

Totality 2024, The Last Hoorah!

Or How Imaging Can Almost Ruin a Total Solar Eclipse!

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This eclipse, the Total Solar Eclipse of April 8, 2024, like all eclipses was to some extent, was fraught with uncertainties. What about motel? Could I even get a room? Would the site be right for viewing totality? What about the weather prospects? What about travel in getting back?

It was impossible to get motel reservations in advance more than a year out. When things opened up, many motels were already booked up, probably because of preordered block bookings. So, my first choice of the Drury was out, but I was able to get a booking at the Super 8 Inn in Marion. Unfortunately, I was only able to book up to the day of the eclipse, which met driving up later in the day, with the onslaught of travelers leaving after the eclipse. As it would turn out, the drive back would be not that bad at all, taking the two lanes and avoiding the interstate. The Super 8 had some grounds east of the east parking lot, that was also bounded by grounds next to the Interstate 57 and Illinois Route 13. It would make for a remote, semi-private area to setup equipment without being in a purely public area.

I made the decision, since I had purely observed totality visually with great results, to attempt record the experience with still imaging with a DSLR camera. The camera was original bought for the 2017 eclipse, however, I made the decision then, that since it had been 38 years previous to my last total solar eclipse, to experience it visually again. The addition of pictures for 2024 would add something new to the experience and I was up to the challenge. Besides, I would have something to share with my ailing brother Chris, who like in 2017, could not make this eclipse. Still, I had this nagging thought, "Do I really want to take pictures when it might take away from the visual enjoyment of the event?"

I spent the five weeks leading up to eclipse practicing, first indoors, just to decide how I would set things up with the camera and tripod, and then shooting the Sun through a window, before going outside, in the side yard to execute the imaging under real conditions. I ordered a mylar solar filter, designed to image with a smart phone camera. The mounted mylar was just large enough to cover a DSLR lens. I took some Styrofoam and cardboard to produce a frame to fit on the telephoto lens.

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Circles were cut into the cardboard and Styrofoam to fit the frame on to the lens. The cardboard mounted on the Styrofoam and two cardboard frames that were taped together so that the solar filter could be lifted out of the frame without affecting the focus of the telephoto lens. The design was inspired by an article for Sky and Telescope by Dennis DiCicco, when he had something similarly set up. Both he and Alan Dyer suggested focusing the Sun before the eclipse with the solar filter, to avoid time wasted refocusing during totality.

The biggest problem I had was focusing the camera with the solar filter. The fine tuning aspect was exasperating. I never could quite get it right in practice, though, in the past, was able to get it spot on when imaging the full moon, with the telephoto lens. Still, I had self-doubt. Should I really be doing this at the expense of wasting valuable time, when I could be maximizing my time visually taking it in? I had used a timer on my drill of shooting the camera and had settled on nine exposures of progressively longer exposures. I could take these in about 2 minutes and still have plenty of time to visually take in the eclipse in the remaining two minute of totality. Below are the elements of the shots to take place.

Exposures Time for Settings at f/8, ISO 200,

Chromosphere	1/4000
Prominences	1/2000
Corona - 0.1 Rs	1/500
Corona - 0.2 Rs	1/125
Corona - 0.5 Rs	1/30
Corona - 1.0 Rs	1 / 8
Corona - 2.0 Rs	1 / 4
Corona - 4.0 Rs	1 / 2
Corona - 8.0 Rs	2

The weather would also be a random factor that wouldn't really be a guarantee until the day of the eclipse. The forecast looked variable, one to two weeks out. Sometimes overcast or

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rain for the date, other times clear to partly cloudy. By the weekend, the forecast for Monday looked reasonably good! While, climatologically looking like the chances for fair skies favored Texas and not Illinois, the situation turned out to be flipped, with Illinois having the better weather!

Finally, the big day arrived, and I was up for it!

I woke up to look out the motel room to see that a pea soup thick fog that rolled in in the pre-dawn hours. The airport west of Marion had measured visibility down to a quarter of a mile! Fortunately, the fog burned off by 9:00AM.

I set up my equipment in the park-like area bounding the parking lot of the Super 8 Inn parking lot, around 11:00AM. The eclipse wouldn't start until 12:45PM, but from my motel room window I could see that others were starting to set up and I didn't want to lose out on a good spot, in case it got crowded. The park area had a pavilion where some other eclipse watchers had utilized the picnic tables to set up some food and refreshments for themselves. We were all spread out, about twenty or thirty of us into perhaps five or six separate groups or families. It was a very friendly, small collection of people. Some came by and asked about the tripod mounted 7 x 35 binoculars and the projected image of the Sun, that I had on an extended screen. The Sun was sporting two sunspots. The larger of the two was near the center of the disk, and one could see the darker core umbra and fainter encircling penumbra, quite a view considering the complexity of the sunspot structure and the minimal optical aid! A smaller sunspot was seen in the northwestern quarter of the Sun with no distinguishing characteristics other than just being a black spot.

While the binoculars were on the old K-Mart tripod, I had mounted on the trusty, sturdy Vivitar tripod, the DSLR Nikon D3200 Camera. The Vivitar had been with me at two previous eclipses. I had only extended the tripod legs of the Vivitar, one extension up, so that I could sit on the ground to shoot at totality. I had a pillow to sit on when on the ground as I worked the camera. In planning for imaging the eclipse the month before, I found this approach to be the only reasonable way to get physically comfortable. The Sun was nearly 60 degrees up, and impossible to focus and image standing, with the tripod fully extended.

Around 1:30PM, with the solar filter in place, I attempted my first shots for focusing the camera using the Live View

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function. The camera seemed in focus or so I thought, and all I had to do was now wait. Manual focusing in the daylight was somewhat difficult, but turning up the monitor brightness feature did help.

As the eclipse progressed, when the Sun was fifty percent covered, song birds in the trees along the perimeter of the grounds ceased singing. They quickly picked up singing again immediately after totality ended however! Though the winds were forecasted to be 7 to 10 miles per hour, they gusted to 20 mph and blew over my tripod mounted binoculars and projection screen, just minutes before totality. I was able to recover quickly resetting it up. But I had to give up something to do imaging with the camera, so I did not observe Bailey's beads, near second contact. But as totality approached, the crescent Sun looked a very pure white as totality beacons just minutes before.

At about 1:52PM, I started to see shadow bands for the first time at a total solar eclipse. Standing up, near my tripod mounted camera, I saw them against the white background of my white seat cushion on the ground. As I was standing there, looking down on the pillow and noticed a faint flickering of uniform, column shaped shadows going across rapidly. They were very faint but noticeable.

I did notice as I was waiting to click the first image of totality, the quality of light from the shrinking sliver of Sun was slowly changing. Without the eclipse glasses it was becoming a purer, dimmer white light becoming more gentle to the eye, until finally being extinguished. I was careful not to stare at it and only glance at it briefly while looking at it, to protect my vision.

Totality was ushered in with a rapid decent into darkness, like someone turning out a light fixture with a dimmer switch, very quickly. There was a loud cheer from the onlookers at the grounds at the Super 8 Inn. Fortunately, all exterior lights in the nearby parking lot were off, and we had an unfettered view of the event as the eclipsed Sun bared itself through the cirrus veil of clouds.

And off I went imaging. In every eclipse, the first thirty seconds or so are fraught with some kind of technical glitch or panic. This was one was no exception for me. I started snapping away nervously, but realizing by the fifth image that I forgot to take out the solar filter! So, I removed it and

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started over. It was probably more like two and a half minutes by the time I finished imaging, and could enjoy visually the rest of totality.

To the naked eye, the corona was both silvery and pearly at the same time. A bit compact, almost blocked shaped, no very prominent streamers like in 2017, that might be the result of viewing through the cirrus clouds that were a substantive presence in the sky. However, there were what appeared to be four rather muted streamers in all. Two were in the eight and four o'clock positions, along with two more prominent streamers at the twelve o'clock and six o'clock positions. The 2017 Total Solar Eclipse was known in my mind as the "mustache eclipse" for its flared coronal streamer at the eight and four o'clock positions. The 2024 total Solar Eclipse will be known to me as the "Ace of Clubs" eclipse for its distinctive coronal pattern. I didn't see either the fan like projections seen along the poles of the corona, like I did view through binoculars in 1979 and 2017. Again, the cirrus veil might have had something to do with it. My images would reveal many more streamers from longer exposure times.

A tremendously huge prominence was seen at the six-thirty position and one lesser one at the four o'clock position. The one in the six-thirty position was twice or three times as long as any I have ever seen, in previous total eclipses. In the Cannon anti-shake 10 x 30 binoculars, the southern prominence looked as if the Sun had grown a small pink goatee! It look somewhat like the "chin beards" worn by men of the nineteenth century, having an almost corkscrewed shape or looking looped. I later had some confirmation from a Twin City Amateur Astronomers member Ray Silva, imagining the eclipse in Indianapolis. The southern prominence had certainly an unmistakable presence to the naked eye observer. That prominence really wowed the crowd at the Super 8 grounds! I remembered seeing the projection of a prominence with a Zeiss Planetarium Projector in 1979 for a presentation concerning the 1979 Total Solar Eclipse, in Winnipeg. This prominence was more visible but again, by a factor of two or three.

To the eye the cirrus cover gave the effect of being in cathedral or a domed ceiling to the sky. As with total solar eclipses, it gave one pause to give one reverence for the event that unfolded. The horizons had pastel yellow hues for clouds and deep blue hues for sky. The clouds were streaked every which way along the horizon. The Marion airport, 3 miles to the west northwest of the observing site for the eclipse, indicated

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the skies overhead had a scattered ceiling at 20,000 feet with visibility at 20 miles 15 minutes before totality. I did see Venus during totality, however, Jupiter was not visible to me, nor were Mars and Saturn, all because of the cirrus veil. I did look around at the grounds at other sky watchers in the vicinity, and thought the whole scene representative of conditions one hour after sunset.

The diamond ring effect was fast approaching. I had reset the camera to a 1/125 of a second exposure after I made my last exposure of 2 seconds and before got up off the ground to visually take in totality. The eclipsed Sun would still be in the frame of view when the diamond ring would occur albeit a bit off center. As the diamond ring emerged I used the camera's remote control to take a couple of quick exposures as I was watching it, standing beside the camera. The first exposure was the better one. I had planned to do this type of a shot only a week before the event and it was an off-the-cuff attempt. I figured this last imaging would give me a prompt to reinsert the solar filter, to protect the camera's CMOS chip from over exposure and damage. With all the planning that went into the bracketing of the series of exposures during the first half of totality, I had no idea ahead of time, after processing the exposures, that this would be my "money shot"!

The diamond ring visually came across with a brightness of a white colored car headlight with a slight iridescent quality, but bright, then a couple of seconds later, booming like a freight train. Kind of a cross between what I had seen in 1979, a shimmering image, and in 2017, a booming image! One person in the crowd remarked afterwards that the diamond ring looked more like an LED light. Naturally, as the sunlight from the diamond ring brightened to the point of having to turn away, sunlight started to fill the landscape, and a universal applause from the crowd erupted! Venus soon disappeared and the dim landscape grew progressively brighter. Someone said, "Encore! Encore!" How many of us would ever experience or could afford to travel for an encore is subject to our age, health, and financial well-being, as well as our spirits!

In terms of convection from the ground, like last time in 2017, I measured temperature through the progress of the eclipse using a simple, digital thermometer set on the ground and shaded. This was a crude way for measuring heat flux from the ground. Solar radiation heats up ground and causes the air above the ground to heat and rise, hence causing convection during the daytime, and can contribute to cloud formation at higher

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altitudes. The ground was never that warm and measured just five or so degrees above the air temperature at the nearby airport 3 miles west of the Super 8 Inn. The temperature of the ground started to drop toward totality. After totality, the ground temperature continued to drop for the next half hour or so but rebounded an hour after totality, demonstrating the loss and rebound of convection during a total solar eclipse, like it does at the beginning of the day, the ground continuing to cool, up to an hour after sunrise. Unlike 2017, there was no visual change in the sky, with the cirrus veil still in place for the most part. The puffy cumulus clouds in 2017 disappeared after totality, because of the lack of convection that immediately followed.

<u>TIME (CDT)</u>	<u>TEMP AT GROUND LEVEL (F)</u>	<u>AIR TEMP AT MARION AIPORT (F)</u>
12:30	77	
12:35	78	
12:45		75
01:43	81	73
01:52	69	
02:20	63	
02:41	68	75
02:58	72	
03:03	73	
03:06	75	

I noted after the eclipse, when I was packing up, that the Sun filter that was prepared for the camera had some pollen on it. It didn't seem to affect the imaging.

When I post-processed the images, they didn't look as good as they did on the smaller, camera monitor. On the big screen of my desktop, unfortunately, they were somewhat out of focus. Using Corel Aftershot, the first image of the diamond ring at first shot immediately after third contact turned out to be very artsy. Turning the "exposure" setting the way down made the diamond ring appear much like I saw it at the time with the other features of the inner corona and a hint of one prominence in view. The artsy part was a faint iridescent glow around to burst of light. So, all was not lost, and at least I got something unique out of the work.

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Two qualities out of this eclipse experience seem to repeat themselves from past eclipses. One, the frantic moments of problems or getting something wrong, thus losing valuable time in doing so. Two, having something done off-the-cuff and getting a surprisingly good result from it.

For my preparation and performance of imaging totality, it was rather like George Plimpton in Paper Lion. The preparation in the backyard, weeks in advance shooting with the solar filter, learning the complexities of the camera, and getting coaching from the pros at this sort of thing via books and websites, was my education. The performance, while richly applying what I learned at that moment, came up way short of a perfect job. However, I came away from the experience with something tangible (the images, most not great, but one good one), a true, personal learning experience to share with others (not to brag but share and poke fun at myself), and appreciated and value it, faults and all.

The weekend of the eclipse was also a time to revisit with extended family and a longtime friend, as I did in 2017. Likewise, it was a coming home again, watching totality in my home area of Williamson County. This time around, with the self-doubt of whether or not I could pull it off, and if the circumstances would work out with it, added some tension that melted away on eclipse day. I sensed it was also the coming of the end of an era in my life with this eclipse. In a sense, everything would be "post-eclipse". The time of these total eclipses crisscrossing southern Illinois when I was first made aware of them in my college days, the late 1970s, looked way off into the future. Since then, a tremendous amount of change has occurred in my life, and I am now retired! The post-eclipse life will be a time to look back, take on some unfinished business, and enjoy what I can without being overburdened with much responsibilities, that may be difficult to do considering my own situation. Hail to the past with its ups and downs, embrace the present and the important aspects of living, and plan for the remaining time, valuing time and energy for the intangibles of life.

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