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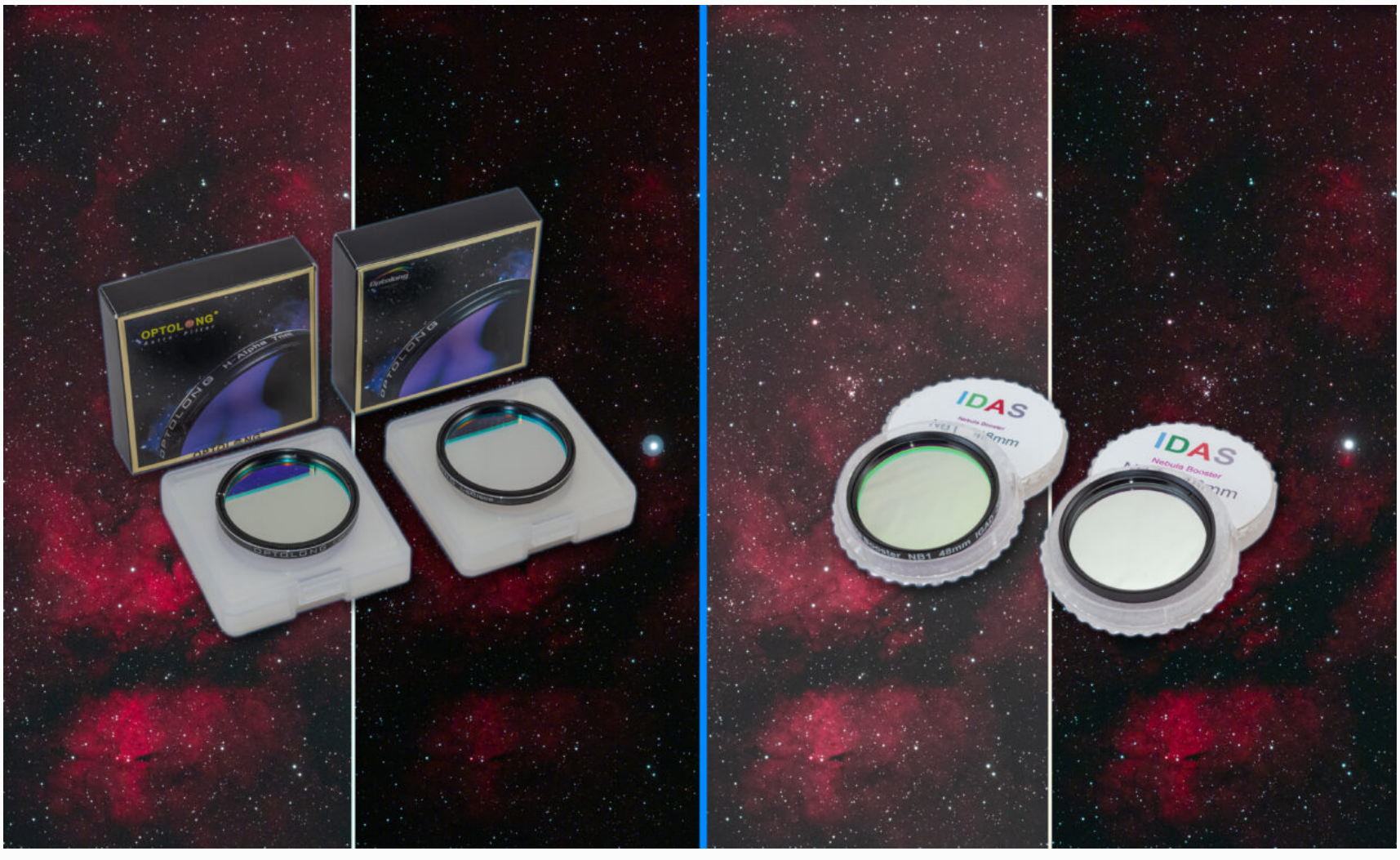
Filter Face-off: Optolong vs IDAS For Shooting Nebulas

By: Alan Dyer

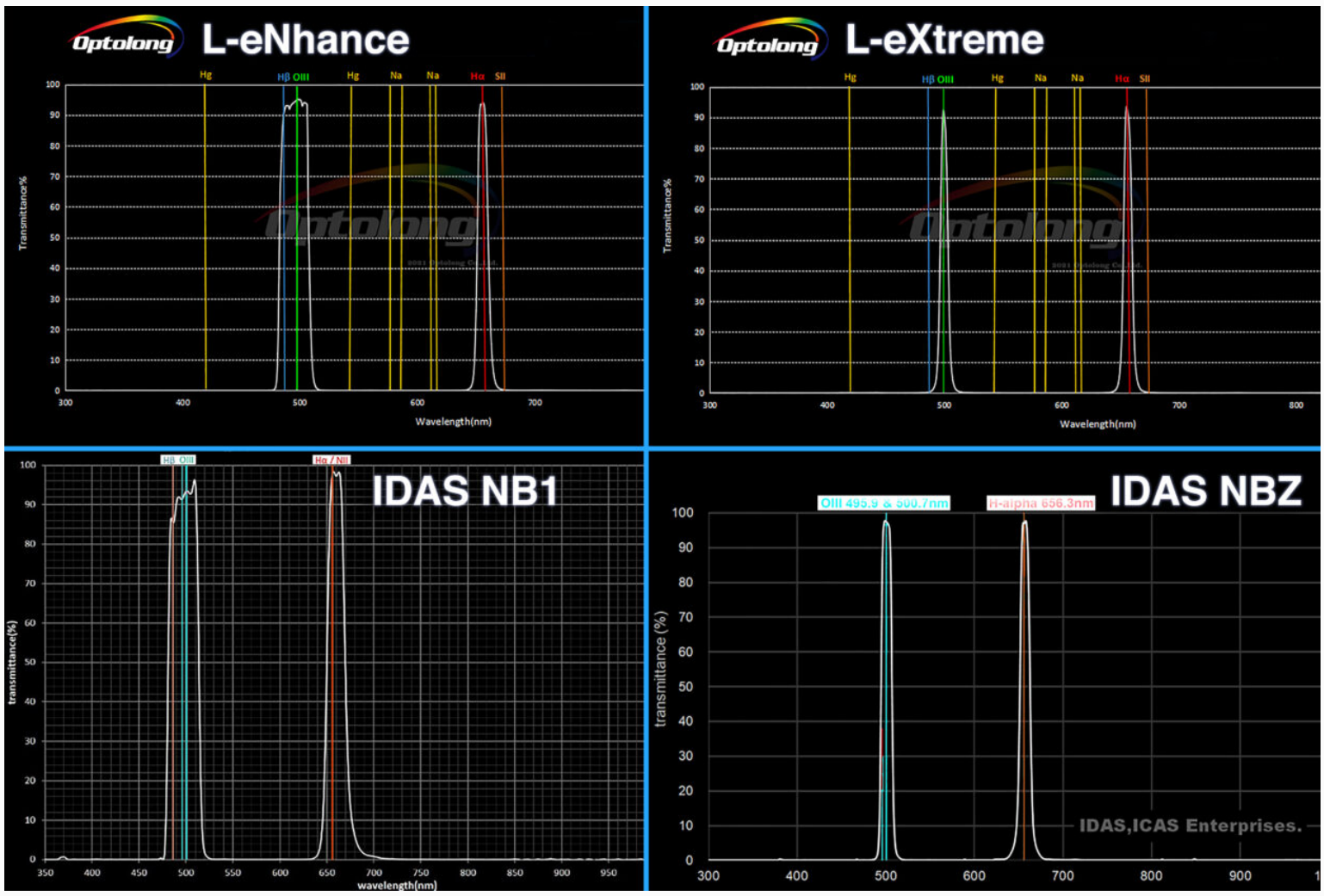
Published: Sep 19, 2021



Credit: Alan Dyer

In the last few years the selection of light pollution filters for astrophotography has expanded to bewildering proportions. Costing $200 to as much as $1,000 each, these filters make it possible to shoot nebulas under light polluted skies, and to pull out the faintest of structures under dark skies.

However, the wide range of models and brands makes it difficult to know which is best. I test two pairs of similar models from the popular brands Optolong from China (their L-eNhance and L-eXtreme) and IDAS from Japan (their Nebula Boosters NB1 and NBZ).



The transmission charts supplied by Optolong and IDAS show the filters' bandwidths, with the L-eXtreme and NBZ having narrower passbands than the other two filters. All four are more restrictive in bandwidth than typical Ultra High Contrast (UHC) filters. Credit: Adapted by Alan Dyer from originals by Optolong and IDAS

Choose Your Bandwidth

All four filters transmit only the red Hydrogen-alpha (H????) emission line at 656.3 nanometers (nm) and the two green Oxygen III wavelengths at 495.9 and 500.7 nm. The Optolong L-eNhance and IDAS NB1 filters also transmit the weaker blue-green Hydrogen-beta (H????) line at 486.3 nm. These are the main wavelengths emitted by nebulas.

All four filters are "dual narrowband" designs, letting through only those select few wavelengths in two bands, deep red and blue-green. As such, they are suitable only for

photographing emission nebulas, though that would include planetary nebulas and supernova remnants.

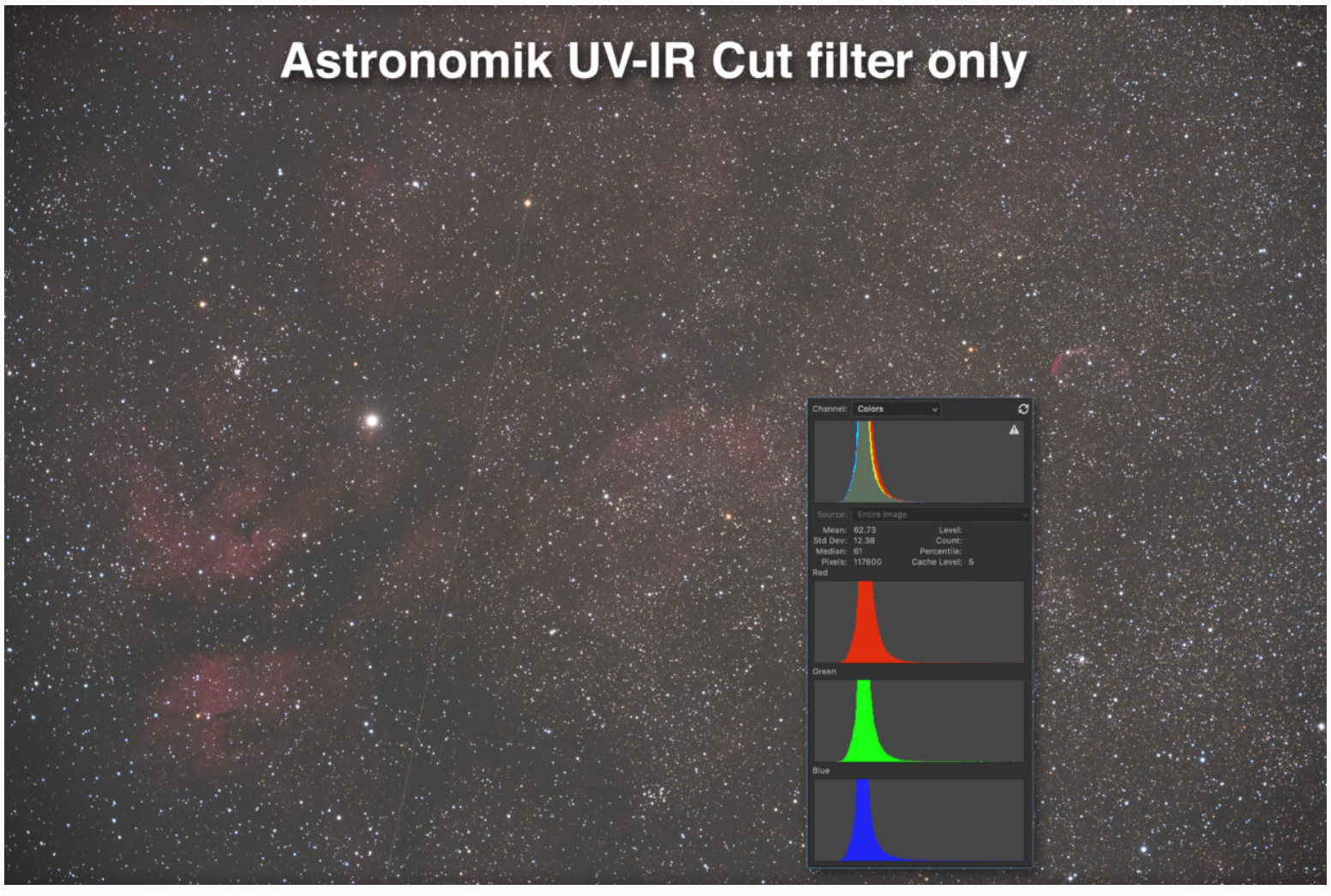
Optolong's L-eNhance and the IDAS NB1 are similar in having bandwidths about 20 to 30 nm wide in each of their two pass bands. They both provide excellent contrast and light pollution reduction, but require longer exposures than unfiltered images.

The Optolong L-eXtreme and IDAS NBZ are closely competitive, having even narrower bandwidths about 10 nm wide at the H???? and O III wavelengths. These filters can further reduce light pollution, but require even longer exposures.

For milder reduction of light pollution when shooting all objects, many companies offer broadband filters. Optolong's L-Pro and the IDAS LPS D3 are examples, but are not tested here. Also, don't confuse these dual narrowband filters for the single-wavelength narrowband filters (SII, H???? and O III) intended for use with monochrome cameras. The filters on test here are made for one-shot color cameras. For more on selecting filters, see AstronoMolly's report.

Testing Techniques

For my shootout I tested the two pairs of filters under rural skies. I chose the field in Cygnus around the star Sadr for its mix of H???? and O III emission. I shot in quick succession on a moonless night and again on a moonlit night, through a 94mm SharpStar apo refractor with its field flattener/reducer at f/4.4 and with an H????-sensitive Canon EOS Ra camera.

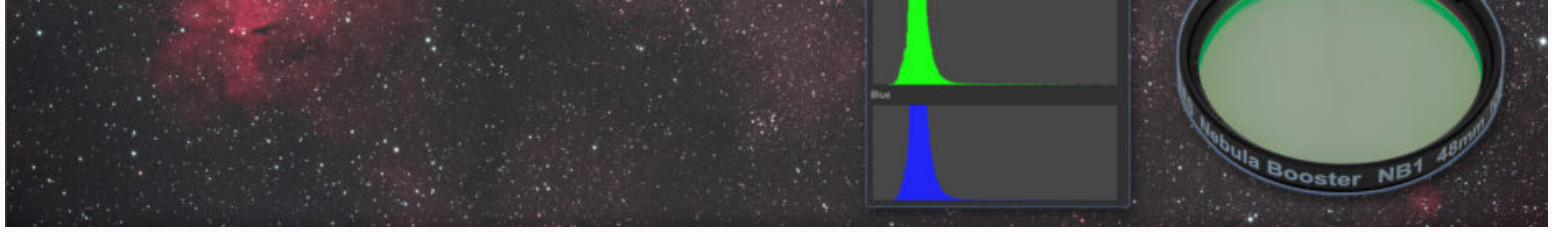


This shows a single "white light" image taken in a dark sky with no light pollution filter, for comparison. It records nebulosity, but not to the extent possible with a narrowband filter. The inset histogram graphs the exposure in this "out-of-camera" raw image. Credit: Alan Dyer

On the moonless night, the exposure for the “no-filter” comparison image was 6 minutes at ISO 1600. (I actually shot this image through an Astronomik UV-IR Cut filter to eliminate the red halos the Ra can exhibit from infra-red light. The Astronomik filter was not in place for the other images.)

To compare their light transmission, I shot the four filtered images using identical exposures, each 12 minutes at ISO 3200, so double the exposure time and double the ISO speed of the unfiltered image. I’ve found that narrowband filters like these require at least four times more exposure (i.e. two stops) than a “white-light” unfiltered view, in order to yield a histogram similar to the unfiltered image. Good exposure is essential to good images.

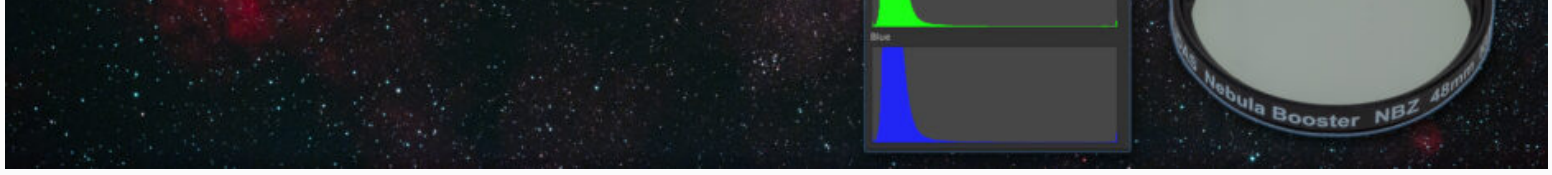
The test images presented are all single “out-of-camera” raw files with no calibration, nor adjustments to exposure, contrast or noise reduction, just a color correction to neutralize the dark sky background, and with the Adobe Standard camera profile applied in Adobe Camera Raw.



The popular L-eNhance filter provides excellent contrast but produces images that are darker than with the NB1, requiring more exposure, despite the two filters having similar specifications. Credit: Alan Dyer

Comparison 1. L-eNhance vs. NB1 in a Dark Sky

In identical exposures, the L-eNhance provided a raw image about 1/2-stop darker than the NB1 but with more contrast, punching out the faint nebulosity better. This would suggest the L-eNhance has narrower bandwidths and therefore lower light transmission than the NB1. However, while less contrasty, the NB1 did show as much nebulosity as the L-eNhance, and in a shorter exposure.

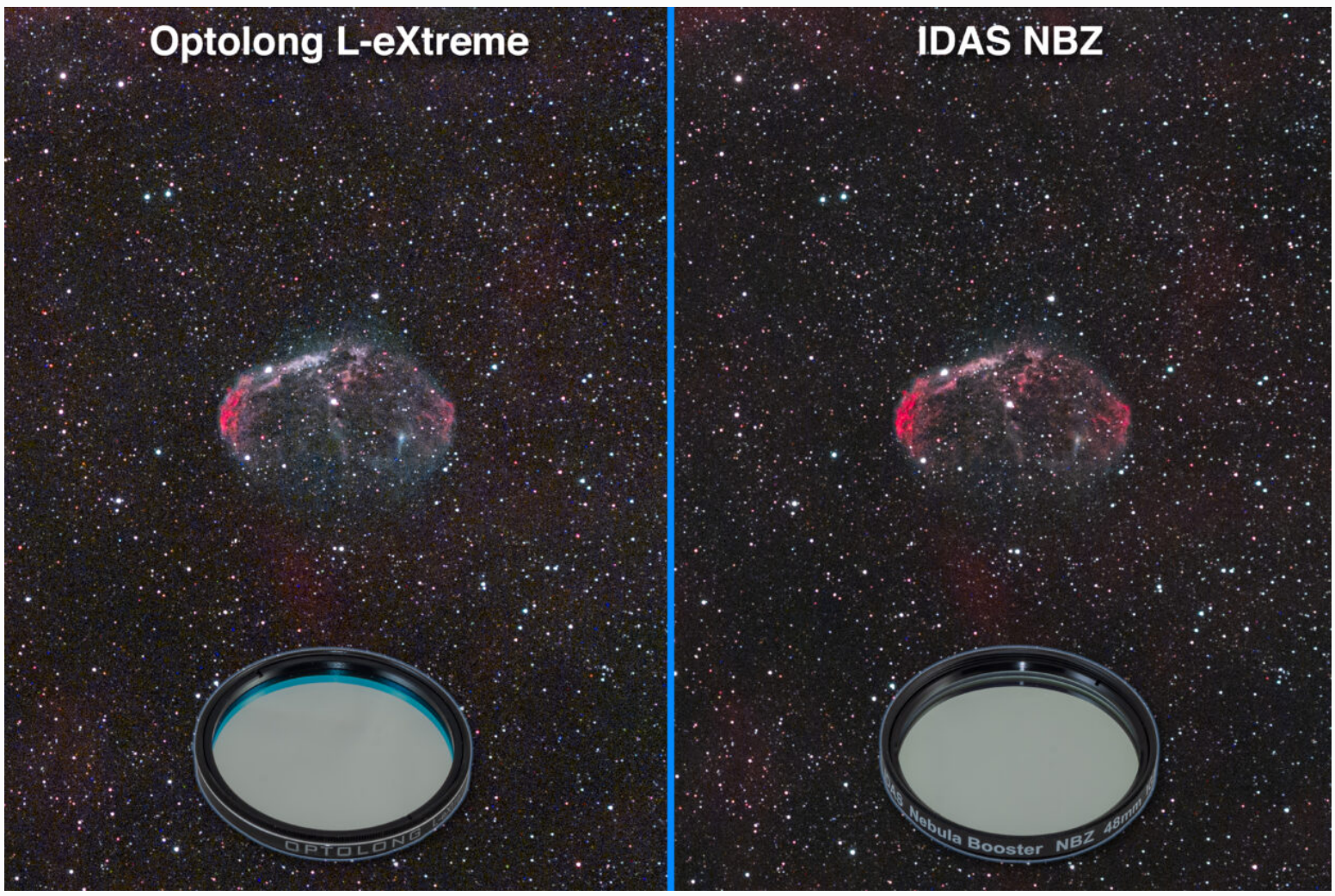


These two images were taken using the same exposure times as the other two filters, to show how these even narrower filters produce darker image due to their lower light transmission. Both demand longer exposures at the telescope. The L-eXtreme is the darkest of the four filters. Credit: Alan Dyer

Comparison 2: L-eXtreme vs. NBZ in a Dark Sky

The L-eXtreme's ultra-narrow bandwidths produced an image about one stop darker than the NBZ, which was itself about 3/4-stop darker than the NB1. Going "ultra-narrowband" comes at a high price in light transmission.

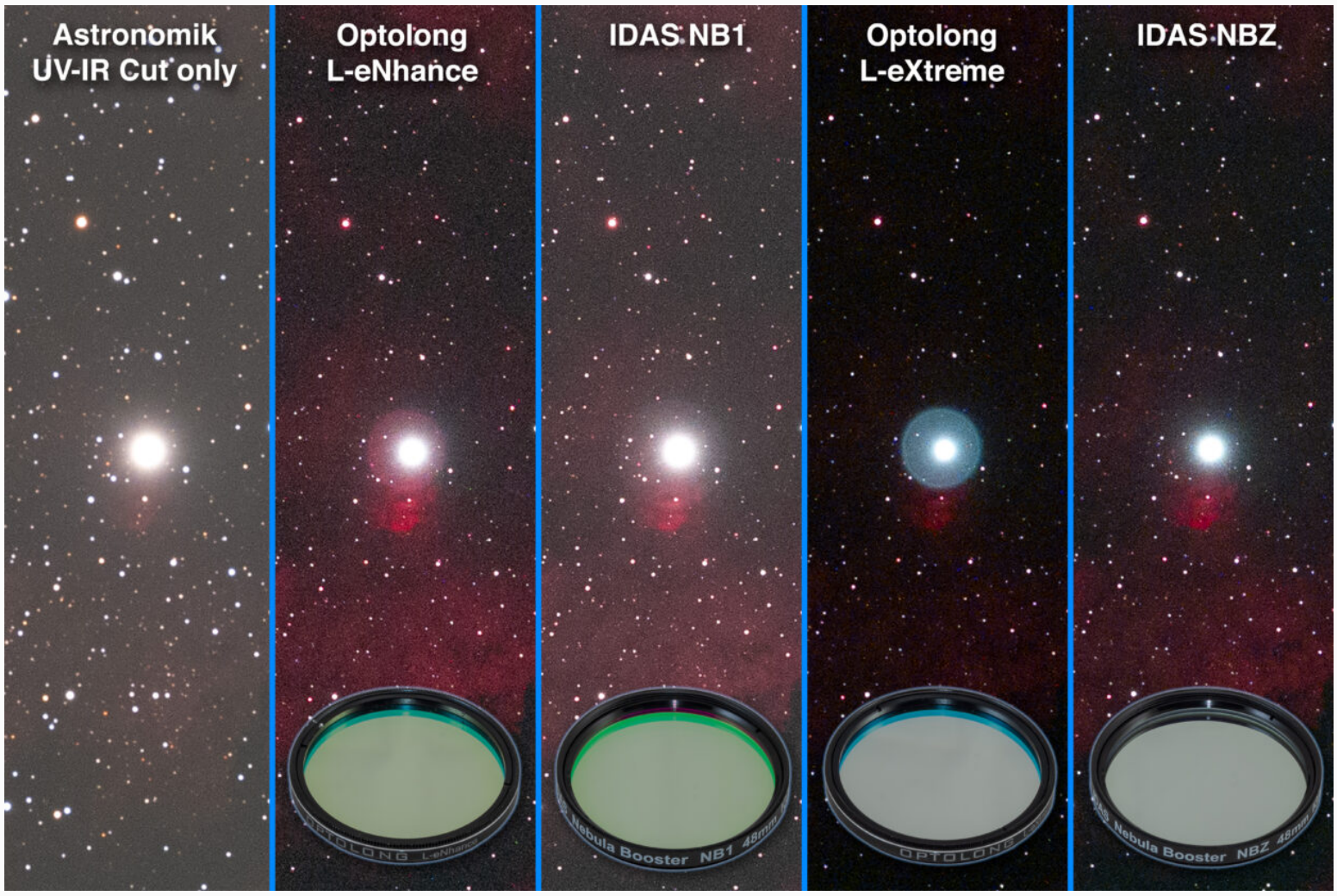
The benefit exhibited by both filters was that they each picked up the cyan O III components of the Crescent Nebula, aka NGC 6888, better than the L-eNhance or NB1. But neither showed more extensive H???? nebulosity than the wider pair of filters; if anything they showed less.



The L-eXtreme revealed more O III emission than the NBZ. Either filter could be used just to collect images primarily for the O III content, with the Ha content coming from images shot with one of the wider bandwidth filters. Images shot without a filter can add the natural star colors. Credit: Alan Dyer

Of the two, the L-eXtreme did a better job pulling out the subtle cyan O III emission in the Crescent Nebula. But revealing it in this comparison pair required boosting the L-eXtreme's image brightness in processing by a full stop, which brought out much more noise. The L-eXtreme does work, but demands long exposures and many sub-frames for

stacking. That all equals lots of time at the telescope.

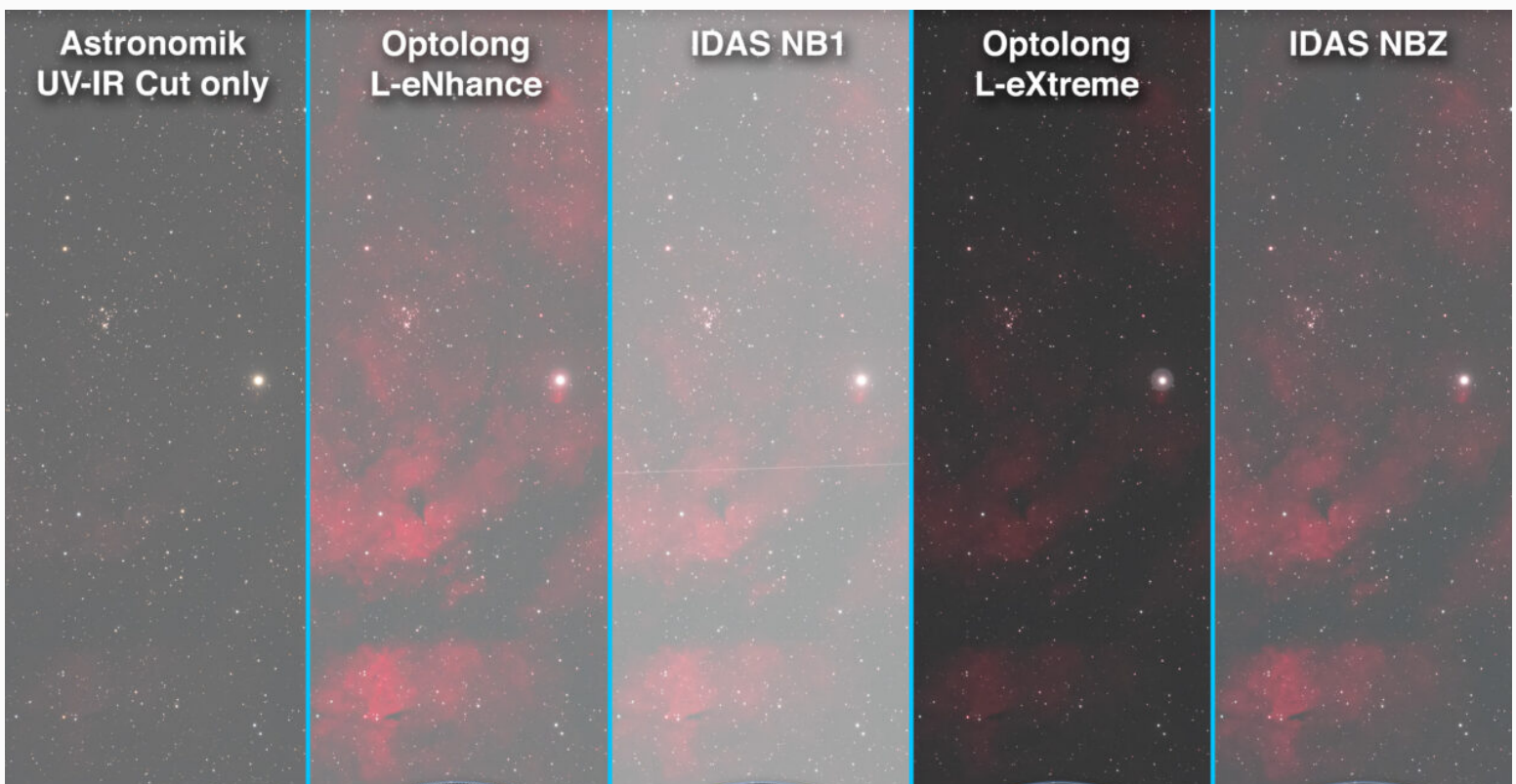


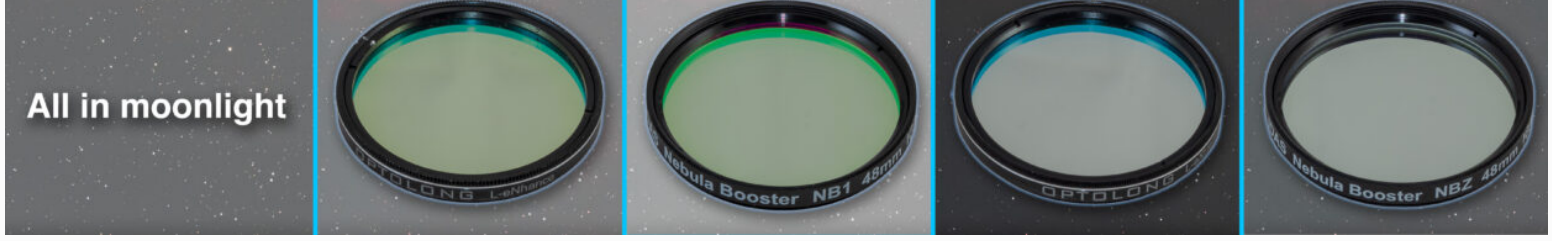
The L-eXtreme was the worst offender for halos on bright stars, followed by the L-eNhance. The IDAS filters performed the best for lack of halos. The red patch below Gamma Cygni is a nebula, not a halo artifact. All are 400% blow-ups. Credit: Alan Dyer

Both Pairs: Comparing Halos

The field included bright star Sadr, or Gamma Cygni, as a test for halos from internal reflections. The L-eNhance showed a dim magenta halo, while the NB1 had a very faint cyan halo.

The L-eXtreme was prone to large and prominent halos on bright stars, while the NBZ was entirely free of them, perhaps due to its proprietary coatings. So full marks go to the IDAS NBZ on this count.





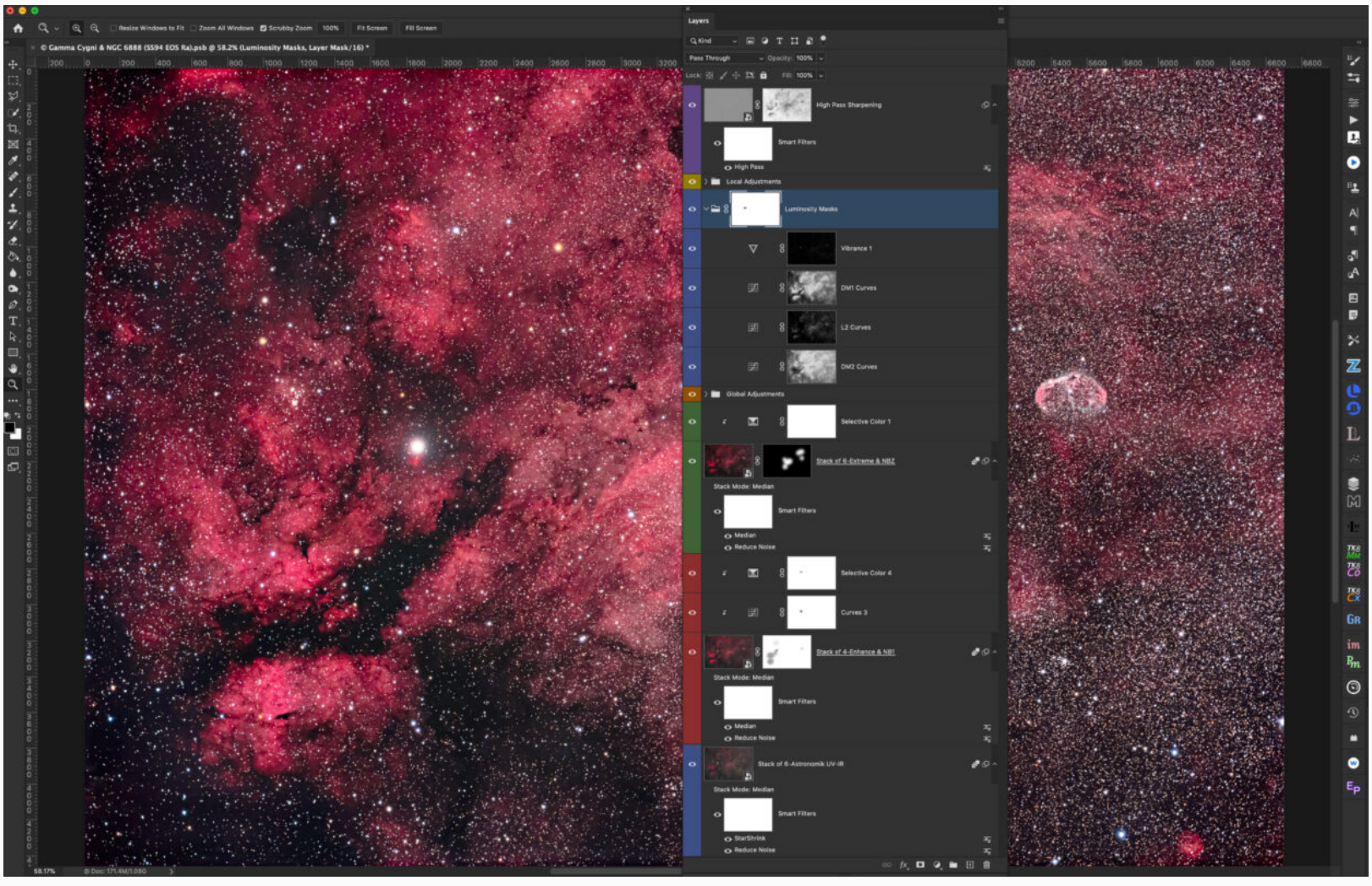
Under a bright moonlit sky, the “no-filter” image at left was 3 minutes at ISO 800. All four filtered images were 6-minutes at ISO 3200 with no adjustments made to equalize their brightness, just the color balance. Here, the L-eNhance and NBZ look similar. Credit: Alan Dyer

Both Pairs: Moonlit Sky Test

As a further test, I shot on a night lit by a bright, waning gibbous Moon, as a partial stand-in for a sky lit by white LED streetlights, to see which filter might be best under suburban skies. In the above set, all images are single “out-of-camera” raw files, with only color correction applied to neutralize the sky background.

Without a filter in a clear but moonlit sky, the Cygnus nebulosity barely shows up. The L-eNhance and NBZ did the best job extracting the red nebulosity and appeared similar to each other, with the NBZ having the advantage of no halos.

The NB1 presented the least contrast and suppression of the sky background. The L-eXtreme did provide the darkest skies, but not necessarily more nebulosity than the NBZ. And the L-eXtreme is beset with halos.



The final photo from the dark-sky set is a stack of six unfiltered images, blended with 10 filtered image: two with the L-eNhance, two with the NB1, two with the L-eXtreme, and four with the NBZ. All stacking, alignment, blending and processing were with Photoshop. Credit: Alan Dyer

Recommendations

In my main example, and with other targets I shot under a dark sky, I've found the L-eXtreme useful primarily for bringing out the cyan components from O III emission in nebulas rich in that content, such as the Veil Nebula and planetary nebulas. But the filter's large cyan halos on bright stars are troublesome. While the NBZ is halo free, it doesn't pull in quite as much O III.

I feel the L-eXtreme, and to some extent the NBZ, are specialized filters for advanced imagers wanting to add O III content for the limited selection of targets that emit strongly at those wavelengths. But under dark skies, neither would be my first choice as a primary nebula filter for most targets.

In the dark-sky test, the L-eNhance did the best job bringing out rich H???? nebulosity, which is by far the biggest component of most extended nebulas. The IDAS NB1 was almost as good, with the benefits of requiring the least increase in exposure and of reduced halos. For anyone wanting to buy just one filter for shooting under dark skies, I would recommend the IDAS NB1 first, though the L-eNhance is a fine second choice.

However, under a bright sky, the NBZ performed very well, much better than the wider NB1. For use under bright skies, the IDAS NBZ looks like an excellent performer, with the benefit of not having to deal with halos. But again, the Optolong L-eNhance is also a good choice. I'd recommend it over the L-eXtreme.

Caveats

While I trust you'll find my tests useful, I do offer caveats. In other words, your mileage may vary!

Sky — First, I shot under a rural sky where filters are highly valuable for enhancing nebulas. While my moonlit night provides some idea how the filters might behave under light polluted skies, it isn't a complete substitute for a bright city sky.

Object — The Crescent Nebula shines with a good mix of H???? and O III content. Other deep sky objects with variations in the strength of their emission lines will respond differently to filters.

Scope — While my test scope was fast at f/4.4, filter performance can change when shooting with even faster f/2.8 or f/2 astrographs. Their steep light cones can shift a filter's passband off the desired wavelength, resulting in lower light transmission. However, the IDAS Nebula Booster (NB) filters are advertised as being able to accommodate fast f/2 light cones. I was not able to test that claim.

Camera — Another caveat is that I shot using a filter-modified Canon EOS Ra. You certainly will not pick up lots of red nebulosity using a DSLR or mirrorless camera that has not been modified, even with the aid of a nebula filter. Conversely, a one-shot-color cooled CMOS camera, while made for astronomy, could also yield different results, from users applying their own non-linear stretches unique to each image or camera.

Brands — Finally, I tested two of the most popular brands. Many others, including Astronomik, Baader, OPT Radian, SkyTech, STC, SVBony and ZWO, offer dual narrowband or wider UHC-class filters. I have not used filters from these other brands to know how they might compare.

But seeing the differences between ostensibly similar pairs of filters from Optolong and

IDAS, it's reasonable to assume other brands might also show significant variations. And tests of multiple copies of any filter might show unit-to-unit variations; I tested one copy of each filter.

Optolong Filters: L-eNhance and L-eXtreme
MSRP: $229 and $309 respectively for 2-inch (48mm) models
Website: www.optolong.com

IDAS Filters: NB1 and NBZ
MSRP: $199 and $299 respectively for 2-inch (48mm) models
Website: Astro Hutech

About Alan Dyer

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Alan Dyer is an astrophotographer and astronomy author based in Alberta, Canada. His website at www.amazingsky.com has galleries of his images, plus links to his product review blog posts, video tutorials, and ebooks on astrophotography.

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