MONTHLY OBSERVER'S CHALLENGE

Las Vegas Astronomical Society

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&

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March 2010

IC-405, The Flaming Star Nebula and IC-410/NGC-1893 Open Cluster and Diffuse Nebula

Introduction

The purpose of the observer's challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, we will be happy to include them in our monthly summary. Observing is not only a pleasure, but an art. With the main focus of amateur astronomy on astrophotography, many times people tend to forget how it was in the days before cameras, clock drives, and GOTO. Astronomy depended on what was seen through the eyepiece. Not only did it satisfy an innate curiosity, but it allowed the first astronomers to discover the beauty and the wonderment of the night sky.

Before photography, all observations depended on what the astronomer saw in the eyepiece, and how they recorded their observations. This was done through notes and drawings and that is the tradition we are stressing in the observers challenge. By combining our visual observations with our drawings, and sometimes, astrophotography (from those with the equipment and talent to do so), we get a unique understanding of what it is like to look through an eyepiece, and to see what is really there. The hope is that you will read through these notes and become inspired to take more time at the eyepiece studying each object, and looking for those subtle details that you might never have noticed before. Each new discovery increases one's appreciation of the skies above us. It is our firm belief that careful observing can improve your visual acuity to a much higher level that just might allow you to add inches to your telescope. Please consider this at your next observing session, as you can learn to make details jump out. It is also a thrill to point out details a new observer wouldn't even know to look for in that very faint galaxy, star cluster, nebula, or planet.

IC-405, The Flaming Star Nebula and IC-410/NGC-1893 Open Cluster and Diffuse Nebula

This month's objects really define the "challenge" in our observer's challenge.

IC-405 is a diffuse nebula surrounding the variable star AW Aurigae. The nebula is about 1,500 light years away and five light years across. It's believed, by motion studies, to have originated in the area around Orion's belt. Some sources list the mag. as around 6 but that's highly deceptive. Because it's dispersed so widely, through an eyepiece it's very difficult to spot unless you have a large backyard telescope. It's much easier to spot in a photograph.

IC-410 is embedded in the unusual open cluster NGC-1893. Both of these objects are close to IC-405 and can be seen by moving the telescope a few degrees to the southeast.

The cluster has wildly different mags. listed, from as dim as 14.8 to as bright as 7.5, easily seen in binoculars It will be challenging because it's in a relatively rich star field. On the other hand, IC-410 will be extremely difficult to see visually. If it's visible at all, IC-410 appears as a faint lumpy haze in and around the cluster but is much better seen in photos than visually. An O-III or maybe a UHC filter may help bring it out.

Observations/Drawings/Photos

Roger Ivester: Observer from North Carolina

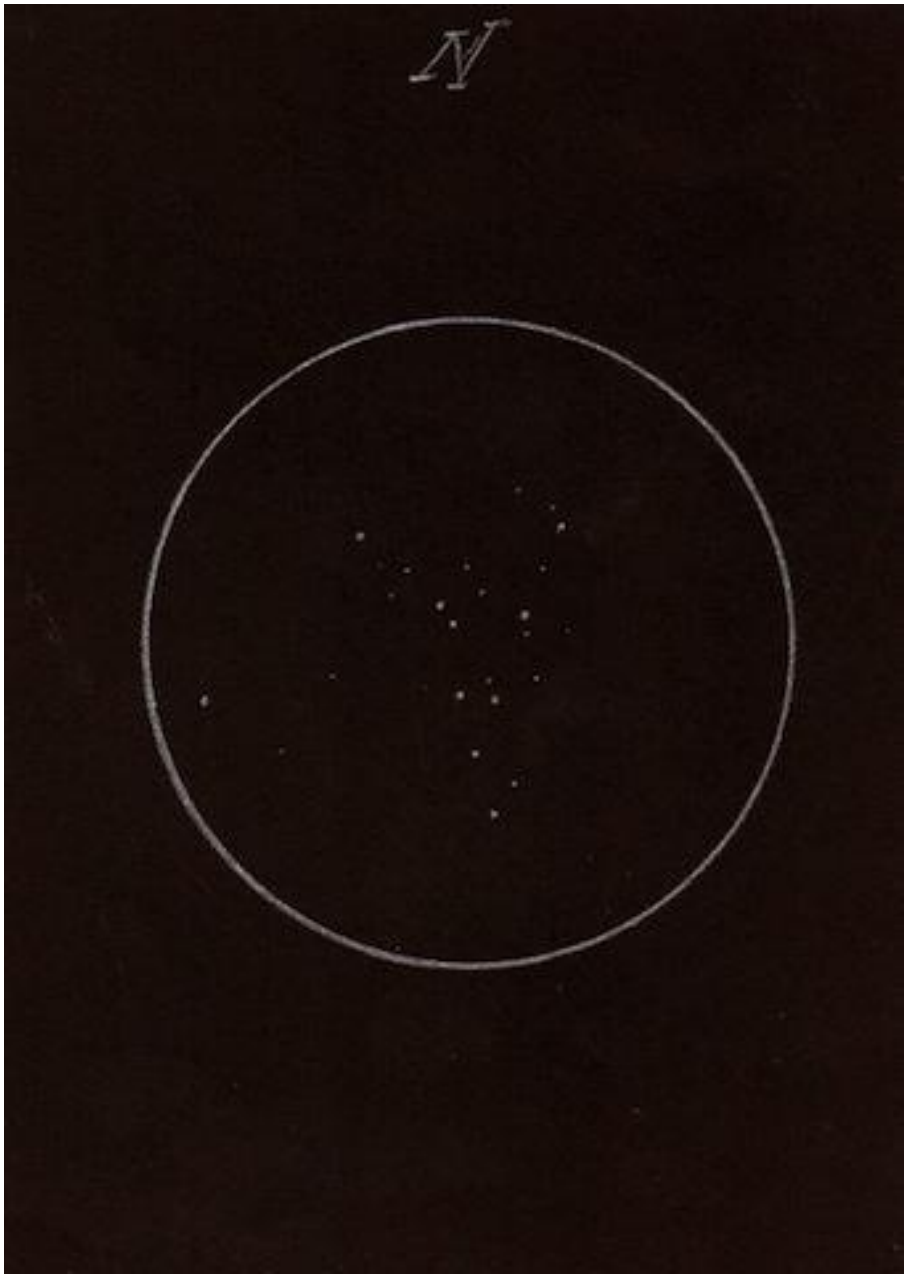
I believe that the Observers Challenge for March 2010 contains possibly two of the most difficult objects to date for the visual observer. All observations were made from my backyard in Boiling Springs, North Carolina, located in the western foothills of the state. My limiting naked eye magnitude on a good night averages between mag. 5.0 and 5.5. On an exceptional night, it can go as high as mag. 6.0. There are several unshielded streetlights in relative close proximity, but I use several methods to block as much direct light as possible. On occasion, I have had the opportunity to observe from some very dark skies located in the South Mountains, only 25 minutes from my home. However, it's far more convenient to set up in my backyard, especially when time is a factor.

The first object is IC-405, a diffuse nebulosity, also called the "Flaming Star Nebula". It is illuminated by the variable star, AE Auriga. I've attempted IC-405 with my 10-inch reflector on numerous occasions, but have never been able to see the nebula. This object is definitely best suited for the astrophotographer and not the visual observer. I'm hopeful that someone with a very large scope, observing from a dark site will visually glimpse this illusive object.

The second object is nebula IC-410 which is illuminated by open cluster NGC-1893. This object is very difficult to view with most backyard or amateur scopes. With the 10-inch, there was a definite glow surrounding the cluster, but I couldn't say for certain that it was IC-410 or just scattered light within the optical system.

Open cluster NGC-1893 lies in a very rich star field, but was easy to see in my 4-inch refractor using a magnification of 83X. With careful observation, I could count 20 stars, but a number of fainter stars seemed to be just beyond the limit of the small refractor. Walter Scott Houston of Deep-Sky Wonders describes "a conspicuous Y pattern formed by four 8th

magnitude stars." This is indeed one of the features that allows this object to stand out when using low power in the 4-inch. The Y pattern is easily recognized in the following sketch which was made with a 4-inch f/9.8 refractor with a magnification of 83X, field of view 0.72° or 43’. North is at the top and east is to the right.



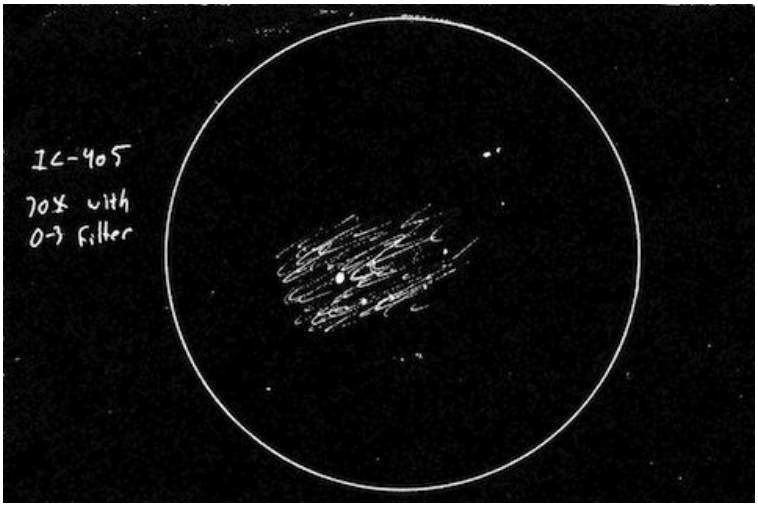
Fred Rayworth (see *Fred at Sawmill.jpg*): Observer from Nevada

Try as I might, I wasn't able to get out and observe these objects during the month of March. I could only wonder if I'd be able to spot the nebulosity in either object, though I was confident I'd be able to see NGC-1893.

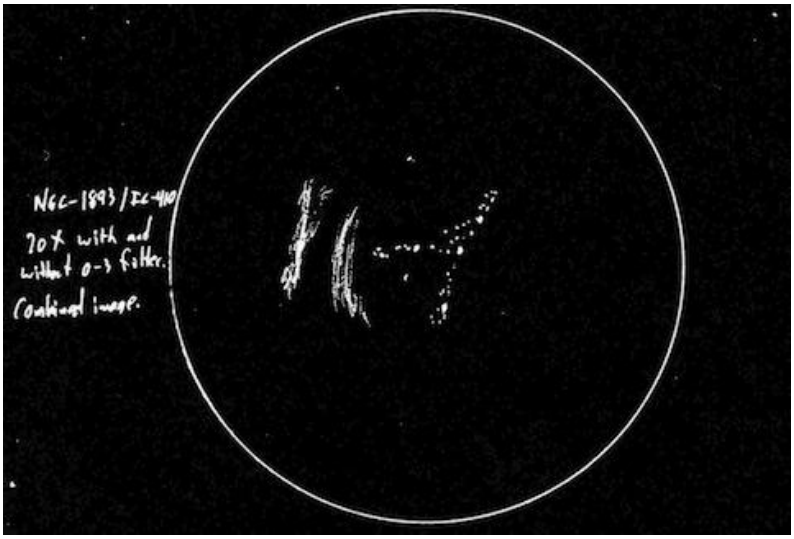
I finally got an opportunity on the April 8, 2010. It was a lousy night for seeing with a lot of light pollution coming off two barges in the middle of Lake Mead, along with the skyglow of Las Vegas. Because I went out by myself, I had to stay within cell phone range and chose Sunset Overview on the west shore of Lake Mead. I used my 16" f/4.5 Dobsonian along with 26mm (70X), 17mm (101X), and 8mm Hyperion (229X) eyepieces.

IC-405 and IC-410/NGC-1893 are next to each other in Auriga. I found them easily when the weird Y shape of NGC-1893 stood out against the rather rich background. The two major objects were separated by a line of stars going roughly north to south. By using that line, I was able to switch back and forth between the two/three objects.

Starting with the more difficult object, IC-405, I zeroed in on AE Aurigae. Despite substantial light pollution from the glow of Las Vegas, I noticed a haze which seemed a bit more intense than the surrounding "glow" of the sky. At 70X it looked the best. I added an O-III filter and there was no mistake that a nebula was lurking in the background. By sweeping around, I could tell a definite difference in the sky background. It was much darker to the south of AE Aurigae while it faded fairly fast the further north it got from the star. There's another bright (though a bit dimmer) star next to AE Aurigae and the nebula filled in behind it also. I detected a slight lumpiness to the grayish cloud, but it was mostly concentrated around those two stars. I noticed on Megastar that the "official" nebula extended in a kind of "7" shape and I scanned the area but saw no hint of anything beyond 1/2° of those two stars.



Crossing the "bridge" of stars to NGC-1893, I was quite surprised at how distinct that cluster was. At 70X it was a grainy Y with many different magnitude stars concentrated within the thick arms of that Y. At 101X, I saw even more stars. At 229X, the cluster blended in with the background and didn't look like a Y anymore. Even without a filter, I saw a blotch of gray "something" around one leg of the Y. Backing off to 70X again, I plugged in the O-III filter and there was no mistaking a few lumps of nebulosity that contrasted nicely with the background, yet it was still quite faint. I saw two distinct long lumps, both of which were to one side of the Y and crossing just the tip of one leg of it. I scanned the area and didn't see any more lumps and whatever might have been there blended in with the background. At 101X and 229X, the nebulosity washed out, though I could still tell something was just there at 101X. Since the O-III filter cuts out much of the starlight, in the drawing I show a combined view with and without the filter to show both objects in relation to each other.



Overall I was quite surprised to see any nebulosity at all, especially since I couldn't see even mag. 10 galaxies to the east a little while later. However, even with the skyglow in the west, I noticed 6 stars in the Trapezium for the first time. I chalked it up to just an inconsistent sky that night.

Rob Lambert: Observer from Nevada

March was a difficult observing month for me. It seemed that I couldn't get out on the nights that were clear and steady and the sky condition of nights around the new moon were not conducive to capturing a good image of the Flaming Star Nebula. To even catch a hint of the nebula, I had to push my Mallincam integrations to 60 sec, which is right at the limits of my Alt-Az mount with regard to field rotation. In my enclosed image, there's just a hint of the nebula all around AE Auriga, but it appears somewhat more dense from the northeast to the northwest (North is at approximately the 2 o'clock position on the photo). Evidence of the nebula is seen more in the fuzziness of the stars rather than in an obvious visual presence. An interesting feature of this area is the formation of stars which form a squared-off cup that opens to the upper right corner of the photo. The bottom of the cup is a straight row of four stars. AE Auriga is the center of the left side of the cup. It was this star formation that assured me that I was in the right area for observing the nebula. At five sec integration, this formation was visible, but I couldn't see the nebula until I approached 60 sec of integration. The attached image was captured with the Mallincam Variable Shutter System Video Camera through an ST120 piggy-backed on an LX200GPS for alt-az tracking. I used the Mallincam Focal Reducer (MFR) 3 with 25mm of spacers to reduce the native f/ratio of the ST120 from f/5.0 to f/2.5, which results in an approximate FOV of 1.5°.

Since my observations of IC-405 were not that impressive, I'll shed a little light on the reference of AE Auriga being a rogue star. AE Auriga is not native to this area of the Auriga constellation. According to the research of Ronnie Hoogerwerf of the Leiden Observatory in the Netherlands, it actually originated in the heart of the Orion Nebula's Trapezium. It was supposedly violently ejected from the Trapezium as the result of a close encounter of two closely bound binary-star systems. It, like Mu Columbae, was flung away at high speed and it continues to move relatively rapidly through Auriga. As it moves through this particular piece of space, it is lighting up the nebulosity known as IC 405. It is estimated that it will take another 20,000 years to leave this nebulous region, all the while greatly altering the cloud of dust that surrounds it by pushing the nebula out of the way as it travels through it.

Hopefully, the rest of Spring observing will be better than that of March and early April.

David Blanchette: Observer from Nevada

I took a single, 15-minute ISO-1600 exposure. I obviously need to start shooting flats. This was taken at Amargosa airport under some of the best sky I've seen in a while. Zodiacal light was a nuisance, even at 9:30 pm, but appeared to be clear of IC-405. I couldn't see the nebula visually.

Dr. James Dire: Observer from North Carolina

IC-405, The Flaming Star nebula is a large complex emission/reflection nebula located in the constellation Auriga. The nebula has an integrated magnitude of 10.0 and spans 30 by 19'. The surface brightness is very low and the nebula is very difficult to see visually, even in large aperture telescopes. Long exposure images show an extended comma shaped gas cloud surrounding IC-405 which extends nearly 1.5° from end to end. IC-405 is located 4° due west of M-36, and 3° southwest of M-38. The nebula is approximately 1,500 light years away and spans 5 light-years of space.

The variable star AE Aurigae is the brightest star within the nebula. AE Aurigae is a mag. 6 O-class star whose brightness varies sporadically by 0.3 mags. AE Aurigae was born in the Orion Nebula, but it is hypothesized that 2.7 million years ago, it had a close encounter with the star Mu Columbae which resulted in both stars being ejected from the area.

This image of IC-405 was taken with a SBIG ST-2000XCM CCD camera attached to prime focus on a 190 mm (7.5") Maksutov-Newtonian Astrograph. The exposure was 4 hours on January 10 & 13, 2010.

NGC-1893/IC-410 is an open star cluster embedded in a diffuse nebula. NGC-1893 is the designation of the star cluster, while IC-410 is the nebula. This object is located 1.5° southeast of IC-405. NGC-1893 is mag. 7.5 and easily seen in binoculars. Estimates of the cluster's distance range from 10,000 to 20,000 light years. The cluster contains many hot O-type main sequences stars, several of which are mag. 9. The cluster spans 25 arcminutes.

IC-410 is presumed to be at the same distance as NGC-1893. The nebula is 40’ by 30’ in size. An integrated magnitude for the nebula is difficult to obtain due its diffuse nature and size, but the brighter regions are estimated to be near mag. 12. This nebula is much more difficult to see visually than IC-405.

The image of IC-410 is the longest exposure I have taken to date, 5.5 hours over the nights of March 4, 5 and 6, 2010. My image reached sky glow saturation prior to the end of 5.5 hours, so at some point, I failed to overcome increased signal-to-noise and probably could’ve obtained the same image with a shorter exposure. “Oh to have the dark skies of the desert southwest!” The image was obtained with the same equipment configuration as IC-405 from the Wildwood Pine Observatory in Earl, NC.

Frank Barrett: Observer from North Carolina (*www.celestialwonders.com*)

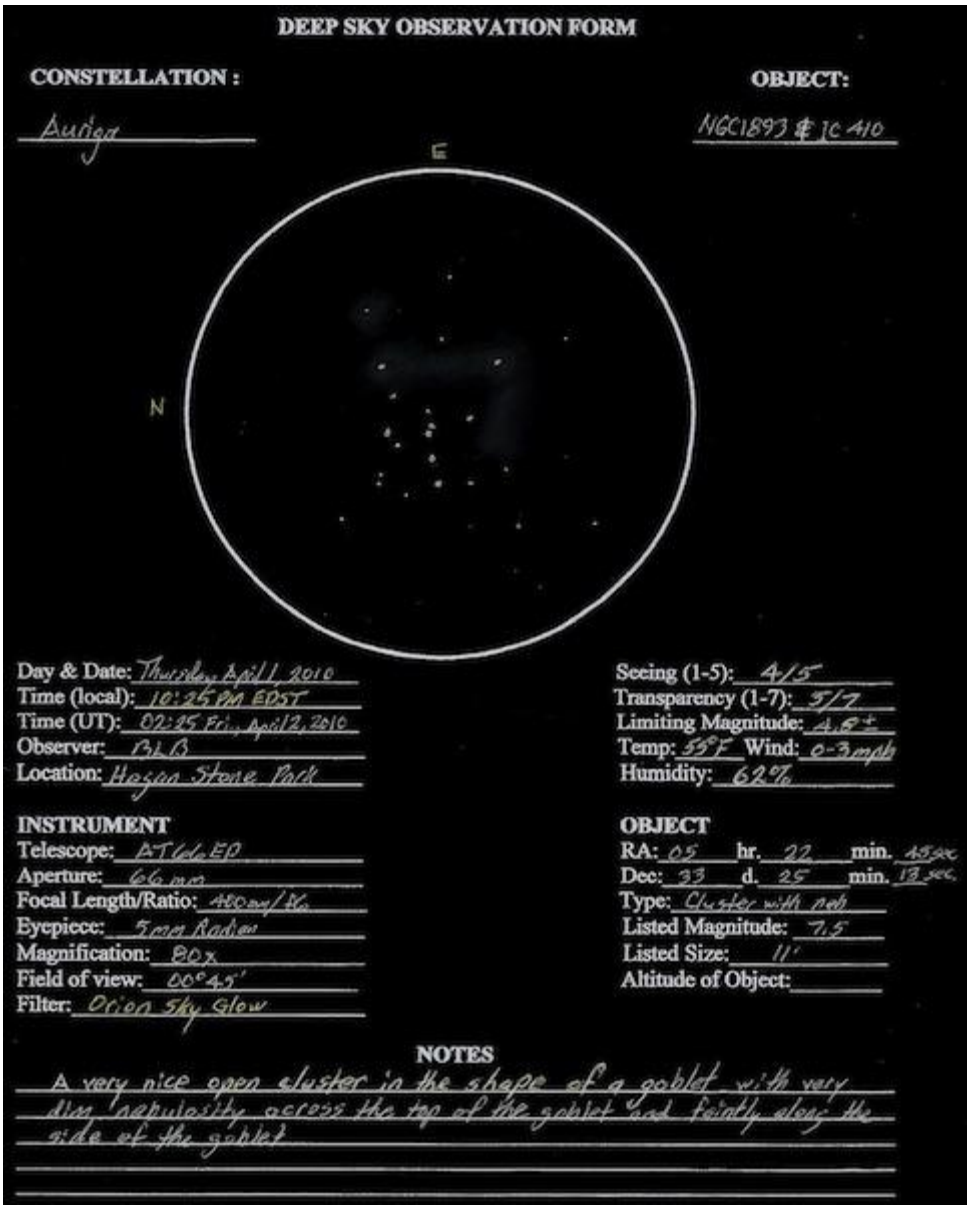
I got an excellent image of IC-405 from my observatory. I started this target much too late in the year from my tree-challenged horizon. Only 95 minutes of luminance was captured and the shot was planned to be a two-frame mosaic. I reused the color channels from an image I took in 2005 with the ST-2000XCM. Perhaps it will have to wait until next season to try this one again. It looks like there is a small galaxy in the upper right corner.

I took this image on March 5, 2010 from Gastonia, NC. I used a 10-inch SCT, 2800mm f/11 with an SBIG STL-11000m camera. My mount was a Losmandy G11 with an Ovision worm upgrade.

Buddy L. Barbee: Observer from North Carolina

It's was Thursday, April 1, 2010 and my wife and I went camping for the Easter Holidays. We stayed at Hagan Stone Park near Greensboro, NC. After spending the day packing the camper, driving to the campground and setting up camp, I was pretty much worn out. Being very tired, I only set up the AT66ED for some solar viewing. It has been really fun watching the sunspots return once again.

After supper and a couple hours of rest, I decided to do a little observing. The sky was beautiful after almost a month of cloudy skies or bad weather; so I went after the March Observers Challenge to see if it could be observed with a small telescope. Using the AT66ED and a 15mm eyepiece (with a wide 2 1/2° field-of-view at 27X), I pointed the scope at the Flying Minnow Asterism in Auriga. From there I swept eastward until I found the open cluster NGC-1893. Having found the open cluster, I added a Nebustar filter to the eyepiece for a look see. The filter revealed faint puffy wisps of nebulosity all over and around the cluster. The nebula was really faint but I could see it with both direct and averted vision. At only 27X, the cluster was a small but fairly bright gray spot with four to five dim stars visible. I needed more magnification to see the cluster well. Using a 5mm eyepiece with a 0.75° field-of-view at 80X, it was a very lovely, nicely detached open cluster. Some say the cluster is shaped like the letter Y. To me it looked more like a goblet. The 5mm eyepiece only has an exit pupil of 0.8mm, so both the nebustar and O-III filters failed to show any nebulosity with the little scope. On the other hand, a Sky Glow filter did show some nebulosity. There appeared to be a faint haze around three of the stars at the top of the goblet with a faint haze across the top and down the south side of the goblet as well. This haze began to appear after looking for a minute or two and I saw it best with averted vision although I saw some nebulosity with direct vision.



DEEP SKY OBSERVATION FORM

CONSTELLATION : Auriga

OBJECT: NGC1893 & IC 410

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Day & Date: Thursday, April 1 2010
Time (local): 10:25 PM EDST
Time (UT): 02:25 Fri., April 2, 2010
Observer: BLB
Location: Hogan Stone Park

Seeing (1-5): 4/5
Transparency (1-7): 5/7
Limiting Magnitude: 4.8±
Temp: 55°F Wind: 0-3mph
Humidity: 62%

INSTRUMENT
Telescope: AT66ED
Aperture: 66 mm
Focal Length/Ratio: 460mm/f6
Eyepiece: 5mm Radian
Magnification: 80x
Field of view: 00°45'
Filter: Orion Sky Glow

OBJECT
RA: 05 hr. 22 min. 45sec
Dec: 33 d. 25 min. 13 sec.
Type: Cluster with neb
Listed Magnitude: 7.5
Listed Size: 11'
Altitude of Object:

NOTES
A very nice open cluster in the shape of a goblet with very dim nebulosity across the top of the goblet and faintly along the side of the goblet

All in all, with the AT66ED, this cluster of 30 to 40 faint stars is best seen at 80X but the nebula was best seen at 27X with the Nebustar filter. I believe this little scope does as well as or better than anyone would expect it to do.