

**THE 2017 TOTAL SOLAR ECLIPSE AND INTERNATIONAL OBSERVE THE MOON NIGHT: OPPORTUNITIES TO ENGAGE THE AMERICAN PUBLIC IN LUNAR AND SPACE SCIENCE.** L. V. Bleacher<sup>1</sup>, A. J. P. Jones<sup>1,2</sup>, C. Runyon<sup>3</sup>, C. Hall<sup>3</sup>, the Heliophysics Education Consortium Team, and the International Observe the Moon Night Coordinating Committee. <sup>1</sup>NASA Goddard Space Flight Center, Greenbelt, MD 20771 ([Lora.V.Bleacher@nasa.gov](mailto:Lora.V.Bleacher@nasa.gov)). <sup>2</sup>Planetary Science Institute, Tucson, AZ. <sup>3</sup>College of Charleston, Charleston, SC.

**Introduction:** 2017 presents an amazing opportunity to engage the public in learning about lunar and space science, the motions of the Earth-Moon-Sun system, the scientific connections between these objects, and NASA's current and future exploration efforts, beginning with the 2017 total solar eclipse on 21 August and continuing with International Observe the Moon Night on 28 October.

**Total Solar Eclipse:** On 21 August 2017, everyone in the continental United States will have the opportunity to witness a solar eclipse, weather permitting, in total or partial form [1]. The path of totality, in which the Sun will be completely obscured from view by the Moon, will stretch from Oregon to South Carolina (Fig. 1). People along this path will experience the multitude of sensations unique to a total solar eclipse – bright planets and stars will be visible in the darkened sky, the temperature will drop, and the solar corona will become visible.



Figure 1. The path of totality on 21 August, 2017.

**NASA's eclipse portal.** NASA has created a new eclipse portal, <https://eclipse2017.nasa.gov>, in an effort to connect the public, subject matter experts (SMEs), stakeholders, and interested organizations with accurate, timely, and NASA-unique content related to the eclipse. Current resources include free, downloadable materials, such as lithos, posters, and maps, information about how eclipses work, recommendations for safe viewing, multimedia products, citizen science challenges, suggestions for hands-on educational activities, options for viewing live streaming of the eclipse, and more. New content and features, including images of the Earth taken by orbital assets during the eclipse, will be added as they become available.

Organizations are invited to submit information about their eclipse events via the portal. "Official"

NASA events, those for which organizers commit to having SMEs and NASA materials on hand for their participants, as well as a safety plan, will be designated as plans coalesce.

**Subject Matter Experts.** SMEs are needed to engage with the public at eclipse events around the country, as well as to increase public awareness of the eclipse prior to 21 August. SMEs can raise awareness by presenting information about the eclipse at museums, schools, and other public and educational venues in their local communities (see below), pointing to NASA's eclipse portal via their social media accounts, participating in pre-eclipse professional development telecons and webinars for educators and amateur astronomers, and encouraging participation of their local community in citizen science challenges.

SME participation at eclipse events could include giving general-public-friendly presentations, leading hands-on activities for families, serving as a Master of Ceremonies to help the public understand what they are seeing and experiencing, and sharing information about opportunities for participants to extend their engagement with lunar and space science—such as through participation in International Observe the Moon Night (see below).

**Engaging communities.** A number of communities around the country are coordinating efforts in preparation for the eclipse. City officials, safety officers, schools, museums, astronomy clubs, civic organizations, state and national parks, and other groups and organizations are working together to plan and coordinate strategies and events to inform and engage their community members while also ensuring their safety. We present Charleston, SC as an example of this type of community planning and engagement.

In coordination with the local Convention and Visitor's Bureau, the SC Space Grant and Lowcountry Hall of Science and Math are partnering with different venues to host eclipse outreach events for the public before and during the eclipse. For example, local semi-professional baseball and soccer teams are opening their stadiums for viewing and pre-eclipse activities and demonstrations and will live-stream the eclipse as it unfolds from coast to coast on their 100,000-ft<sup>2</sup> Jumbotron screens. The Charleston Aquarium and Charles Town Landing State Park will live-stream video foot-

age from the outdoor fish tanks and animal pens to observe animal behavior before, during, and after the eclipse. Local libraries and museums are gathering a host of eclipse-related reading materials, videos, and activities. Local amateur astronomy clubs are planning to send their members to multiple parks and viewing areas across the Lowcountry of SC to answer questions and provide background information on eclipses. Five student-led teams from local high schools and colleges will launch high-altitude balloons with video cameras, temperature and pressure gauges, and other instruments to observe and record measurements of the eclipse from 90 – 100,000 ft. The Coast Guard – Charleston Base will assist with at least one of these launches from approximately 10 miles offshore. Eclipse video will be live-streamed from the balloon cameras.

In addition, the SC State Department of Education is working with SC Space Grant and the Lowcountry Hall of Science and Math, SC State Museum and Roper Mountain Science Center to host three educator professional development workshops for formal and informal educators. Each school district will participate in this ‘train the trainer’ opportunity, and will share information and resources from the workshops with their respective educators. Included in these training sessions will be activities and resources for students/audiences with special needs, so that all can engage in and enjoy the upcoming eclipse.

**International Observe the Moon Night:** Audiences inspired by the eclipse can continue to engage in NASA lunar and space science by participating in International Observe the Moon Night (InOMN) on 28 October 2017. One day each year, through InOMN, everyone on Earth is invited to observe and learn about the Moon and its connection to planetary science, and to share personal and community connections we all have to the Moon [2, 3, 4 and references therein].

*Introduction.* InOMN began in 2010 in order to build upon and sustain a renewed public interest in the Moon surrounding the arrival at the Moon of the Lunar Reconnaissance Orbiter (LRO) and Lunar CRater Observation and Sensing Satellite (LCROSS). LRO continues to sponsor InOMN annually, with additional contributions of time, graphics, and print resources coming from partner organizations such as the Solar System Exploration Research Virtual Institute and Lunar and Planetary Institute. To learn more about InOMN and to access related resources, visit <http://observethemoonnight.org>.

*Reach.* Public interest in the Moon continues to grow, as evidenced by the number of InOMN events held annually and the feedback provided by attendees. A record 611 registered events took place around the

world in 2016 (Fig. 2). Since its inception in 2010, at least 98 countries and over 500,000 people have participated in an InOMN event.



Figure 2. Map of InOMN events in 2016.

*Evaluation results.* Evaluation results show that InOMN is as an easy-to-implement event that is attractive to many different organizations and segments of the population; InOMN provides opportunities to observe and learn about planets and other celestial objects, in addition to the Moon; NASA content is featured in InOMN events worldwide; InOMN participants are motivated to learn more about NASA science and exploration after attending an event.

*InOMN as a bridge to the eclipse.* With InOMN taking place barely two months after the total solar eclipse, it offers an opportunity to sustain and grow public interest in lunar and space science generated by the eclipse. For viewers across the United States, the total solar eclipse of 21 August provides an exciting opportunity to watch a New Moon cross in front of the Sun, casting the viewer in shadow and providing amazing views of the solar corona. The public will observe the Moon in a different part of its orbit, when reflected sunlight reveals a fascinating lunar landscape – and extend their excitement for space science – by participating in InOMN on 28 October.

As with the eclipse, SMEs are needed before, during, and after InOMN to raise awareness and to share information with InOMN audiences about the Moon; past, current, and future exploration efforts; how we use the Moon as a gateway for understanding the rest of the solar system and beyond; etc.

**Ready to get involved or want more information?** For more information about the 2017 total solar eclipse, InOMN, and/or opportunities for involvement, please contact the authors of this abstract.

**References:** [1] Mayo L. and NASA/GSFC Heliophysics Education Consortium (2016) *DPS* 48, id.418.05. [2] Bleacher L.V. et al. (2015) *LPS XLVI*, Abstract #2281. [3] Jones, A.J.P. et al. (2016) *LPS XLVII*, Abstract #2899. [4] Buxner et al. (2017) *AAS* 229.