

the ASTROGRAPH



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COVER PHOTOGRAPH

Object.....M31
Photographer.....Robert C. Price
Instrument.....Canon 300mm F/4 Lens
Exposure/Camera.....three 20 minutes/Hutech modified Canon 40D
Date.....22 October 2008
Location.....south of Blue Knob State Park, PA

VOLUME 40 No. 3

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Features

Image Processing: Overexposure35
Image Processing: Anti-Vignetting.....44

Departments

Astrophotography for December and January.....42

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Image Processing: Overexposure

by
Robert Price

It is a relatively simple matter to process a well exposed astronomical image. Overexposed images present a challenge especially with digital image sensors. Overexposed images on film were simple to deal with. The overexposed area could be masked and burned into the enlarging paper. This process usually resulted in a lot of contrast being lost, but the result was that some of the overexposed area showed some detail. The overexposed area from a digital sensor is not so forgiving. Once a digital sensor has been saturated from overexposure, all data is lost. Images from such cameras as the Canon 40D contain no data in overexposed areas. Figure 1 is a portion of an image of M42 and shows the central region of the nebula with proper exposure. This exposure was only 23 seconds. Figure 2 shows this same nebula but with an exposure of 105 seconds. More of the outer nebula is captured but at the expense of an overexposed central area. The center area is totally white and has lost all the color

and detail that is seen in Figure 1. Figure 3 shows the image in Figure 1 and Figure 2 after processing in Adobe Photoshop Elements 2.0. The processing in Adobe Photoshop Elements 2.0 consists of opening both images and layering the image with the overexposed region on top of the image with the properly exposed area. The top image obscures the bottom image and the erase tool is used to erase the overexposed areas in the top image and allow the properly exposed area on the bottom image to be seen. Figure 4 shows both Figure 1 and Figure 2 opened in Photoshop and Figure 2 layered on top of Figure 1. Figure 4 also shows the central portion of Figure 2 erased to reveal the center portion of Figure 1. The erasure alone does not produce a seamless blend from Figure 1 to Figure 2. Figure 5 shows this layered image after the levels of Figure 1 have been increased so that the transition from Figure 1 to Figure 2 is improved in terms of brightness. Figure 6 shows a full frame 4.5 minute exposure of M42. Note that even more of the central area of M42 is overexposed. Figure 7 is a combination of the layered image shown in Figure 3 and the 4.5 minute exposure shown in Figure 6.



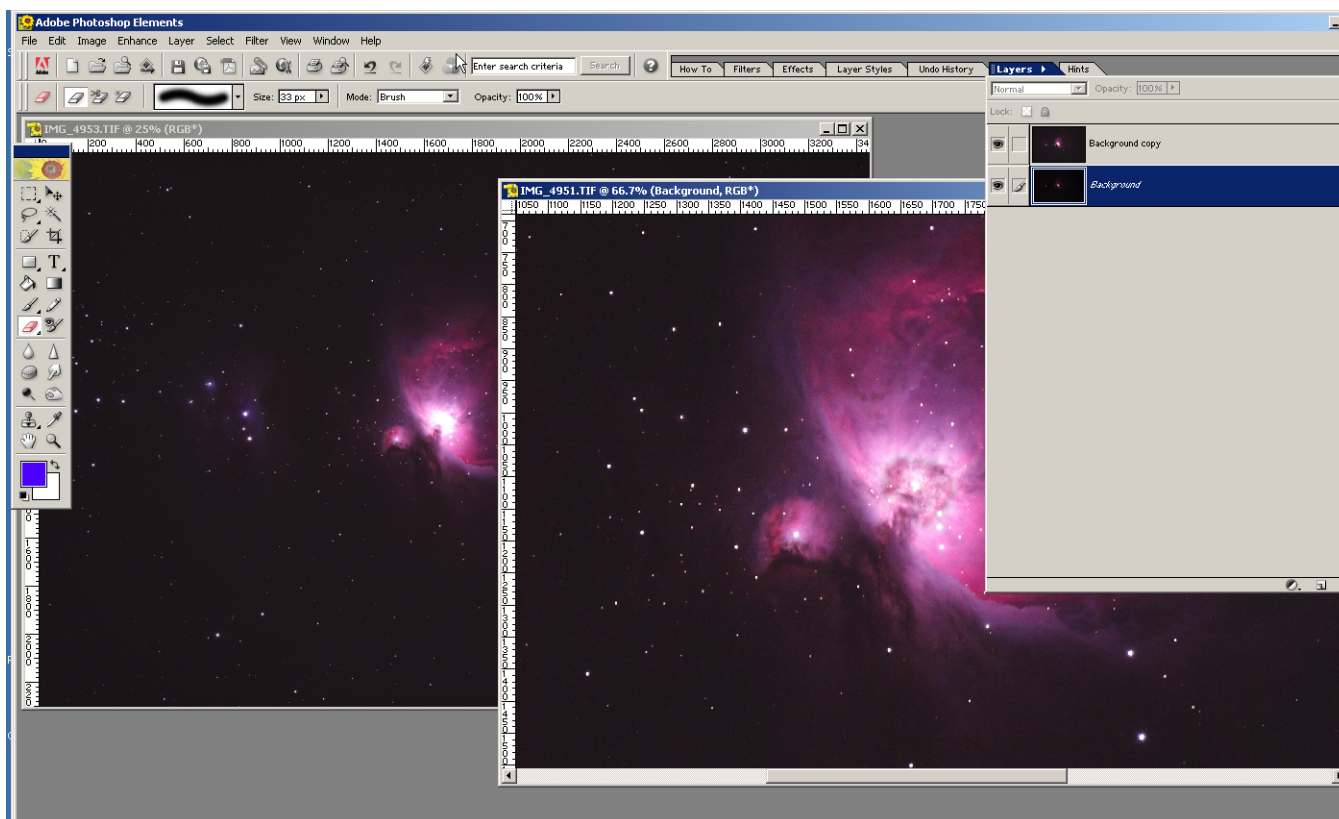
Above, Figure 1: Original cropped image of M42 taken with a Canon 40D camera and Tele Vue NP-101 four inch refractor. Exposure was 23 seconds at 400ASA. Note the center area is correctly exposed.



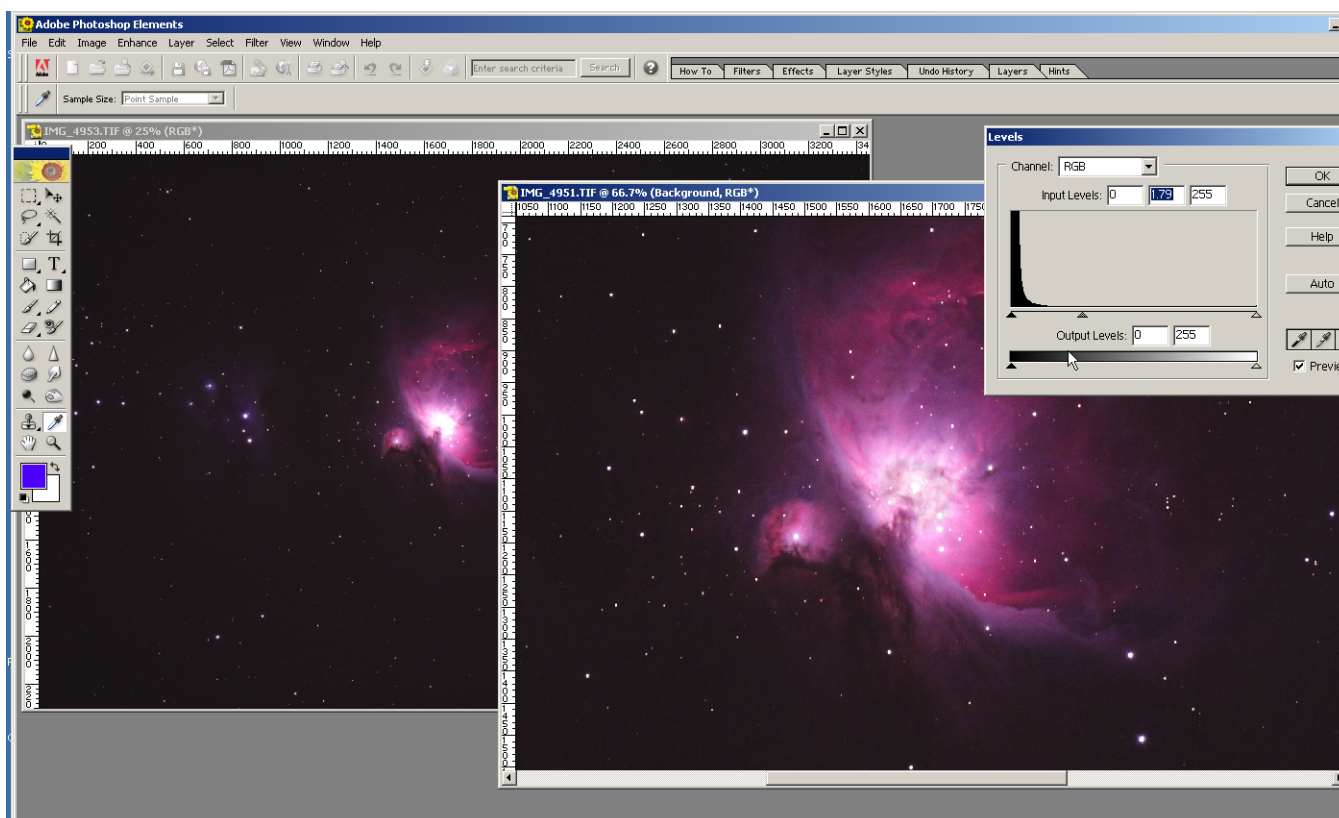
Above, Figure 2: Original cropped image of M42 taken with a Canon 40D camera and Tele Vue NP-101 four inch refractor. Exposure was 105 seconds at 400ASA. Note how the center area has been totally overexposed.



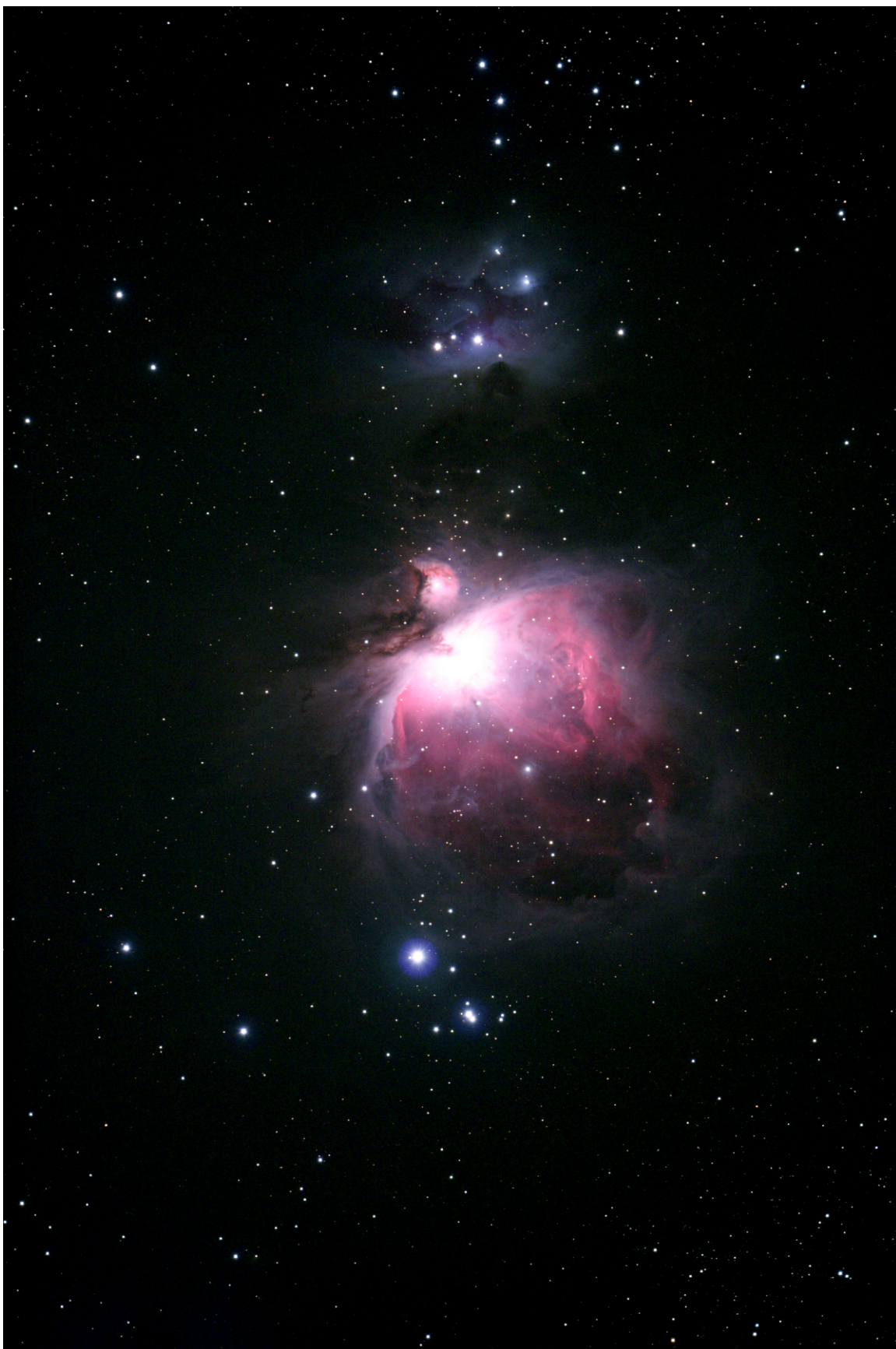
Above, Figure 3: Using Photoshop Elements 2.0, the images in Figure 1 and Figure 2 were combined to produce this composite image.



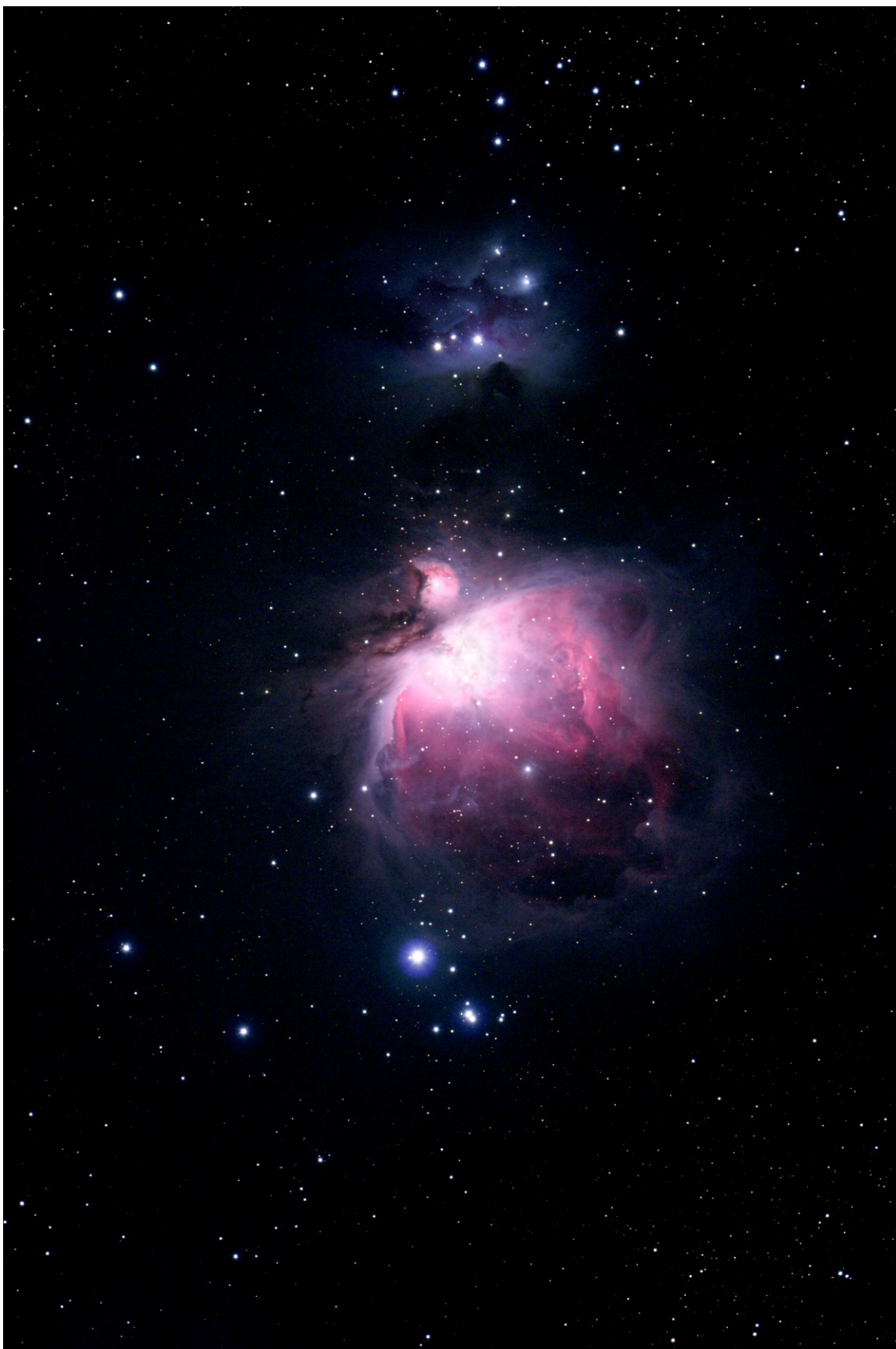
Above, Figure 4: Screen shot showing images in Figure 1 and Figure 2 after being opened in Photoshop Elements 2.0 and after initial layer addition and erasure of the center portion of Figure 2.



Above, Figure 5: Screen shot showing images in Figure 1 and Figure 2 after being opened in Photoshop Elements 2.0 and after the level of the image in Figure 1 was increased to blend with the image of Figure 2.



Above, Figure 6: Full frame image of M42 taken with a Canon 40D camera and Tele Vue NP-101 four inch refractor. Exposure was 4.5 minutes at 400ASA. Note that the center area is totally overexposed.



Above, Figure 7: Full frame image of M42 taken with a Canon 40D camera and Tele Vue NP-101 four inch refractor. This image is a combination of the image in Figure 6 and the image in Figure 3. Note that the center area is still overexposed, but some detail is visible and is a more realistic image because some center detail is visible.



Above: M78 photographed by Lee C. Coombs on 8 March 2002 using a 10 inch F/5 Newtonian. Exposure was 35 minutes on Kodak Ektachrome Professional 200.



Above: NGC6910 photographed by Lee C. Coombs on 23 July 2003 using a 10 inch F/5 Newtonian. Exposure was 25 minutes on Kodak Ektachrome Professional 200.

Astrophotography for December and January

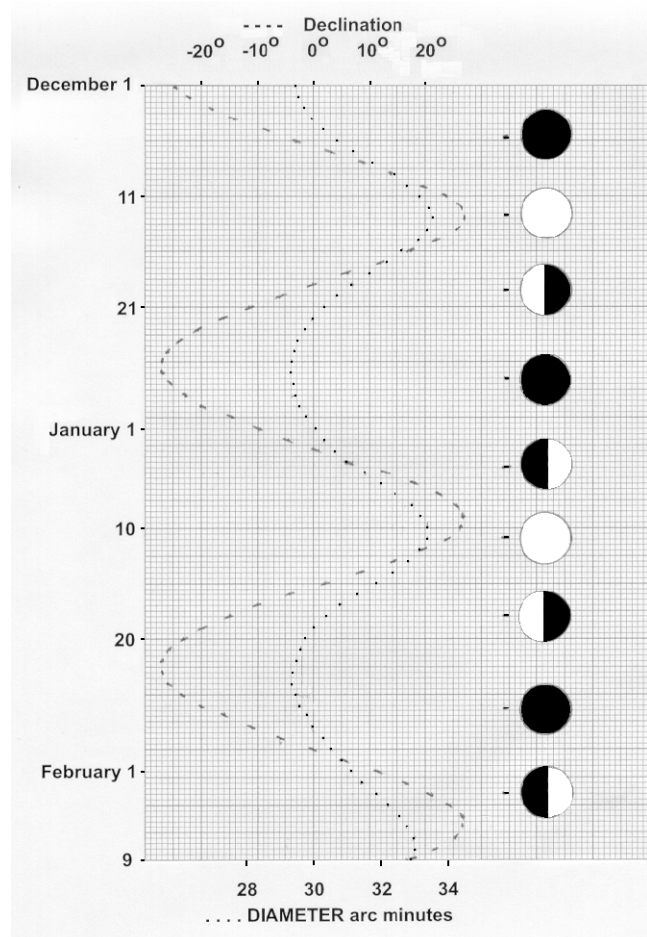
by

Ralph Proctor

Mercury begins December lost in the Sun's glare. Mercury emerges from the Sun's glare in mid-December as an evening object low in the western sky. Mercury moves higher in the western sky and reaches a greatest eastern elongation of 19 degrees on 4 January when it will be in poor photographic position with a declination of minus 21 degrees. During the remainder of January Mercury moves lower in the western sky and by the end of January disappears into the Sun's glare.

Venus begins December as an evening object high in the western sky. During December and January Venus moves higher in the western sky and reaches a greatest eastern elongation of 47 degrees on 14 January when it will be in poor photographic position with a declination of minus 8 degrees.

Lunar Declination and Diameter:



The Moon's waxing gibbous and full phases will be located high on the ecliptic and in excellent photographic position during December (December 19) and January (January 15), with an apparent declination of up to +28 degrees.

Mars begins December lost in the Sun's glare and does not reappear as a morning object until mid-January. During December and January Mars increases in brightness from magnitude +1.4 to +1.3, and increases in diameter from 3.78 to 3.99 arc seconds.

Jupiter begins December as an evening object low in the western sky in the constellation Sagittarius. Jupiter disappears in the Sun's glare during the first week in January and reaches conjunction with the Sun on 24 January. During December and January Jupiter moves lower in the western sky, decreases in brightness from magnitude -2.0 to -1.9, and decreases in diameter from 34.0 to 32.4 arc seconds. **Saturn** begins December as a morning object low in the eastern sky in the constellation Leo. During December and January Saturn moves higher in the eastern sky, increases in brightness from magnitude +1.1 to +0.8, and increases in diameter from 17.5 to 19.3 arc seconds.

Uranus begins December as an evening object in the western sky in the constellation Aquarius. During December and January Uranus moves lower in the western sky, decreases in brightness from magnitude +5.8 to +5.9, and decreases in diameter from 3.54 to 3.38 arc seconds. Uranus is located at R.A. 23 hours 20.3 minutes declination -05 degrees 06 minutes on 15 December and at R.A. 23 hours 23.4 minutes declination -04 degrees 45 minutes on 15 January.

Neptune begins December as an evening object low in the western sky in the constellation Capricornus. Neptune disappears in the Sun's glare in late January and reaches conjunction with the Sun on 12 February. During December and January Uranus moves lower in the western sky, decreases in brightness from magnitude +7.9 to +8.0, and decreases in diameter from 2.25 to 2.20 arc seconds. Neptune is located at R.A. 21 hours 37.9 minutes declination -14 degrees 31 minutes on 15 December and at R.A. 21 hours 41.5 minutes declination -14 degrees 13 minutes on 15 January.

Pluto begins December as an evening object low in

the western sky in the constellation Sagittarius. During December and January Pluto moves lower in the western sky and by early December disappears into the Sun's glare. During December and January Pluto increases in brightness from magnitude +14.1 to +14.0. Pluto is located at R.A. 18 hours 02.2 minutes declination -17 degrees 43 minutes on 15 December and at R.A. 18 hours 06.9 minutes declination -17 degrees 45 minutes on 15 January.

Events:

Venus will be occulted by the Moon on 1 December (16 hours universal time) for the northeastern tip of Canada, Europe, and southern Scandinavia.

Antares will be occulted by the Moon on 25 December (07 hours universal time) for the southern half of Africa, Madagascar, and southeastern Asia; and on 21 January (13 hours universal time) for the eastern Pacific Ocean, the central portion of South America, and the southern portion of the Atlantic Ocean.

Mercury will be occulted by the Moon on 29 December (04 hours universal time) for eastern Asia, Japan, and northern Indonesia;

Jupiter will be occulted by the Moon on 29 December (09 hours universal time) for all but the eastern portion of Australia, and most of Antarctica.

The Sun will undergo an annular eclipse on 26 January 2009 for the southern Indian Ocean and Indonesia. The eclipse begins at 4 hours 56.6 minutes and ends at 11 hours 00.7 minutes universal time. Central eclipse at local apparent noon occurs at 7 hours 46.4 minutes. The shadow of the annular eclipse begins southwest of the southern tip of Africa, travels northeast across the southern Indian Ocean and Indonesia, and ends in the Pacific Ocean.

The Sun will undergo a total eclipse on 21-22 July 2009 for India, southern and eastern Asia, Japan, northern Indonesia, the Philippines, and the western and central portion of the Pacific Ocean. The eclipse begins at 23 hours 58.3 minutes universal time 21 July and ends at 05 hours 12.4 minutes universal time 22 July. Central eclipse at local apparent noon occurs at 02 hours 33.0 minutes universal time 22 July. The shadow of the total eclipse begins in the central Pacific Ocean, travels across Asia, and ends off the eastern coast of India.

MINOR PLANETS

Planet	Magnitude	position			
		15 December		15 January	
		R.A.	Decl.	R.A.	Decl.
Ceres	08.3 - 07.2	11 hr 05.3 min	+17 deg 27 min	11 hr 19.1 min	+19 deg 24 min
Pallas	08.0 - 08.2	05 hr 01.8 min	-32 deg 49 min	04 hr 43.5 min	-28 deg 41 min
0Juno	11.1 - 10.8	19 hr 01.6 min	-14 deg 09 min	19 hr 51.3 min	-13 deg 09 min
Vesta	07.0 - 08.1	02 hr 01.6 min	+03 deg 41 min	02 hr 10.3 min	+06 deg 38 min

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 Volume No. 18 issue 1, 4, 5, and 6
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Image Processing: Anti-Vignetting

by
Robert Price

Vignetting is the name for the phenomena of light falling off in brightness as measured from the center of an image to its edge or corner. Most vignetting is caused by light baffles within a telescope tube or the image sensor setting deep in a camera where there is not enough room between the sensor edge and camera's internal mechanism to allow the light cone from the telescope objective lens full access to the sensor or film. In this article the author looks at two programs with anti-vignetting features. GradientXTerminator (from www.rc-astro.com, trial or \$49.95) is a Photoshop plug-in whose purpose is to reduce the appearance of vignetting in image files. DeepSkyStacker (free from deepskystacker.free.fr) has a feature that uses a "flat" image to compensate for an image system's vignetting characteristics. Both programs seem to do a decent job of reducing vignetting. Figure 1 is the full frame of an image of M81 and M82 taken with a NP-127 and Canon 40D camera. Figure 2 is

a stack of three similar images using CCDStack, and clearly shows some vignetting. Figure 3 is the image in Figure 2 after using the Photoshop plug-in and default values of GradientXTerminator. An objectionable red donut is produced with these default values. After changing some of the default values, GradientXTerminator can yield a better image, seen in Figure 4, but some of this red donut is still visible. Figure 5 is an enlargement of M81 after processing Figure 4 in Adobe Photoshop Elements 3. Figure 6 is an image from the program DeepSkyStacker which used the three stacked image files that produced Figure 2 plus a "flat" frame image file. This flat frame is a daylight exposure of a white or gray card using the NP-127 focused at infinity. This flat frame is used to characterize the NP-127 vignetting characteristics and then compensates for the vignetting. Figure 6 is the image from DeepSkyStacker and still shows some vignetting. Figure 7 is an enlargement of M81 after processing Figure 6 in Adobe Photoshop Elements 3. The difference in color between Figure 5 and Figure 7 is a typical when using two different programs such as CCDStack and DeepSkyStacker.



Above, Figure 1: Original full-frame image of M81 and M82 taken with a Hutech modified Canon 40D camera and Tele Vue NP-127 five inch refractor. Exposure was 20 minutes at 100ASA.



Above, Figure 2: Image after using CCDStack to register and stack three images of M81 and M82 (one of the three images is shown in Figure 1). Note the darkening at the corners caused by vignetting.



Above, Figure 3: Image after using GradientXEliminator (default values) on the stack of three images, Figure 2. Note that while the corners have been brightened, there is a red colored ring that resulted from the process.



Above, Figure 4: Image from Figure 2 after changing GradientXEliminator default values changed as follows. The value of "detail" was changed to "fine". The value of "agressiveness" was changed to "low".



Above, Figure 5: Cropped image from Figure 4 showing enlarged view of M81 after levels were adjusted in Adobe Photoshop Elements 3.



Above, Figure 6: Stacked image using DeepSkyStacker and the three images that were used by CCDStack to produce Figure 2. A fourth image “flat” frame was used with DeepSkyStacker to compensate for vignetting in the NP-127.



Above, Figure 7: Cropped image from Figure 6 showing enlarged view of M81 after levels were adjusted in Adobe Photoshop Elements 3.



Above: M44 photographed by Lee C. Coombs on 1 February 2000 using a 4.25 inch F/4/6 Newtonian. Exposure was 25 minutes on Kodak Ektachrome Professional 200.