Script for video about using cell phones to record the eclipse from graze zone locations

Without a Tripod (Procedures for making the observations)

Before watching this video, you should watch the one about how to do it using a tripod. It describes the setup and use of two smart phones at a location with two people to make the observations. The basic information about that is in the “tripod” video and won’t be repeated here. As noted in that video, you can just point your phone camera “B” at the Sun and record for the two minutes around the time of central eclipse that we need, maybe steadying your arm against the top of a low fence, the edge of a building, or on the roof of your vehicle. But then the person operating phone “B” needs to watch its screen, to keep the eclipsed Sun in its field of view. It will make a better view, with less shaking, if the phone “B” camera can be set motionless by itself to record the eclipse, freeing both people at the location to enjoy and watch the eclipse directly during the most interesting two minutes of the eclipse. The recommended way to keep the camera still is to use a photographic tripod, as described in the other video. But if you don’t have a photographic tripod, I will describe an alternative approach soon. But first, I want to describe the visual observation of the eclipse by at least one of the observers, which I forgot to include in the “tripod” video. During the minute surrounding the central eclipse (that is, starting 30 seconds before the central eclipse time), it will be safe to look at the eclipsed Sun by naked eye. The brightness will be changing rapidly, and we want you to call out when you think the last bright part of the Sun disappears, leaving only the red or pink chromosphere visible, and again when the chromosphere brightens and is overwhelmed as the bright surface of the Sun reappears. These are called “2nd contact” and “3rd contact”, respectively, the start and end of the total eclipse. That’s all that the observers lined up at the edges of past eclipses could do; we want to compare the visual impression with the recorded one. As soon as the Sun becomes too bright to comfortably look at, start using the eclipse glasses, to see the now expanding crescent of sunlight.

The alternative approach, without using a tripod, is to just put your cell phone down on the ground and let it record by itself. But it needs to be pointed at the Sun, so I will describe how to set your phone at the right angles to record the Sun. You should test this procedure some day between Aug. 17 and 20, when the Sun will be in the same position in the sky, to good-enough accuracy, at the Aug. 21st time of central eclipse for your location. If you center the Sun two minutes before central eclipse, even at 4.0 magnification (which we want), the Sun will stay in the field of view for the next 3 minutes that are needed. Due to the Earth’s rotation, the eclipsed Sun will move from left to right across the field of view, so if you place the Sun on the left side of the field of view at the start, it will stay in the field of view for the longest time.

My practical experience is that this technique will probably be too difficult for most people to follow accurately enough; those who want to try it must practice in advance, to see if they can really record the Sun this way. I recommend the other two procedures, using a photographic tripod, or hand-held as steadily as possible, described above, over this method.

For placing phone “B” on the ground to record the eclipse, it needs to be pointed in the direction of the Sun, using its known angle above the horizon (altitude) and direction for your location. In order to use those angles, you need to be on a level surface. Carpenters are usually careful about making decks level, so they make good surfaces to use. But if you are on a sidewalk, it might not be level enough, if the road is on a small hill. Use a level device to check it; if necessary, use a flat surface, such as a card table with legs folded in, a piece of plywood, or even a large piece of cardboard, cut from a large box, and place some magazines or other objects to prop up the downhill side, until the surface is level. After I describe the angles of the Sun, I’ll demonstrate what to do.

The first angle is the tilt angle to the horizontal; it’s called the “zenith distance” and is 90 deg. – the altitude of the Sun above the horizon. For the demonstration, we’ll use 64 deg. for the altitude, which is the maximum altitude of the Sun above the horizon in the eclipse path, from Missouri to western Kentucky. Then the tilt angle is 90 deg. minus the altitude, or 26 deg.

The direction, which will generally be towards the south, is called the azimuth. The azimuth of directly south is 180 deg. Many cities and rural areas have a grid of north-south and east-west streets; most in Kansas City are that way, but not in St. Louis city. For our demonstration, in early July in Maryland, the Sun’s azimuth will be 123 deg. when the altitude is 64 deg., at 11:40 am EDT. So for our demonstration, we will use the angle 180 deg. – 123 deg., or 57 deg. east of due south. I will use a protractor, to plot these angles (26 deg. and 57 deg.) on a piece of paper that can be cut for positioning the smart phone.

If you live in an area with north-south streets, you can just use the curb to tell where due south is, but here in Maryland, the streets are in different directions. So I will use the compass function of the free “GPS Test” app on my Android to find the north-south direction, and I will place a piece of paper on our deck in that direction. Then I use the 57-deg. paper wedge, to determine the direction of the Sun, and then I will use two blocks of wood, to prop up the phone to the proper tilt angle, using the 26-deg. paper wedge to determine that. Depending on how slippery the surface is, you’ll need some rocks or other fairly heavy object to stabilize the propped-up smart phone. The rocks, or other objects, may be needed to hold down the north-south piece of paper, and the 57-deg. wedge, especially if there is any wind. Sometimes, on a calm day, an “eclipse wind” will suddenly form as the air temperature falls as the eclipse deepens.

P.S. This script was only approximately followed in the accompanying YouTube video and will be updated later this month (July 2017). David Dunham, dunham@starpower.net