

The eye safety campaign for the 2017 TSE

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Solar Eclipse Conference 2018
Genk, Belgium

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Co-authors

- Rick Fienberg
 - Press officer, AAS
 - Former editor *Sky & Telescope*
 - Eclipse chaser
 - 2018 recipient of NASA Exceptional Public Achievement Medal



Awarded to Rick Fienberg



for exceptional service to the nation in his tireless efforts for the public's safe solar viewing of the 2017 total solar eclipse

Co-authors

- Stephen Dain
 - Professor Emeritus
Optometry & Vision
Science, University of
New South Wales
 - Expert on eye safety,
color vision, safety
standards



Queensland TSE 2012

- Lessons learned
 - Early preparation
 - Eye safety messages
 - Education programs – school, public
 - Public information materials
 - Coordination with government, tourism, health officials

Thanks to Terry Cuttle for years of hard work!

August 2015

- American Astronomical Society workshops
 - Workshop 3, Portland, OR
 - Terry Cuttle
 - Australia 2012: Organizing a nationwide, continental outreach event
 - Discussion group lead: Eclipse preparedness
 - Ralph Chou
 - ISO 12312-2:2015

Eclipse eye safety information

- Conversations with Terry Cuttle
 - Draft public information leaflet
 - One page
 - Use of eclipse glasses
 - Product safety issue
 - Consideration of specialist information package on eclipse eye safety

Specialist information

- Evidence-based information
- For educators, media, health professionals, government agencies
- Contents
 - eye damage mechanism
 - details on safe filters
 - applicable standards and why they are appropriate
 - past eclipse eye damage statistics

The way forward from Portland

- AAS to be focus for developing eye safety campaign
 - Draft safety messages
 - Approach eye care professions to accept/endorse safety messages
 - Co-ordinate distribution of safety messages with other astronomical organizations and, critically, NASA

Safety Flyer

- One-page
- Information on safe eclipse viewing
- First draft by RTF
September 2015
 - Based on Terry's info sheet



How to View a Solar Eclipse Safely

A solar eclipse occurs when the new Moon partially or totally blocks the Sun as it passes between the Sun and Earth. On Monday, 21 August 2017, a solar eclipse will be visible (weather permitting) across all of North America. The whole continent will experience a partial eclipse lasting 2 to 3 hours. Halfway through the event, anyone within a 60- to 70-mile-wide path from Oregon to South Carolina will experience a brief total eclipse; the Moon will completely block the Sun's bright face for up to 2 minutes 40 seconds, turning day into night and making visible the otherwise hidden, always breathtaking solar corona — the Sun's wispy outer atmosphere.



Looking directly at the Sun is unsafe to your eyes at any time except during the brief total phase of a solar eclipse ("totality"), when the Sun's bright face is entirely blocked by the Moon. (Outside the narrow path of totality, this will not happen.) It is never safe to look directly at the uneclipsed or partially eclipsed Sun.

The only safe way to look at the uneclipsed or partially eclipsed Sun is through a filter that has been made specifically for solar viewing, examples include special-purpose "eclipse glasses" and hand-held filters. Look for viewers that have been certified against the international standard ISO 12312-2*. Filters that do not comply with this standard should never be used, even if they seem to dim the Sun enough. Ordinary sunglasses, even very dark ones, are not safe for looking at the Sun.

Inspect your solar viewer before use; if it is scratched or otherwise damaged, discard it. Take note of any instructions for use that came with the viewer. Always supervise children using solar filters.

Cover your eyes with your solar viewer before looking up at the uneclipsed or partially eclipsed Sun. After a brief look, turn away and remove your filter — do not remove the eclipse viewer while looking at the Sun.

Do not look through a camera, telescope, or binoculars while using your eclipse glasses or hand-held viewer — the concentrated solar rays will damage the filter and enter your eye(s), causing serious injury. Seek expert advice before using any solar filter with a camera, telescope, or binoculars.

If you are within the narrow path of totality, take off your eclipse glasses or put down your hand-held viewer only when the Sun's brilliant face is completely covered and it gets dark. (If you are located outside the path of totality, this will not happen.) Then, as soon as any part of the bright Sun reappears, replace your filter to watch the remaining partial phases of the eclipse.

A solar eclipse is one of nature's grandest spectacles. By following these simple safety rules, you can enjoy the view and be rewarded with memories to last a lifetime.

More information: <http://eclipse2017.aas.org>

*The following manufacturers have confirmed that their eclipse glasses and hand-held solar viewers are certified to meet the international standard for eye protection for direct observation of the Sun: Rainbow Symphony, American Paper Optics, and Thousand Oaks Optical.

Safety Flyer

- 15 revisions
 - Comments from many contributors
- Legal review
 - “publication and distribution of the flyer as currently written will not expose the AAS to successful litigation.” Oct 2015
- Final version ready Aug 2016

Safety Flyer



How to View the 2017 Solar Eclipse Safely

A solar eclipse occurs when the Moon blocks any part of the Sun. On Monday, August 21, 2017, a solar eclipse will be visible (weather permitting) across all of North America. The whole continent will experience a partial eclipse lasting 2 to 3 hours. Halfway through the event, anyone within a roughly 70-mile-wide path from Oregon to South Carolina (<http://bit.ly/1xuvQda>) will experience a brief total eclipse, when the Moon completely blocks the Sun's bright face for up to 2 minutes 40 seconds, turning day into night and making visible the otherwise hidden solar corona — the Sun's outer atmosphere — one of nature's most awesome sights. Bright stars and planets will become visible as well.



Looking directly at the Sun is unsafe except during the brief total phase of a solar eclipse ("totality"), when the Moon entirely blocks the Sun's bright face, which will happen only within the narrow path of totality (<http://bit.ly/1xuvQda>).



The only safe way to look directly at the uneclipsed or partially eclipsed Sun is through special-purpose solar filters, such as "eclipse glasses" (example shown at left) or hand-held solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the Sun. To date four manufacturers have certified that their eclipse glasses and hand-held solar viewers meet the ISO 12312-2 international standard for such products: Rainbow Symphony, American Paper Optics, Thousand Oaks Optical, and TSE 17.

- Always inspect your solar filter before use; if scratched or damaged, discard it. Read and follow any instructions printed on or packaged with the filter. Always supervise children using solar filters.
- Stand still and cover your eyes with your eclipse glasses or solar viewer before looking up at the bright Sun. After glancing at the Sun, turn away and remove your filter — do not remove it while looking at the Sun.
- Do not look at the uneclipsed or partially eclipsed Sun through an unfiltered camera, telescope, binoculars, or other optical device. Similarly, do not look at the Sun through a camera, telescope, binoculars, or any other optical device while using your eclipse glasses or hand-held solar viewer — the concentrated solar rays will damage the filter and enter your eye(s), causing serious injury. Seek expert advice from an astronomer before using a solar filter with a camera, telescope, binoculars, or any other optical device.
- If you are within the path of totality (<http://bit.ly/1xuvQda>), remove your solar filter only when the Moon completely covers the Sun's bright face and it suddenly gets quite dark. Experience totality, then, as soon as the bright Sun begins to reappear, replace your solar viewer to glance at the remaining partial phases.



An alternative method for safe viewing of the partially eclipsed Sun is pinhole projection. For example, cross the outstretched, slightly open fingers of one hand over the outstretched, slightly open fingers of the other. With your back to the Sun, look at your hands' shadow on the ground. The little spaces between your fingers will project a grid of small images on the ground, showing the Sun as a crescent during the partial phases of the eclipse.

A solar eclipse is one of nature's grandest spectacles. By following these simple rules, you can safely enjoy the view and be rewarded with memories to last a lifetime. More information:

eclipse.aas.org

eclipse2017.nasa.gov

This document does not constitute medical advice. Readers with questions should contact a qualified eye-care professional.

v.1.70210

- NSF, NASA endorsements
- Endorsements by US Optometry and Ophthalmology organizations – a first!
- Download from AAS, NSO websites
 - Spanish version on AAS, NASA websites

Specialist package

- Update of BRC safety info in NASA eclipse bulletins
 - Adding info from ISO 12312-2
- Evidence-based information
 - Eclipse retinopathy information
 - Eye injury statistics
 - Safe viewing practices
 - References

Specialist package

- Written by BRC, edited by RTF
- Comments from T. Cuttle
- Draft presented at Carbondale AAS workshop June 2016 by T. Cuttle
- Completed July 2016
- Submitted with flyer for endorsements
- Posted to AAS eclipse website

August 2016

- Acceptance of flyer and specialist package by AAOptometry, AAOphthalmology, AOA, CAO, NSF, ASP, RASC, NASA
- Posting to TSE webpage on AAS website
- RTF prepares public information campaign for 2017

Eclipse filter safety

- ISO publishes ISO 12312-2 in 2015
 - CEN withdraws EN1836 simultaneously and adopts ISO 12312-2
- Manufacturers given notice of change
 - Mandatory labels change to comply with EN regulations
 - Certification of compliance to ISO 12312-2 required

Eclipse filter safety

- ISO 12312-2
 - Applies ONLY to filters used without optical instruments to observe the Sun directly
 - Photographic filters, filters for telescopes and binoculars NOT covered
 - Retailers begin advertising that their products comply

Eclipse filter safety

- Approved filter list on AAS website
 - Manufacturer/Retailer provides certification report to AAS office (RTF)
 - Competent test labs identified
 - Authorized to certify compliance with standard

Eclipse filter safety

- Vetting of eclipse glass products
 - AAS (RTF) receives certification reports
 - BRC reviews reports
 - Confirmation of qualification of test laboratory
 - BRC and SJD measure transmittance of samples

Eclipse filter safety

- Public info campaign
 - AAS issues media releases
 - Safe filter information
 - ISO 12312-2 compliance
 - Experts available for interviews

Eclipse filter safety

- Dec 2016
 - First indication of possible non-compliant eclipse glasses
 - No statement of compliance on website
 - No certification report available on inquiry

Eclipse filter safety

- August 2017
 - Most legitimate sellers run out of product several weeks before eclipse day
 - Stories about non-compliant eclipse glasses appear
 - Amazon shuts down online sales
 - Demand for proof of certification of products before sales allowed to resume

The interviews

- 20 by BRC in 3 weeks; RTF lost count
 - TV interviews
 - Pre-recorded: CBC-TV, Fox News, CBS
 - Live-to-air: CBC-TV News, CTV News
 - Radio interviews
 - Pre-recorded
 - NPR All things considered, Brains-On
 - 5 radio stations USA and Canada

Online videos

- How to use eclipse glasses safely
- How to photograph the eclipse safely
 - AAOptom, AAOphthalmol websites
 - RASC website
- PBS <https://www.youtube.com/watch?v=jS45tOchYx4>
- CBC https://www.youtube.com/watch?v=tJMmkc2_WWo

So how did things turn out?

- Astronomy, optometry and ophthalmology groups all gave the same advice
- High public awareness of safe viewing practice and equipment
 - Good compliance for the most part...

A notable exception



Reported eye injuries

Average age 30

25 cases, 35 eyes

Symptoms:

- Blurry vision 19/25
- Metamorphopsia 5/25
- Scotoma 15/25
- No symptoms: 1/25

Retinal findings:

- Yellow lesion in retina 12/35
- Retinal pigment changes 13/35

American Society of Retinal Specialists

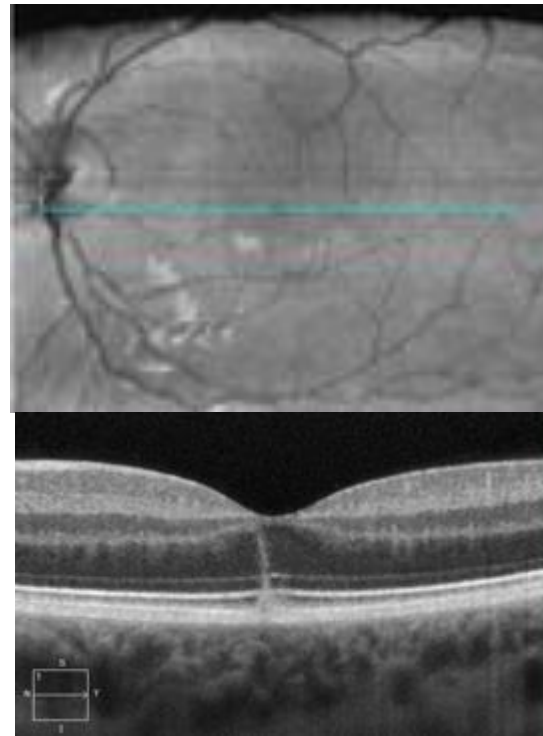
Reported eye injuries

- Macula Society
 - 10 retinal injuries
- American Optometric Association
 - 13 retinal injuries

48 cases among 350M people!

Example

- 18 y.o. male
 - Viewed PSE without protection several minutes
 - Seen next day



For future eclipses

- Print and video resources are available
 - AAS
 - YouTube
- BRC and SJD will assess non-compliant eclipse glasses and publish findings
- 2012 and 2017 campaigns are the models for successful eye safety campaigns for future solar eclipses

Thanks

- Terry Cuttle
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