Astronomy Observation Journal by Target

Piero Dalle Pezze

July 25, 2015

Abstract

This document contains my observation reports by target. This file was generated using Java software tool *AstroJournal* (https://zarshark@bitbucket.org/zarshark/astrojournal.git) and *pdflatex* (http://www.tug.org/texlive/). *AstroJournal* imports files containing astronomy observation reports and observed objects by catalogues. Once imported, it generates an integrated journal document in LaTeX which is then exported in PDF using the utility *pdflatex*. *AstroJournal* is released under GPL v3 license.

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1 Legends

Seeing Scale (Antoniadi):

1. Perfect seeing, without a quiver
2. Slight undulations, with moments of calm lasting several seconds
3. Moderate seeing, with larger air tremors
4. Poor seeing, with constant troublesome undulations
5. Very bad seeing, scarcely allowing the makings of a rough sketch

Transparency Scale (American Association of Amateur Astronomers):

1. Do Not Observe: Completely cloudy or precipitating (Why are you out?)
2. Very Poor: Mostly Cloudy
3. Poor: Partly cloudy or heavy haze. 1 or 2 Little Dipper stars visible
4. Somewhat Clear: Cirrus or moderate haze. 3 or 4 Little Dipper stars visible
5. Partly Clear: Slight haze. 4 or 5 Little Dipper stars visible
6. Clear: No clouds. Milky Way visible with averted vision. 6 Little Dipper stars visible
7. Very Clear: Milky Way and M31 visible. Stars fainter than mag 6.0 are just seen and fainter parts of the Milky Way are more obvious
8. Extremely Clear: overwhelming profusion of stars, Zodiacal light and the gegenschein form continuous band across the sky, the Milky Way is very wide and bright throughout

Target Types:

- SN Rem: Supernova Remnant
- Neb: Nebula
- Galaxy: Galaxy
- CL+Neb: Cluster with Nebula
- Opn CL: Open Cluster
- Glob CL: Globular Cluster
- Pln Neb: Planetary Nebula
- Satellite: Our Satellite (Moon)
- Planet: Solar System Planet
- Star: Star
- Dbl Star: Double Star
- Mlt Star: Multiple Star
- Asterism: Asterism

2 Solar System

Sun, Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 50x; 15x, 51x. TV60F6, Cambridge (UK).
- 11/04/2015 18:00-19:00, Cambridge, UK. 2 - Slight undulations, 2 - Poor. Tele Vue 60 F6, 51x +/- VPF; 72x. Two spot areas: one in the north, the other one in the south. 5 small spots where visible in the north, 4-5 in the south spot area. 2 small spots in the centre of the sun. Best view 51x, using variable polarising filter. No granularity was visible due to the bad seeing.
- 14/04/2015a 18:00-19:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 51x +/- VPF; 72x, 103x. Today at 4pm there was a gigantic flare (CME) about 1 sun radius long. Unfortunately I was not at home. I looked at the Sun, but the flare was gone by the time I set up the telescope. A large group of black spots was visible in the North hemisphere. Around them granulation was clearly visible. Granulation was also detectable, although with some difficulty, on the Sun surface at 51x using a VPF. At 72x the Sun revealed a nice image where Sun spot details were visible as well as surface granulation. 103x was just too much for this seeing. Although it can be used for magnifying the solar spots, granulation is completely lost. In addition, floaters become a real issue when watching the sun using 0.6mm exit pupil. I think the best magnification is between 51x and 72x. The Vixen 5mm works very well with the Sun. This was used without VPF filter.
- 06/06/2015 15:00-18:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 51x +/- VPF or SPF, 72x +/- VPF, 103x +/- VPF. I enjoyed observing the Sun a lot today. There were more than 30 sunspots and also a hint of granulation when the wind became calm for short moments. Very nice day. The wind did not allow to see Sun granulation most of the time. The seeing improved after 5pm when the wind became more moderate. Many sunspots were visible. Three larger umbrae were surrounded by nice areas of penumbra. One of this had an irregular shape and the South part vanished gradually. This at all powers. It was very attractive. A central area contain 4 well defined sunspots and many little grey spots. Around the larger sunspots, there were brighter and extended areas on the Sun surface. 51x gave the best view most of the time. 72x and 103x were interesting powers but only suitable when the wind was calm, which was rare! A VPF increased the detail noticeably. Apart from reducing image brightness, I appreciate this filter because it stabilises the image, particularly under average seeing. Surprisingly I found that I prefer the view through a SPF rather than VPF. A VPF reduces image brightness, whereas a SPF improves contrast to me. Through a SPF I could see a hint of granulation at 51x even when there was moderate wind. This did not happen with a VPF. I am considering whether separate the two filters. Having them separate would also be quite comfortable when watching planets in the twilight. SPF also improved contrast for all the sunspots. This works as follows: 0 (or 180) degrees shows the brightest image, 90 (or 270) degrees shows the darkest image. For observing both planets and the Sun, I found that I prefer the view when the SPF is positioned at 45 (or 135 or 225 or 315) degrees. The image was still bright, contrast was highest than all other options and the number of details was maximised. Nagler 7mm, Vixen 5mm, and Nagler 3.5mm form my best eyepiece combination for watching the Sun with the TV-60. All of them are really useful, although the first two achieve best results almost every time. The Nagler 3.5mm can show some very nice close-up of umbrae and penumbrae.
- 19/07/2015 15:50-16:45, Cambridge, UK. 4 - Poor seeing, 5 - Clear. Tele Vue 60 F6, 28x, 51x, 72x, 103x. It was generally windy, but sometimes the wind was mild for a few minutes. There were not many sun spots today. One was located at about the centre and was formed by a penumbra region followed by four little spots. A little bit North of this spot region, there was a chain of six spots. Faculae were detectable around these two areas when the wind was calm. 51x was generally the best magnification for today, whereas 72x could be used when the wind was mild.

Moon, Satellite:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x, 90x, 180x; 15x, 51x, 72x, 103x, 144x. C114F8, Italy (IT); B15x70, TV60F6, Newcastle, Cambridge (UK).

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Waxing crescent 25%. Very crisp details.

- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 51x, 103x. Moon phase 91%. The moon at 103x did not need a filter. It was very crisp and showed details in the South hemisphere despite it was almost full. At 51x, the moon is simply scaled of a factor of 1/2, indicating that the Nagler 3.5mm behaves as a perfect 2x Nagler 7mm. It would be useful to have a Moon map to check the crater's names.

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF, 206x + SPF. Observed in the twilight. Visible almost 60% of its phase. The SPF seems to stabilise the image if the seeing is not good. This is a lovely target with the TV60, and keeps magnification pretty well. At 206x the moon surface appeared like a bubble at the poles due to the seeing, but there were moments in which it was possible to see a quasi stable image. Subtle details on the surface were observable as well as minute craters and shades on the ground. Interestingly, on the terminator mounts tips were illuminated whereas their bases were obscured. There is so much to see at 206x that one could spend the entire night observing our satellite! Montes Apenninus, Caucasus, and Alpes were incredible targets and appeared just beautiful. The crater Cassini and all the small nearby craters were spectacular. While I am not sure the SPF increased image contrast, I prefer the view with SPF as it seems that the image is just stabler at both 103x and 106x.

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF. Phase 96%. No many detail were revealed. The moon is not really interesting when full. Craters and seas were detectable but not immersive.

- 23/06/2015 21:40-23:15, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x, 103x, 206x. Observation at twilight. Waxing crescent at about 40%. At 72x, the Moon was really beautiful and crisp. Very soft little clouds passed over the South hemisphere and the view was really suggestive. At 103x, some more detail were visible, although these were somehow lost at 206x due to the non perfect seeing which did not allow to get a perfect focus. At 28x, the Moon appeared as a lovely target floating on the sky. The ultra wide field of the Nagler 13mm really shows the Moon and the surrounding context.

- 29/06/2015 21:30-22:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 72x, 103x, 206x. Observation at twilight. Waxing Gibbous, 94%. The moon was not very crisp tonight due to a little layer of high clouds caused by the high temperature during the day. I moved from Montes Apenninus to Copernicus. A small crater was visible inside, but many details on the circular border were not clear. Therefore I moved to Kepler as this was farther East hoping to improve the visible contrast. This showed a little shadow on one border. At 206x, from Kepler I moved North-East, following the crater chain formed by Kepler C, Marius D, F, A, C, and B. All these craters are relatively small and close to each other. Finally I moved North reaching Aristarchus which appeared beautiful. This white crater shows an impressive contrast and is close to a little half circle of hills at North-East and a dark crater (Herodotus) at East. Really nice view.

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 72x, 144x, 206x. Observation at twilight. Waxing Gibbous and phase 97%. I observed Tycho, Copernicus and Kepler.

Mercury, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).

Venus, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 72x, 144x. C114F8, Venice (IT); TV60F6, Cambridge (UK).

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x, 144x. 144x was too much. Possibly because the planet was too low, or because the eyepiece did not cool down properly. In any case, even at 72x, no planet atmosphere detail.

- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x. Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. A polarised filter might help on this target.

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x, 206x. Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. At 206x, on one side of the focus, Venus appeared violet, on the other side green/yellow. When in focus, there was no colour aberration. Curiously, at this magnification it was still very bright suggesting that a variable polarising filter might be beneficial.

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF, 206x + SPF. Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable even with the SPF. Planet glare was reduced but it was very difficult to focus, likely due to the average seeing and high magnification.

- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 103x, 206x. Phase about 50%. No detail visible, but the image was sufficiently stable. A SPF would have helped, but I forgot it at home.

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 72x, 144x +/- SPF. Gorgeous with the Vixen SLV 5mm. The best view of Venus I have ever had so far. Phase was about 45%, and Venus appeared crystal clear without any glare and perfectly focused. The borders were very crisp. At 144x the planet was bigger, but no additional detail was detectable. At both 72x and 144x, I felt that at the center of the visible part of the planet, the colour was just slightly dimmer as if a soft darker cloud was there. Really beautiful. SPF did not help much with the Vixen, so I removed.

- 23/06/2015 21:40-23:15, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x, 103x. Observation at twilight. Phase about 40%. Again, the Vixen revealed a wonderful Venus. Very crisp on the border and a clear arc defining the phase. A few times I had the impression of a slightly darker patch on the clouds located in the South hemisphere near the centre centre of the planet. This happened with Venus at different position in the eyepiece. At 103x Venus was still a pleasure to see, but not as much as at 72x. At 28x the phase was clearly there too, and the image was still crisp.

Mars, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x, 90x,180x. C114F8, Venice (IT).

Jupiter, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x, 90x, 180x; 72x, 103x, 144x. C114F8, Italy (IT); B15x70, TV60F6, Newcastle, Cambridge (UK).

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 103x, 144x. A bit of wind, but the image stays crisp at high magnifications. No aberration.

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 144x. Order: Europa, Callisto, Jupiter, Io, Ganymede. Two belts very visible. The lower one was visible on the left (refractor). On the right the great red spot was detectable. Very minor belts north and south.

- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Quick observation. Two belts and four satellite were visible.

- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 103x. Two belts clearly visible and a faint one in the South hemisphere was detectable. All four satellite were visible. Io and Europa were very tight at East of the planet.

- 09/04/2015 21:20-22:45, Cambridge, UK. 2 - Slight undulations, 2 - Poor. Tele Vue 60 F6, 15x; 103x +/- VPF. At the eyepiece from right to left: Callisto, Io, Jupiter, Europa and Ganymede. This evening I decided to test my new eyepiece (Nagler 3.5mm). Due to the lack of transparency, I only tested this on Jupiter. This was the first time I observed at 103x without using a Bresser 2x SA. The difference was quite substantial. I had the impression that the Nagler 7mm with Bresser 2x SA was more colour corrected than the Nagler 3.5mm only at the edge (last 10% before the field stop). This might have been caused by the presence of light fog though, instead of the eyepiece. I will test this again. On the other hand, the lack of the Bresser 2x SA (4 lens less) improved transparency, and this was detectable. With a Nagler 7mm and Bresser 2x SA, I am able to see a bit more than the two main belts only when the seeing is quite good. Tonight, although the seeing was acceptable, but the sky was quite foggy. The main two belts (North and South Equatorial Belts) were visible and other two belts at the poles were easily detectable (North Polar Region, S.S. Temperate Belt). In the North and South Equatorial Belts, some shades were also detectable. No direction was visible but it was possible to see that the borders and belt colours were rough and not homogeneous. This was particularly true for the North Equatorial Belt. No GRS was detectable. The use of a single or double polarizing filter did not improve image quality. The whole image only appeared too dark and the minute details previously described were lost. Possibly, the VPF is more appropriate for brighter objects (e.g. the Sun and the Moon) or Jupiter during sunset or dawn.

- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x, 72x. Transit of Ganymede on Jupiter. Little black dot on the Equatorial zone. All the other three main satellites were well distict on right.

- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x. At 103x Jupiter showed 4 moons and 4 belts. No specific events were visible this evening.

- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x, 206x. Observed in the twilight. Still visible at 206x with some detail but the new tripod is not up to this sort of magnifications. To be fair, the new tripod was fine at 103x but only when there was no wind. 3 belts and 4 moons visible. It would be interesting to try 206x with my solid tripod.

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x, 206x. Observed in the twilight. The idea started as a joke because I thought the image would have been too dark for discerning any detail. Instead, it was possible to perceive a little amount of shades on the two major belts of the planet. The boundaries of the other two less visible belts (North and South hemisphere, respectively) were also there. At 103x I was able to see the boundaries of these two belts on the 'equator side', but not on the 'pole side'. At 206x these were noticeable. 4 moons were detectable and one was just about to get closer to Jupiter. I agree with Gerry (sgl: jetstream) that watching Jupiter in twilight shows more contrast. I was also able to see some red-ish colour on the major two belts, which instead is less noticeable when watching Jupiter in the dark. Looking at a bright source before watching the planet did not help me instead. I found I had more difficulty to notice details. Although the exit pupil was only 0.3mm, floaters did not cause me serious problems. Interestingly, I found floaters to be a problem when watching the Sun at 103x. Could these be related to overall image brightness?

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF, 206x + SPF. Observed in the twilight. The SPF noticeably improved the view. Four belts and the transit of Callisto were easily visible at both 103x and 206x. The use of a SPF seemed to stabilise the image and improved contrast. A fair amount of shades were also perceptible on the main two belts. The transit appeared as a crisp black dot on the planet atmosphere. Without the SPF it was only possible to see the two main belts and no shade on them. They simply appeared as two thick lines across the planet. Interestingly the transit shadow appeared a tiny bit better without the filter. To me, using the SPF requires a bit of experience in order to rotate the eyepiece to gain the best contrast. However this is feasible.

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF. Observed in civil twilight. The seeing was not enough good for pushing magnification beyond 103x. At 103x, two major belts and two moons were visible. I did not spend much on this target tonight because it was too windy when I observed it.

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x +/- SPF, 206x + SPF. Just a quick look until the sky became darker. No particular event tonight. It was very nice to see it. The two main belts revealed some subtle detail appearing like tiny shades. In particular these were more detectable in the North Equatorial Belt.

- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 103x, 206x. 206x was too much for Jupiter tonight. Mostly seen it at 103x. Three moons visible, whereas the fourth seemed behind the planet. North and South Equatorial Belts were visible. On the North Hemisphere another belt was also detectable. No GRS visible.

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 72x, 144x +/- SPF. Jupiter was visible with North and South Equatorial Belts and four moons. No other detail was detectable. SPF did not help with the Vixen. The planet did not appear much crisp in contrast to Venus. Also here, I preferred the view of Jupiter at 72x (without Barlow). It is as if the barlow lens introduces some imperfections which remove the additional benefit of using a Vixen vs a Nagler. The same can be said for the SPF with the Vixen. Vixen alone gave the best views (without Barlow or SPF).

- 23/06/2015 21:40-23:15, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 72x, 103x. Observation at twilight. All four moons were visible tonight. At 72x 4 belts were detectable and colours were also visible. These appeared as brown-red for the belts and slightly darker white for the zones. At 103x the image was a bit degraded compared to 72x. I believe the Vixen SLV is just a tiny but noticeable bit better than the nagler 3.5mm

Saturn, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x, 90x, 180x. C114F8, Venice (IT).

- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 103x. Very low on the horizon and therefore not the best moment for viewing this target. Despite this, rings and titan were visible. Neither the Cassini division nor belts were detectable.

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x. It was a bit higher than yesterday, but unfortunately, my telescope and eyepieces were soaked with humidity and could not really see this target after the first 5 min. Rings were clearly defined, and I believe the Cassini division could have been detectable.

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 103x, 206x. It is still fairly low on the horizon. Titan was visible. The Cassini division was not detectable, but it was possible to see a shade in the middle of the ring. At 206x the image was just degraded and difficult to focus. I have to wait for a higher position of the planet.

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 103x. Seen during civil twilight and later in the nautical twilight. Although the seeing was not great, Saturn appeared very crisp. The rings had a very nice inclination. The Cassini division was generally not detectable. For few seconds when the seeing stabilised, a hint of dimmer colour was visible on the external part of the rings. A nice belt was visible all the time in the North hemisphere (North Equatorial Belt) of the planet. Titan was visible too. The view was really nice generally. Possibly due to the seeing, but I preferred the view when the sky was darker.

- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 103x, 206x. Very nice view of Saturn tonight. At both 103x and 206x, the Cassini division was detectable when the sky appeared steady for few seconds. It appeared as a soft grey shade on the lateral parts of the rings. Possibly what I was seeing was the shade between the A and B rings. This was not always visible, but just for few seconds when the seeing was steady and no wind blew,

the difference in colour intensity was noticeable. Titan was also visible on the South of the planet. It seemed a grey dot. The North Equatorial Belt on the planet appeared as a soft darker gradient compared to the planet equatorial zone. The North Polar Region was not clearly detectable.

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x +/- SPF, 144x. Saturn was wonderful with the Vixen at 72x. The North Equatorial Belt was detectable particularly when in contrast with the Equatorial zone. The Cassini division was visible on the left and right parts of the rings when the planet was at the centre of the eyepiece. It appeared as a soft grey line which separated more dense rings (B rings) from lighter rings (A rings). The shadow of the planet on the ring or details on the polar region were not visible. Titan was also visible. A SPF did not help and actually degraded the image for Saturn with the Vixen. At 144x, the image degraded and was not as nice as at 72x. At 28x, the planet was very small, but the rings and the empty part between the planets and the rings were visible. Titan at South-West of the planet in the eyepiece was much brighter at this magnification (due to the larger exit pupil) and I felt a small faint dot was detectable at South-East of the planet in the eyepiece. This was closer to the planet than Titan. After checking Saturn's moons positions with Sky and Telescope software application, the only moon at that distance and position was Rhea. I am not sure I saw this moon of magnitude 10. It would be at the limit of my TV60. This dot was more visible with averted vision although it was also detectable via direct vision.

- 23/06/2015 21:40-23:15, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 18x, 28x, 72x, 103x. Observation at twilight. At 72x, Titan was clearly visible and appeared yellow-orange. The planet appeared yellow globally, whereas one the North Equatorial Belt was more orange. The Cassini division was detectable on the lateral parts of the rings and the Ring A was distinguishable from the Ring B, due to the difference colour intensity. At 103x, no additional detail was visible, but the Cassini division was still there on the lateral parts. At 28x, the rings were visible and well separated from the planet. Titan's colour was a bit more orange. It is really interesting that these colours appear much more evident when the sky is clear rather than dark. I believe this is due to the eye cones which are more active than the eye rods. At 18x, I could not really distinguish the rings from the planet, although the non spherical shape was observable. No additional moon was detectable at these low powers.

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 72x. Observation at twilight. Due to the poor seeing, I did not push magnifications higher than 72x. Even at this zoom, the planet was not very crisp.

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 51x, 72x, 103x . Observation at twilight. At 28x I could spot the rings and Titan. At 51x Saturn was very crisp but not additional detail was detectable. At 72x, the North Equatorial Belt and the Cassini division on the lateral rings were visible. At 103x those gained details were somehow lost unfortunately. Saturn was lovely at 72x.

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x, 51x, 72x, 103x . Observation at twilight. At 72x, the North Equatorial Belt was easily visible. The Cassini division was detectable at the lateral sides of the rings, and the rings A and B were clearly distinct. Titan was visible and appeared like a small star. At 28x or 51x the planet looked crisper, but the NEB was not easily detectable. At 103x the Cassini division was not visible. The seeing was not good enough for higher power, unfortunately.

Uranus, Planet:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 10x; 15x; 15x. B10x50, Lorenzago (IT); B15x70, TV60F6, Newcastle (UK).

Venus - Jupiter, Planet:

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x, 72x, 103x. Observation at twilight. Conjunction Venus-Jupiter. The two planets were about 0.3 / 0.5 degrees apart. Venus was largely brighter and bigger than Jupiter. Venus phase was

less than 40%. The planet border was well defined. Jupiter bands were only visible at low power (28x) due to the mediocre seeing. It was possible to see 3 satellites but the sky was still too bright for detect them easily. It was nice to see this conjunction, but unfortunately the seeing did not allow sufficient resolution for Jupiter which was not easy to focus. At 28x the North and South Equatorial belts were visible in the early evening. It was an interesting conjunction but not as great as the one I saw when I was teenager. At the time the two planets were elongated at naked eye. It was spectacular.

3 Messier Catalogue

M1, Tau, SN Rem:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x. Crab Nebula. C114F8, Venice (IT).
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x; 51x +/- OIII, UHC. Crab Nebula. Invisible after trying with different magnifications and averted vision. Filters did not help either. Darker skies are required for this target. Possibly try with an eyepiece at 2.0mm exit pupil.

M2, Aqr, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for M15.

M3, CVn, Glob CL:

- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Again, not easy to find. I used the axis from Gamma to Beta Com. This cluster is brighter than M54 and at 51x seems a large white/grey blob.
- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. As all the globular cluster seen with a small telescope, M3 also appears like a little grey cloud. This is a bright globular cluster and a hint of 'granulation' is perceptible although no star can be resolved. Not very easy to find due to the lack of bright stars to star hop from Arcturus.

M4, Sco, Glob CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. I was not able to detect this cluster. I suspect the reason was that it is too low in the sky for my TV-60 and Antares brightness did not help either. Therefore I decided to focus on the beautiful open cluster of this region of Sky, which was the only area not affected by clouds and actually transparent.

M5, Ser, Glob CL:

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. It appears like a grey cloud. From the star Unukalhai (Alpha Ser), go South and you find it. It is a relatively easy target.

M7, Sco, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x. Ptolemy Cluster. C114F8, Venice (IT). Large and beautiful open cluster. It was just above the horizon and the last cluster visible if moving towards East.

M8, Sgr, CL+Neb:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Lagoon Nebula. About 1-1.5 degree large, this is a very nice cluster with nebulosity. I did not have a OIII filter with me, but the nebula was detectable without filter. It appeared a soft gray patch surrounding the cluster. This cluster is quite elongated. Superb.

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC or OIII, 28x. Lagoon Nebula. At 28x the stars in this cluster with nebula are much better separated. I decided to use a low power eyepiece on the nebulae in this area. The OIII was too strong mainly because the sky was not dark enough and this target is just above the horizon. Instead a UHC was ideal and revealed the nebula via direct vision clearly. This is one of my favourite targets in Sagittarius.

M10, Oph, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x. C114F8, Venice (IT); B15x70, Newcastle (UK).
- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Nice globular cluster. It does not have nearby stars, but is relatively large. Stars are not really visible, but the cluster appear with some hint of granulation particularly detectable on the outside.

M11, Sct, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Wild duck cluster. B15x70, Newcastle (UK).
- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x, 51x, 72x. The first time I observe M11 this year. Gorgeous. Stars were visible with averted vision at 51x and 72x. At this last magnificaiton, the cluster appeared really nice and clear. Apart from the limited field of view, it seems to me that the Vixen SLV works really nicely also on DSO.

M12, Oph, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).
- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Like M10, this is another nice globular cluster. Somehow I preferred it to M10 because of the presence of surrounding close stars at east. I believe this cluster is slightly bigger than M10, or at least it seemed so. Like M10, a hint of granulation was detectable.

M13, Her, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 51x. Hercules Globular Cluster. C114F8, Venice (IT); B15x70, TV60F6, Newcastle (UK).
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Detectable at 15x, but nicer at 28x. No star was resolved. It would be interesting to try 51x although I guess this might be too much.
- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Same as M3. Very bright and large globular cluster. Some granulation is perceptible but no star could be resolved.

M14, Oph, Glob CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Bright globular cluster and relatively easy to find. As all the globular cluster I have observed with the TV60, no star is resolved.

M15, Peg, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. One of the most brightest globular cluster.

M16, Ser, CL+Neb:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Eagle Nebula. After seeing M25, I moved North-West towards M16. This appeared quite bright with some stars at the centre.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. Eagle Nebula. This nebula was only visible with averted vision. Whereas I did not see much difference in the Omega Nebula between averted and direct vision, for the Eagle Nebula averted vision showed a much wider nebula extension.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC or OIII. Eagle Nebula. As previously found, the UHC seems to work better on these targets. I believe it is due to the lower position and to the sky which is not fully dark. The OIII largely shrank the nebulosity. Beautiful target as always.

M17, Sgr, CL+Neb:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Omega Nebula. From the Eagle Nebula, I simply moved South and saw this target. It is a bit smaller than the Eagle, but still bright.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. Omega Nebula. The nebula was clearly visible at 15x with direct vision. It appeared as a small but quite dense cloud.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC or OIII. Omega Nebula. As for the Eagle nebula.

M18, Sgr, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. A small open cluster at South of Omega Nebula.

M20, Sgr, CL+Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x. Trifid nebula. C114F8, Venice (IT).
- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Trifid Nebula. Positioned at North of M8, M20 is a bit smaller, but still impressive. Also here, the nebulosity was detectable and the shape of the cluster was elongated connecting M20 with M21.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. Trifid Nebula. The Southern part of this nebula benefitted from the UHC filter and showed a patch of cloud around the cluster. The Northern part of the nebula was not visible instead.

M21, Sgr, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. M21 was a condensed group of stars on one extremity of M20. M8, M20 and M21 are really spectacular targets.

M22, Sgr, Opn CL:

- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Large globular cluster quite similar to M13 in Hercules. There is a little star triangle at South West from this cluster. At about 2.5 degrees in the same direction there is Lambda Sgr (Kaus Borealis), a fairly bright star shining at magnitude 2.8. At 51x a hint of granulation was perceptible but no star was really resolved. Really beautiful.

M23, Sgr, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. This cluster was a little bit at North-West from M21. It was a bit dim, but if the sky were more transparent and darker it would be a lovely target, I think.

M24, Sgr, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Sagittarius Star Cloud. Impressive and large group of stars. Really spectacular. It covered a field of almost 2 degrees populated by stars. The surrounding stars were quite bright. Globally this appeared as a bright area with a few faint stars.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x. Sagittarius Star Cloud. I counted about 50 stars, although the sky was not dark yet. Fantastic cluster
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x. Sagittarius Star Cloud. Large open cluster.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Sagittarius Star Cloud. Always superb to see this dense cloud of stars.

M25, Sgr, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. This cluster showed a mix of bright and dim stars. The size is sufficient for the Nagler 13 and the details are quite rich.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. This is a nice open cluster of medium size. Some star are bright, others much dimmer.
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. This cluster is located at about 4-5 degrees West from M24. To me this is one of the best open cluster in this area. It is surrounded by bright stars, but dimmer stars are also present.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Much more compact than M24, but this target shows stars of different magnitude really nicely.

M27, Vul, Pln Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Dumbbell nebula. B15x70, Newcastle (UK).
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC. The Dumbbell Nebula. This planetary nebula is clearly distinguishable from the background sky and shows up like a grey ball. No detail at this magnification was visible though. Really pretty target.
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 28x +/- UHC or OIII, 51x. Great open cluster of medium size. About 20-25 bright stars were visible and another 20-25 faint stars detectable. This is a nice open cluster with a decent size, shape and a mixture of bright and dim stars.

M29, Cyg, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).
- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x. Cooling Tower. From Sadr (Gamma), this cluster is East - South-East. The main six stars forming a little tower, or an academic hat, were easily visible. No dim star was detectable likely due to the Moon. This is a nice cluster which might be interesting to see at higher power (e.g. 51x).
- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 51x. Cooling Tower. At 51x the cluster revealed 2-3 dim stars but not much else. The full moon did not help though.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. Cooling Tower. Easily detectable as it is in the same field of view of Sadr. It is at about 2 degrees South from Sadr and 2 degrees East from the Cygnus' neck.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Cooling Tower. About 8 stars were visible, 2 were very faint.

M31, And, Galaxy:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x. Andromeda Galaxy. C114F8, Venice (IT); B15x70, Luton, Devon (UK); TV60F6, Newcastle (UK).
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Andromeda Galaxy. It is still low in this season. The core was very bright but the disc was loosely visible.

M32, And, Galaxy:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Companion to M31. B15x70, Luton, Devon (UK).

M34, Per, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, TV60F6, Newcastle (UK).

M35, Gem, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 72x. B15x70, Newcastle (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Detectable but not much detailed.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Under transparent night, many stars are visible inside.
- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Many other stars are visible.
- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x. Under dark sky this object emerges clearly. A few bright stars with many little faint stars in background. Averted vision helps, but this object is not too demanding if the sky is sufficiently transparent.

M36, Aur, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Newcastle, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Very poor detail, but detectable.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Easy to find after finding M38. A bit difficult to see inside as it is quite dim.

M37, Aur, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Newcastle, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Very poor detail, but detectable.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Easy to find after finding M36. Still difficult to see inside.

M38, Aur, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Newcastle, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. The first of the group to find. Poor detail.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Quite clear under transparent skies.

M39, Cyg, Opn CL:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Quite large open cluster position at North North-East of Deneb. Some stars are faint but still visible without much difficulty with direct vision. The clouds were slowly coming from West. I decided to move to South for the last observations.
- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 51x. Great open cluster of medium size. About 20-25 bright stars were visible and another 20-25 faint stars detectable. This is a nice open cluster with a decent size, shape and a mixture of bright and dim stars.
- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. Nice medium size open cluster. 20-25 stars visible. Others required averted vision.

M41, CMa, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. TV60F6, Cambridge (UK).

M42, Ori, CL+Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 18x, 30x, 36x, 51x, 72x. Orion nebula. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK).

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 18x. Great Orion Nebula. M42 benefits from both UHC and OIII filters, but in different way. The OIII shows a sublime image where the border between the nebula and sky background really emerges. The same can be said about the North part (that one linked to M43). In the centre of the nebula, some 'waves' were also visible. It is a super target to my eye. The UHC shows a much larger extension for this nebula and this is amazing with a wide field telescope. Small fine details visible within the nebula with the OIII are less obvious with the UHC, but the nebula just appears as massive globally and faint details on the outside borders are accessible as pure diffuse bright areas.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x + OIII, 51x. Well balanced contrast at 15x with OIII. 51x shows trapezium

M43, Ori, Brt Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 18x, 30x, 36x, 51x, 72x. Detached part of Orion Nebula. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK).

M44, Cnc, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Beehive Cluster. B15x70, TV60F6, Newcastle (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Praesepe. Spectactular at 15x.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Praesepe. Spectacular at 15x.
- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x. Beehive cluster. One of the best wide open cluster. Not many faint stars were visible because of almost full moon. However, the cluster still emerged in the sky.
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. The Nagler 13mm offers the best view. Its fov covers the whole object nicely. Image not degraded at all and the background sky was darkened just the right amount for maximising contrast. Exit pupil of about 2.0mm shows a really nice brightness / contrast for point source DSO.

M45, Tau, CL+Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 51x. Pleiades. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK).
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. Very clear and defined. 15x offers the best fov.

M46, Pup, Opn CL:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. Missed as I confused it with the aggregation of stars at North-West of 2 Pup A and 4 Pup.
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. This is a compact cluster. It is detectable.

M47, Pup, Opn CL:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. Superb anchor shape. 51x reveals many more details. Quite tight double star near the centre. From Alpha Mon, go 5 degrees South.
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Rich of stars. These are quite spread, making this cluster easy to detect and study.

M48, Hya, Opn CL:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Not easy to see if the sky is not very dark. Fortunately it is quite large. It is the third vertex of the triangle formed by the trio of stars "1Hya C Hya 2Hya (CHya mag 3.8 is the brightest in the middle of the trio) and 29 Mon (mag 4.35).
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Dim open cluster. It requires transparent skies to shine properly.

M51, CVn, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Whirlpool Galaxy. From UMA-Alkaid, move south to 24CVn. Continue on that direction until HIP65768. This forms a triangle with HIP66004 and HIP66116. They are all 7mag stars. HIP65768 is the brightest in the area. M51 lies externally of the line between HIP65768 and HIP66004. Averted vision for 10min is required. You will see a grey patch. No structure.
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 30x. Whirlpool Galaxy. Grey patch without a structure visible with averted vision. A darker sky will make the difference on this target.

M53, Com, Glob CL:

- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 18x, 51x. This object is not easy to find. It is just 1-2 degrees east of Diadem (Alpha Com), but this star is very dim to be seen, unless the sky is enough dark. Instead use the Virgo trapezium and point to north following the star Vindemiatrix (Virgo). You can find Diadem just going some degree north from Vindemiatrix. M53 appears as a little grey cloud at 15x. No detail of this globular cluster is visible. At 18x, the contrast is a bit improved, but the image is the same. At 51x this objects is larger and well detectable, but still appears like a grey cloud.

M56, Lyr, Glob CL:

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 28x. This is the first time I detect this target. It is quite challenging to find with a 60mm but not impossible. I used the Sheliak (Beta Lyrae) and Sulafat (Gamma Lyrae) as pointers to target M56 along the line passing through these two stars on the side of Sulafat. M56 was detectable with a 15x using an atlas but was very faint and averted vision was almost required to find it. At 28x the object was more visible, but did not show much detail as it only appeared as a soft grey patch. This target required larger aperture and / or darker skies.

M57, Lyr, Pln Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 37x; 15x. Ring Nebula. C114F8, Venice, Lorenzago (IT); B15x70, Newcastle (UK).
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x, 51x. Ring Nebula. For the first time, I managed to see this object with the TV-60. I find extremely difficult to detect it at 15x unless I map the nearby stars with Stellarium. At 28x M57 is clearly visible and appears as a grey blob. At 51x the ring is detectable. I did not try to use an OIII filter because I was freezing due to lack of cloths and about to leave. I believe this target will show much more detail at 51x with OIII filter.

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Ring Nebula. The OIII filter largely improves the detection of this nebula at 15x. Without a filter, its detection is not easy. It emerges in the sky as a grey little ball. I believe the Nagler 7mm or even the Vixen 5mm can give great views when combined with an OIII filter.

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x +/- OIII. Ring Nebula. I tried the OIII filter with the Nagler 3.5 (103x). Although the ring shape was noticeable, it was just too much magnification and the overall image was largely degraded. At 28x + OIII the Ring Nebula emerged from the background sky and appeared as a colourless bubble. I believe that an exit pupil of 1-1.5mm can improve the view for this target.

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x +/- UHC, 103x +/- UHC or OIII. Ring Nebula. The UHC filter increases a little bit the visibility of this target at 28x, but does not improve the contrast. The object appears as a grey blob without a shape. At 103x the ring was detectable using an UHC filter using averted vision, but this was not easy too see. The ring shape was more noticeable with a OIII filter despite the severe loss in image brightness. Without filter the nebula appeared just as a grey blob and no ring was detectable. Generally, I think an exit pupil of 0.6mm is just too small for nebula filters. It seems to me that 1.0mm is the maximum usable effectively. As this is the exit pupil typically used when observing planetary nebulae, I would say that an OIII filter is a better choice for these targets as it allows to increase contrast which is needed on these targets. Conversely, for bright extended nebulae to watch with low power eyepieces (or exit pupils larger than 3mm), a UHC filter can be beneficial for targeting and maximizing nebulae extension.

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 103x +/- OIII. Ring nebula. The ring was visible with averted vision, but no other detail really. The contrast between the ring and the internal area is much more visible with an OIII filter. Still nice planetary nebula.

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 51x. It was lovely to see this planetary nebulae at 1.2mm exit pupil. The ring was clearly visible and the size was acceptable. No colour of course, but averted vision showed this object pretty well, although it was visible also via direct observation. As expected, the Nalger 7mm is perfect for this target and I expect that is more than adequate for many other planetary nebulae.

M60, Vir, Galaxy:

- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Turn West to Vindemiatrix. A little crown of star is visible slightly South. Continue and you see a little arrow of stars and a single star in the North. M60 is between these two objects. Not detectable at 15x. Detectable via averted vision at 28x. A patch of grey. The sky was not fully dark though and my eye was not dark adapted. I believe this object can show more detail.

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. It was detectable with averted vision at 28x. It appeared as a grey patch without a structure. I tried M58, but it was not visible. I believe that to see these targets with this small telescope, very dark skies are required.

M65, Leo, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Leo triplet. From Chertan (theta Leo), use the star pointers HIP54688 and HIP54711 to reach eta Leo. Eta Leo forms a 90Deg triangle with HIP55033 and HIP55262. From the latter look at south slightly. Galaxy detectable as patches. M56 is elongated. Averted vision for 10min is required. Cover the other eye to relax the observing eye nerve.

- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 18x, 30x. Invisible. Sky not transparent enough. I think an exit pupil of 3.3mm is a good compromise between 4mm and 2mm. 2mm is too much for the TV60 on this targets.

- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 30x. Leo triplet. Elongated grey patch visible with averted vision. Shape of a cigar. At 30x, the patch is visible more easily than at 15x. The leo triplet is more easily detectable when the telescope is slightly moved. The patches will move accordingly.
- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 18x. This object requires aperture and dark sky to be detected and viewed properly. Just very faint object visible through averted vision. An exit pupil of 3.3mm is better than 4.0mm. I wonder whether something between 2.5 and 2.0mm can improve this view even more.

M66, Leo, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Leo triplet. As for M65. Maybe using an exit pupil of 2.7-2.0mm is better.
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 18x, 30x. Invisible. Sky not transparent enough.
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 30x. Leo triplet. As for M65.
- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 18x. See above

M67, Cnc, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. The King Cobra Cluster. TV60F6, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. King cobra. Not to easy to detect. Looks like a grey patch, more visible using averted vision.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. King cobra. Not to easy to detect. Nicer at 51x.

M71, Sge, Glob CL:

- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. This globular cluster appeared very faint, but noticeable via direct vision when the sky became sufficiently dark. No much difference at 51x. It requires larger aperture telescopes.

M72, Aqr, Glob CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Very difficult to detect. Even with averted vision, this target was very faint. It appeared like a grey faint patch.

M73, Aqr, Asterism:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Slightly easier than M72, but still very difficult. This target was wrongly classified as an open cluster, but is actually just an asterism of four stars.

M78, Ori, Neb:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Unsuccess

M81, UMa, Galaxy:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Bode's Galaxy. B15x70, Newcastle (UK).

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Bode's nebulae. Not easy to find it at 15x with half moon, but M81 and M82 were detectable via star hopping from Dubhe. At 28x this large galaxy shows its core and a bit of brightness on the body. I was very impressed at seeing these two targets and I believe M31, M32, M101, M81, and M82 are the most appreciable galaxies for small telescopes. Averted vision improved the visibility of this target significantly.

M82, UMa, Galaxy:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Cigar Galaxy. B15x70, Newcastle (UK).

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Cigar galaxy. Its elongated shape was visible. It was amazing to see this galaxy and its neighbour M81 in the same field. These two targets are going to become one of my favourite objects.

M92, Her, Glob CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).

M95, Leo, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Unsuccess

M96, Leo, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Unsuccess

M97, UMa, Pln Neb:

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x +/- OIII. Owl Nebula. Interesting target. Completely invisible without OIII filter. With the OIII, it emerges from the sky and the nearby stars. It is a quite large planetary nebula. No colour or shape was detectable, but it simply appeared as a grey bubble. At 15x + OIII was detectable, but was too small to see any major detail.

- 26/05/2015 21:15-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x +/- UHC. Owl Nebula. Invisible at 28x with or without UHC filter. This target requires an OIII filter for being detectable with small aperture telescopes. Consistently with what said for M57, the OIII filter is a better choice for planetary nebulae (and for extended nebulae where we want to maximise nebulae contrast).

M101, UMa, Galaxy:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Unsuccess

M103, Cas, Opn CL:

- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Not sure whether I saw M103 or NGC457 (the Owl Cluster) though. A clear double star was well visible and there were a few dim stars in the background were also detectable. This object starts being visible at 28x. It is relatively small, but a lovely target. I think it was M103 as my memory seems more similar to the images.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. This cluster has less impact than NGC663, but is still pretty. It is more compact than NGC663.

M107, Ser, Glob CL:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. From Han, Zeta Oph, go slightly South and see a triangle. M103 is on the outside of one of the vertices. It was barely visible at 15x, also due to the bright sky. At 51x was detectable but still with difficulty. Not much to see. Just a grey smudge visible with averted vision.

M108, UMa, Galaxy:

- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Surfboard Galaxy. Invisible at both 15x and 28x. This object as well as most of the other galaxies require larger aperture and / or a darker sky.

M110, And, Galaxy:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. M31 Companion. B15x70, Luton, Devon (UK).

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NGC188, UMi, Opn CL:

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. The detail of this target seemed accessible, but I did not manage to see anything in the position suggested by Stellarium. Unfortunately, I did not have a star atlas with me.

NGC381, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC436, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC457, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Dragonfly Cluster. Very beautiful open cluster. Not sure why it is called Dragonfly. It reminds me of a bell where the two bright stars are at the bottom.

NGC559, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. This cluster is relatively small compared to NGC663, but shows a little bit more content than the nearby NGC open clusters.

NGC637, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC654, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC659, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC663, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Very pretty medium size open cluster. About 10-15 stars were visible. It contains some bright stars and the background is dusty.

NGC744, Per, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. As for NGC957.

NGC752, And, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).

NGC957, Per, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Faint small open cluster. Few dim stars were visible via direct vision.

NGC1027, Cas, Opn CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Cluster just below Heart Nebula.

NGC1647, Tau, Opn CL:

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x . Beautiful open cluster easily detectable from Aldebaran
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. In this period of the year, Taurus is quite low on the horizon. This object did not show many stars due to the light pollution and atmosphere. You will need darker skies or look at it when it is higher on the horizon. From Aldebaran, go east for 4 degrees. It is near a couple of stars and i Tauri (mag 5), which is the brightest star in the area. 51x did not help tonight, as the object became too dim. I suspect a 30x, exit pupil 2.0mm would be the best for these targets.

NGC1662, Ori, Opn CL:

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. Found casually while scanning from Aldebaran to Beltegeuse. Very small little open cluster at 15x. Much better at 51x. Not easily detectable, because of its small size
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. A little open cluster near the top of Orion's shield. It is also reachable from Aldebaran (Alpha Tauris) moving towards south for about 8deg. At 15x it only shows it compactness. At 51x it shows some stars. This is a compact open cluster formed by relatively visible stars.

NGC1746, Tau, Opn CL:

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Not sure I found it. It appeared smaller than NGC1647. Possibly a darker sky reveals more interesting features.
- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. After finding NGC1647, from i Tauri, go east for other 4-5deg until you see iota(?) Tauri (102 Tau, mag 4.6). NGC1746 is a medium size cluster at 15x at west of 102 Tau. It also appears very nice at 51x.

NGC1750, Tau, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 51x. TV60F6, Cambridge (UK).

NGC1807, Tau, Opn CL:

- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. See NGC1817. NGC1807 is more spectacular than NGC1817 at 51x possibly because it has brighter stars.

NGC1817, Tau, Opn CL:

- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x. After finding NGC1647, from i Tauri, go south-east for 5 deg until you see m Tauri (mag 4.9). NGC1817 and 1807 appear on the same field of view at both 15x and 51x. 15x is not sufficient for seeing details of these two clusters. These are accessible at 51x. NGC1817 seems less visible than NGC1807

NGC1980, Ori, Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. TV60F6, Cambridge (UK).
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x + OIII. With 4mm exit pupil, OIII shows a bit of nebula around the star Hatsya

NGC1981, Ori, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 51x. TV60F6, Cambridge (UK).

NGC2237, Mon, Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Rosette Nebula. TV60F6, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 18x. Rosette nebula. Detectable with OIII filter. Very soft grey patch. No structure. Invisible with UHC filter.
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x + OIII. Rosette nebula. Detectable with OIII filter. A grey patch 2 degree large. No structure visible

NGC2244, Mon, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Satellite cluster. TV60F6, Newcastle, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 18x. Satellite cluster. Six stars in two columns
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Satellite cluster. Six stars in two columns
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Satellite cluster. Six stars in two columns

NGC2264, Mon, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 51x. C114F8, Venice (IT); TV60F6, Cambridge (UK).
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x + OIII. Christmas tree + Cone nebula. Christmas tree is easily visible. Cone nebula is not detectable with or without an OIII filter near. Apparently apertures of at least 300mm and H-beta filter or UHC filters are required beside a moderately dark sky.

- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Christmas tree.

NGC2392, Gem, Pln Neb:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 51x, 72x. Eskimo Nebula. TV60F6, Cambridge (UK).
- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 51x +/- OIII, UHC, 72x. Eskimo nebula. From Wasat (Delta Gem) move east to 63 Gem. 63 Gem is the brightest star of a 'half moon' of 7 stars. The Eskimo nebula is next to the star HIP36370 (mag8.2), which is a bit isolated but very close to 63 on the opposite direction of Wasat. You can spot it at 15x without filters, but you see it only with averted vision. It appears as a very small patch next to the star. At 51x the nebula is visible as a grey little ball. The boundaries are obfuscated. An UHC filter helps increasing the contrast between the sky and the nebula. An OIII filter shows even more contrast, although I think an UHC filter is better at this exit pupil (1.2mm). Using these filters, the boundaries of the nebula appear much clearer although no structure is visible at this magnification. At 72x (and no filter) is still visible as a grey little ball. Boundaries are obfuscated.
- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Eskimo nebula. At 15x it was detectable with averted vision. It was easily visible at 51x and appeared like a fuzzy blue/grey small patch next to the star.

NGC3242, Hya, Pln Neb:

- 06/04/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x; 51x +/- OIII, UHC; 72x. Ghost of Jupiter. By naked eye, from Alphard (Alpha Hydrae, mag 1.95), move east and detect the Lambda Hydrae (mag 3.6). This star appears like a star system extending north and south from Lambda Hydrae. Continue moving east following Hydrae body. The next star is slightly south of Lambda. This is Mu Hydra (mag 3.6). Then next one is Nu Hydra (mag 3.10). Mu Hydra will appear Yellow/Orange and almost isolated. It has a little star on the north. Slightly south, you see two bright couples of stars: two more distant at east (HIP50693, HIP50764), two closer at west (HIP51170, HIP51193). Consider the tight couple at west. There is a little star (near this couple in the direction of the other couple. If you use the tight couple and the little star as pointer and you move for another segment in the direction of the little star, the planetary nebula will appear. This appears as a faint tiny and diffuse light. No structure. At 51x it appears like a little full circle. An OIII seems more effective than an UHC filter here possibly because the planetary nebula is low on the horizon. The OIII filter makes it appear from the sky, whereas really few nearby stars are visible. 72x does not show more detail. UHC filter works fine but does not boost the object at the same level as the OIII does.

NGC5053, Com, Glob CL:

- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 18x, 51x. Invisible. This is a bit smaller and dimmer than M53. I could not find it.

NGC6530, Sgr, Opn CL:

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. Cluster inside / East the Lagoon Nebula. This cluster emerges at 28x to me.

NGC6604, Ser, CL+Neb:

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC, 28x. This cluster with associated nebulosity is located at about 1.5 degrees North of the Eagle Nebula. It is a fairly spread cluster without many stars. The nebula shape was not really identifiable, but it was possible to spot the presence of diffuse nebulosity in the area.

NGC6633, Sct, Opn CL:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. From 71-72 Oph to East, NGC6633 and Cr386 appear in succession. Both are sufficiently large to be appreciable with a low power eyepiece. They are quite rich in stars.

NGC6633, Oph, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x. C114F8, Venice (IT); B15x70, Newcastle (UK). A beautiful chain of stars.

NGC6823, Vul, Opn CL:

- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. This cluster is located on the line formed by M27 and NGC6823. From it, two roads of stars form and converge at 3 degrees South East with Cr399, the Brocchi's cluster. Also this cluster is relatively smallish and emerges at 51x.

NGC6830, Vul, Opn CL:

- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Located next to 12 Vul, this medium-small open cluster is detectable at 15x, but is more appreciable at 51x.

NGC6871, Cyg, Opn CL:

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x. From NGC6883, I moved South-West. There is a chain of about 8-10 stars, leading to this wonderful open cluster. The cluster is of medium size. I could see about 10-15 blue bright stars, and 3-4 pairs seemed to be double stars. There are also lovely double stars in this area.
- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 51x. I tried to see this wonderful open cluster again at both 28x and 51x. It is a fantastic cluster with the faint Milky Way dust in the background. 3-4 pairs of double stars were visible. All the bright stars are blue. Really nice.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. As for IC4996.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Nice target with doubles inside.
- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x. Just passing across Cygnus' body and I stopped on this lovely open cluster.

NGC6882, Vul, Opn CL:

- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. See NGC6885.

NGC6883, Cyg, Opn CL:

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x. From IC4996, I moved South, using as a reference a group of stars reminding me of a pan and a long handle. NGC6883 is located below a line of 3 stars. It is quite easy to find.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. As for IC4996.

NGC6885, Vul, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Also called 20 Vulpeculae cluster, this cluster surrounds the star 20 Vul. From this, the south part is NGC6885, the North is NGC6882, another open cluster. NGC6885 is about one third the size of NGC6882, but two magnitudes brighter.

NGC6888, Cyg, Neb:

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC or OIII. Crescent Nebula. The nearby group of stars is located on the Cygnus' neck at about 1.5 degrees from IC4996 (from IC4996, just move 1.5 degrees North-West). Spotting the nebula was difficult though. I suspect it requires a darker sky. With averted vision and a UHC filter, very faint small grey patches were suspected around the nearby stars. A OIII filter made these patches slightly more noticeable. However, in my opinion this seems to be a challenging target.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Crescent Nebula. No real shape was visible, but the presence of a soft nebulosity was detectable to my eye.

NGC6910, Cyg, Opn CL:

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x. From Deneb (Alpha), I moved to Sadr (Gamma). This open cluster is on the line between these two stars, but on the side of Sadr. Its size is only 8', but is sufficiently bright (magnitude 7.4, surface brightness 11.7). It is formed by few bright stars and I could count about 7-8 dim stars. Apparently, many of these stars are variable. Very beautiful to me.

NGC6934, Del, Glob CL:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Easy to find. As usual a nice grey ball.

NGC6940, Cyg, Opn CL:

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x. Large spread open cluster. I was a bit disappointed when I saw this open cluster as it did not show any striking feature, but just a collection of disconnected stars of similar magnitude, luminosity and colour.

NGC7000, Cyg, Neb:

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- UHC. North America Nebula. The presence of diffuse nebulosity was visible in the area, but it was not obvious to spot the presence of this nebula specifically.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. North America Nebula. The patch of nebula is visible but the America continent shape is not clearly identifiable.

NGC7063, Cyg, Opn CL:

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. I casually found this open cluster when exploring the sky in Cygnus. It a medium-small open cluster with about 10-15 stars visible directly and others via averted vision. Quite pretty.

NGC7082, Cyg, Opn CL:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 51x. Although this cluster is a bit smaller than M39, it is much less evident. It is located at South of M39 and where the lines made from two pairs of stars intersect. Nice to see, but far less spectacular than M39.
- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. Open cluster close to M39. It is spread and its stars do not have specific features.

NGC7086, Cyg, Opn CL:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Located 3-4 degrees North of M39 and above the star 80 Cyg (Azelfafage, mag 4.75), this cluster is just above a curved chain of stars. It is a small open cluster made of dim stars.

NGC7235, Cep, Opn CL:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. From the Garnet Star, I moved East until I reached Zeta Cep. From there in the same field I gradually moved South. There are three bright stars as a reference. Between Zeta Cep and these three stars there is this little open cluster formed by dim stars.

NGC7261, Cep, Opn CL:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Two of the three stars previously mentioned are double stars (I think!). To find NGC7261 I moved along the line depicted from these three stars on the side of the double star on the corner (the one located at East). This cluster was also small and made of 3-4 dim stars.

NGC869/ 884, Per, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 51x. Double Cluster. B15x70, Exeter, Newcastle (UK); TV60F6, Newcastle (UK).
- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Double cluster. Superb cluster. Even if low in the sky, it was a pleasure to see it. At 51x, the cluster emerged from the background and showed more faint stars.
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Double Cluster. Again, the Nagler 13 offering almost 3 degrees of fov shows the full object with great detail but conserving an adequate image brightness.
- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Double Cluster. This target is superb with the Nagler 13. Although low on the horizon, it still offers nice contrast with the background sky and the 2.8deg of fov show the object with all its context.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Double Cluster. As already found before, 28x and 2.7 degrees of field of view shows this target as a real gem. It is wonderful.

NGC6992/ 6960, Cyg, SN Rem:

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Veil Nebula. No visible, although it is not the best time of the year to see this target.
- 20/05/2015 21:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Veil Nebula. Again, no visible although it is too low on the horizon.

- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 15x +/- OIII, 28x +/- OIII. Veil Nebula. No visible or detectable. I carefully searched the stars and positioned at 52 Cygni. 28x +OIII seemed to show a soft transparent cloud, but I cannot say that that was the Veil Nebula. The sky was not fully transparent and dark. This might be the reason.

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x +/- OIII. Veil Nebula. I did not spot it. After positioning at 52 Cyg, I gradually moved in the surrounding area at South, but was not able to spot any nebulosity. As for the Crescent Nebula, this is a challenging target and I believe it requires darker skies.

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Veil Nebula. The first time I observe this target and it is gorgeous. The Eastern part nicely emerged from the sky. The shape and some features were visible with direct vision, although other minute details, mainly about the extension, were accessible via averted vision. The Western part above 52 Cyg was also visible via direct vision. The Northern part was more difficult although the presence of nebulosity was detectable. Tonight the sky was very clear and sufficiently dark (nautical twilight). A bit of Milky Way was visible on Cygnus at Naked eyes. Superb.

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x +/- OIII, 28x + OIII. Veil Nebula. At 28x (2.2mm exit pupil) + OIII, the nebula was difficult to identify. The view improved by choosing an exit pupil of 4mm. Without OIII the nebula is completely invisible. With the OIII, the Eastern component was easier to see than the western. The sky was not completely dark and the was some haze in the sky.

5 Index Catalogue (IC)

IC1396, Cep, CL+Neb:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x +/- OIII, 51x. Elephant's Trunk Nebula. I tried to reach this open cluster from M39, but I wrongly arrived at Alpha Cep (Alderamin). Star hopping from Alderamin was much easier. Although the nebula was not visible with the OIII filter, it was nice to see this cluster. In front of the Garnet Star, there is a chain of stars. The brightest is a tight system of three stars of different luminosity. Really nice to see and already split at 28x. This was well separated at 51x. Nearby this system there is another double star where the components have different brightness. Almost all, if not all these stars but the Garnet Star, are blue.

IC1805, Cas, CL+Neb:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Heart Nebula. The full nebula was not visible but the top part of the heart shape was detectable. It is the area where there are more stars. A faint but visible layer of grey patch was there.

IC1848, Cas, CL+Neb:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x + OIII. Soul Nebula. Again, the whole nebula was not visible, but some nebulosity and the chain of stars was there.

IC4665, Oph, Opn CL:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. Summer Beehive Cluster. Amazing open cluster of large size above the star Cebalrai. A pleasure to see with a low power eyepiece. Stars have similar colours and magnitude, but the shape is nice.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x. Summer Beehive Cluster. Wonderful open cluster, close to Beta Oph (Cebalrai). Always worth having a look if in the area.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. The Summer Beehive. I used this target for finding the Barnard's Star. It is a lovely target.

IC4756, Sct, Opn CL:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. Graff's cluster. See above

IC4756, Ser, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x. Graff's Cluster. C114F8, Venice (IT); B15x70, Newcastle (UK).

IC4996, Cyg, Opn CL:

- 30/06/2015 21:30-23:20, Cambridge, UK. 3 - Moderate seeing, 4 - Partly clear. Tele Vue 60 F6, 28x. From M29, I moved South. This is a very small open cluster which is detectable at this low power, but would benefit of higher power. It is near an isolated star near three pairs of aligned stars. Three - four stars were detectable apart from the main one.
- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. From Sadr, follow the line forming Cygnus' neck. This object is located at about 1.5-2 degrees East from the Cygnus' neck. It is easily detectable at 15x.

6 Stock Catalogue

Stock1, Vul, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).

Stock2, Cas, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, TV60F6, Newcastle (UK).
- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x. This cluster next to the double cluster is very nice and needs a wide field telescope. Its stars are not so bright and generally of similar magnitude and colour.
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. As above.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Large open cluster right above the Double Cluster.

7 Melotte Catalogue

Mel20, Per, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, TV60F6, Newcastle (UK).
- 30/04/2015 22:00-23:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x. Alpha Per moving cluster. Wide field telescopes or binoculars are the best for this superb cluster. Even if low in the sky, it was very beautiful to see. ¿70 stars detectable.
- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x. Alpha Persei Cluster. Lovely large open cluster formed by very bright stars. Always a pleasure to see.

Mel25, Tau, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 51x. Hydes. C114F8, Venice (IT); TV60F6, Newcastle, Cambridge (UK).

Mel111, Com, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Coma Berenices Star Cluster. B15x70, Newcastle (UK).
- 14/04/2015b 21:30-23:20, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x. Coma Berenices star cluster. Located just south of Gamma Com, this large object is as spectacular as M44. Very rich of stars, some bright some small and fainting. Some are doubles. As this is a large object, 15x is the adequate magnification. As Coma Berenices does not have bright stars, you can find this object knowing that is between Denebola (Leo) and Cor Caroli (Alpha CVn).

8 Collider Catalogue

Cr39, Ori, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 36x; 15x, 51x. TV60F6, Cambridge (UK).

Cr65, Tau, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. TV60F6, Cambridge (UK).
- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Nice aggregation of stars, although none of them really emerges. Wide field is required. North of Orion-Meissa.

Cr68, Ori, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6. Newcastle, Cambridge (UK).

Cr70, Ori, Opn CL:

- 23/02/2015 19:00-21:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. Gorgeous Orion's belt. The chain of stars surrounding Alnilam is superb. Wide field telescope.

Cr89, Gem, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. TV60F6. Newcastle, Cambridge (UK).

Cr97, Mon, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Cambridge (UK).

Cr106, Mon, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Cambridge (UK).

Cr107, Mon, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x, 30x. TV60F6, Cambridge (UK).

Cr399, Vul, Opn CL:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Brocchi's Cluster, the Coathanger. B15x70, Newcastle (UK).
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. Brocchi's Cluster. Very nice open cluster at 15x.

9 Stars, Double Stars, Multiple Stars

And, Beta, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Mirach. B15x70, Newcastle (UK).

Boo, Epsilon, Dbl star:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x. Izar. I could not split this double star at 28x or 72x. I thought it was easier. Still a very nice yellow bright star. The sky was becoming less transparent on this region of the sky. Therefore I moved North.

CMa, Alpha, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Sirius. Not able to split Sirius. Too much bright.

Cap, Alpha, Mlt Star:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Algedi. Two lovely bright stars, one of which has a grey dim companion. Stunning.

Cap, Beta, Dbl Star:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Dabih. Another nice double star. Yellow-Blue.

Cap, Omicron, Dbl Star:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Much tighter than Rho, but already split at 28x. One blue, the other is yellow.

Cap, Rho, Dbl Star:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x. Well separated double star.

Cep, Delta, Dbl Star:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Very close to the cluster above, continuing along that imaginary line, I found this beautiful easily split double star. One component is orange, whereas the other is blue. The brightness is different between the two and in particular the blue star is dimmer. This double star is a little gem and reminded me of Beta Cyg (Albireo).

Cep, Mu, Star:

- 02/07/2015 21:50-0:00, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Hershel's Garnet Star. Bright red supergiant star located next to IC1396. Magnitude 4.2. It is the biggest star visible at naked eye.

Cyg, Beta, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 72x. Albireo. C114F8, Venice (IT); TV60F6, Newcastle (UK).

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 103x. Albireo. Wonderful double. A bit tight at 15x, but very nice at 103x. One orange, the other one blue.

Dra, 19-20, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 51x. TV60F6, Cambridge (UK).
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. 4.5mag and 7mag.

Dra, Eta, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 51x. TV60F6, Cambridge (UK).
- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x. 2.7mag and 6.05mag

Gem, Alpha, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Castor. The companion Castor B is also bright and the two stars are quite close to each other. Same colour. Castor C is very dim and more distant from the other two.

Gem, Zeta, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Mekbuda. Easily split double star.

Her, Alpha, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. Rasalgethi. B15x70, Newcastle (UK).
- 07/07/2015 22:30-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 72x, 103x. Rasalgethi. A real gem. Superb double star. The bright component is orange, whereas the second component appears green. They are already split at 72x, but I preferred the view at 103x where they are split more clearly.

Hya, 27, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 51x. TV60F6, Cambridge (UK).
- 12/05/2015 21:00-23:45, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 15x, 28x. Easily split. Colours detectable.

Hya, Alpha, Star:

- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Alphard. Yellow star

Leo, Alpha, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 37x, 74x. Regulus. C114F8, Italy (IT).

- 25/03/2015 21:00-22:45, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 15x, 72x. Regulus. Blue-white double star visible at 15x. Clearly split at 72x although not all this magnification is actually required for split it.

Lyr, Beta, Dbl star:

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 103x. Sheliak. Splendid double already split at 15x. This was very nice at 103x.
- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Sheliak. Wonderful colour double star. One orange and one blue. Really beautiful.

Lyr, Delta, Dbl star:

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 103x. This is a very nice system of stars already visible at 15x. A larger triangle with a little internal triangle. Just beautiful.
- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. Superb multi star system. At 28x it is really bright and proportional to the field of view. I love the triangles and the overall geometry in this system of stars.

Lyr, Epsilon, Dbl star:

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 103x, 206x. The Double Double. Epsilon 1 and 2 were easily split at 15x. At 103x it was possible to detect that both Epsilon 1 and 2 are double stars themselves. At 206x this pair of tight double stars was visible although these double stars remained very close. Same colour.
- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 51x. The Double Double. I could not split the two. The image suggested a possible elongation of the two stars, but this was not obvious. I would not have detected it if I had not known that they are doubles. I carefully focused inward and outward to reach the optimum, but this was not sufficient.
- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 103x. The Double Double. Just managed to see the two pairs, although the separation was not clear. They appeared just a tiny more than elongated stars. I am not sure, but I suspect this was more due to the Nagler 3.5mm. I will try with the Vixen 5mm next time, as generally this eyepiece delivers better views than the Naglers, on planets at least.
- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 72x. The Double Double. It was possible to see the two pairs at 72x, although to me this was not appreciable. The two pairs appeared a little bit more than elongated or just separated, but I much prefer when a double star is clearly and nicely separated. The two pairs were similarly separated. Possibly Epsilon1 (the North pair) was slightly more, but, if so, a tiny bit.

Lyr, HD175634, Dbl star:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x. This double star is relatively close to M57 and inside the parallelogram of Lyra. One star is orange, the other is blue. Similar to Sheliak but a bit dimmer.

Lyr, Zeta, Dbl star:

- 03/06/2015 21:40-23:30, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 103x. Already split at 15x, but much nicer at 103x.

Oph, 61, Dbl Star:

- 05/07/2015 21:50-0:20, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 28x. From Beta Oph (Cebalrai), I moved South towards Gamma Oph. 61 Oph is a double star located at about 1 degree East of Gamma Oph. It is already split at 28x. It seems to me that they were both blue but with slightly different magnitude. The sky was not completely dark, so I might be wrong. Nice pair.

Oph, 71-72, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x. B15x70, Newcastle (UK).

Oph, HIP87937, Star:

- 17/07/2015 23:30-3:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 15x, 51x. Barnard's Star. Located near 66 Oph. This faint star of 9 mag is the fourth closest star to the Sun. It is a red dwarf. At 51x it was slightly more visible. Interesting target.

Ori, Beta, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 37x, 74x; 15x. Rigel. C114F8, Italy (IT), B15x70, Newcastle (UK).

Ori, Delta, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Mintaka. Easily split.

Ori, Iota, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Hatsya. Very nice double star. The companion is quite dim and small compared to Hatsya. Companion is grey.

Ori, Sigma, Mlt star:

- 22/03/2015 19:00-22:00, Cambridge, UK. 2 - Slight undulations, 3 - Somewhat clear. Tele Vue 60 F6, 51x. Sufficient for seeing 5 stars
- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Visible 5 stars, although only able to split Sigma Orionis into two stars.

Ori, Zeta, Dbl Star:

- 24/03/2015 19:00-21:30, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 72x. Alnitak. Separated components A and C. Cannot remember if B was detectable.

Sco, Alpha, Star:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 15x. Antares. Lovely red star. I could see the Airy disc and diffraction rings very nicely. Antares is one of my favourite stars.

Sco, Beta, Mlt star:

- 10/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 5 - Clear. Tele Vue 60 F6, 51x. Acrab or Graffias. Very fine multiple star system at 51x. The two stars have different colour and brightness. If I remember correctly the small one was blue. They were split but still quite tight. At 70x they should be split clearer.

- 11/06/2015 22:00-0:00, Cambridge, UK. 3 - Moderate seeing, 3 - Somewhat clear. Tele Vue 60 F6, 103x. Acrab or Graffias. It was clearly split, but the seeing was not very nice near the horizon and the stars light was not punctiform. The small star is blue. This double star is the top of the three stars of Scorpius.

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x. Acrab or Graffias. Although tight, I prefer this double star at 28x rather than 72x because of the smaller Airy disks. Very nice though. A bigger and bright orange star associated with a smaller blue star.

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. Acrab. Nice double star. The colours were not very clear because of the low position just above the horizon. Still very pretty though. Already split at 15x

Sco, Nu, Dbl star:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x. I am not sure I saw this. If so, it appeared as a tight double star with the same colour and quite dim. 28x was better due to the higher image brightness.

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. This is tighter than Beta, but at 28x the two stars are separated.

Sco, Omega, Dbl star:

- 15/06/2015 21:45-0:30, Cambridge, UK. 2 - Slight undulations, 5 - Clear. Tele Vue 60 F6, 28x, 72x. The two stars were largely more separated than Acrab double stars. A no substantial difference in colour or size was noticeable though. I did not find this target particularly interesting. Nicer at 28x.

- 22/07/2015 22:50-0:00, Cambridge, UK. 2 - Slight undulations, 4 - Partly clear. Tele Vue 60 F6, 15x, 28x. Largely separated double star, if it is a double.

UMa, Alpha, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x; 30x. Dubhe. B15x70, TV60F6, Newcastle (UK).

UMa, Zeta, Dbl Star:

- xx/xx/1998 Mar 1998 to Jan 2015, See location(s) later. Moderate to perfect seeing, Moderate to clear transparency. See telescope(s) later, 15x; 15x, 51x. Mizar and Alcor. B15x70, TV60F6, Newcastle, Cambridge (UK).

UMi, Alpha, Dbl Star:

- 13/05/2015 21:00-0:00, Cambridge, UK. 1 - Perfect seeing, 5 - Clear. Tele Vue 60 F6, 28x, 103x. Polaris. A nice target because of the large difference in brightness between the two stars. Polaris' companion was dim grey and detectable at 28x with some difficulty. 103x easily split the two stars.