The Total Solar Eclipse of August 21, 2017

Historically, total solar eclipses have instilled both fear and awe-inspiring feelings among humans. However, we now know that a total solar eclipse occurs when the sun is completely covered by the moon on a new moon day. Total solar eclipses occur nearly as often as total lunar eclipses. However, from a given geographic location, the opportunity to observe a total solar eclipse is extremely rare because the path of totality for a total solar eclipse is confined to a narrow strip of land typically around 100 km wide. In other words, on average, total solar eclipses from any geographic location can be seen once in about four centuries. In addition to this, one has to consider the possibility that clouds can obscure the total solar eclipse! Therefore, even to observe a total solar eclipse from locations within a 100 miles radius is essentially once in a lifetime opportunity. To put things in perspective, the last total solar eclipse that was observed from Sri Lanka was on June 20, 1955. It was visible from most parts of Sri Lanka, but not from the extreme northern and southern parts of the country (Figure 1, left). The next total solar eclipse to be visible from Sri Lanka will be on April 11, 2070, and the path of totality will go over southern Sri Lanka, missing Colombo (Figure 1, right). It will be a partial solar eclipse from Colombo. This eclipse will occur shortly after sunrise when the sun is only a few degrees above the horizon.

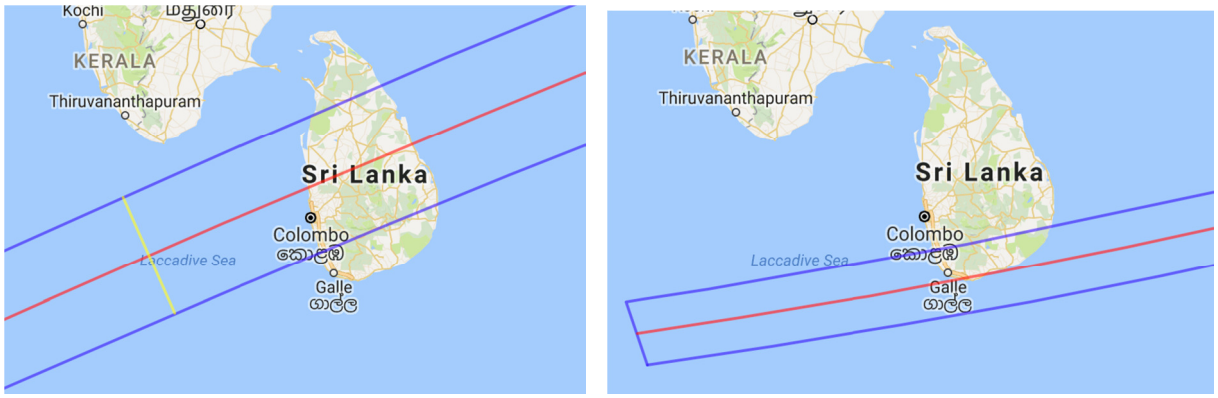

Figure 1. The path of totality over Sri Lanka for the 1955 total solar eclipse is shown on the left while the path of totality for the 2070 total solar eclipse is shown on the right. The red line corresponds to the maximum duration of the totality. The predictions are based on eclipse.gsfc.nasa.gov.

The totality of a solar eclipse lasts less than 8 minutes, and for many total solar eclipses, the totality will only be two or three minutes based on the Earth-moon and Earth-sun distances. This is due to the fact that the angular size of the moon can only be slightly larger than the angular size of the sun. Since the average distance to the moon increases slowly as Earth's rotation slows down (due to conservation of angular momentum), the angular size

of the moon decreases, and in a few hundred million years time there will be no total solar eclipses! Then, instead of total solar eclipses, there will only be annular solar eclipses as the apparent size of the moon can never be larger than the apparent size of the sun leaving an annulus of the sun. It is important to keep in mind that one should not look at the sun without protective glasses either during an annular eclipse, during the partial phases of a total eclipse, or at any time except during the totality of a solar eclipse. Otherwise, it may cause permanent damages to the eyes. It is pertinent to mention that there will be an annular eclipse of the sun visible from northern Sri Lanka on December 26, 2019. However, an annular eclipse is a no match for a total eclipse.

Because of the rarity, the total solar eclipse of August 21, 2017 was a significant event, which drew worldwide attention. There were millions of Americans and foreign visitors travelling to locations within the path of totality (Figure 2) to observe this celestial event, and science faculty alumni of University of Colombo were no exception.

Figure 2. The path of totality for the August 21, 2017 eclipse extending from Oregon to South Carolina is shown. This figure is from eclipse.gsfc.nasa.gov.

Many alumni travelled hundreds of miles to the path of the totality in order to observe the solar eclipse. Fortunately, the sky was clear, barring a few locations such as Charleston, South Carolina. A number of alumni from the western and southwestern states gathered in Oregon to observe this event. It was the first time many had witnessed a total solar eclipse.

Karl Uduman (batch of 1973) and his wife Lalangi (batch of 1978) travelled from Vancouver, Canada, while Kavan Ratnatunga (batch of 1972) came all the way from Sri Lanka. Raj Perera (batch of 1972) came from Washington State, while Nalin Samarasinha (batch of 1977) travelled from Arizona. Sarath Gunapala (batch of 1974) drove from California. They met Oregonians Vijaya Bandara Wickremarachchi (batch of 1973) and Rohith Gunawardena (batch of 1974) there. Meanwhile, Oregonians Varuni Livera and Chathura Bamunusinghe (batch of 2006) were visiting friends in Idaho and observed the eclipse from there. Karl, Lalangi, Kavan, Raj, Nalin, and Vijaya Bandara travelled to Salem, Oregon to observe the eclipse (Figures 3, 4, 5, 6, and 7). Rohith observed it from Dayton, Oregon and his photographs are available at https://rohithg.smugmug.com/Eclipse-2017. Sarath observed the eclipse from Madras, Oregon. Varuni and Chathura returned to Portland, Oregon after the eclipse (Figure 8). While the eclipse itself was worth the long trips for many, meeting science faculty alumni after many years was a bonus from the heavens! It was an opportunity to meet friends after a long time and hopefully similar events will be repeated when the next total solar eclipse visible from the USA (and Canada) occurs on April 08, 2024 (Figure 9).

Figure 3. An image taken during the totality highlighting the bright corona surrounding the eclipsed sun is shown. The bright dot to the bottom left nearly three lunar/solar diameters away is the bright star Regulus (alpha Leonis) in constellation Leo. Image credit: Nalin Samarasinha.

Figure 4. When the sun was eclipsed, the planet Venus was easily visible to the upper right of the over-exposed solar corona. Image credit: Nalin Samarasinha.

Figure 5. Multiple holes of a colander acted as pinhole cameras to produce multiple images of the partially eclipsed sun and they are projected on to the shirt of Vijaya Bandara shortly before the totality started. Image credit: Nalin Samarasinha.

Figure 6. Above, some of the alumni are observing the eclipse from Salem, OR. From left to right: Karl, Kavan, Nalin, and Vijaya Bandara. Image credit: Seth Wickremarachchi.

Figure 7. Sarath (second from left), his wife, and friends observed the eclipse from Madras, Oregon. Image credit: Tissa Karunasiri.

Figure 8. Meeting more alumni in Oregon. left to right: Varuni, Vijaya Bandara, Nalin, and Chathura. Image credit: Varuni Livera.

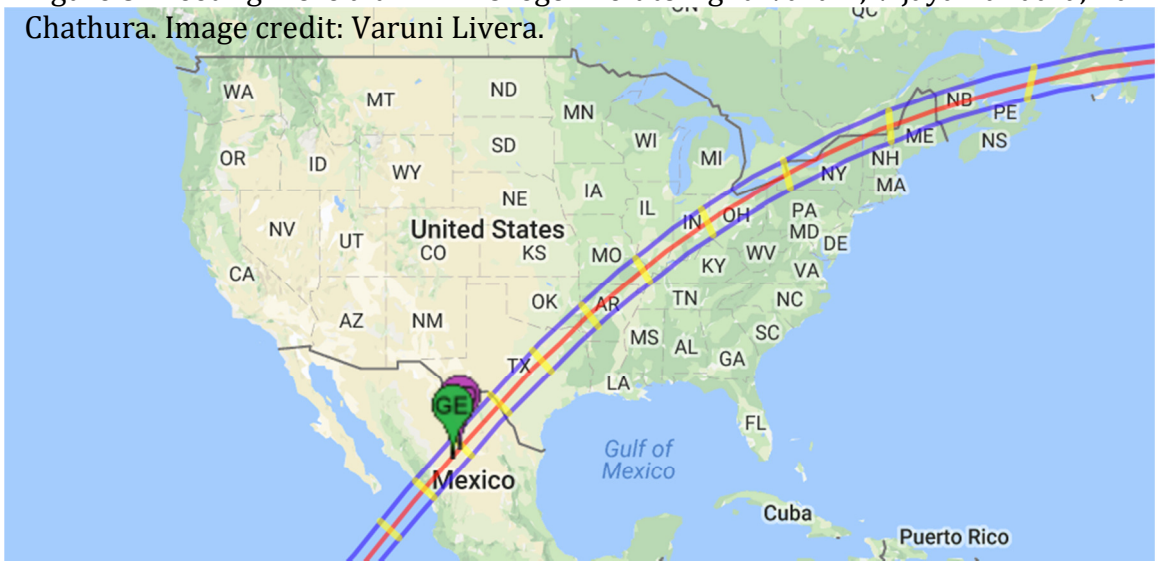

Figure 9. The path of totality for the 2024 total solar eclipse extending from Texas to Maine is shown. You may find additional information at eclipse.gsfc.nasa.gov or at the www.timeanddate.com/eclipse/ site.