# Optolong preliminary filter test report

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## Optolong Astronomical Filters - Preliminary Test Results

**Introduction:**

A sample of four Optolong brand astronomical filters was received from Yulong Optics Co., Ltd (contact Laura Ge): UV/IR Cut, CLS, L-Pro and UHC. All filter samples are 1.25" size, a photo of which is presented in Figure 1. My objective was to evaluate the sample filters in a number of different ways:

1. Measure the spectral transmissivity of the filters, and compare with that published by the manufacturer as well as that of competing filters;
2. Field test the filters using a CCD camera in a back-to-back test with competing filters (as weather conditions permit);
3. Field test the filters using an eyepiece in a back-to-back test with competing filters (as weather conditions permit); and
4. Visually inspect the filters and compare to those of competing filters.


**Figure 1 Optolong Filters Tested**

As of today, all but Step 3. has been completed. As this is a preliminary report, the remainder of this document is presented in a brief point form format. A more complete report may follow at a later date.

**Spectral Transmissivity:**

- measured using Ocean Optics USB4000 UV-VIS-IR spectrometer
- spectrometer factory calibration: 22-Sep-2009, field calibration: 03-Dec-2012 (HG-1 calibration reference)
- reference light source 12 VDC halogen lamp, Solux brand 50W 4700K colour temperature, shining on 8" x 12 " pane of opal glass
- measured spectral response of both Optolong and competitor filters to give comparison

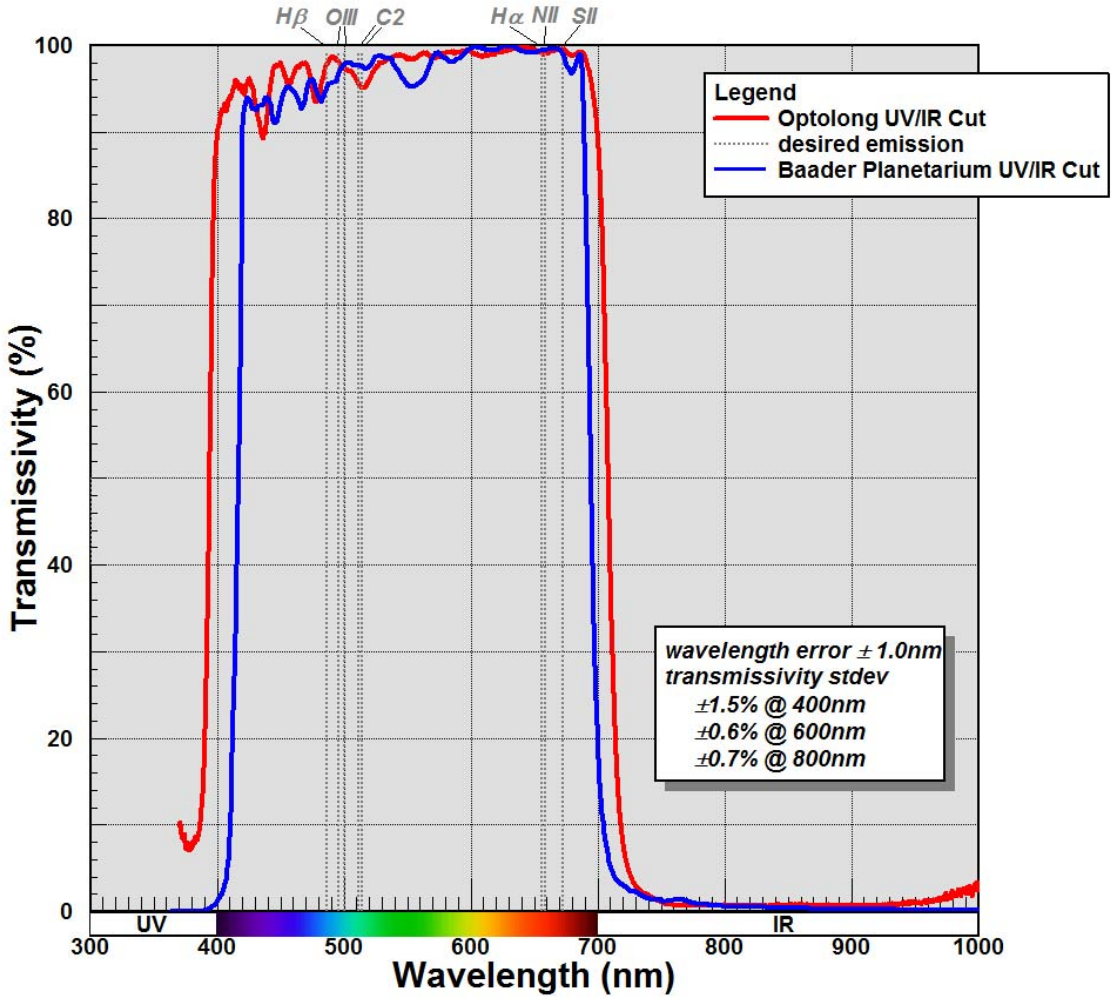


**Figure 2** **Measured Spectral Response - Optolong UV/IR Cut**

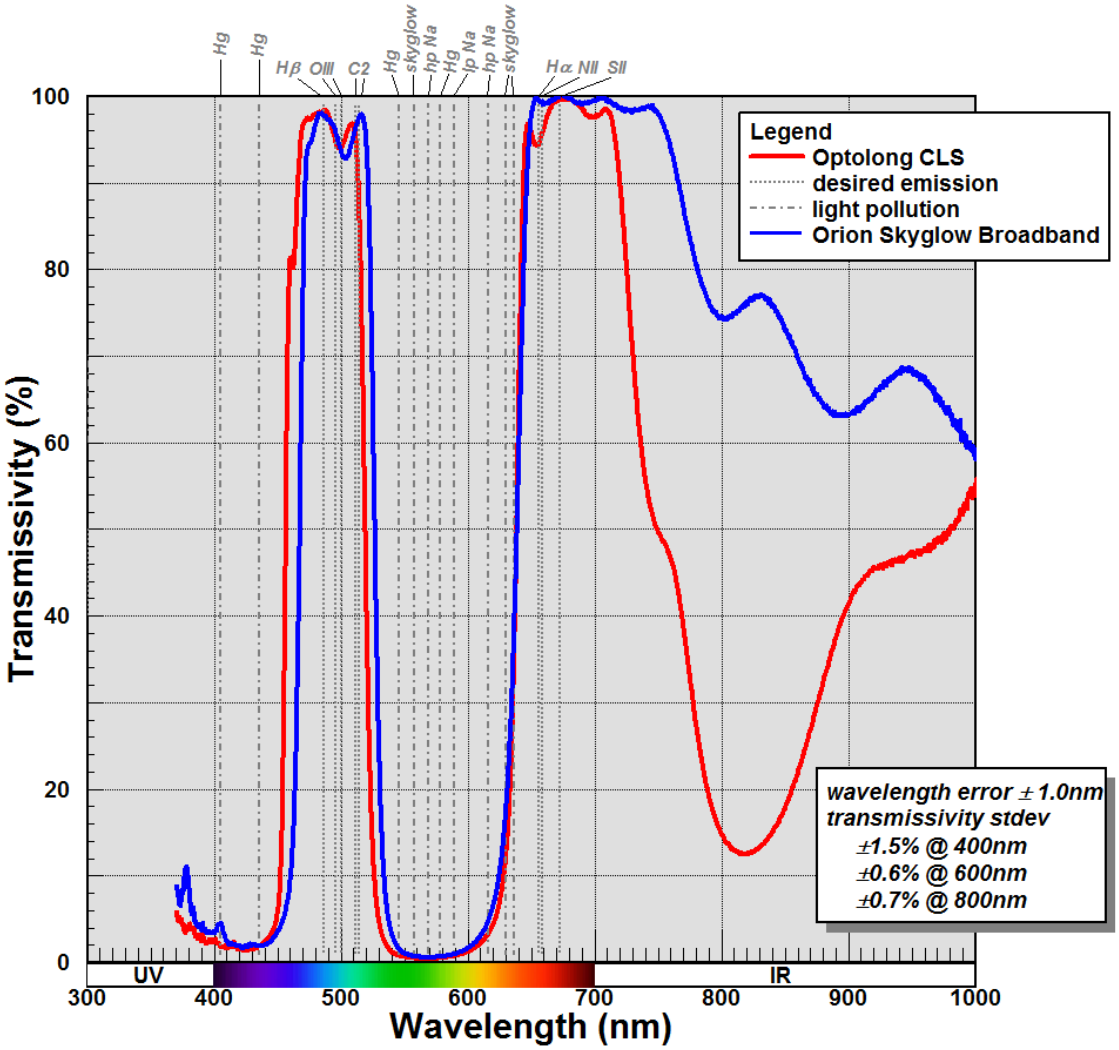


**Figure 3** **Measured Spectral Response - Optolong CLS**

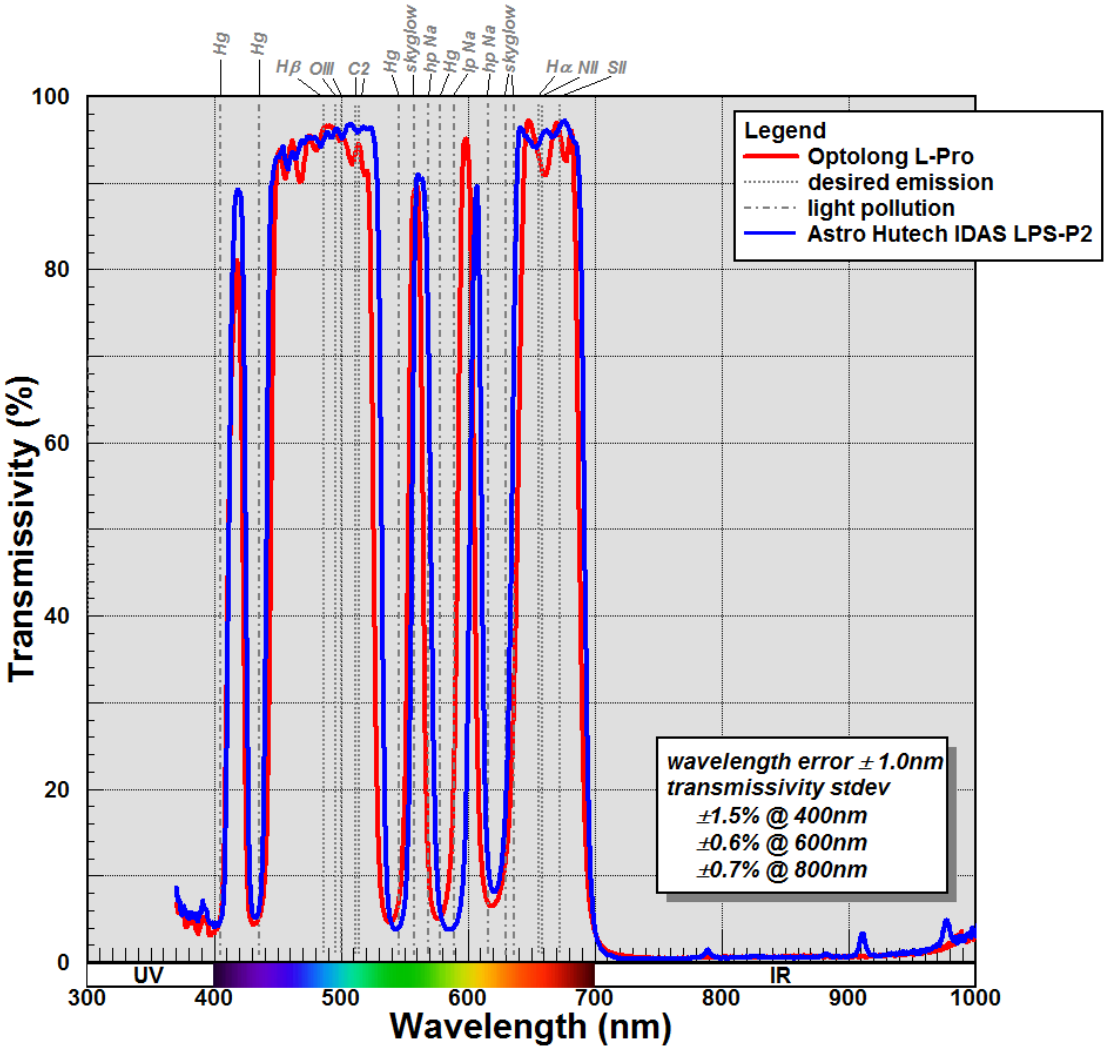


**Figure 4** **Measured Spectral Response - Optolong L-Pro**

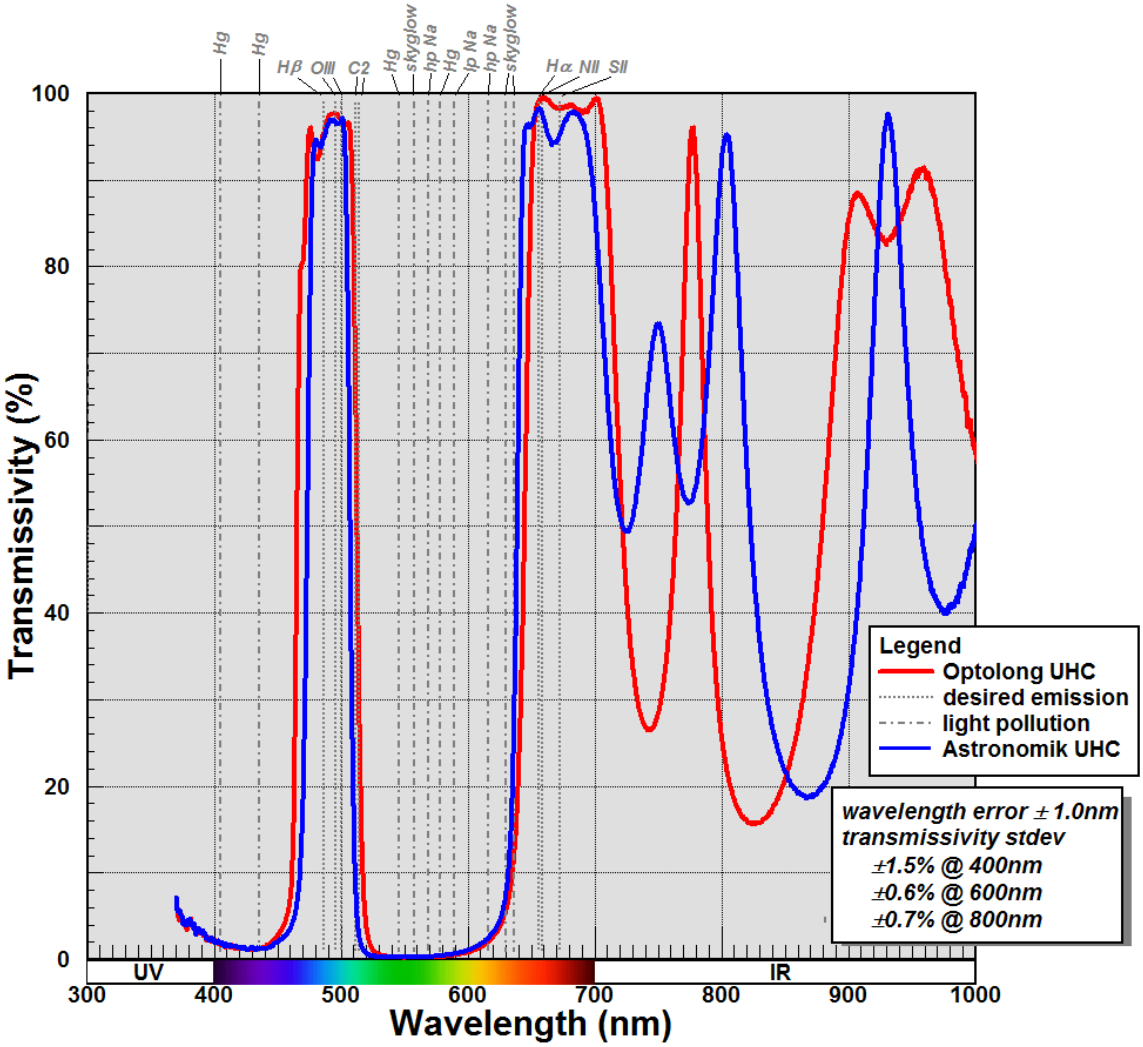


**Figure 5** **Measured Spectral Response - Optolong UHC**

- all the Optolong filters tested show spectral responses very similar to their contemporaries in each category, and should therefore provide a high level of performance similar to these well known filters
- the only exception is the Optolong CLS and UHC filters when imaging infrared rich targets (eg. galaxies), as the Optolong filters show less response to IR than their competitors

## CCD Camera Field Test:

- all observations made using William Optics FLT98 refractor with Meade 0.63x focal reducer
- images captured using Starlight Xpress Lodestar X2C camera (sensor: Sony ICX829)

- all images captured on same night, 16 August 2015, in an urban area with limiting visual magnitude ~ Mv+3.5
- two deepsky targets were selected, Messier 8 "Lagoon Nebula" and Messier 20 "Trifid Nebula"
- only the results from M8 are presented in this report
- images comparing UV/IR cut filters were not collected
- images are presented at the maximum exposure time allowed for by the level of light pollution, thus filters with narrower band passes allowed for longer exposure times, where the default exposure limit with no filter was 15sec.
- camera histogram set points were kept the same between all images
- in all cases, the Optolong filters were able to go to a longer exposure time than their competitors (see images at end of section)

No filter - 15sec exposure

**Figure 6 CCD Imaging Reference - No Filter**

Optolong CLS - 30sec exposure

Orion Skyglow Broadband - 30sec exposure

**Figure 7 CCD Imaging Comparison - Optolong CLS**

Optolong L-Pro - 30sec exposure

Astro Hutech IDAS LPS-P2 - 30sec exposure

**Figure 8 CCD Imaging Comparison - Optolong L-Pro**

Optolong UHC - 45sec exposure

Astronomik UHC - 45sec exposure

**Figure 9 CCD Imaging Comparison - Optolong UHC**

**Figure 10 CCD Imaging - Optolong CLS @ 45sec Exposure**

**Figure 11 CCD Imaging - Optolong L-Pro @ 45sec Exposure**

**Figure 12 CCD Imaging - Optolong UHC @ 60sec Exposure**

- the visual differences between competing filters is small, but in general these observations suggest that the Optolong filters have equally high performance compared to the competitor in each category
- the ability to go to a longer exposure time before hitting the skyglow limit using the Optolong filters suggests that they are slightly narrower in overall response

**Visual Inspection:**

- filters come well packaged, in durable reusable foam padded plastic container
- general appearance and feel of filters is that of high quality
- filter cell is black anodized aluminum, with engraved and painted labelling
- filter element retained by threaded aluminum ring, which was tight on all filters received
- filter glass is external coating type, not gel laminated between glass layers
- there was no edge blackening of filter glass to improve contrast
- L-Pro filter showed coating inconsistencies (see Figure 13) which were measureable with the spectrometer, but difficult to perceive in the CCD images
- all other filters had coatings that appeared uniform
- all filters were clean, with no marks or finger smudges on filter glass
- filter cells are short, making filters compact but without ability to stack more than one together

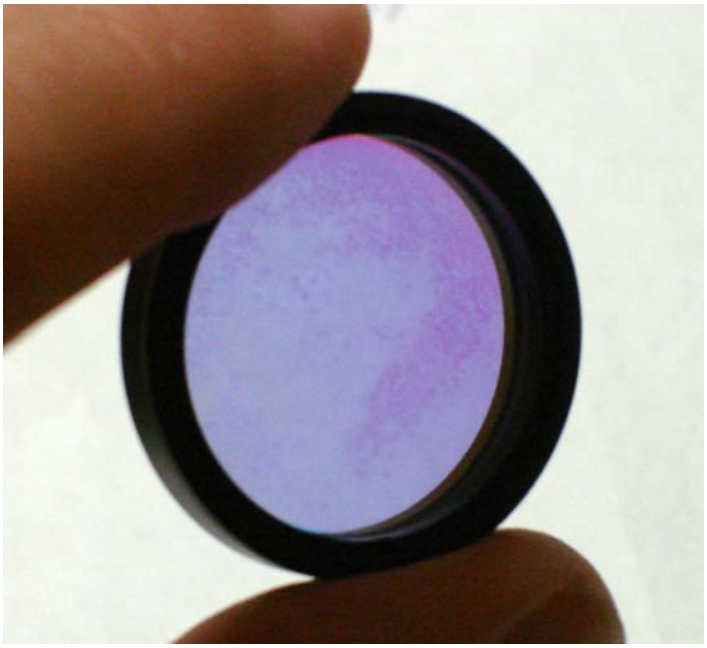

**Figure 13 Inconsistent Coating on Optolong L-Pro Filter**

**Conclusions:**

Based on the observations I have made, as summarized above, I believe that the Optolong brand filters evaluated are of a high quality and provide a high level of performance; performance on par with their competitors in the same filter categories. My only noted quality escape was the coating inconsistency on the L-Pro filter. My only recommendation would be to consider lengthening the filter cell on at least the UV/IR Cut filter so that there is an opportunity to stack this filter with others, which is a common thing to do with a UV/IR Cut filter in astronomy.

It has been a pleasure testing these filters for Yulong Optics Co., Ltd. If you have any questions regarding the above report, please feel free to contact the undersigned.

Regards,

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