

## Total Success - Observing the Solar Eclipse of August 21, 2017

It had been 18 years and 11 days since the last time I was in the path of the Moon's umbral shadow (making this the next total solar eclipse of the same "saros series"<sup>[1]</sup>), though on that occasion (in Devon, England) clouds had prevented appreciating the true splendor of the experience. On August 21 of this year, the path of totality would cross the entire continental United States and we arranged a vacation in Colorado and Wyoming to co-incide - a part of the world which is well worth a visit for its natural beauty even without an eclipse. Clear skies would be a bonus.

After flying to Denver on August 16 and spending a few days in Colorado, we drove up to Jackson in the State of Wyoming (via the Flaming Gorge in Utah), where we had booked accommodation for August 20, 21 and 22. On the drive up, we spotted a road sign which truly astonished me, advising drivers to **"TURN ON LIGHTS DURING ECLIPSE"** ! Would anyone actually continue to drive during the event, rather than spare two minutes of their lives to experience a phenomenon which few get the chance to behold ?



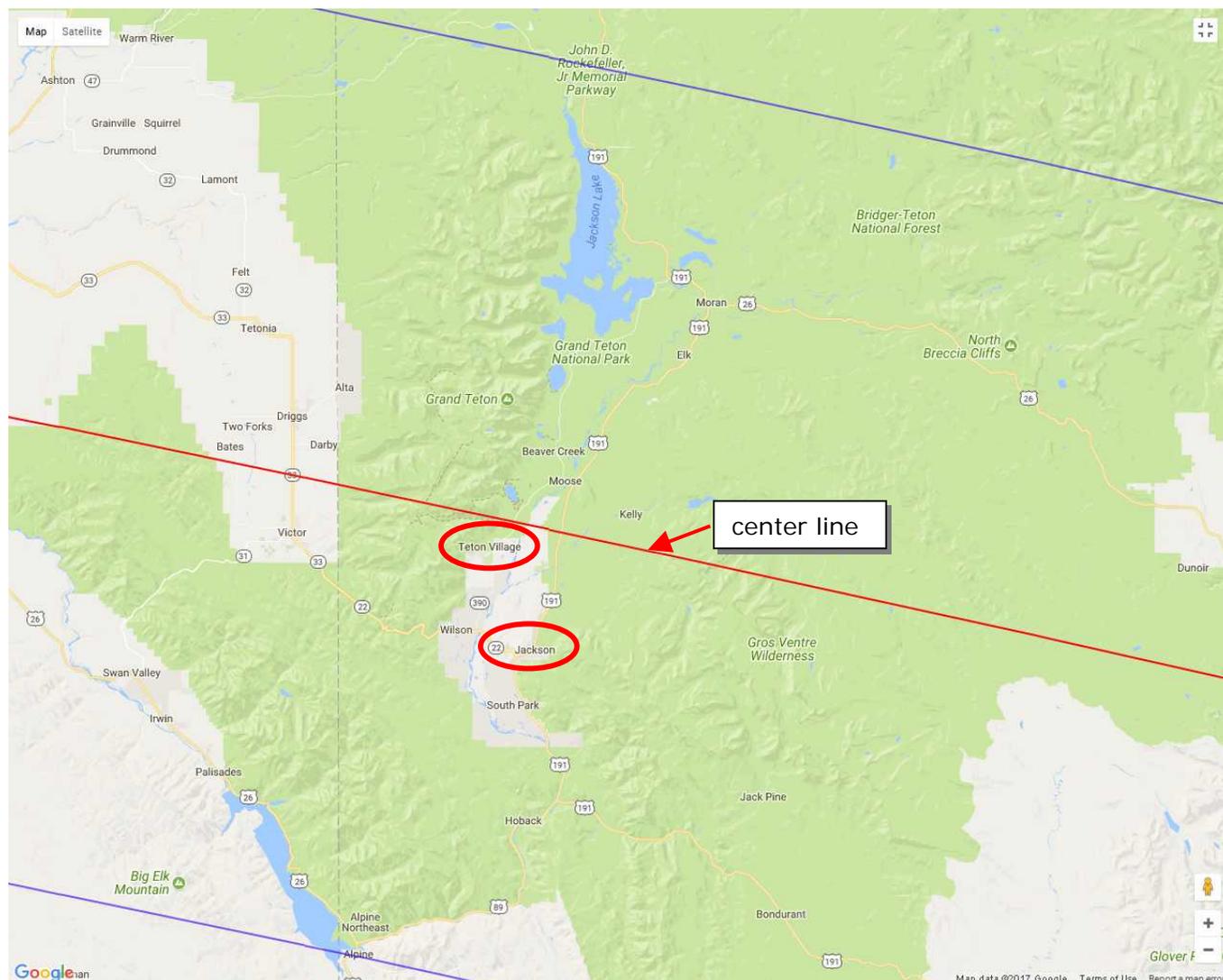
We arrived in Jackson mid afternoon on Sunday, August 20. Welcome signs throughout town left no-one in any doubt as to what was to happen here the following day.



We had booked our accommodation over two and a half years earlier and Jackson's hotels were full to capacity, with no vacancies to be found, although town didn't seem too busy and traffic was no problem at this time. However, we took the opportunity to decide exactly where we wanted to be to observe the eclipse the following day. We selected a location in Teton Village at the base of the "Jackson Hole Mountain Resort", about 12 miles to the north. Jackson itself would experience about 2 minutes and 16 seconds of totality, but driving up to Teton Village would give us an additional 3 seconds ! Checking the exact GPS co-ordinates of this observing location revealed that we were at:

**43° 35'15.294"N, 110° 49'15.707"W**

<https://www.google.co.uk/maps/place/43%C2%B035'15.3%22N+110%C2%B049'15.7%22W/@43.5875817,-110.8232237,17z/data=!3m1!4b1!4m5!3m4!1s0x0:0x0!8m2!3d43.5875817!4d-110.8210297>



The location seemed ideal - parking was free and plentiful, but could not be reserved and was available on a "first come, first served" basis. A field had been set aside as a public viewing area for the eclipse. A few free guides were being given away with instructions for safely observing and enjoying the eclipse, which made nice souvenirs of our visit. [4] [5]

We were unsure of what traffic would actually be like on Eclipse Day itself. So, Sunday morning, we awoke early and had a light breakfast before hitting the road at about 5:30am to drive the 12 miles up to Teton Village, arriving just before 6:00am to find the parking lot already starting to fill up and folks walking around with cameras, tripods and other equipment. There was some scattered light cloud at this time, but prospects looked pretty good and we were hopeful that it would disperse for the main event, with "first contact" expected about 10:16am and the start of totality at about 11:35am at our location, by which time the Sun would be fairly high in the sky.

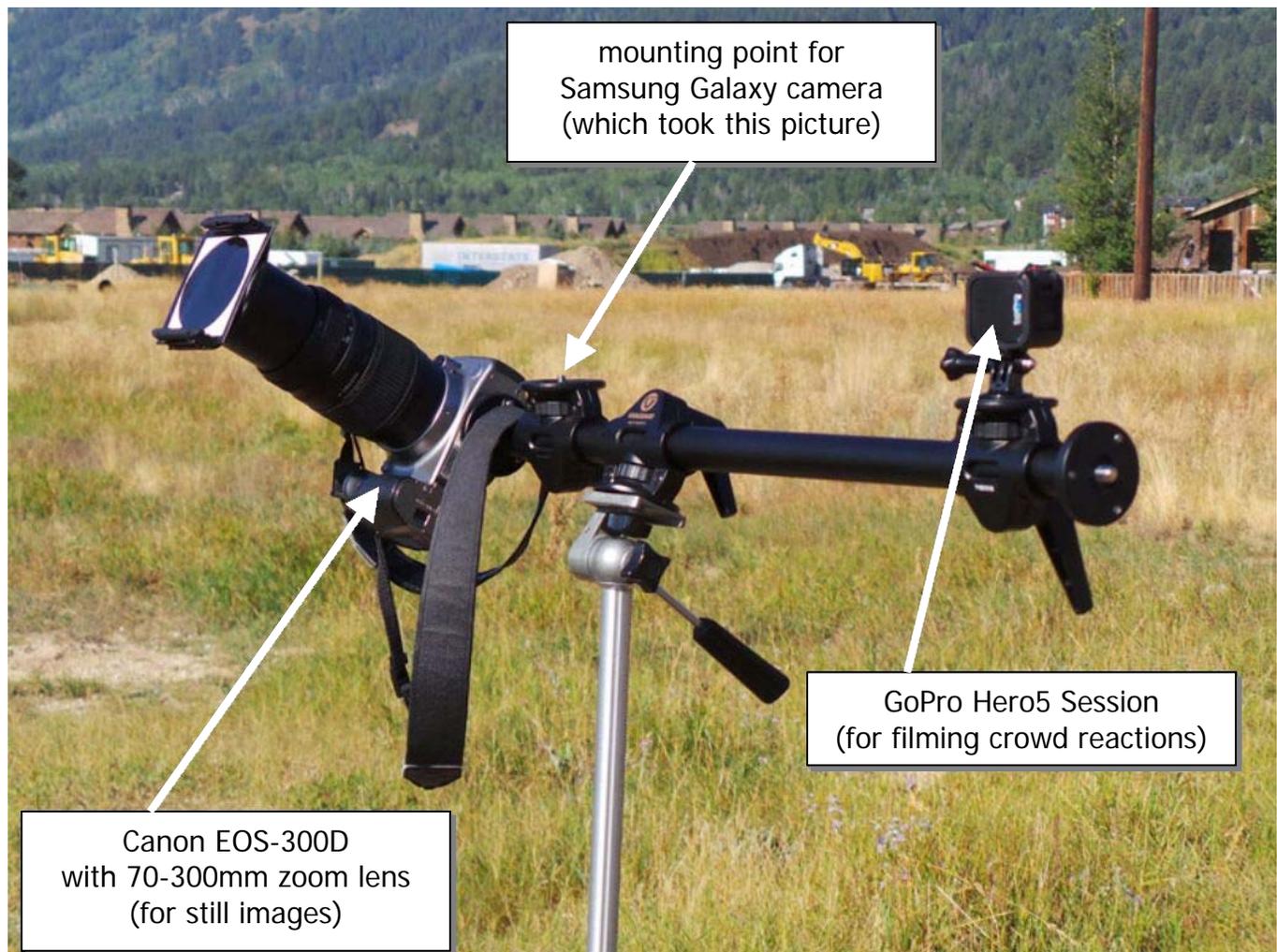
## Photography

I took three cameras with me:

- a digital SLR (or "DSLR") (Canon EOS 300D, also known as "Digital Rebel") fitted with a Tamron 70mm to 300mm zoom lens
- a compact Android-based camera for stills and video (Samsung EK-GC110)
- a GoPro Hero5 Session, which I pointed toward the crowd to capture the atmosphere of the event and crowd reactions.

Solar filters were made for the SLR and the compact camera. For the SLR, I used a Kokin filter holder and made a square filter from cardboard and solar film - earlier, I had experimented with an instant porridge pot, but this proved a little cumbersome and prevented access to the camera's focussing ring. For the compact camera, a filter was made from a plastic milk bottle cap with a small piece of solar film inserted - this camera does not have any screw thread on the lens for fitting standard filters, so I had to improvise with the milk bottle top, which actually worked very well. After setting up the cameras, I started to experiment with different exposures through the solar filter in preparation for taking some shots of the partial phase. Ideal values with the 300mm lens set at f/16 and the camera on ISO200 turned out to be about 1/30sec.

All cameras were mounted on a single tripod by means of a horizontal bar.



The plan was to film our own reactions with the GoPro, take some stills and video with the Samsung Galaxy camera (not shown in the above photo because it took that photo) and take a few stills with the Canon EOS-300D DSLR, whilst trying to spend some time just looking at the eclipse during totality. Well, that was the plan anyway. As it turned out, although the horizontal bar was tightened down firmly to the tripod head, the weight of the Canon DSLR on one end caused it to rotate, which became apparent when taking a few shots during the partial phase of the eclipse. [7] Luckily, this happened before totality, giving chance to re-position that camera at the mounting

point indicated as originally intended for the Samsung Galaxy camera. I decided then to keep the Samsung on a selfie pole, which I used as a monopod, but it proved difficult to hold still. The whole set-up still seemed less than stable, so I decided to use the timer on the DSLR for taking stills to reduce the possibility of camera shake, but this meant that I could take fewer shots. Focusing proved difficult, but I did get a shot of the diamond ring following third contact<sup>[3]</sup>, which I was very pleased with, more by luck than design, as I was using the timer for shots from this camera. I produced a video, which can be viewed on YouTube<sup>[2]</sup>, which includes a section showing the view of the crowd from the GoPro, with the view from the other two cameras overlaid onto the main image, synchronized at the point they were taken. Of course, cameras are far too "smart" these days, so the video doesn't really give a true sense of how the light level drops leading up to totality - as the light level reduces, the video camera tries to brighten the image, so it is actually getting darker more noticeably than the video shows.

## **Totality**

Photographs certainly do not do justice to the experience of totality - what is perceived by the eye and experienced by all of the senses can never be adequately captured photographically. The closest representation I have seen are composites of multiple photos using different time exposures, such as some of the shots by Fred Espenak<sup>[7]</sup>. The human eye perceives so much more than any imaging system designed by man. I was struck by the extent of the Sun's outer corona and the intricate detail visible within it. Photographs showing the corona during totality generally show it set against a black sky, as a result of the short photographic exposure times used. In reality, the sight is far more colorful - the corona is seen against a sky which is a deep midnight blue - the experience is not one of pitch blackness, but is similar to a moonlit night. The sky retains an eerie twilight toward the horizon in all directions. The planet Venus became visible, though I did not notice other planets or stars, due to spending far too much time fiddling with cameras. Moments after totality ended at "third contact", I tried desperately to get the solar filter back on the camera (my instinct was to replace the solar filter at this point) - luckily, I didn't quite get the filter back on as quickly as I intended and the camera snapped the best photo that I got of the day - the "Diamond Ring".<sup>[3]</sup> Not sure if it did the camera's image sensor any good though. This shot was a complete fluke as far as timing is concerned, as I was taking each shot using the self-timer to avoid camera shake. I had always assumed that the Diamond Ring appeared while the sky was still quite dark, but as you can see from the video<sup>[2]</sup> at time marker [33min 50sec](#) until 34min 00sec, totality had ended about 10 sec before the camera snapped this picture. An interesting effect in this photo is the appearance of dark bands radiating from the Diamond Ring into the corona. At first I assumed that this must have been an artefact of the camera lens as opposed to shadows cast by mountain peaks into the corona, as the corona is self-luminous and I doubted that it would be possible to cast shadows onto something which is self-luminous. Thinking about this more, though - I guess it is possible and the dark bands are perhaps not truly dark, but just less bright than the other areas of the corona such that they appear dark in comparison, in a similar way to how sunspots appear dark in comparison to the rest of the Sun's disk even though they are actually very bright.

## **Reflections**

Despite a friend's advice to spend at least half of the period of totality just looking, I failed to do so due to completely underestimating the time I was spending with the cameras and taking each photo using a 10-second self-timer to avoid camera shake on my less than stable tripod arrangement. I thought I would be able to rely on my own sense of timing, but apparently not - totality was over much sooner than I expected, although it was nearly 2min 20sec. Well, it's true what they say - once you have experienced a total solar eclipse, you just have to see another. If I am ever fortunate enough to experience another, I either take a stopwatch and allow myself no more than one minute with cameras, or just don't take any pictures at all. Right now, I'm leaning toward the second option. The next one visible from the United Kingdom will be in September 2090 (over 73 years away), but the next in the United States will be April 8, 2024 - less than 7 years away. The path will cross central Texas and head north-east, with totality lasting nearly twice as long as this one - well over 4 minutes throughout Texas, with the Sun at an elevation of about 60 degrees at the time of totality, which is after 6:00pm. Time to start saving and dusting off my cowboy boots and hat.

## References

- [1] Saros - definition  
[https://en.wikipedia.org/wiki/Saros\\_\(astronomy\)](https://en.wikipedia.org/wiki/Saros_(astronomy))
- [2] "Observing the Total Solar Eclipse of 8/21/2017 from Teton Village, Wyoming" (YouTube)  
<https://www.youtube.com/watch?v=YJO3zhK-gYo>  
Re-live our experience of "Eclipse Day" with us in this video. Totality at [31 minutes in](#).  
(do you hear owls hooting moments after totality begins ?)
- [3] Photograph of the "Diamond Ring" following "3rd contact"  
<http://www.neilbreakwell.net/photos/hi-res/2017/08-21Eclipse.jpg>  
<http://www.derbyastronomy.org/TotalSolarEclipse210817.htm#Breakwell210817>
- [4] "Teton Total Solar Eclipse Official Survival Guide"  
<http://www.neilbreakwell.net/pdf/TetonEclipseSurvivalGuide.pdf>
- [5] Jackson Hole Total Solar Eclipse Guide  
<http://www.neilbreakwell.net/pdf/JacksonHoleEclipseGuide.pdf>
- [6] Interactive Map of Path of Totality  
[https://eclipse2017.nasa.gov/sites/default/files/interactive\\_map/index.html?zoom=1](https://eclipse2017.nasa.gov/sites/default/files/interactive_map/index.html?zoom=1)
- [7] Composite photograph by Fred Espenak (Mr. Eclipse)  
<http://www.mreclipse.com/SEphoto/TSE2017/TSE2017-T2cmp103-1B.html>

direct link to maintained copy of this article online:  
<http://www.neilbreakwell.net/pdf/TotalSuccess.pdf>