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

(Procedures for making the observations, using a photographic tripod)

There should be two people at each station, and each one with a smart phone. One of the smart phones “A” should have the GPS and timing apps that I will describe, while the other (“B”) will be used as the video recorder, to use its camera app to record the eclipse.

For “A”, download two important free apps, if you don’t already have them: “Smart Time Sync” for Androids or “Emerald Time” for iPhones are needed for accurate timing, and “GPS Test”; I give links in a document that accompanies this video. Be sure your smart phone is fully charged before the eclipse. And, go to the smart phone’s settings and turn on Wi-Fi, if Wi-Fi is available (which should be the case if you are observing from home, but if you are at a business establishment, ask if they have Wi-Fi and can give you the security key, if needed). If you are in a park or other place that does not have Wi-Fi, then Wi-Fi should be turned off, but you should have internet access via your smart phone network.

[skip <https://play.google.com/store/apps/details?id=com.chartcross.gpstest&hl=en> . It should be this app; there is a similar one called AndroiTS GPS that you should not get. I’m not sure what the exact name is for the iPhone version, but it should have the capability to tell you how many GPS satellites are used (should be 3 or more) and it should be able to display your latitude and longitude coordinates.]

For “B”, First, be sure to turn off the flash on your cell phone. To do that on my Android, I enter camera mode and swipe my finger to the right, which brings up a menu on a semi-circle on the left side. Touch the lightning symbol, the second from the top. It gives 3 options under “FLASH”, the default is “Auto”. Change it to “Off” by touching “Off”, and now an annoying light will not come on as it gets dark during the eclipse. Second, be sure you have enough storage to record video for at least 3 minutes. Open “Settings”, touch “More”, and move the menu up so that you can see “Storage”, which is the second item below “Sound”. Touching “Storage” will give a display of used and “Available” (or free) space; it may take several seconds for your phone to calculate it. You need to have at least 0.50GB available before recording the eclipse. Check this a day or so before the eclipse, so you can download old photos and videos from your phone gallery to your computer, and then delete them from your smart phone. Hopefully, that will free up more than enough storage so you don’t need to remove any old apps. Third, be sure your smart phone is fully charged before the eclipse.

More than two minutes before the eclipse, smart phone “B” should be placed in the cell phone holder for a photographic tripod, if you have one; that’s recommended, as I’ll explain. Two minutes before the time of central eclipse for your station (that time will be provided for your area and should be known to 10 seconds accuracy or better), smart phone “A” should have the GPS Test coordinates (latitude and longitude) on its display. Then with smart phone “B”, start the camera, swipe it to achieve maximum zoom (4.0X), and touch the video camera symbol to start the video recording. Point smart phone “B” so that it records the display of “A” showing the longitude and latitude; it only needs to be recorded for 5 seconds. Then with “A”, exit the GPS Test app and start the Smart Time Synch app. If Wi-Fi is available at your location and smart phone “A” is using it, press the “Internet” button in the upper right of the Smart Time Synch display; the button should turn green, and after a few seconds, the Source Status should switch from “Off” (in red letters) to “On. Fixed now” (in green letters), and under it, the “Source time” will be displayed in bold letters; it is the accurate time, to better than a second (and our tests show that it is normally within 0.02 second). If you don’t have Wi-Fi, or if the Source status changes to “Off” or “Network error” in red (that happens sometimes), press the “GPS” button on the upper left; then it will turn green and the “Internet” button will return to white. For the “GPS” mode to work, it’s best to be outside with some view of the sky, which of course you need, anyway, to observe the eclipse. The Source status should soon turn to “On. Fixed now” in green, and is more robust than the “Internet” mode, but our tests show that it is a little less accurate, but still within 0.2 second of true time, which is all right for our work. Smart phone “B” should record this Source time display of “A” for ten seconds (with “On. Fixed now” displayed), then you should point “B” to the Sun, to start recording the eclipse (we want you to record for two minutes centered on the maximum eclipse at your location, that is, have “B” pointed at the Sun, and continue with the video recording (do NOT press the square that will stop the recording, keep it recording, until the end, noted below), starting no later than one minute (60 seconds) before the central eclipse time for your location.

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 you may want to be able to leave “B” on a photographic tripod (that’s recommended) to hold the cell phone steady during the eclipse, and leave you free to enjoy the eclipse experience, perhaps looking at the totally-eclipsed Sun briefly with a pair of binoculars. Be careful, viewing with binoculars is only safe when the bright part of the Sun has disappeared, which may be only for a few seconds at your location – if the remaining part of the Sun is too dazzling or uncomfortable to look at, immediately turn away and use the eclipse glasses to safely view the eclipse by naked eye. 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. As soon as the time is one minute (60 seconds) later than the time of central eclipse, remove “B” from the tripod and again image and record the Source time of A’s Smart Time Synch display, for 10 seconds. After that, you can press the red square to stop B’s video recording; if all has worked as described, you have made a recording that will be part of the overall best-observed eclipse in history; congratulations on making this valuable contribution.

Going back to the photographic tripod, if you don’t have one, you may be able to borrow one from a friend or neighbor; it should be high enough so you can easily get your head under the shart phone to see its display, even when the Sun is high in the sky, as it will be especially from Nebraska to Kentucky. A folding chair is useful, so you can get low enough to look at the screen. If you need to wear glasses to see the screen, wash them before the eclipse, since small dirt specks on them can catch sunlight and confuse the view. If the photographic tripod does not hold the camera high enough, you might put it on a table, or on the roof of your vehicle, to get the phone high enough. If you want to buy a tripod, there are some that will raise high enough that cost in the range of $25 to $60; I give some recommendations in the online information that’s posted along with this YouTube video. You also need a small mobile phone tripod, such as the Promark one available for $10 from K-Mart (Wal-Mart has similar units); the small spider tripod is not very useful, but the small frame that securely holds the smart phone can attach to any photographic tripod, or its quick-release pad.

If you don’t have a tripod, it is possible to just put your smart phone down on the ground and let it record by itself, so you can enjoy the view of the eclipse during the two minutes that should be recorded. But the smart phone needs to be pointed at the Sun, which takes some planning that I will describe in a separate YouTube video.

We will not collect them, but if you want, you can use the procedures described above to take some still photos of the partial phases, lasting over an hour before totality. Video of the partial phase is not recommended due to storage limitations on your smart phone. Taking some partial phase stills is useful for practice, to see the Sun in your smart phone display; its image will be overexposed, just a fuzzy blob, but seeing it will confirm that you’re pointed at the Sun. During the partial phases, you can see and image a sharper (in focus) view if you cover your smart phone lens with a small piece of “space blanket” (aluminized mylar) that you can get at sporting goods and similar stores, but that’s not crucial. During the minutes before the total eclipse, the Sun will become a narrow crescent of decreasing brilliance that will become increasingly easy for your smart phone to focus on.

In any case, you should make a dry run, to test the full procedure during a day before August 21st, at the same time that the eclipse will occur on August 21st. I think it will help if you select a day that is mostly cloudy, so the Sun is fainter shining through the clouds, which can mimic the deep partial phases before totality.

A word of caution – if the weather is calm (little or no wind) during the partial phases, just before and during the total eclipse, the cooling temperature of the atmosphere can cause a rather strong “eclipse wind”. Therefore, I recommend that you hang a weight (a sizeable rock, water bottle, or other object) in a net, or with string, rubber bands, or blue painter’s tape, low at the center of the tripod, to increase its stability in the case of wind.

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The tripod I’m using is a Sunpak 9002TM tripod/monopod, but I could find it for sale only at superiorphotonic.com for $65; even Amazon only says “currently unavailable”. An inexpensive tripod that will probably work about as well is the Amazon Basics 60-in. Lightweight Tripod with Bag, $23.49 plus shipping, at [https://www.amazon.com/AmazonBasics-60-Inch-Lightweight-Tripod-Bag/dp/B005KP473Q/ref=pd\_lpo\_sbs\_421\_t\_2/146-5218444-7067204?\_encoding=UTF8&psc=1&refRID=ZJ64CTNCEFWPEW8CN200](https://www.amazon.com/AmazonBasics-60-Inch-Lightweight-Tripod-Bag/dp/B005KP473Q/ref%3Dpd_lpo_sbs_421_t_2/146-5218444-7067204?_encoding=UTF8&psc=1&refRID=ZJ64CTNCEFWPEW8CN200) .

This script was only approximately followed in the accompanying YouTube video and will be updated later this month (July 2017).

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