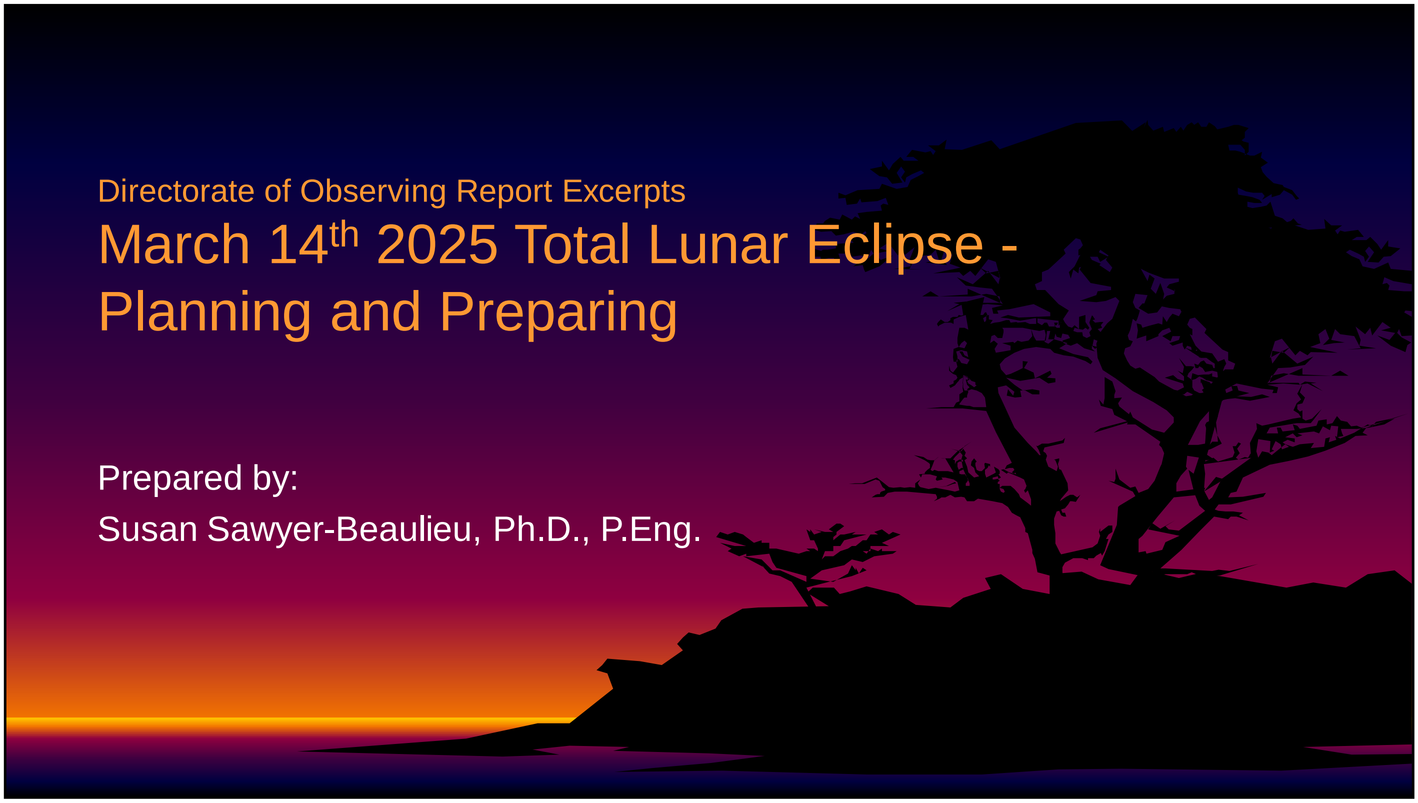
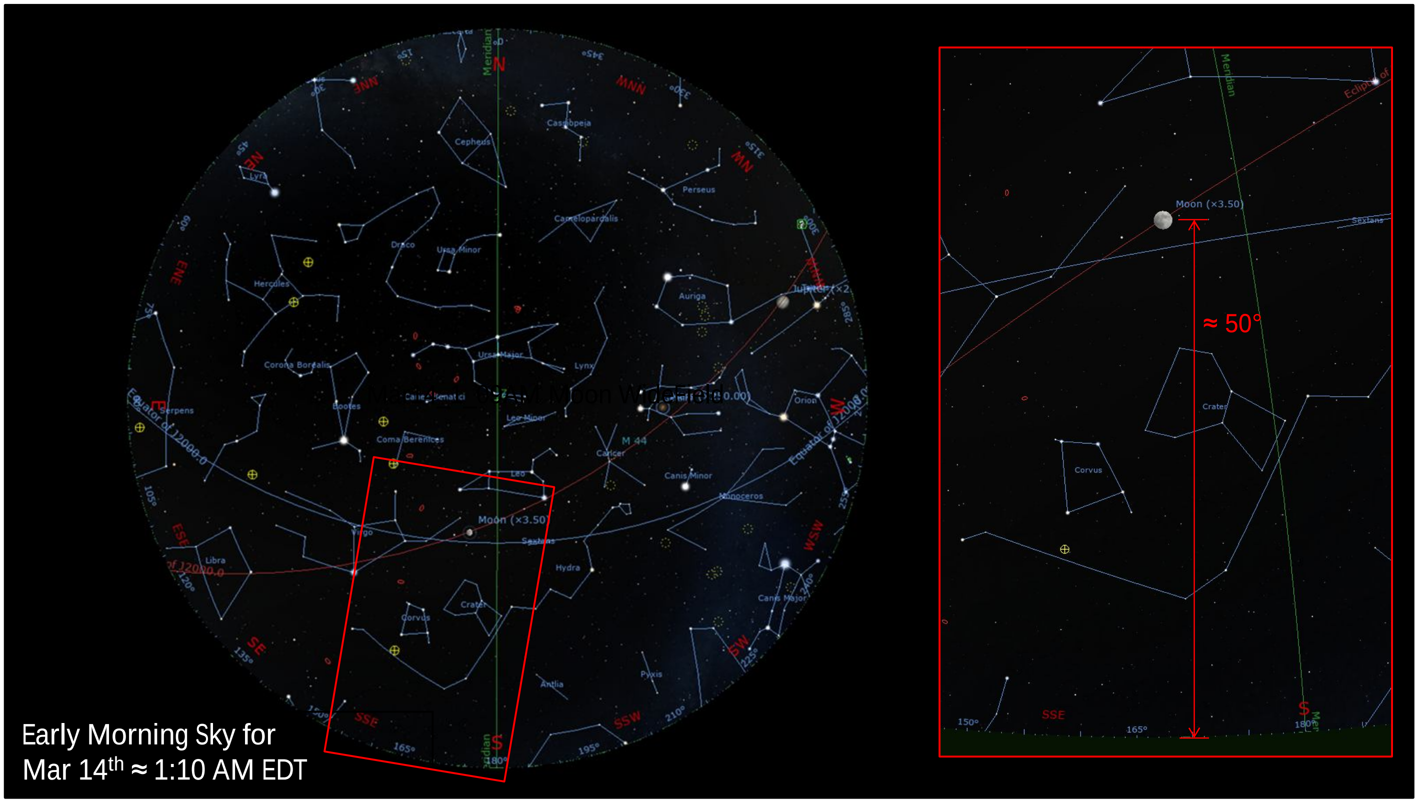
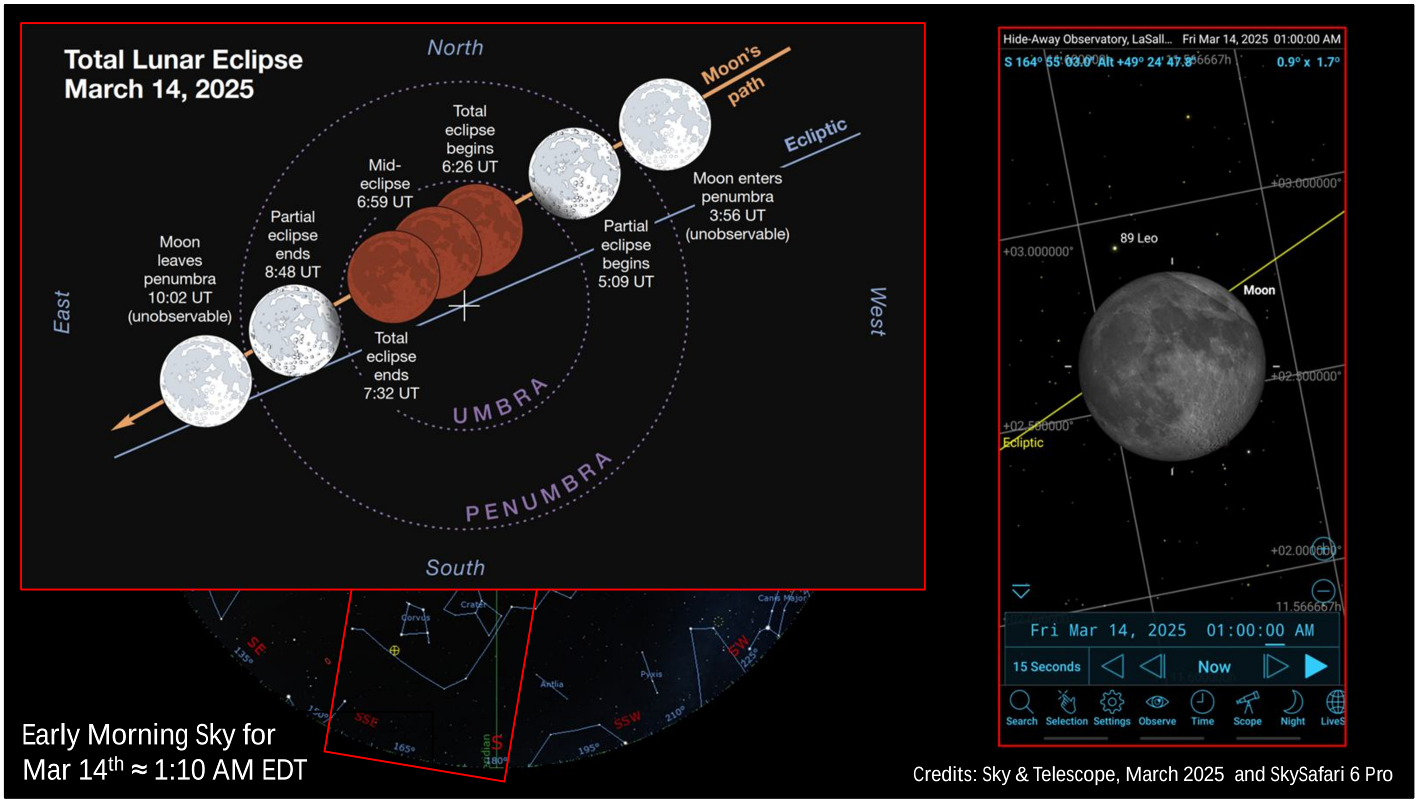
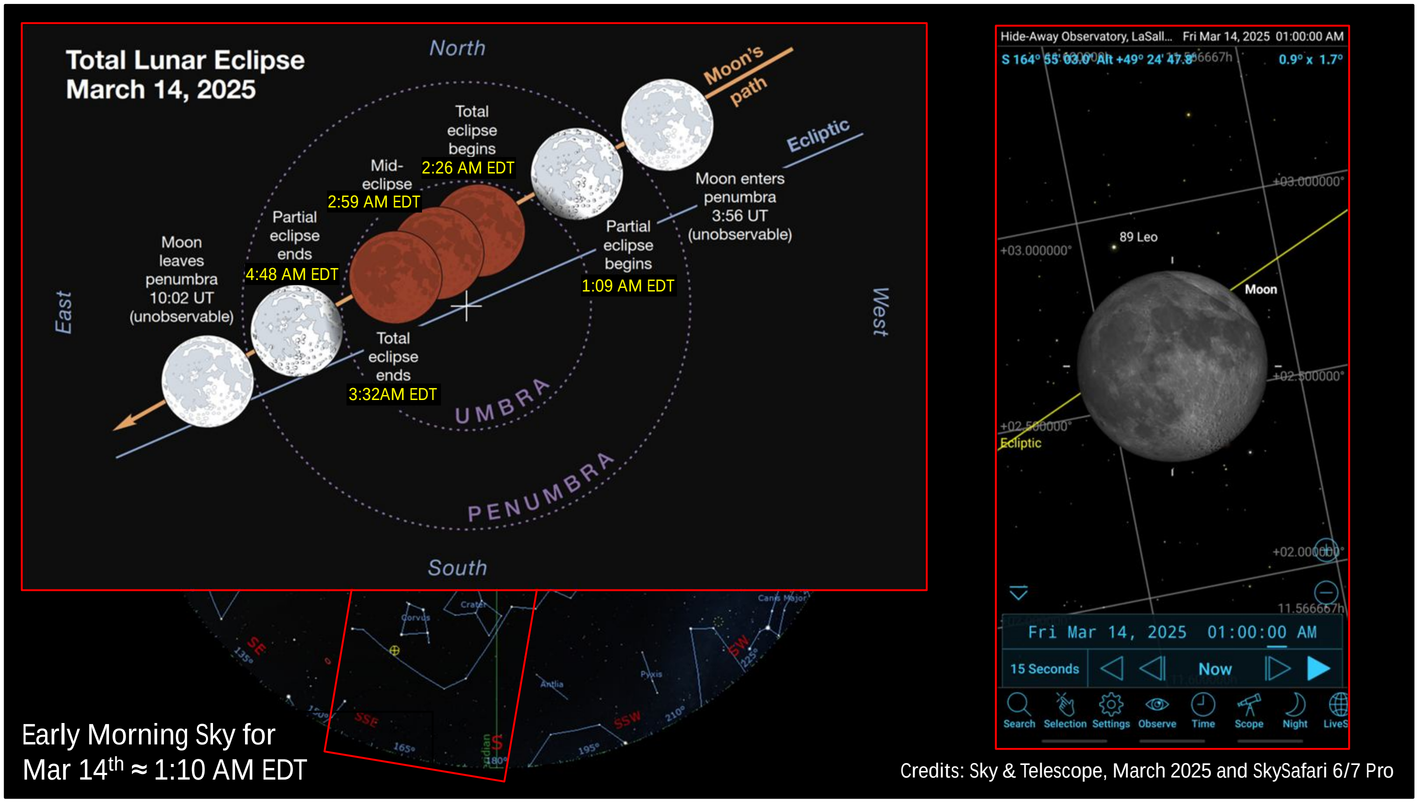

Directorate of Observing Report Excerpts
March 14th 2025 Total Lunar Eclipse -
Planning and Preparing
Prepared by:
Susan Sawyer-Beaulieu, Ph.D., P.Eng.



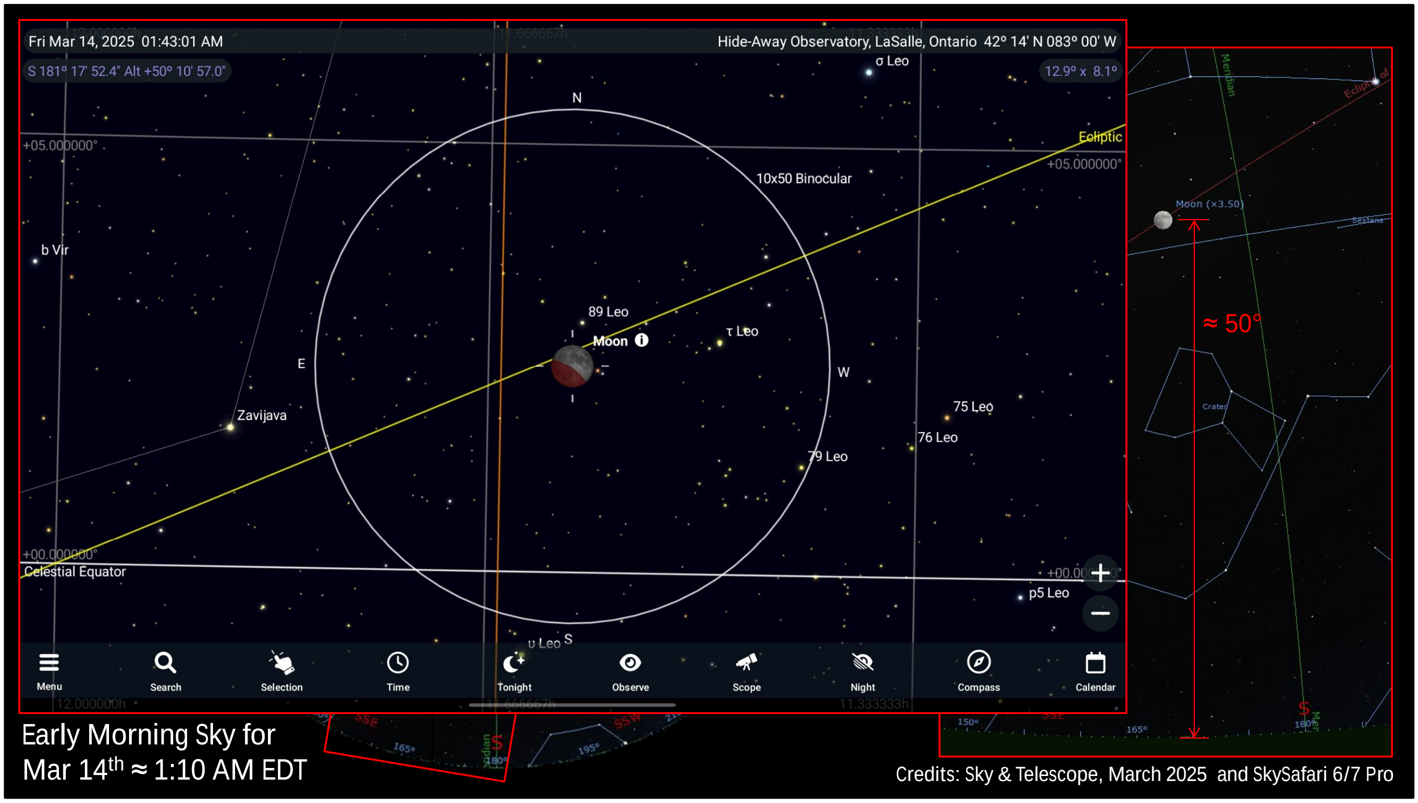

- **Early Morning Sky chart for Friday Mar 14th, a little after 1:00 AM EDT (≈ 1:10 AM EDT)**
- **Early in the morning of March 14th there will be a total lunar eclipse.**
- **Looking roughly South, high in the sky, the Full Moon will be ≈ 50° above the horizon, approaching the Meridian**



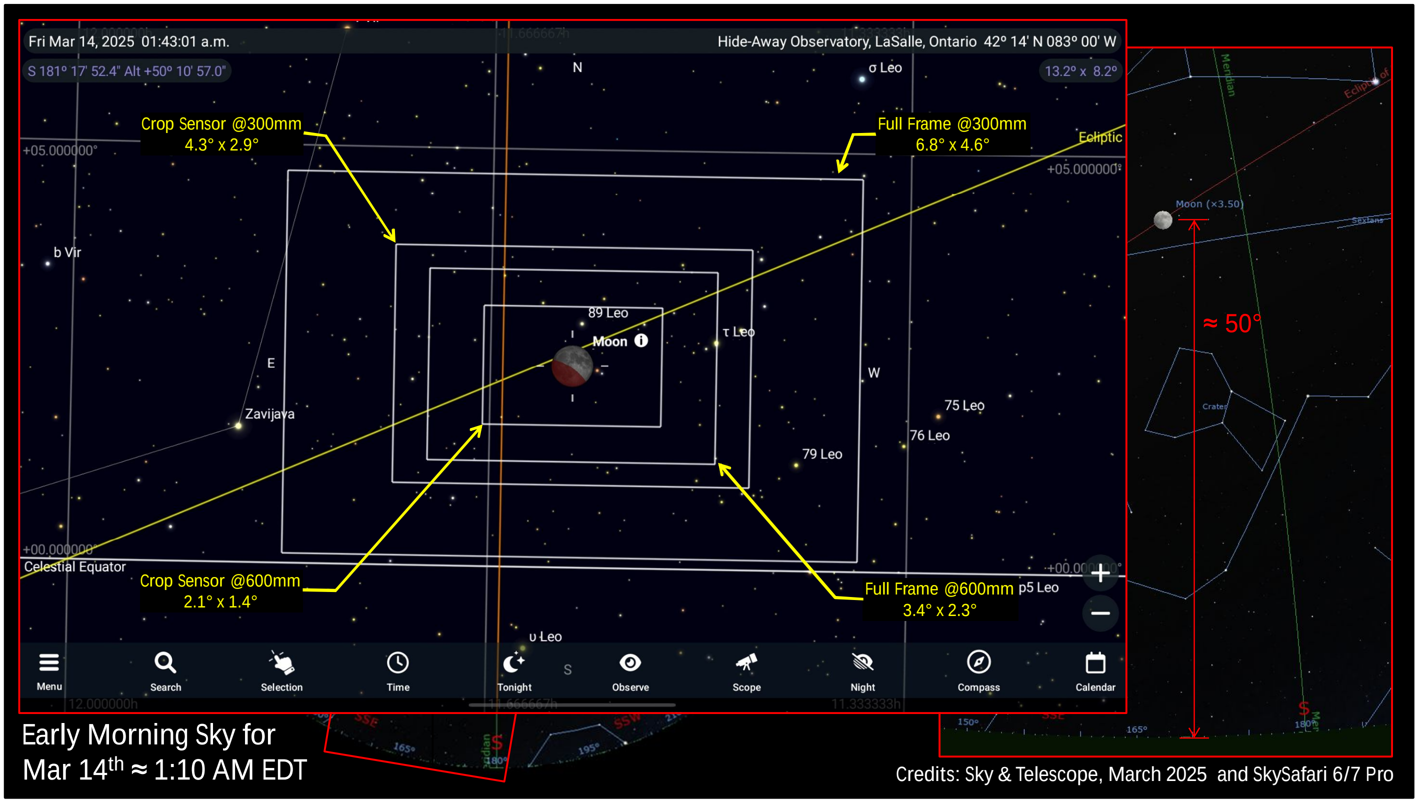

- **Early Morning Sky chart for Friday Mar 14th, a little after 1:00 AM EDT (≈ 1:10 AM EDT)**
- **As illustrated in the chart on the left, the partial eclipse starts with the Moon moving into the Earth's Umbral shadow at 5:09 UT….**



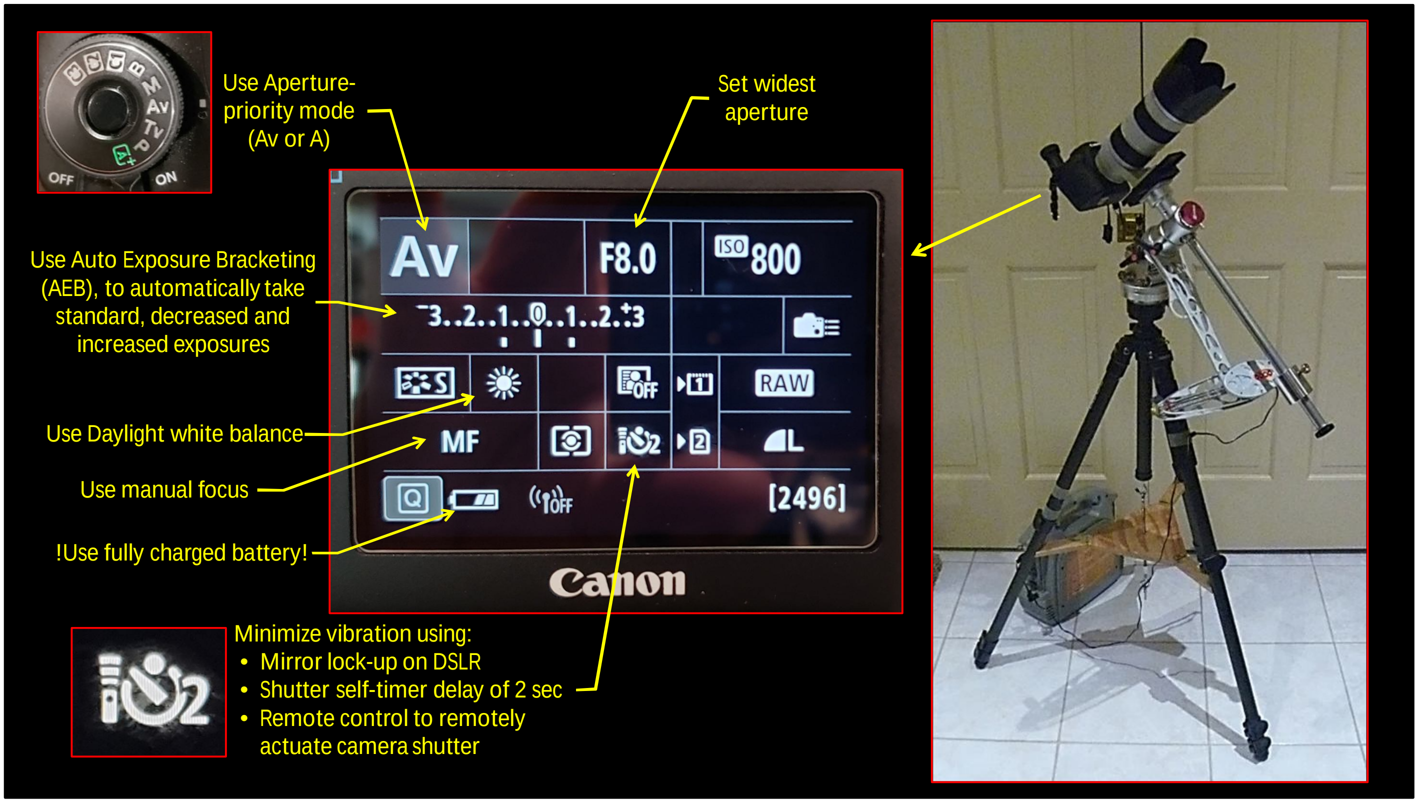

- **Early Morning Sky chart for Friday Mar 14th, a little after 1:00 AM EDT (≈ 1:10 AM EDT)**
- **As illustrated in the chart on the left, the partial eclipse starts with the Moon moving into the Earth's Umbral shadow at 5:09 UT…**
- **…. In local time, this translates to 1:09 AM EDT;**
  - **Total eclipse starts 77 minutes later at ≈ 2:26 AM EDT**
  - **Mid eclipse occurs 33 minutes later, at ≈ 2:59 AM EDT**
  - **Totality ends at ≈ 3:32 AM EDT, giving totality a duration of 66min.**
  - **The partial eclipse will end at ≈ 4:48 AM EDT**



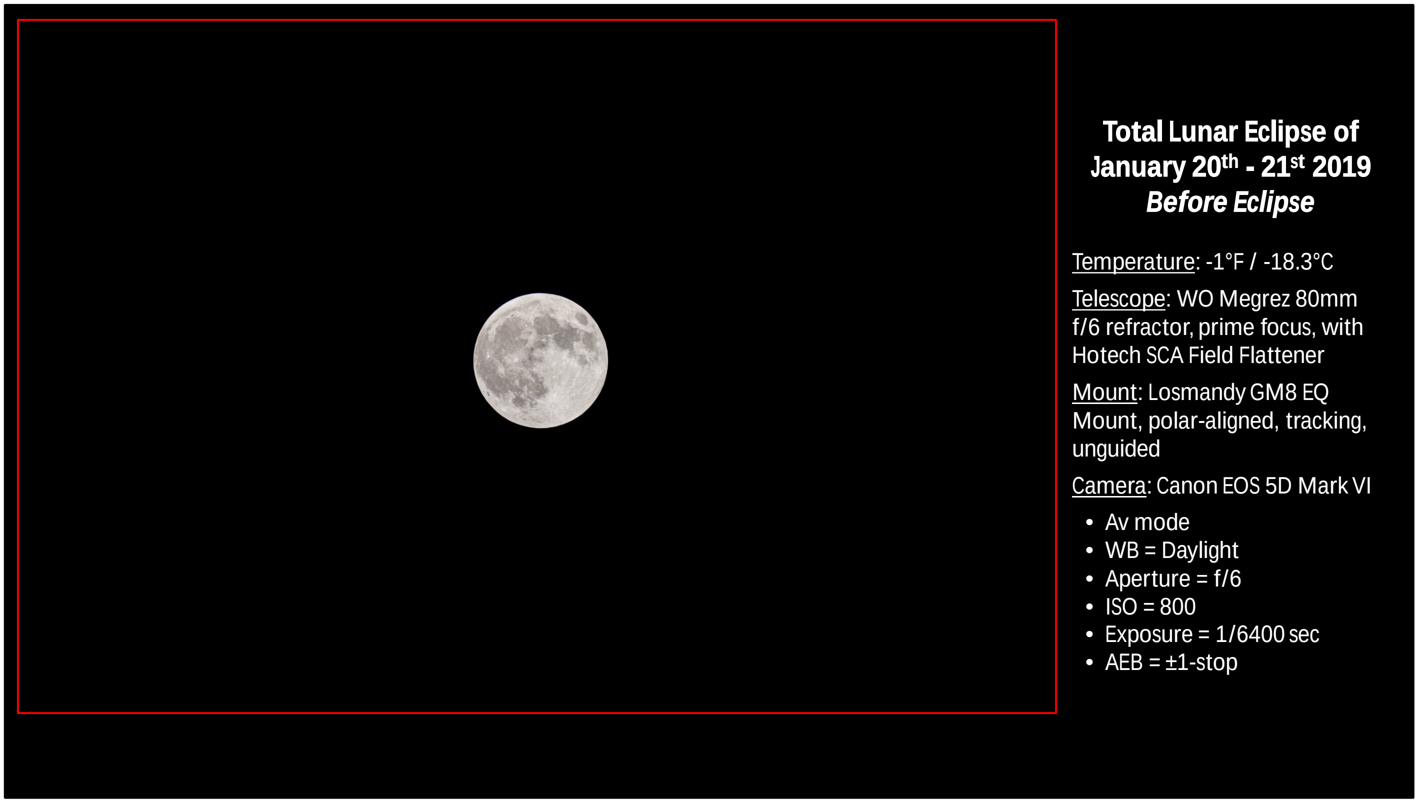

- **Early Morning Sky chart for Mar 14th, a little after 1:00 AM EDT (≈ 1:10 AM EDT)**
- **Assuming we have clear weather that night, I encourage you to try to get out and watch the eclipse visually.**
- **Although, it is easily visible without optical aid, I suggest using binoculars to enhance the view.**
- **For example, this SkySafari screenshot simulates the size of the ½° Full Moon in a 10° FOV of 10° x 50mm binoculars**



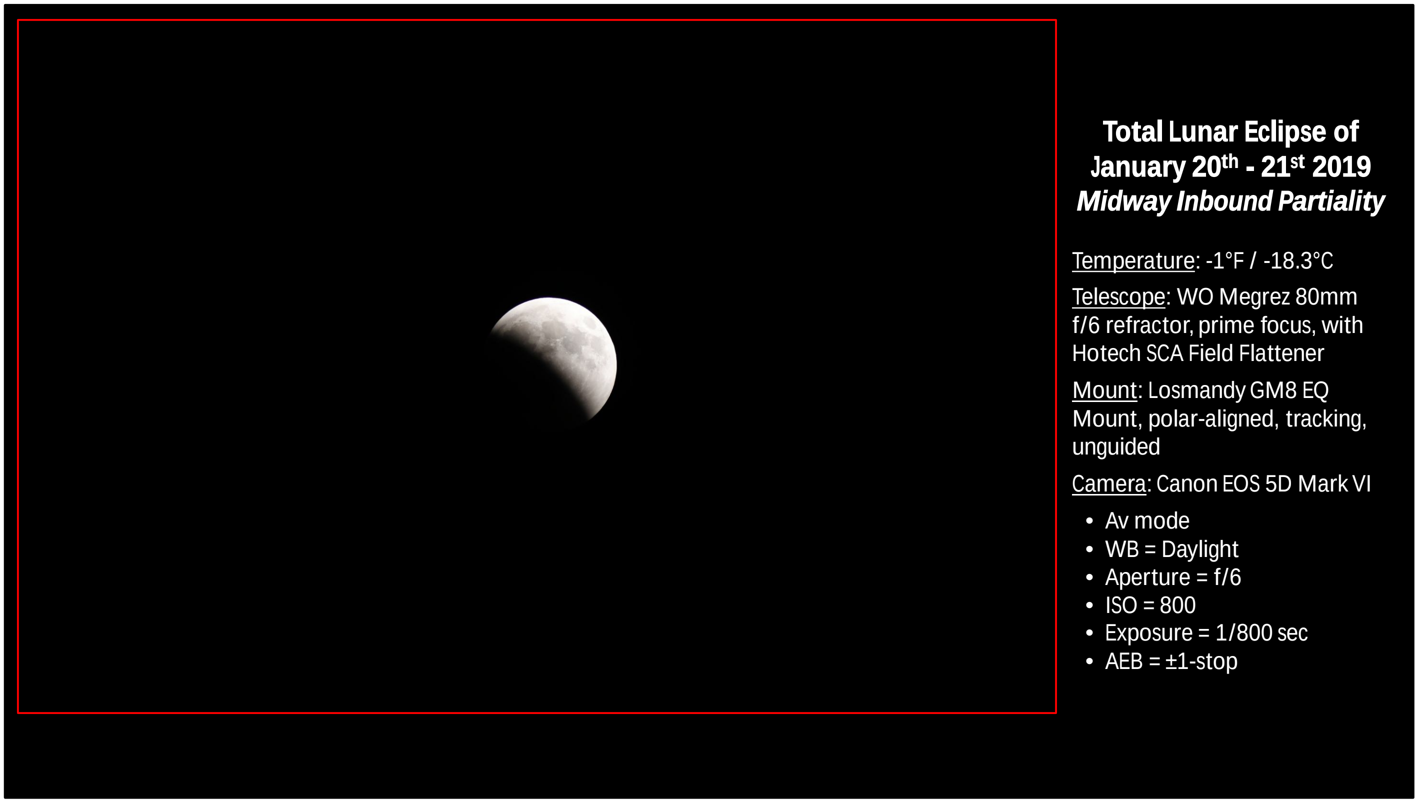

- **There is also the option of imaging the eclipse.**
- **Here are a few suggestions to help you to prepare for the event, and these suggestions are based on using a DLSR or mirrorless camera for imaging:**
- **1st Plan your shots! How do you want to frame the moon? What camera and lens or telescope do you want to use? This chart illustrates simulated fields-of-view for Crop sensor and Full-frame cameras using a 300mm and 600mm focal length lens or telescopes at prime focus... *(compare FOVs)…***
  - **Full Frame @300mm 6.8° x 4.6° FOV**
  - **Crop Sensor @300mm 4.3° x 2.9°**
  - **Doubling the focal length of the lens or telescope decreases the FOV by ½. In the end the choice is yours.**
- **Recommended to use a stable mounting platform, e.g., simplest would be a sturdy tripod and ball head to support your camera and lens assembly.**
- **Mount can be stationary or tracking; tracking is very helpful but isn't absolutely critical. Even at mid-totality, the moon can be bright enough to allow capture of short exposures, while avoiding trailing and smearing of the image, but planning is required.**
- **Wider fields-of-view are more forgiving than narrow, allowing slightly longer exposures without trailing.**
- **In addition, in wide FOVs, as simulated here, the Moon will drift slowly enough through the field, that manually recentering the moon in the frame between shots can be accomplished relatively easily. For example, assuming a sidereal rate of approximately 15°/hr or 0.25°/min, it would take the moon about 8min to drift across the smallest FOV simulated here.**
- **Also, well before the eclipse starts, align your camera's FOV so that the moon and stars drift though the field parallel to the long edge of the camera field and not diagonally across the field.**
- **Next question, is what camera settings should you use?**



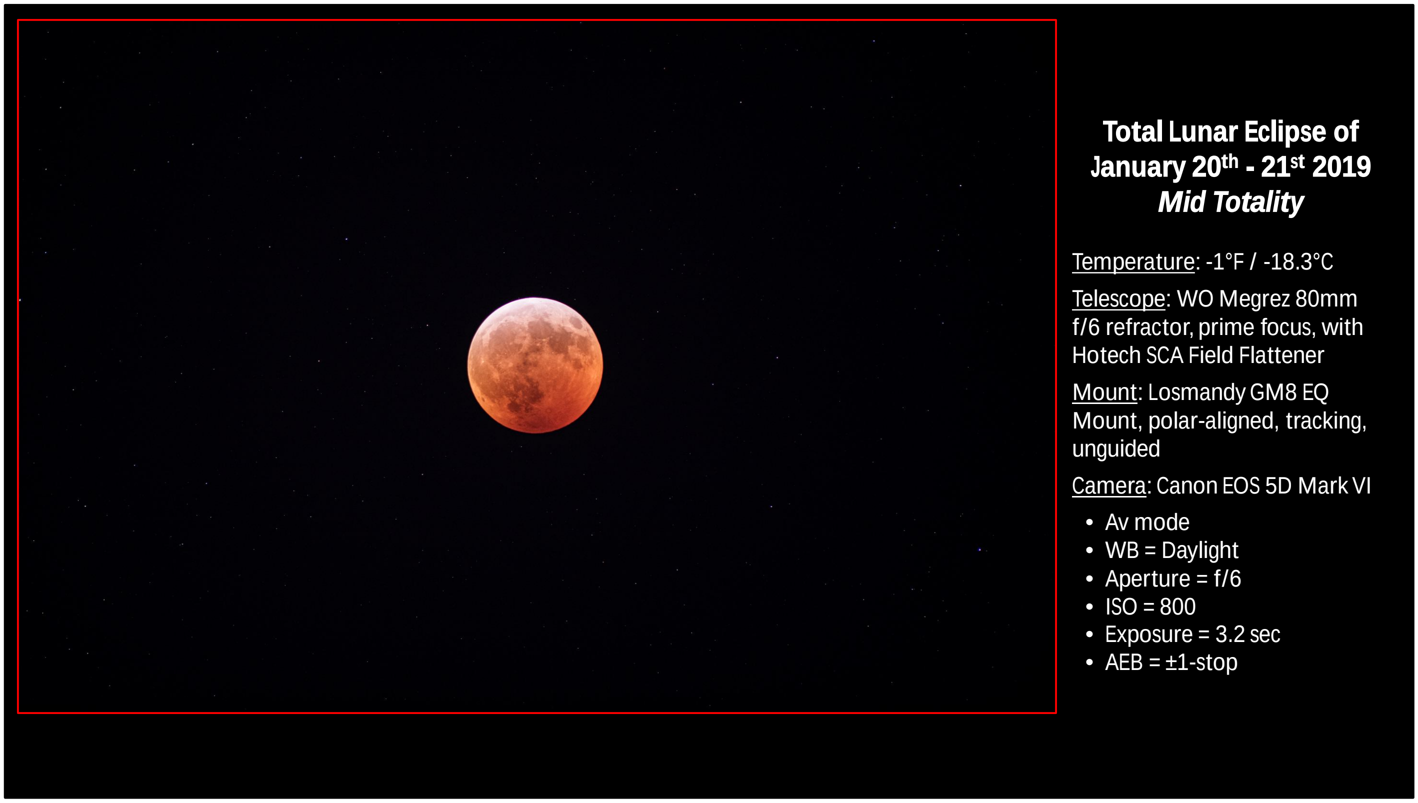

- **Camera settings to use: ...**
- **Whether using a telescope or lens, I suggest using Aperture-priority mode on your DSLR or mirrorless camera; Av-mode on Canon cameras or A-mode on a Nikon.**
- **Aperture-priority mode allows you to choose the aperture, as well as ISO, and the camera selects the shutter speed for best results**
    - **If Using a camera lens, Set aperture to widest setting; On a telescope, at prime focus, aperture is fixed, i.e., it’s simply the focal ratio of the telescope.**
    - **Set ISO; good starting point might be ISO 800; Test settings on Full Moon well before eclipse starts.**
    - **Use Daylight White Balance.**
- **To minimize vibration when imaging: On DLSR, use its mirror lock-up feature, if available; Also, set a shutter self-timer delay of 2 sec. and use a remote control to remotely actuate the camera shutter.**
- **Use Auto Exposure Bracketing (AEB), to automatically take a minimum of 3 exposures, a standard exposure, a decreased exposure and an increased exposure.**
- **Use Manual Focus**
- **Make sure you are using a fully charged battery!**



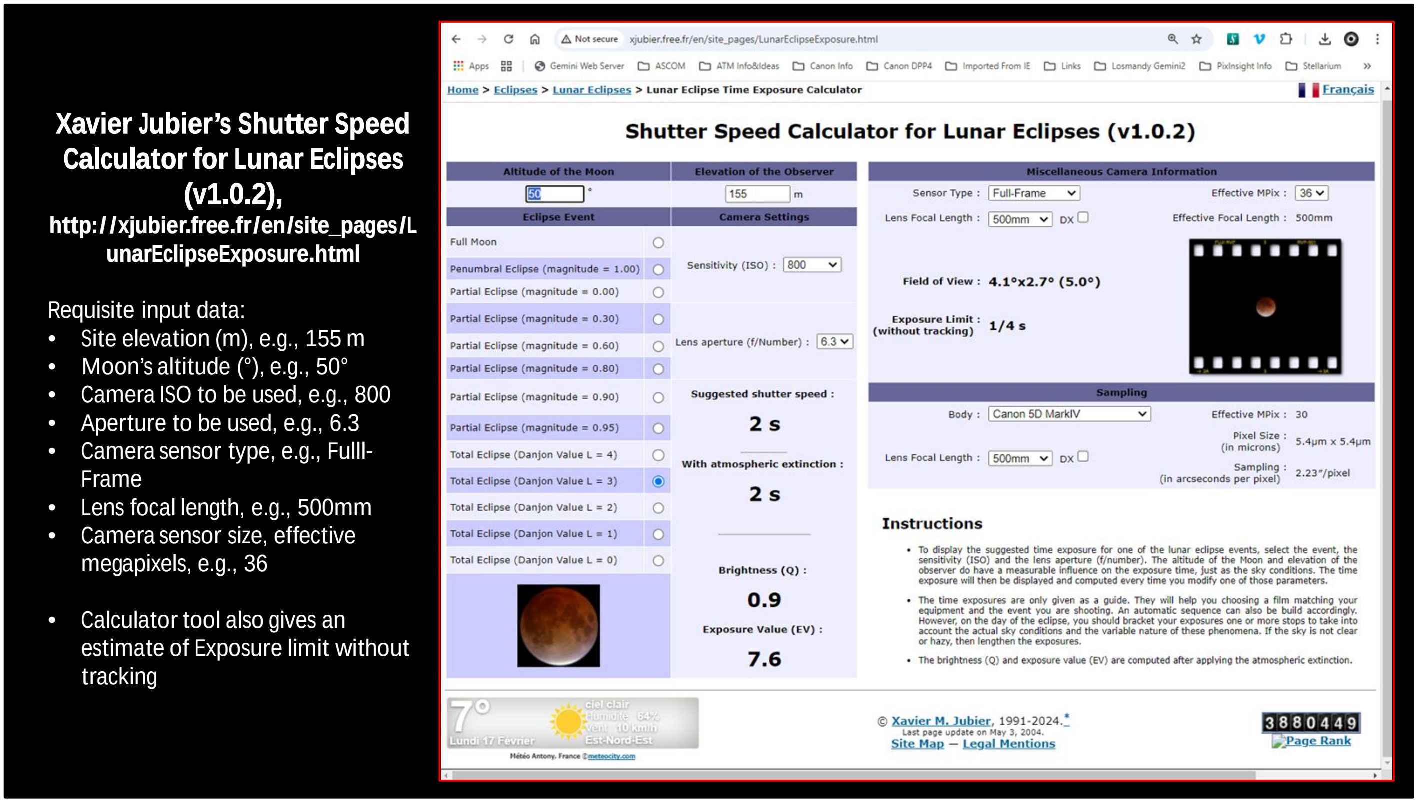

- **Let's look at some sample images, taken of the Total Lunar Eclipse of January 2019**
- **For the 2019 eclipse, used 80mm f/6 refractor on a polar-aligned, tracking EQ mount, and my Canon 5D MK IV DSLR**
- **This 1st image is of the moon prior to the start of the eclipse**
- **Aperture-priority mode was used. At a setting of ISO 800 and @f/6, the camera set the exposure to 1/6400th sec.**
- **Now if I had set an ISO value 1-stop lower, meaning at ISO 400, the camera would have automatically adjusted the exposure to 1-stop slower, meaning an exposure of 1/3200th sec.**




- **This 2nd image is of the moon at about Midway Inbound Partiality.**
- **Again Aperture-priority mode was used. At a setting of ISO 800 and @f/6, the camera increased the exposure to 1/800th sec.**
- **Now if I had set an ISO value 1 full-stop slower, meaning at ISO 400, the camera would also have automatically adjusted the exposure by 1 full-stop slower, meaning an exposure of 1/400th sec.**

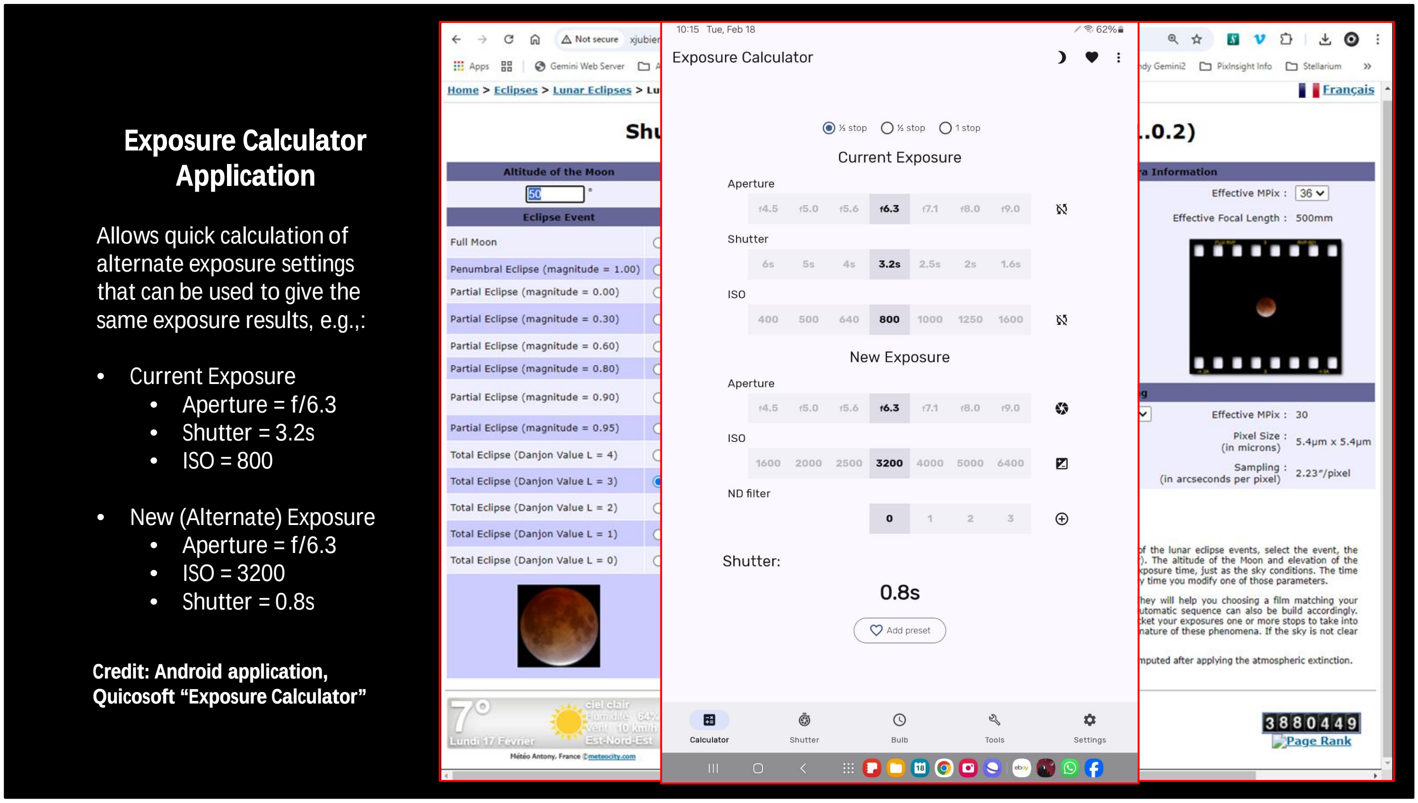



- **This 3rd image is of the moon at Mid Totality**
- **Again Aperture-priority mode was used. At a setting of ISO 800 and @f/6, the camera increased the exposure to 3.2 sec. Keep in mind, these images were taken using a tracking mount, so the longer exposure was possible without causing trailing in the image.**
- **The easiest way to shorten the exposure is to increase the ISO value by 1 or more full-stops. For example, if I had set an ISO value 2 full-stops more, meaning at ISO 3200, the camera would also have automatically adjusted the exposure by 2 full-stops shorter, meaning an exposure of 0.8 sec.**




- To help take some of the guess work out of deciding what camera settings to use, here is Xavier Jubier's Shutter Speed Calculator for Lunar Eclipses (v1.0.2), http://xjubier.free.fr/en/site_pages/LunarEclipseExposure.html
- This should look somewhat familiar to you if you attended my presentation on Solar Eclipse Imaging: Tips, Tricks & Tools at the membership meeting February last year. In that presentation, I talked about the Shutter Speed Calculator for Solar Eclipses.
- The Shutter Speed Calculator for Lunar Eclipses is a similar tool, allowing estimation of shutter speeds to use for lunar eclipses, based on the input of requisite data:
    - Site elevation (m), e.g., 155 m
    - Moon's altitude (°), e.g., 50°
    - Camera ISO to be used, e.g., 800
    - Aperture to be used, e.g., 6.3
    - Camera sensor type, e.g., Full-Frame
    - Lens focal length, e.g., 500mm
    - Camera sensor size, effective megapixels, e.g., 36
- Calculator tool also gives an estimate of Exposure limit

  exposure times estimated by the tool, should




- **Another useful tool to use with the Lunar Eclipse Shutter Speed Calculator, is some sort of Exposure Calculator application**
- **These applications allow quick calculation of alternate exposure settings that can be used to give equivalent exposure results.**
- **In the example shown here:**
  - **Current Exposure Settings**
    - **Aperture = f/6.3**
    - **Shutter = 3.2s**
    - **ISO = 800**
  - **New (Alternate) Exposure Settings**
    - **Keep Aperture = f/6.3, but set ISO = 3200, then the recommended Shutter speed = 0.8s will give the same exposure results as the**
- **The app I use, Quicosoft "Exposure Calculator", is an Android application**

# Resources:

- Quicosoft Exposure Calculator (for Android), https://play.google.com/store/apps/details?id=com.quicosoft.exposurecalculator.app&hl=en_CA
- Xavier Jubier's Shutter Speed Calculator for Lunar Eclipses (v1.0.2), http://xjubier.free.fr/en/site_pages/LunarEclipseExposure.html