Frontiers of STEM Learning Webinar Series

June 15th 2016
2017 Eclipse with Lou Mayo and Andy Fraknoi

If you are having audio problems, please click the “communicate” button at the top of your screen and then click “test audio”

To receive info about future webinars (join our newsletter list) email: aholland@spacescience.org
AGENDA:

What is an Eclipse? And what will happen during the 2017 event? (Andy)

NASA’s role in the Eclipse (Lou)

How can libraries participate? (Andy)

Safe eclipse viewing (Lou)

Q&A (All)
Total Eclipse 2017:
An Educational Opportunity for Libraries

Andrew Fraknoi (Foothill College)
The All American Eclipse?
Solar Eclipse

Earth

Moon

Sun
States Where the 2017 Eclipse is Total:

Oregon  Idaho  Wyoming  Nebraska  Kansas  Missouri  Illinois  Kentucky  Tennessee  Georgia  North Carolina  South Carolina
Population Statistics

U.S. = 319 million
Canada = 35 million
Mexico = 119 million
TOTAL = 473 million
We’ll need lots of eclipse glasses...
## Circumstances of the Aug. 21, 2017 Partial Eclipse for the Largest Cities in the U.S.

<table>
<thead>
<tr>
<th>City</th>
<th>Eclipse Starts</th>
<th>Max Eclipse</th>
<th>Eclipse Ends</th>
<th>Fraction of Sun’s Diameter Covered</th>
<th>Percent of Sun’s Area Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York City</td>
<td>1:23 pm</td>
<td>2:45 pm</td>
<td>4:01 pm</td>
<td>0.77</td>
<td>71%</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>9:06 am</td>
<td>10:21 am</td>
<td>11:45 am</td>
<td>0.69</td>
<td>62%</td>
</tr>
<tr>
<td>Chicago</td>
<td>11:54 am</td>
<td>1:20 pm</td>
<td>2:43 pm</td>
<td>0.89</td>
<td>87%</td>
</tr>
<tr>
<td>Houston</td>
<td>11:47 am</td>
<td>1:17 pm</td>
<td>2:46 pm</td>
<td>0.73</td>
<td>67%</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>1:21 pm</td>
<td>2:44 pm</td>
<td>4:01 pm</td>
<td>0.8</td>
<td>75%</td>
</tr>
<tr>
<td>Phoenix</td>
<td>9:14 am</td>
<td>10:34 am</td>
<td>12:00 am</td>
<td>0.7</td>
<td>63%</td>
</tr>
<tr>
<td>San Antonio</td>
<td>11:41 am</td>
<td>1:09 pm</td>
<td>2:38 pm</td>
<td>0.69</td>
<td>61%</td>
</tr>
<tr>
<td>San Diego</td>
<td>9:07 am</td>
<td>10:23 am</td>
<td>11:47 am</td>
<td>0.66</td>
<td>58%</td>
</tr>
<tr>
<td>Dallas/Ft Worth</td>
<td>11:40 am</td>
<td>1:10 pm</td>
<td>2:39 pm</td>
<td>0.8</td>
<td>75%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>9:01 am</td>
<td>10:15 am</td>
<td>11:37 am</td>
<td>0.8</td>
<td>76%</td>
</tr>
<tr>
<td>Indianapolis</td>
<td>12:58 pm</td>
<td>2:25 pm</td>
<td>3:49 pm</td>
<td>0.93</td>
<td>91%</td>
</tr>
<tr>
<td>Washington DC</td>
<td>1:18 pm</td>
<td>2:43 pm</td>
<td>4:02 pm</td>
<td>0.84</td>
<td>81%</td>
</tr>
<tr>
<td>Miami</td>
<td>1:27 pm</td>
<td>2:59 pm</td>
<td>4:21 pm</td>
<td>0.82</td>
<td>78%</td>
</tr>
</tbody>
</table>
# Eclipse Information for Selected Cities

Where the Eclipse Will be Total

<table>
<thead>
<tr>
<th>City</th>
<th>Partial Eclipse Starts</th>
<th>Total Eclipse Starts</th>
<th>Total Eclipse Ends</th>
<th>Partial Eclipse Ends</th>
<th>Sun’s Altitude At Totality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salem, OR</td>
<td>9:05 am</td>
<td>10:17 am</td>
<td>10:19 am</td>
<td>11:38 am</td>
<td>40 degrees</td>
</tr>
<tr>
<td>Casper, WY</td>
<td>10:22 am</td>
<td>11:43 am</td>
<td>11:45 am</td>
<td>1:09 pm</td>
<td>54 degrees</td>
</tr>
<tr>
<td>St. Joseph, MO</td>
<td>11:41 am</td>
<td>1:06 pm</td>
<td>1:09 pm</td>
<td>2:34 pm</td>
<td>62 degrees</td>
</tr>
<tr>
<td>Carbondale, IL</td>
<td>11:52 am</td>
<td>1:20 pm</td>
<td>1:23 pm</td>
<td>2:48 pm</td>
<td>64 degrees</td>
</tr>
<tr>
<td>Nashville, TN</td>
<td>11:58 am</td>
<td>1:27 pm</td>
<td>1:29 pm</td>
<td>2:54 pm</td>
<td>64 degrees</td>
</tr>
<tr>
<td>Columbia, SC</td>
<td>1:13 pm</td>
<td>2:42 pm</td>
<td>2:44 pm</td>
<td>4:06 pm</td>
<td>62 degrees</td>
</tr>
</tbody>
</table>
SOLAR SCIENCE

EXPLORING SUNSPOTS, SEASONS, ECLIPSES, AND MORE

Dennis Schatz
Andrew Fraknoi

NSTA press
National Science Teachers Association
For an introductory Eclipse 2017 brochure, see: www.nsta.org/solarscience
On Monday, August 21, 2017, a total eclipse of the Sun will be visible in the continental United States for the first time in almost 40 years. A total eclipse is when the Sun is completely hidden by the Moon, the sky becomes dark, and the Sun’s faint atmosphere (corona) becomes visible—looking like a beautiful halo (Figure 1). This total eclipse will only be visible on a narrow track stretching across the United States from Oregon to South Carolina. No other country will get to see the total eclipse this time.

The rest of the United States and other parts of North and Central America will see a partial eclipse, in which the Moon covers only a portion of the Sun. A partial eclipse is interesting, but nowhere near as awe-inspiring and memorable as a total eclipse. A partial eclipse is also dangerous to look at without something to protect your eyes from the Sun’s damaging rays.

What Exactly Is a Total Eclipse of the Sun?

A total eclipse of the Sun occurs when the Moon gets between the Sun and the Earth and covers up the Sun. It just so happens that the Moon, as seen from Earth, and the Sun, as seen from Earth, are the same size in the sky. So if the two are exactly lined up, the Moon can hide the Sun from our sight. This allows us to see the Sun’s corona,
ECLIPSE 2017
Through the Eyes of NASA
August 21, 2017

http://eclipse2017.nasa.gov
Cross Disciplinary Eclipse Themes

Solar Physics and Space Weather
Lunar Science
Eclipses/Transits on other Worlds
Exoplanet Detection
Sun-Earth-Moon System
Eclipse Lore
Celestial Mechanics
Time

http://eclipse2017.nasa.gov
NASA Space Missions

Unique NASA assets positioned to view the lunar shadow, and scheduled to provide live or delayed images and movies.

- Lunar Reconnaissance Orbiter
- DSCOVR
- International Space Station

http://eclipse2017.nasa.gov
NASA Resources

NASA Wavelength

http://eclipse2017.nasa.gov
International Observe the Moon Night

InOMN

http://eclipse2017.nasa.gov
Small Worlds Week

Save the Date: July 10-14, 2017

A weeklong celebration of science, education & career via social media

Table 1. Small Worlds Week Statistics

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts/Comments</td>
<td>703</td>
<td>851</td>
</tr>
<tr>
<td>Users/Shares</td>
<td>466</td>
<td>559</td>
</tr>
<tr>
<td>Video Views</td>
<td>N/A</td>
<td>148,000</td>
</tr>
<tr>
<td>Clicks</td>
<td>N/A</td>
<td>49,000</td>
</tr>
<tr>
<td>Reactions</td>
<td>N/A</td>
<td>6,400</td>
</tr>
<tr>
<td>Reach</td>
<td>12.3 Million</td>
<td>900,000</td>
</tr>
<tr>
<td>Impressions</td>
<td>37.2 Million</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Reach = number of people who saw the post
Impressions = number of potential views of the posts

Exoplanets, Transits, Moon, and Eclipses

http://eclipse2017.nasa.gov
History along the Path

Archive of newspaper articles before 1928 from previous total solar eclipses

Music with themes featuring total solar eclipses from Tin Pan Alley to Carlie Simon

History along the path of totality from 1503 to 2024.
Hands On Science

DIY Science: Five unique hands-on experiments that let visitors explore the math and physics behind the eclipse

Observing Challenges: Three certificate observing programs for amateur astronomers

Citizen Science: Publishable research in partnership with NASA scientists

http://eclipse2017.nasa.gov
Coming Soon

http://eclipse2017.nasa.gov
Eclipse Safety

• Looking at the sun can damage your eyes!
• Only the fully total portion of an eclipse is safe to watch unfiltered.
• Two approaches – direct and indirect viewing:
  • Direct – With solar filter – ISO compliant solar filters
  • Indirect – Projected image

• NASA and AAS are constructing a consolidated safety message

http://eclipse2017.nasa.gov
NASA Night Sky Network

https://nightsky.jpl.nasa.gov