

The Great American Eclipse of 2017: An Outreach Opportunity and Challenge

Andrew Fraknoi,¹ Dennis Schatz,² and Linda Shore³

¹*Foothill College, Los Altos Hills, California, USA; fraknoiandrew@fhda.edu*

²*Pacific Science Center, Seattle, Washington, USA; dschatz@pacsci.org*

³*Astronomical Society of the Pacific, San Francisco, California, USA; lshore@astrosociety.org*

Abstract. This paper consists of notes for, and from, a standing-room only Special Interest Group discussion at the 2014 ASP Meeting regarding the total eclipse of the Sun visible from the U.S. in 2017. There was a great deal of interest in organizing in advance for this total eclipse, and there was considerable discussion of the kinds of efforts and partnerships that may be needed at the national and local levels. People who read this summary and are interested in helping with national eclipse education and outreach efforts can contact the first author.

1. The August 2017 Eclipse

There will be a total eclipse of the Sun on Aug. 21, 2017, which will be visible from only one country: the United States. This is a rather unusual circumstance and is likely to raise interest in the eclipse among residents of the U.S. and a host of visitors.

The partial eclipse will be visible throughout North America; we estimate it will be within viewing range of about 500 million people. And they will be in the most media saturated part of the world, thus probably exposed to a great deal of pre-eclipse news coverage. Most of them, being outside the path of totality, will need some sort of safe viewing method to watch the eclipse in the sky (presuming that they will not be content to simply watch it indoors on a screen).

There is considerable information and material on the web already about this eclipse, and a new resource guide about eclipses (Fraknoi 2014; also in this volume) can lead you to these sources. For example, several amateur astronomers are already dedicating entire websites to eclipse preparation, and excellent maps of eclipse coverage and weather prospects are already available.

The path of totality is roughly 115 km wide, and the eclipse lasts less than 3 minutes in even the best locations, so this will be a relatively quick eclipse. The shadow of the Moon races across the U.S. at speeds greater than the speed of sound, covering roughly one mile every two seconds (Odenwald 2014).

The eclipse will first touch land in the U.S. around 10:15 a.m. in the state of Oregon. From there it will move diagonally across the country, through the states of Idaho, Wyoming, Nebraska, Kansas, Missouri, Illinois, Kentucky, Tennessee, North Carolina, a tiny bit of Georgia, and South Carolina. During this time, totality does not

touch any of the large metropolitan areas in the country—only smaller towns and rural areas. The shadow will leave the U.S. from a barrier island just east of South Carolina’s eastern seaboard. It will have been in the U.S. for a total of 1 hour and 33 minutes.

The eclipse will last the longest in two towns: Hopkinsville, Kentucky and Carbondale, Illinois, and already the two are vying for which will be eclipse central. (The slogan for Hopkinsville is “the most exciting two minutes and 40 seconds in astronomy,” which is a take-off on the Kentucky Derby slogan “the most exciting two minutes in sports.”)

Many eclipse trip veterans have reserved hotels and viewing facilities along the center line of the eclipse and are starting to advertise tours and events around the eclipse (a number of these are listed by Fraknoi 2014).

2. Weather, Location, and Traffic

Of course, to have a successful eclipse experience, you not only need to be in the right place, but also to have clear skies. August weather is variable along the path of totality, and eclipse fanatics are already consulting weather maps (such as those by Jay Anderson 2014) and arguing about the greatest likelihood of clear skies. But local weather conditions are notoriously hard to predict and some sites with excellent logistics along the path are likely to be clouded out as eclipse day dawns.

This may lead to tremendous transportation problems, as huge masses of eclipse enthusiasts take to their vehicles and try to outrun the clouds. Small rural roads could be filled with angry, rushed eclipse buffs, honking desperately or running their cars on the sides of the road to try to reach a clear view of totality. They may not be alone on the roads, however. There will certainly be a huge number of people who are unable to find accommodations within the zone of totality. They will be getting up early that August morning to drive to a better location and thus those who shift their position will be competing for sparse road space with those who are coming into eclipse territory from elsewhere. Police and other safety personnel in small towns and rural areas could be completely overwhelmed.

Even in those locations along the path of totality where the weather remains clear on eclipse day, there may be many more people than local facilities are used to. Timely meals for so many people may be a big problem in many rural areas. Towns will very likely have to designate special flat viewing areas where many cars can be parked and people can set up. Mobile outdoor restrooms will be in great demand.

We should also bear in mind that the eclipse will likely generate interest all over the world, and eclipse chasers from many countries may decide to vacation in unusual U.S. towns that August, selecting them for their position on the path of totality. That will increase the demand on the rooms and food in those areas and make it even more difficult for people who just spontaneously decide to drive there at the last minute.

This demand for rooms means that this will be an incredibly active time for companies like AirB&B and VRBO, who encourage private citizens to rent out space in their homes and apartments; astronomers should probably partner with such companies early to make sure they are ready.

3. Viewers and Information for the Partial Eclipse

With the path of totality so narrow and rural, it is likely that most residents of North America will only be able to see a partial eclipse on August 21, 2017. To see the partial phases for themselves, they will need some method of safe viewing, whether through a properly filtered instrument, by projecting an image with optics or a pinhole, or by using safe glasses. Distributing information and tools for safe viewing for 500 million people is likely to be the greatest outreach challenge of the eclipse.

Astronomers will need help with this endeavor; not just the usual kinds of help from amateur astronomy clubs, science centers, and EPO programs in space science, but big-time, big-budget help to reach so large a population effectively. If we set the goal that want even half—or a quarter—of the families and individuals who *could* see the partial eclipse to have safe viewing glasses (and a sheet of reliable information about the eclipse), then we are confronted with a logistical challenge unlike that of any other eclipse in history.

Here is where we may want to think outside the box. We don't need to assume that such glasses can only be distributed through our "usual" channels. Why not enlist the help of organizations that already deal with masses of people every day?

Wouldn't it be great if Starbucks gave out eclipse glasses with every coffee drink, if McDonald's had a tray insert about the eclipse and glasses to give away with certain purchases? Why not help retailers like Target have an inexpensive "eclipse kit" for sale at every checkout counter, with glasses and an information booklet? Why not have glasses for sale at every gas station or hardware store? Enlisting such commercial partners (whose marketing arms may actually enjoy claiming that they "own" part of the eclipse outreach) early in the planning process may make the biggest difference in how effective our outreach will be.

Rick Fienberg (the Director of Communications of the AAS) has suggested that companies that have products with eclipse-connected names might be especially interested in getting involved with eclipse outreach: Corona beer, the Mitsubishi Eclipse car, Eclipse brand gum and sunglasses, etc.

4. Partnering with Other Organizations

Putting aside the distribution of glasses, we need to think about ways of just getting reliable information out about the eclipse, its cause and meaning, and how to watch it safely. We know from past eclipses that people in other professions (even doctors) don't always give the most reliable eclipse information to the public.

Jay Pasachoff, the veteran eclipse educator from Williams College, mentioned to one of us that he already knows of a doctor at one of the hospitals in the Boston area associated with Harvard who is telling people that they shouldn't look at the eclipse under *any* circumstances. Eclipse pseudo-science (including predictions of the end of the world and events of religious transformation) are likely to sprout as notice of the 2017 total eclipse spreads.

Given how few astronomers and astronomy educators there are in North America compared to many other professions, it makes a great deal of sense to enlist the assistance of other professionals in explaining the science of the eclipse and how to view it safely. One naturally thinks of the members of the news and social media in this context, but there are many other potential partners we might partner with as well:

- Medical societies: ophthalmologists, opticians, optical paraprofessionals, family doctors;
- Convention and visitors bureaus;
- State and local agencies: city halls, police, firefighters, state departments of education, state troopers, etc.;
- Federal agencies: NSF, NASA, Dept. of Education, NOAA, Homeland Security, Dept. of Transportation (airports will be key viewing sites in some towns);
- Youth groups and summer camps: Scouts, 4H, Boys and Girls Clubs, camp associations (Aug. 21 is still summer vacation in many communities);
- Community and religious groups;
- Recreational agencies: National and state parks; rangers associations, AAA;
- Senior housing and senior activity centers, American Association of Homes and Services for the Aging (now called Leading Age), AARP;
- Teachers groups, especially the National Science Teachers Association and its subgroups; National Earth Science Teachers Association;
- Science Outreach Organizations: American Association of Physics Teachers, Association of Science and Technology Centers, International Planetarium Association, American Institute of Physics, American Geophysical Union, etc.;
- Family and consumer magazines, plus the magazines of the groups mentioned above;
- Businesses with a national reach (as discussed in the section above);
- and, of course, the print, broadcast, and social media outlets.

Each of these types of organizations will need outreach efforts from astronomers tailored to their membership, their way of doing things, and their arena of activity. If they are willing to help, each can amplify the voices of a few astronomers to reach millions of people. Several people have suggested forming and supporting subcommittees to do outreach directed toward the most important of these types of groups in the years before 2017.

5. Expanding the Celebration

With so many people likely to be interested in the astronomy of the eclipse, many speakers at the discussion pointed out that the astronomy education (and science education) community should use the 2017 eclipse as an occasion to make a broader case for science education. At the very least, we should point out that one of the hallmarks of science is that it makes specific predictions which can be tested, and that the eclipse date and time was predicted many decades ago and the eclipse happened exactly when and as predicted. The fact that predictions are constantly being tested by experiments

and observations in the real world is what distinguishes science from many other modes of human thinking.

Several people suggested that science organizations and science centers in the U.S. should agitate to make Aug. 21, 2017 a National Day of Science with federal and state support. A few people even suggested that, since Aug. 21 falls on a Monday in 2017, the weekend before should be a National Festival of Science, perhaps organizing the various local festivals of science in the U.S. to coordinate.¹

One problem that would have to be considered is that few festivals are in August; a time traditionally reserved for family vacations, back-to-school preparations, the start of school in some districts, etc. Whether the excitement of ending the weekend with a Monday eclipse might be enough to make the effort of a summer festival worthwhile for local organizers remains to be seen.

6. Get Organized

In some ways, the hardest question that faces the astronomical community is whether and how to get organized for this national eclipse. For past U.S. eclipses, often total in only limited parts of the country, local education and outreach efforts were sufficient. Plus the news media in those days (without the extra boost of the modern Internet) often treated such eclipses as local stories or minor news.

Today, with the demands of the 24/7 news cycle on cable television and on the Internet, very few sky events of interest remain unexplored and unexploited. Many of us are therefore sure that a “uniquely American” eclipse is going to be a news story that few people will fail to hear or read about before the eclipse actually happens. And expectations will be especially high along the total eclipse track, whether those expectations are of witnessing an event of amazing beauty, making a considerable amount of money from eclipse chasers, or worrying about something dangerous coming to your neighborhood.

Given those heightened expectations, should the astronomical community organize early to make sure that everyone’s eclipse experience is as satisfying and educational as it can be? And who can bring about, supervise, and fund such a national approach to organizing? What is the role of the scientific societies, such as the American Astronomical Society, the Astronomical Society of the Pacific, the International Planetarium Society, etc.? What can and should be the role of federal agencies, such as NASA or the National Science Foundation?

Do we try to produce “standardized” materials about eclipse science, eclipse observing, and eclipse safety, or is that best left to the local astronomy institutions in each city or region? Should there be a single eclipse web site (which may well crash on eclipse day) or should a hundred or thousand organizations produce their own web-based and printed information? Do we try to make sure that there are a sufficient number of inexpensive viewing glasses available throughout the partial eclipse area of North America by encouraging early funding and distribution of such glasses? Can we do this with sufficiently deep-pocketed corporate partners? Or do we leave the dis-

¹See: <http://sciencefestivals.org/> for more information on these local festivals and their umbrella organization.

tribution of viewing glasses to the entrepreneurial spirit of local outreach and education professionals and the power of the marketplace?

And who decides the answers to these questions? At the ASP discussion session, all we could do was to ask people to sign up if they wanted to be kept in the loop – and many did. Whether or not a national coordinating body would be formed and funded, and by whom, was not clear.

We did know and report on the fact that, with help from NSF and under the aegis of the Solar Physics Division of the American Astronomical Society, University of Hawaii solar astronomer Shadia Habbal had organized a small workshop for those interested in Eclipse 2017 science and outreach on April 14 and 15, 2012 at the American Institute of Physics in Greenbelt, Maryland (Arndt et al. 2012). Attendees were mostly solar scientists and veteran eclipse chasers; few of us who attend national meetings on education and outreach in astronomy were informed or invited.

A second workshop was being planned for August 2014 at the University of Missouri, with a bit more representation from the EPO community. Such a meeting did take place (after the ASP meeting) and before this paper was written. Those who happened to attend that meeting organized themselves into various committees, some of which are concerned with the above questions.

We also understand that the NSF will be funding one additional meeting organized by Dr. Habbal and that the AAS Council is considering organizing a coordinating task force for the 2017 eclipse. We await future developments with interest.

If you would like to be on any national task groups or subcommittees that are formed to help to organize eclipse education and outreach, you can email the first author of this paper.

Acknowledgments. We thank Connie Walker (NOAO) for taking notes during the session and sending them to us. AF thanks Rick Fienberg for helpful discussions clarifying some of the issues in this paper.

References

- Anderson, J. 2014, <http://home.cc.umanitoba.ca/~jander/tot2017/tse17intro.htm>
- Arndt, M. et al. 2012, “Science and Outreach Workshop for the U.S. Total Solar Eclipse 2017,” <http://aas.org/media/4265>
- Fraknoi, A. 2014, “Eclipse Resource Guide,” <http://www.astrosociety.org/education/astronomy-resource-guides/eclipse-resource-guide/>
- Odenwald, S. 2014, “Musings on the 2017 Solar Eclipse,” http://www.huffingtonpost.com/dr-sten-odenwald/next-solar-eclipse_b_5556071.html