

## DEATH VALLEY DARK SKY FESTIVAL: NASA SCIENCE ENGAGEMENT IN A NATIONAL PARK.

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**Introduction:** Death Valley National Park, a land of extremes, has long been recognized as a site that holds environments similar to environments on Mars, and a place important for studying geological processes that act on rocky worlds throughout our solar system, as well as life at the extremes. NASA has a rich history of conducting research in the park, testing hypotheses and equipment in preparation for exploration of the red planet, and beyond.

The Death Valley Dark Sky Festival celebrates this rich heritage of NASA research conducted in the park and offers an opportunity for NASA scientists and engineers to share this research directly with park visitors. It is an annual celebration of space science, tied to the planetary analog environments and incredible dark skies of Death Valley National Park.

**Festival Evolution:** Festival roots reach back to 2012, when a Mars and the Mojave Festival was held to highlight Mars-focused research conducted in the park [1]. Years of primarily Mars-themed festivals followed [2,3]. A reassessment of park resources and priorities led to a new iteration of the festival in 2019, with a broader embrace of space science and greater emphasis on the park's internationally-recognized dark skies (the International Dark Sky Association has designated Death Valley as a Gold Tier Dark Sky Park, the highest rating of darkness): the Death Valley Dark Sky Festival.



Figure 1. NASA/JPL scientist Morgan Cable discusses research conducted in Death Valley in support of the Europa Clipper Mission at Devil's Golf Course.

The 2019 festival, held March 1–3, engaged new partners and incorporated new program elements (such as a middle school field trip, expanded family programming, planetarium shows, and night sky photography classes and meet-ups). Over 2,400 visitors participated in festival activities that showcased the park's unique landscape and dark night skies. The audience was a mix of park visitors who happened upon the festival by chance, and those who travelled to Death Valley specifically for the event.



Figure 2. NASA/GSFC public engagement specialist Staci Tiedeken drills chocolate 'rocks' with NPS rangers and visitors to demonstrate the importance of the Curiosity rover's drilling capabilities.

**Program Design:** The Death Valley Dark Sky Festival is designed in partnership between NASA and National Park Service. It is organized by education and interpretation leadership in Death Valley National Park and public engagement leadership in the Solar System Exploration Division of NASA's Goddard Space Flight Center. It is a collaboration between the park, Death Valley Natural History Association, NASA, and many other organizations. NASA brings the science expertise, grounded in the park and similar environments and reaching to the skies; the park provides firm connections to the place visitors are in at that moment, leads recruitment of festival partners and target audiences, and leads logistical support.

Each aspect of the program is planned – and, wherever possible, implemented – as a team: a park ranger accompanies each NASA scientist leading a field trip, introducing visitors to the field trip site and providing context for the location. The keynote speakers

are NASA scientists, introduced by park leadership. The middle school program is a collaboration between NASA and Death Valley education and public engagement specialists, supported by NASA scientists.

The program design has evolved over time to better serve park visitors and student groups. For example, the program now includes fewer indoor elements and clear designations of family-friendly activities, and those better suited to adult audiences.

**Program Elements:** The 2020 Death Valley Dark Sky Festival will be held on February 21–23. During the day, the Dark Sky Festival will feature guided hikes to planetary analog sites, family programming, an exploration fair (featuring space-science-themed hands-on activities and demonstrations from a number of organizations), and indoor presentations. At night, visitors can attend evening space science keynote presentations from NASA scientists, night sky photography programs, and a star party.

On Friday, February 21, a program for middle school students will include activities around the visitor center and, new this year, a field trip component. The students are from a Title I school directly affected by the summer 2019 earthquakes in California.

The Furnace Creek Visitor Center is the central hub for festival activities. Hikes are led throughout the park. Further details are available on the park website event page [4].



*Figure 3. (Left) Middle school students and families build Mars landers with NASA educators and Death Valley park rangers during the 2019 Death Valley Dark Sky Festival. (Right) Death Valley park ranger Denette with a Milky Way Galaxy Model at the 2019 festival Exploration Fair.*

**Extension:** Because rangers participate in all aspects of the program, they learn about NASA science and exploration connected to the park. The rangers share highlights of this information, and lead activities first shared by NASA educators at the festival, with park visitors throughout the year. They can point to NASA

science conducted in the park as another reason Death Valley is a special place, important to preserve and protect.

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**References:** [1] Jones A. J. P. et al. (2013) *LPSXLIV*, Abstract #2846. [2] Bonaccorsi, R. et al. (2014) GSA Annual Meeting, Abstract #258-8. [3] Bonaccorsi, R. et al. (2017) *LPSXLVIII*, Abstract #1590.

[4] <https://www.nps.gov/deva/planyourvisit/death-valley-dark-sky-festival.htm>