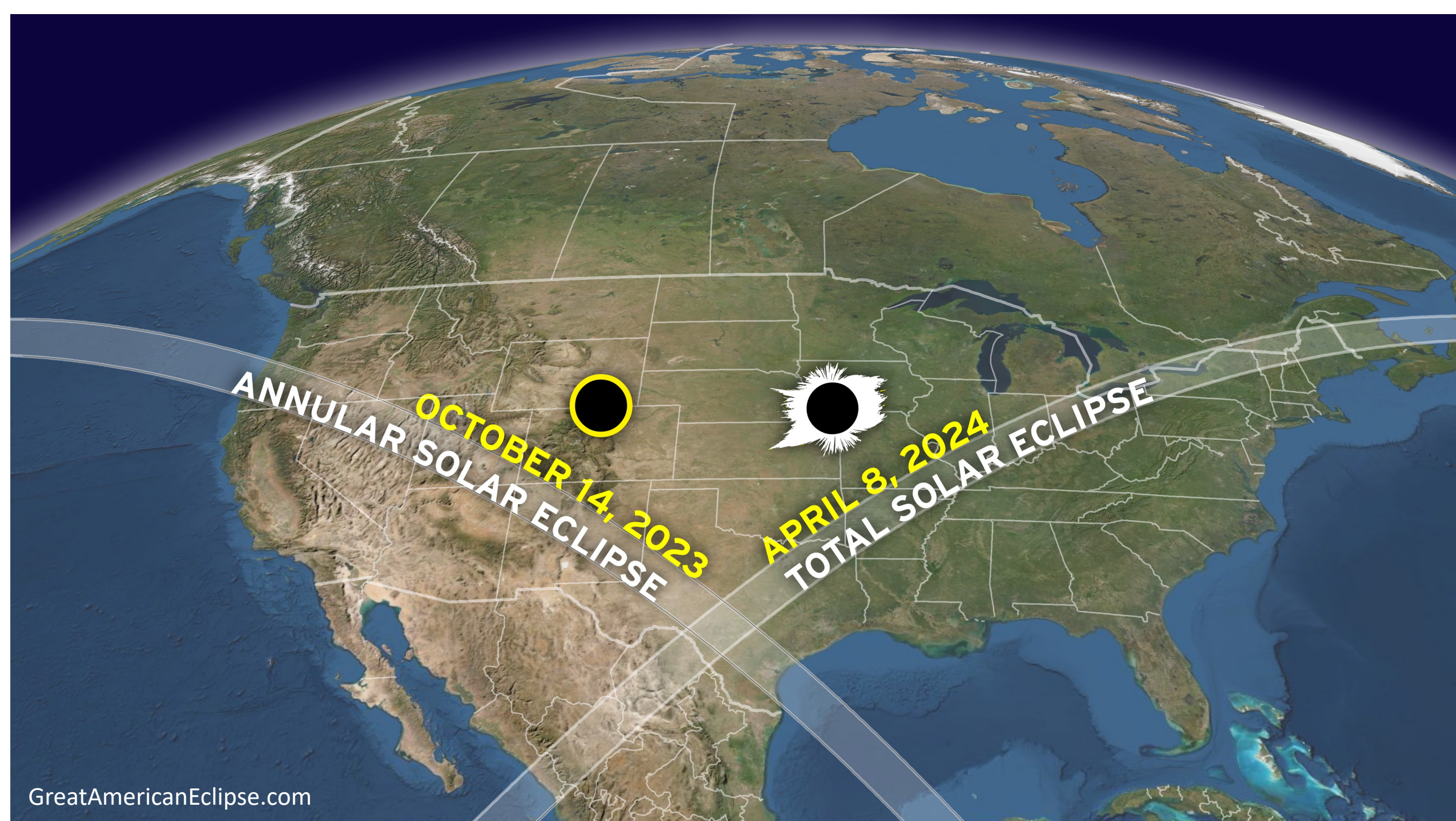


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Solar Eclipse Task Force, American Astronomical Society

Motivation

On October 14, 2023, an annular (“ring”) solar eclipse was visible along a narrow path from Oregon to Texas. On April 8, 2024, a total solar eclipse will be visible along a similarly narrow path through Mexico, across the U.S. from Texas to Maine, and into Canada. For both events, nearly all of North America gets at least a partial solar eclipse.



As we did for the “Great American Eclipse” of August 2017, the AAS Solar Eclipse Task Force (<https://eclipse.aas.org>) has undertaken a key role in preparing the country to experience the back-to-back North American solar eclipses safely and enjoyably. We promote eye safety, convene planning workshops in communities along the eclipse paths, and support innovative programs in eclipse education and public outreach.

Solar eclipses are not just astronomical events but offer opportunities to engage with people from all walks of life and on topics relevant to multiple AIP Member Societies. Framed properly, eclipses can motivate students to consider careers in physics and physics-related fields and can increase public science engagement and literacy.

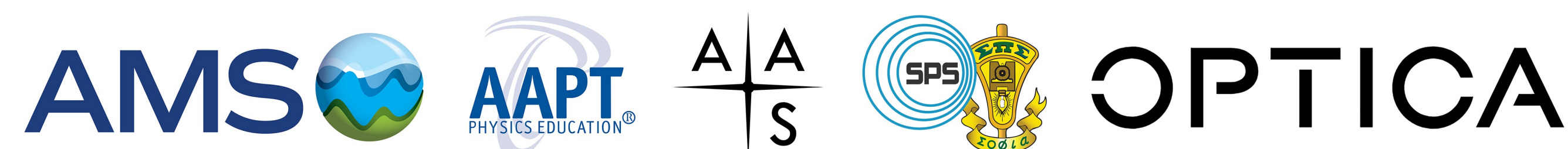
Our AIP Venture Grant Project

To engage citizens and visitors across the U.S. in preparing for and experiencing the 2023 and 2024 eclipses, the AAS is collaborating with the AAPT on eclipse education, the AMS on eclipse climatology and weather (which affect the likelihood of clear skies on eclipse day), Optica on safety when viewing eclipses by eye and through optics, and SPS/ΣΠΣ on education and outreach in local communities on and off the eclipse paths.

Outreach Training

The first component of our project was to conduct three 1-day professional-development trainings on eclipse outreach linked to our semiannual eclipse-planning workshops. The Covid-19 pandemic caused us to get a late start on these trainings; we weren’t able to hold the first one until October 2022, in Rochester, NY. We had 12 trainees in that session.

Our second training was scheduled for April 2023 in Cleveland, OH, but problems with our host venue forced us to cancel it. With only one more event scheduled, in October 2023 in San Antonio, TX, we decided to recruit a much larger number of participants. Forty-five college undergraduates, graduate students, and postdocs; primary, middle-, high-school, and college teachers; and amateur astronomers registered, but only 28 showed up. Still, between the two workshops we trained 40 people in eclipse outreach, close to our original goal of training 45 (15 at each of three sessions). Our trainees ranged in age from 20s to 70s and were quite diverse, with a 50/50 split between males and females and a 65/35 split between Whites and non-Whites, with the latter a mix of Hispanics, Blacks, Asians, and people describing themselves as mixed-race.



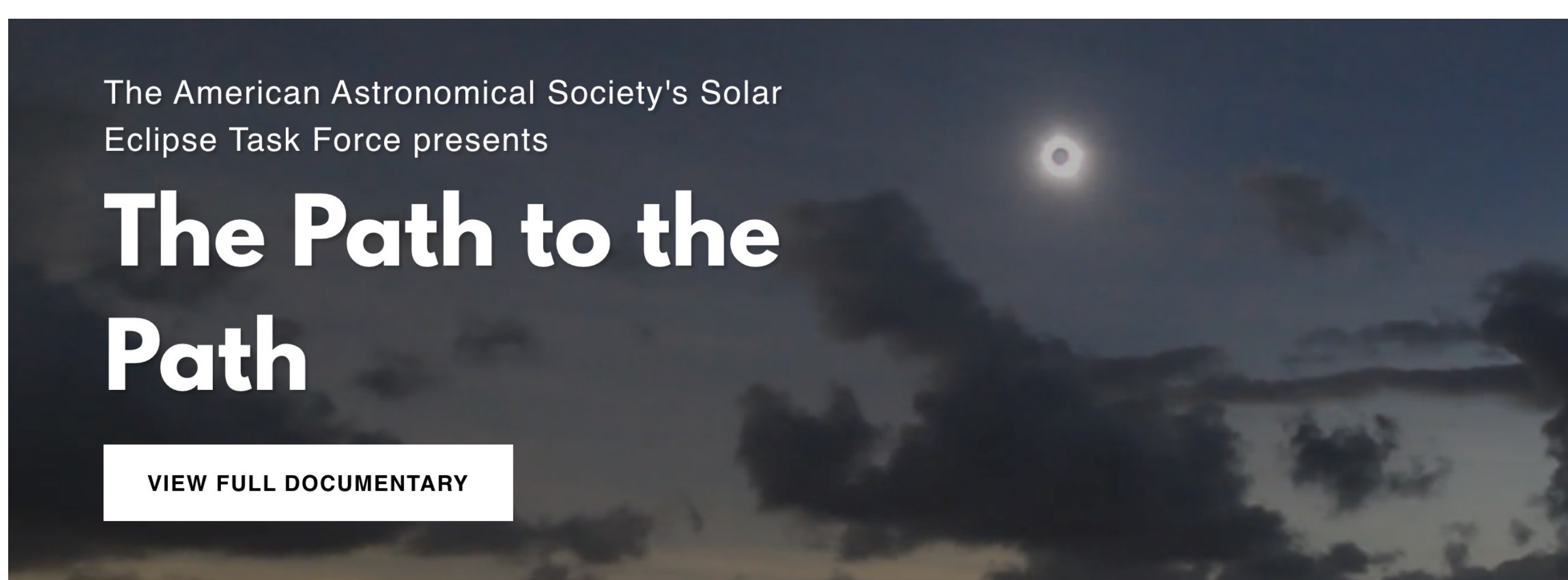
Topics covered in the training sessions included an introduction to solar eclipses and safe viewing techniques; demonstration of, and practice with, hands-on activities related to the scale of the Earth-Moon-Sun system, what causes Moon phases, the geometry of solar and lunar eclipses, why eclipses don’t occur every month, and the spectra of continuous vs. emission-line sources (analogous to the solar photosphere vs. chromosphere and corona); and tips on how to recognize and address misconceptions. We received many compliments from attendees on the value of the sessions, and after the April 2024 solar eclipse we’ll survey all our trainees to ascertain how many outreach events they held, how many people they reached, and how well they felt our training prepared them to engage with their audiences.



Outreach trainees learn how to simulate solar and lunar eclipses with the ASP’s Eclipse Yardstick.

Eclipse Videos

The second part of our project was to produce a series of “public service announcement” (PSA) videos about various aspects of the North American solar eclipses. By the time we were ready to begin work on these, we discovered that there were so many other PSA-type videos about the eclipse on the web and on social media — including a series funded and promoted by NASA — that any similar videos we produced would just get lost in the noise. Then we hit upon a different approach: To create a short documentary film about the work of the task force itself, featuring a wide variety of voices and perspectives. This film, *The Path to the Path*, is now available to watch for free online at <https://thepaththetopath.org>.



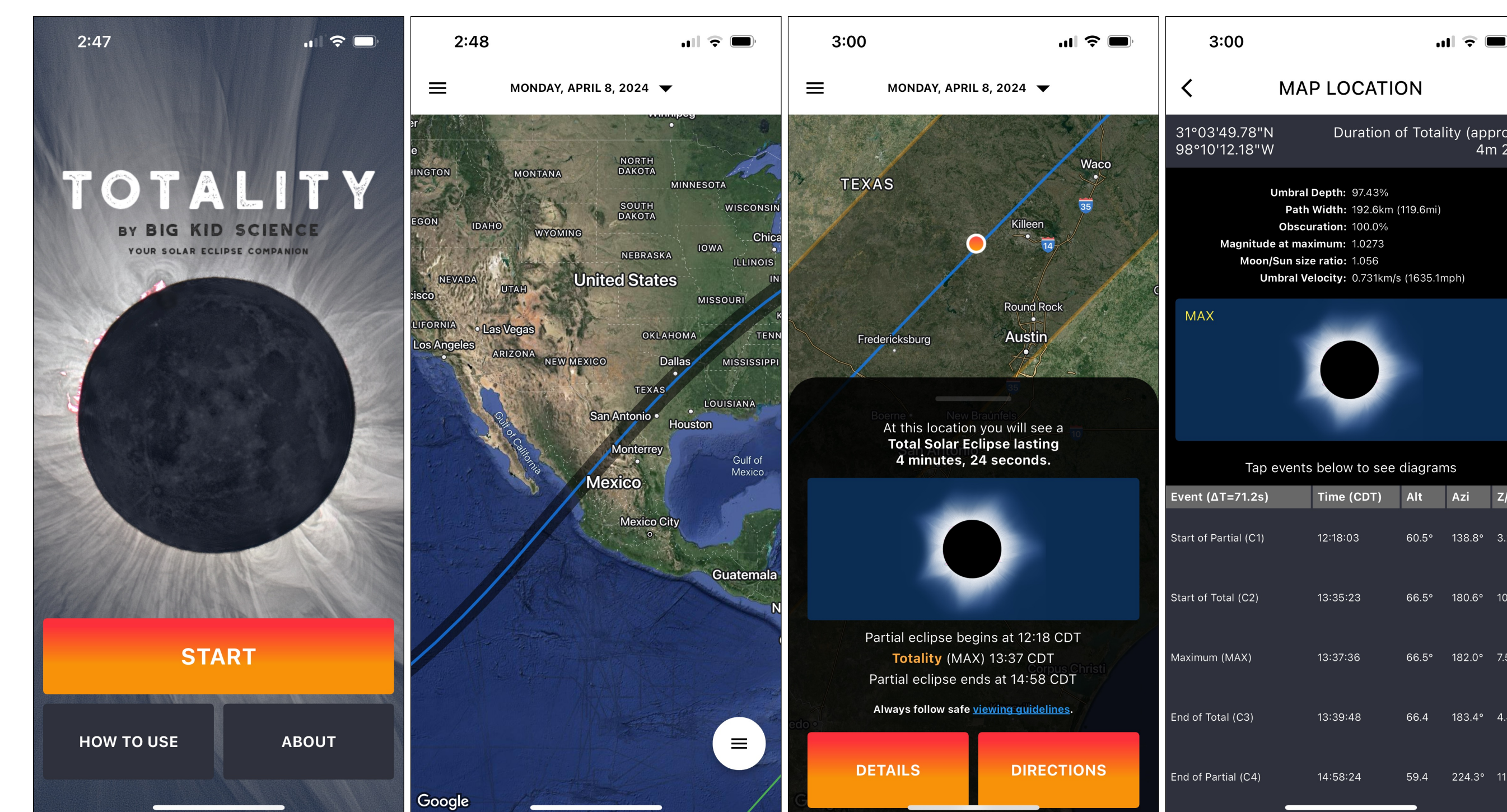
The half-hour-long film was assembled from many hours of interviews with members of the task force and attendees at its planning workshops. Snippets from these interviews addressing the total vs. partial eclipse experience, instructions for safe viewing, and other topics are being shared widely on social media.

Totality by Big Kid Science

Having not held as many workshops as we’d planned nor spent as much on video production as we’d budgeted, we sought and received approval from AIP to use some of our remaining grant funds to update and expand the mobile app *Totality by Big Kid Science* (<https://eclipse.aas.org/totality>). This app, available for smartphones and tablets running iOS or Android, was conceived by an AAS member, science educator, and popular book author in advance of the August 2017 U.S. eclipse. His goal was to create a free educational tool suitable for the general public that would show where and when that eclipse could be experienced, what you’d see and when you’d see it at any location on or off the path of totality, and the most efficient route to drive from any spot in North America into the path. He also include eye-safety information and simple but scientifically accurate explanations of how and why eclipses occur.

The app’s mapping and routing functions use the Google Maps application programming interface (API), and Google recently started charging dearly for its use — but also announced that it would consider waivers of API charges for apps owned by nonprofit educational organizations. The app’s creator offered to donate *Totality* to the AAS if the Solar Eclipse Task Force would apply to Google for a fee waiver and promote the app to the public via its website and other communication channels. The AAS agreed, the task force’s project manager (who is also the PI of our AIP Venture grant) applied to Google for a fee waiver on the strength of the app’s educational value, and Google awarded the waiver in mid-2023.

We are now updating the app for the April 8, 2024, eclipse and future total solar eclipses through 2030. A key element that goes into eclipse predictions — the difference between Terrestrial Dynamical Time (which accounts for Earth’s slowing rotation rate) and Universal Time (on which we base our clocks), a quantity called “delta T” — has changed since the last update, which means the April 8th eclipse path has shifted enough from what was previously plotted in the app to potentially cause some users to miss totality. In addition to that critical update, a number of bugs that have been identified since the last update are being fixed.



Totality by Big Kid Science, an app for iOS and Android devices that is now maintained by the AAS with partial support from an AIP Venture grant, puts total solar eclipses in your pocket. Open the app, choose an upcoming total solar eclipse, and view a map of the path of totality, as shown in the 2nd panel for the April 8, 2024, North American solar eclipse. Zoom in and touch a spot in the path to get basic eclipse circumstances for that location (3rd panel). Touch the DETAILS button to get more data for key eclipse events (4th panel), or touch the DIRECTIONS button to find the best route to drive to that location from anywhere else in North America.