Cerro Tololo Inter-American Observatory
Community Science and Data Center
Gemini Observatory
Kitt Peak National Observatory
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Technical Note:
Optical quality of New GG395 Goodman Filter

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Date: January 08, 2020

After the GG385 filter broke during the Jan 2019 earthquake, SOAR acquired a substtitute otrder-blocking filter. Since the the GG385 is no longer available, Dr. Jay Elias placed an order for two units of a round GG395 filter, with the same prescription as the one used in the COSMOS instrument on the CTIO Blanco 4m telescope.

On 08 Nov 2020 I evaluated the optical quality of the new filter by obtaining an image of the pinhole mask, and measuring the FWHM of the pinholes images, shown in Figure 1. The image was obtained with the RED Camera, Dome Lamps at 20%, and an exposure time of 0.5s, in 1x1 binning mode and the 344ATTN3 readout mode (Gain=1.48 e-/ADU and Readout Noise+3.89 e-), CAM_FOC=-17, and CAM_TEMP=18.4 C.
I used IMEXAM in IRAF to measure the FWHM in pixels on image 0215_pinholes_GG395.fits, as showin in Figures 2 – 4.

Table 1. Goodman Pinhole Mask FWHM measurements with GG395 filter

Pinhole # From top to bottom	FWHM (pixels)
1	3.35
2	3.34
3	3.35
4	3.28
5	3.33
6	3.43
7	3.46
8	3.46
9	3.35
10	3.39
11	3.36
12	3.22
13	3.41
14	3.42
15	3.41
16	3.35
Average	3.37±0.06

Based on the measurements, the optical quality seems within specs. There is no systematic change in the FWHM of the pinhole images across the full length of the mask, with a minimal scatter of 0.06 pixels. As shown in Figures 2 to 4, the qualitative aspect of the images remains similar independent of the location of the pinhole across the field of view. The filter introduces no degradation or distortion that can be readily mesaured using the pinhole mask.

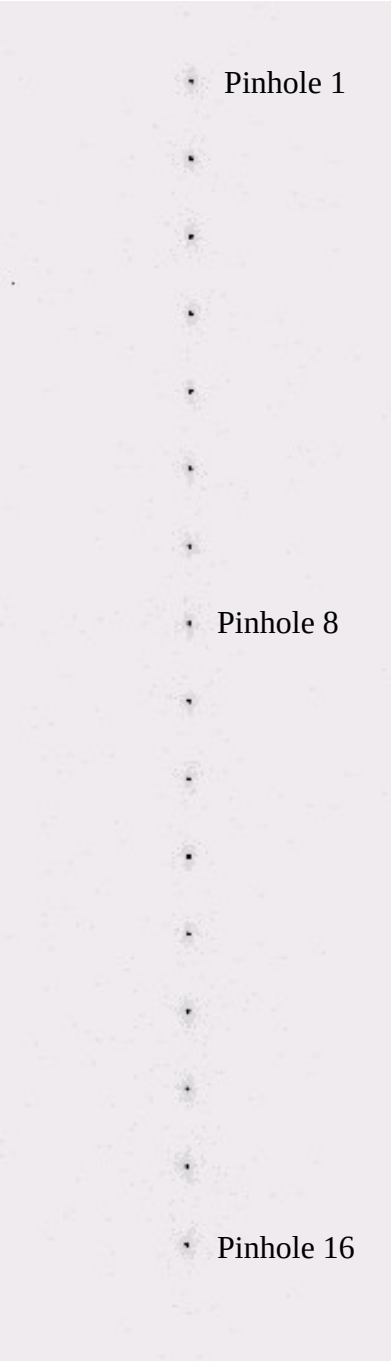
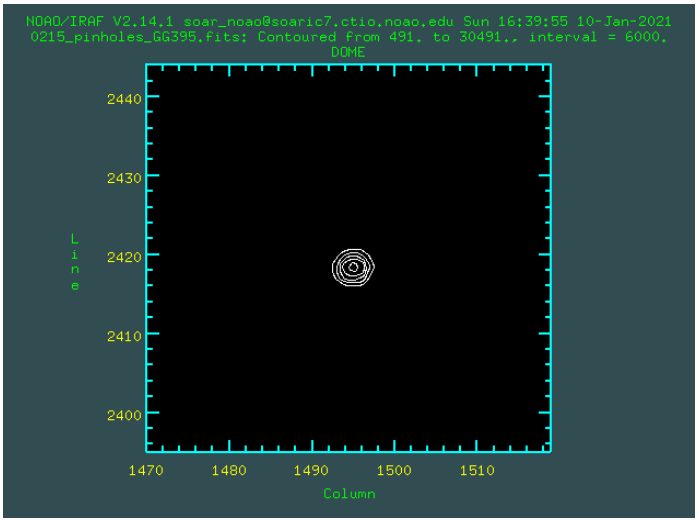
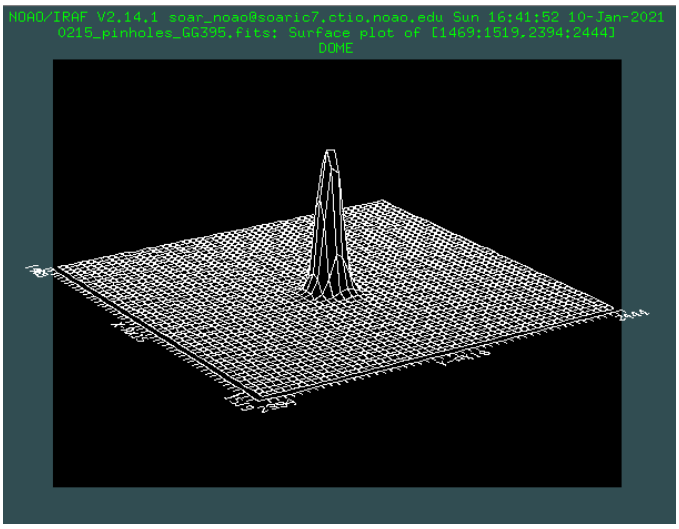


Figure 1: Image of the Goodman Pinhole mask through the new GG395 filter





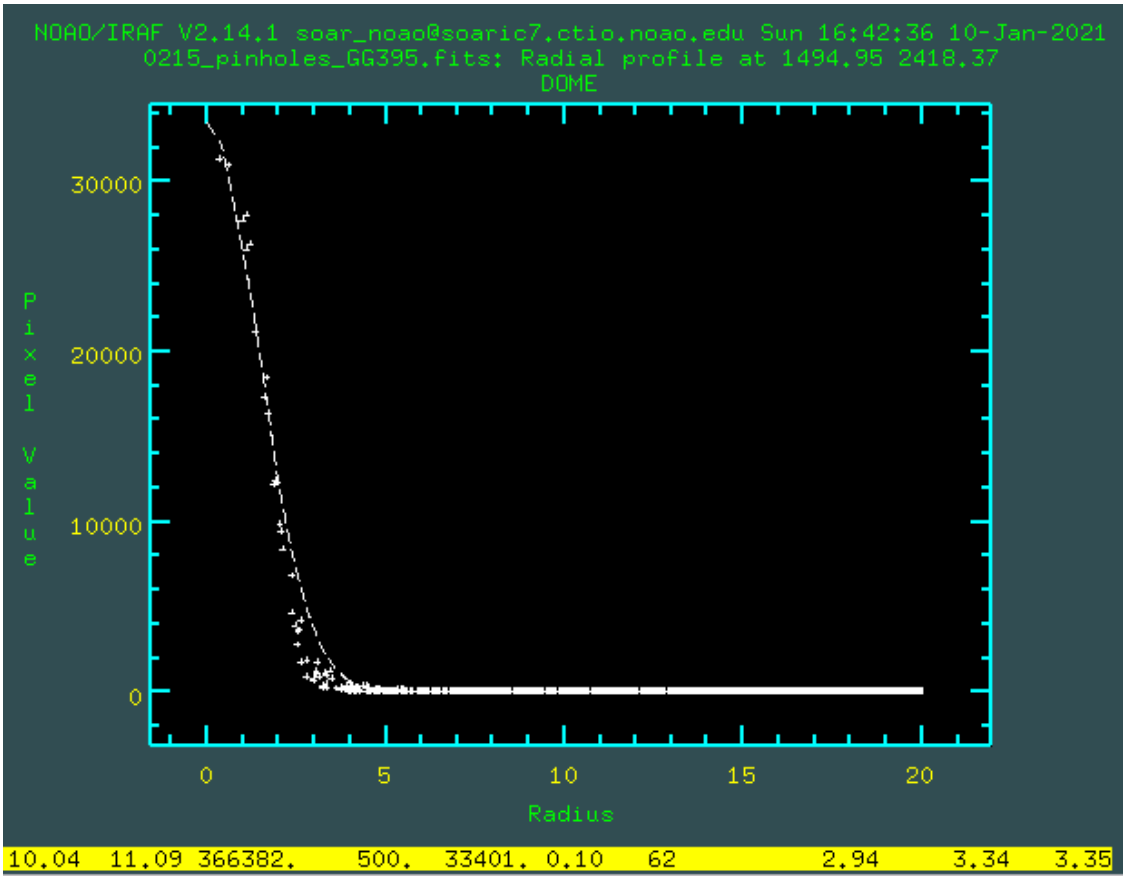
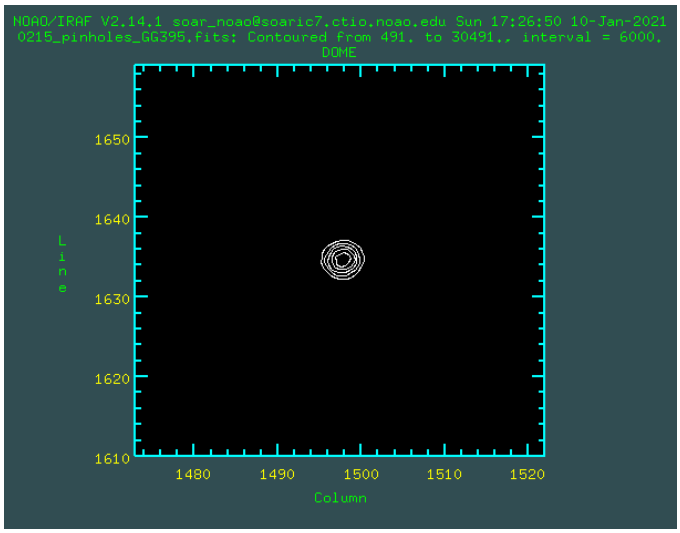
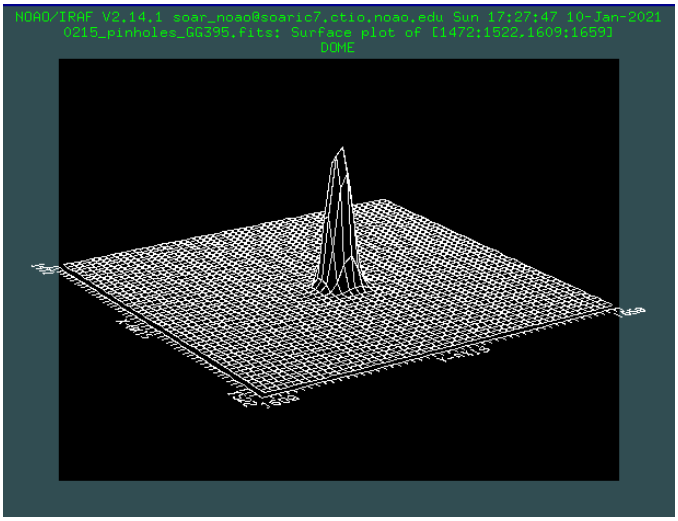


Figure 2: Analysis of Pinhole #1 examined with IMEXAM in IRAF





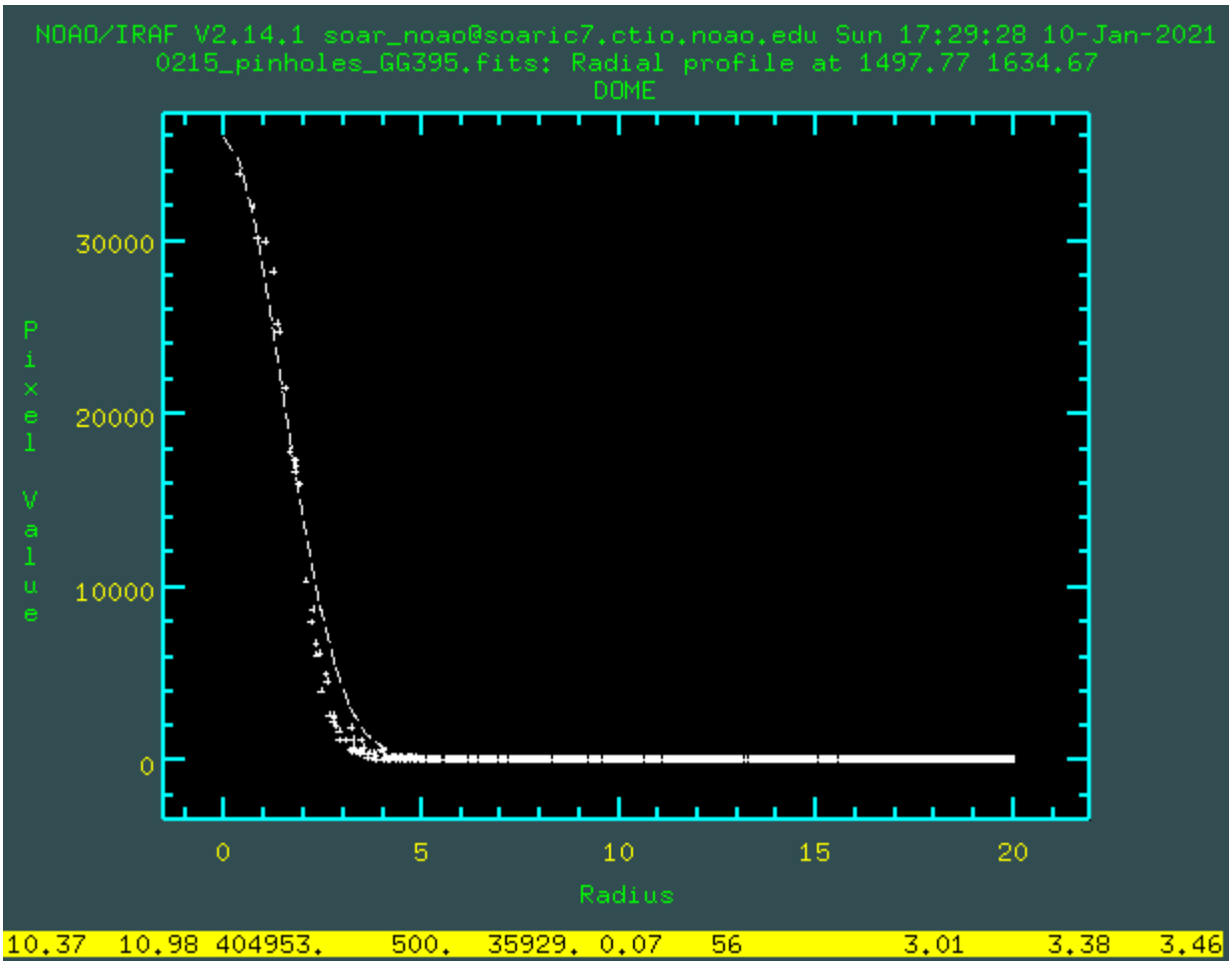
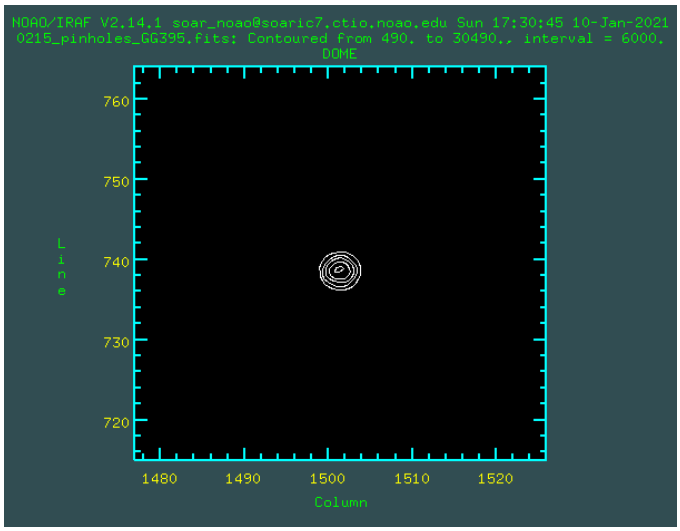
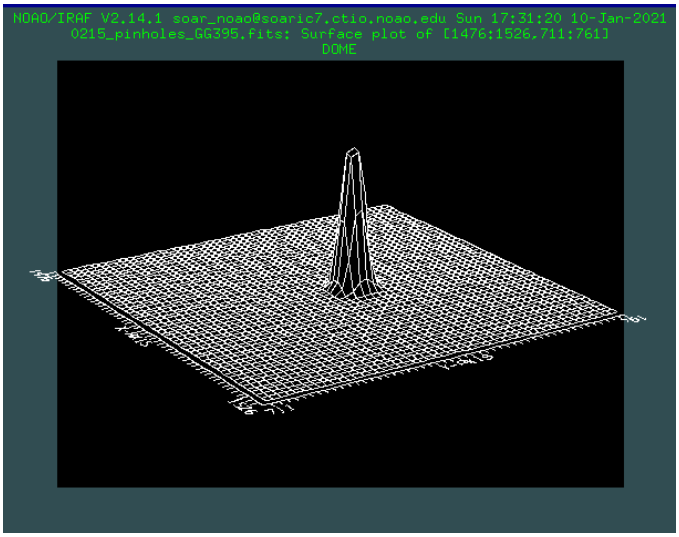


Figure 3: Analysis of Pinhole #8 examined with IMEXAM in IRAF





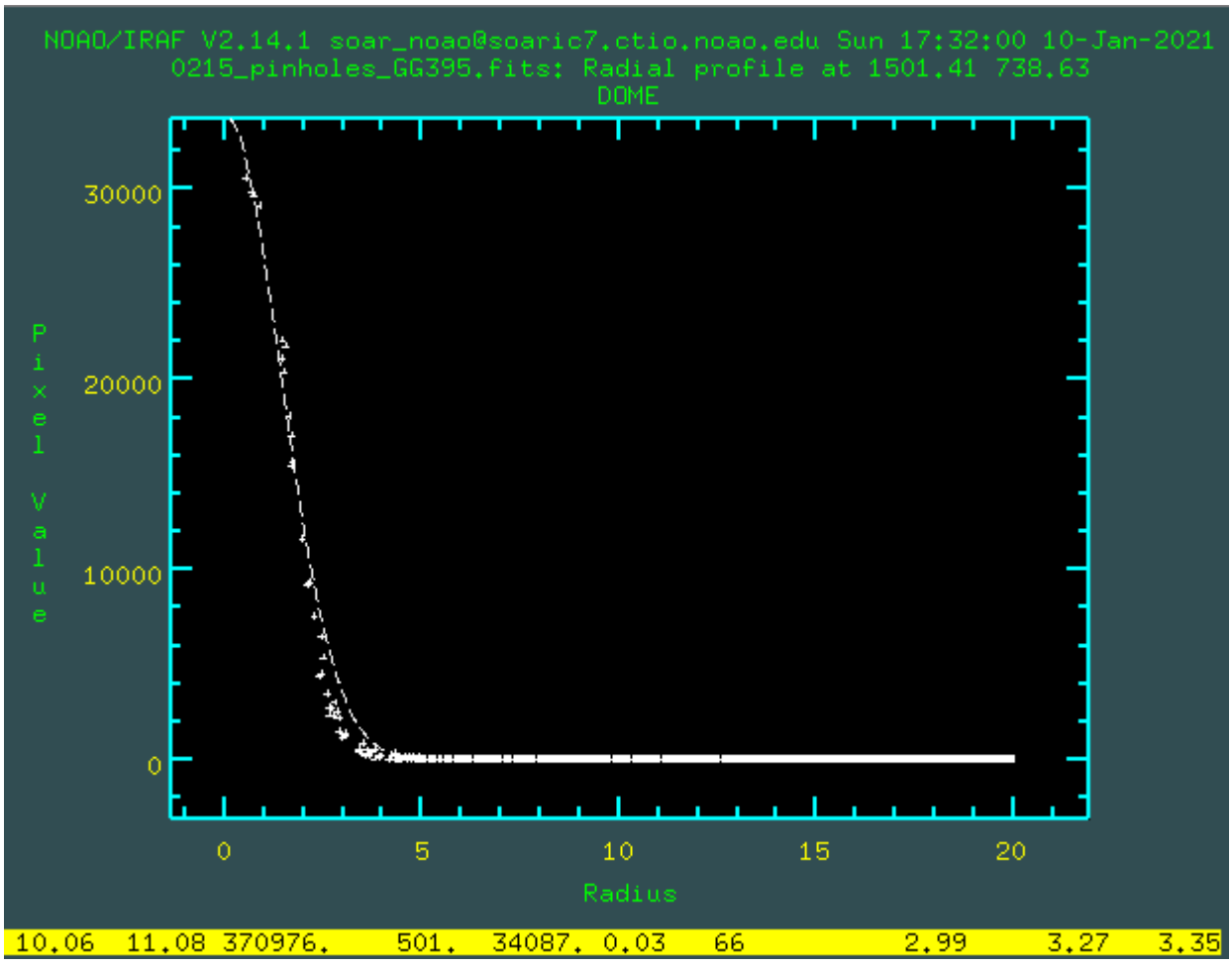


Figure 4: Analysis of Pinhole #16 examined with IMEXAM in IRAF