00						10.00		
NEB(S)	4.75	5.00	5.00	4.50	6.00	4.75	5.00	0.52	0.28
NEB(Z)	3.00	3.00	3.00	3.50	3.00	3.00	3.08	0.20	0.04
NEB(N)			4.00	3.75	3.50	3.25	3.63	0.32	0.10
NTropZ	1.50	1.75	2.00	2.00	1.50	2.00	1.79	0.25	0.06
NTB	3.50	3.50	3.00	3.75	3.00	4.00	3.46	0.40	0.16
NTZ	1.75	2.00	2.50	2.50	1.50	2.00	2.04	0.40	0.16
NNTB	3.25		3.00	4.00	4.00	4.00	3.65	0.49	0.24
NPR	2.50	3.00	4.00	3.00	3.00	3.00	3.08	0.49	0.24
A-Ring	3.50	2.00	3.50	3.50	3.50	3.00	3.17	0.61	0.37
Cassini Div	10.00	10.00	10.00	10.00	10.00	10.00	10.00	0.00	0.00
B1-Ring	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
C-Ring	7.00	6.00	7.00	7.50	7.00	7.00	6.92	0.49	0.24
ShGR	10.00	10.00	10.00	10.00	10.00	10.00	10.00	0.00	0.00

6 Concluding Remarks

Although only a small number of observations were made (due to the weather), Saturn was much better placed for observations, and a number of interesting details were observed on Saturn. Intensity estimates were taken, and although the data set is small, the various features seem to show some variation in intensity.