

The Old and the New:

1. Thomas Jefferson's solar eclipse
2. Photographing eclipses through a pinhole
3. Eclipse-induced waves in the ozone layer



Forrest M. Mims III

www.forrest.mims.org

www.sunandsky.org

fmims@aol.com

Copyright 2014. May be used for non-commercial purposes if acknowledged.

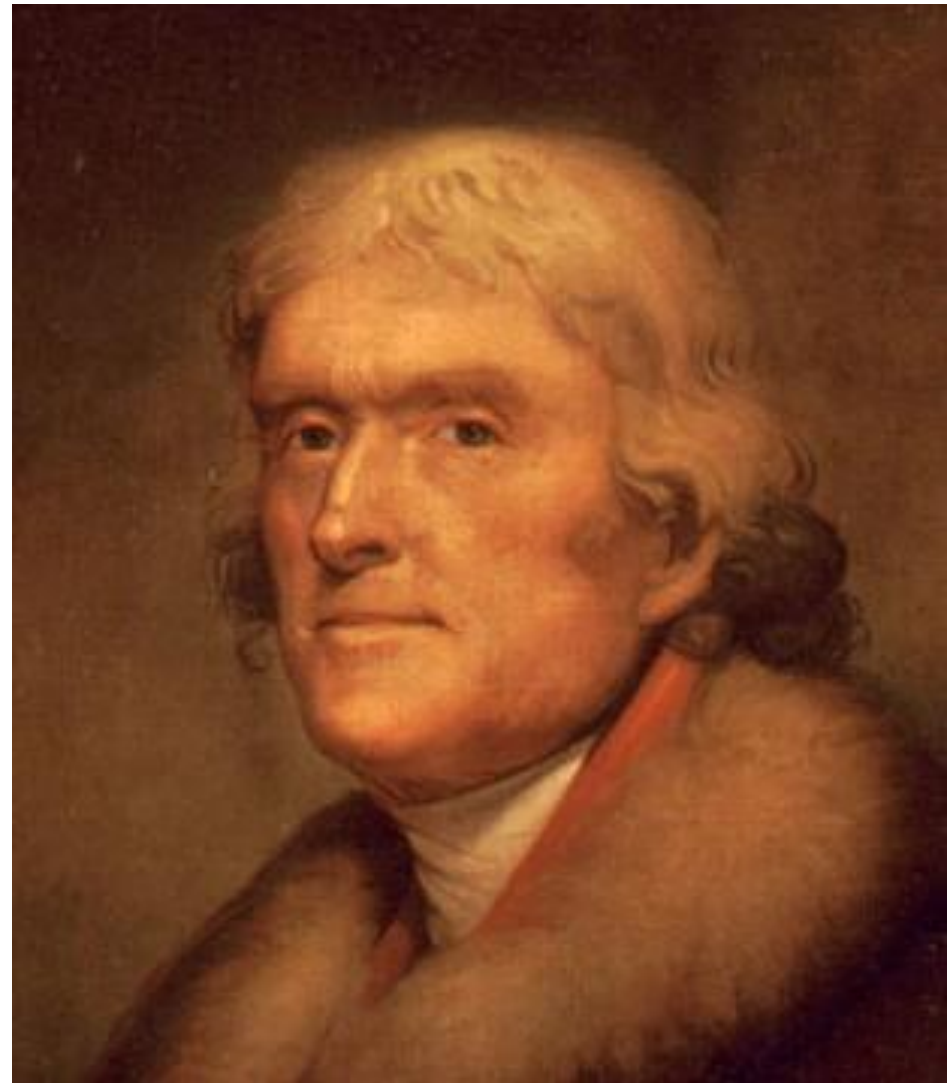
1. Thomas Jefferson and the Annular Solar Eclipse of 1811



THOMAS JEFFERSON

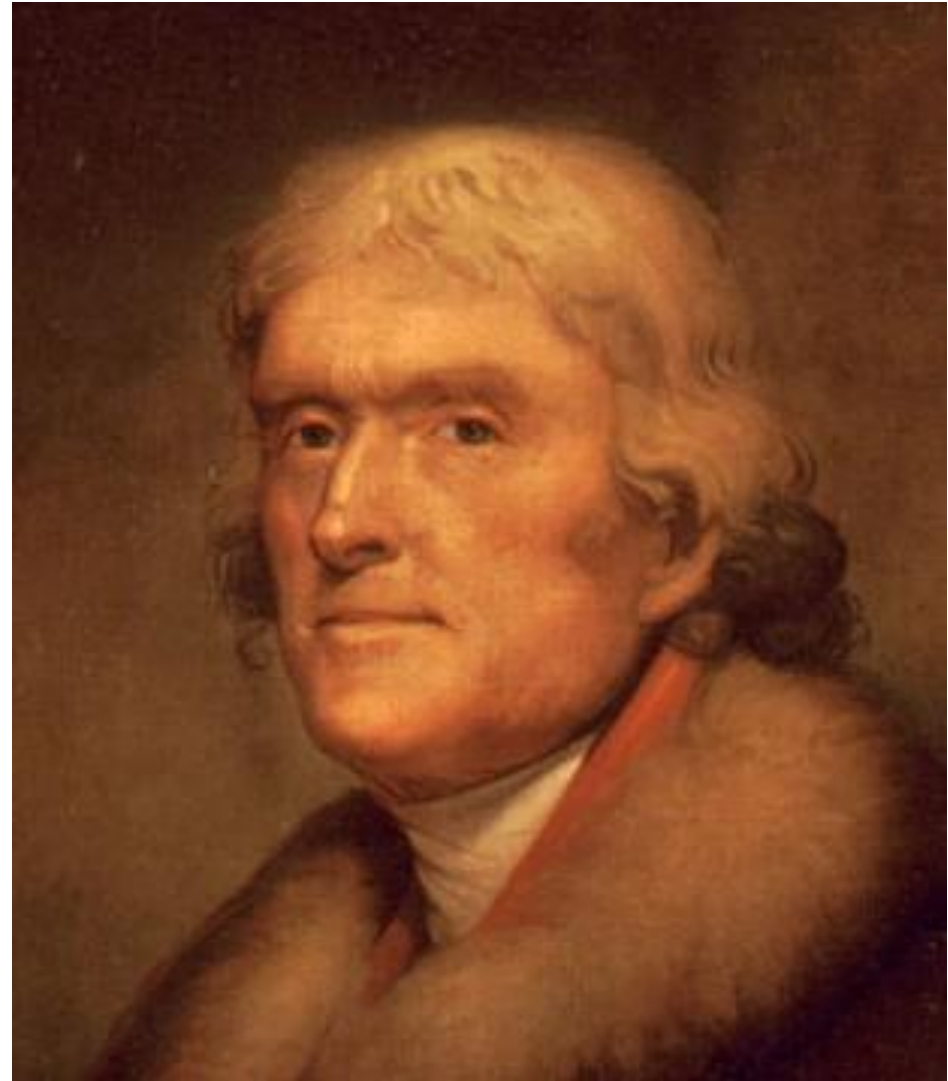
President John F. Kennedy introducing a dinner for Nobel Prize Winners of the Western Hemisphere on April 29, 1962:

“I think this is the most extraordinary collection of talent, of human knowledge, that has ever been gathered together at the White House, with the possible exception of when Thomas Jefferson dined alone.”



THOMAS JEFFERSON

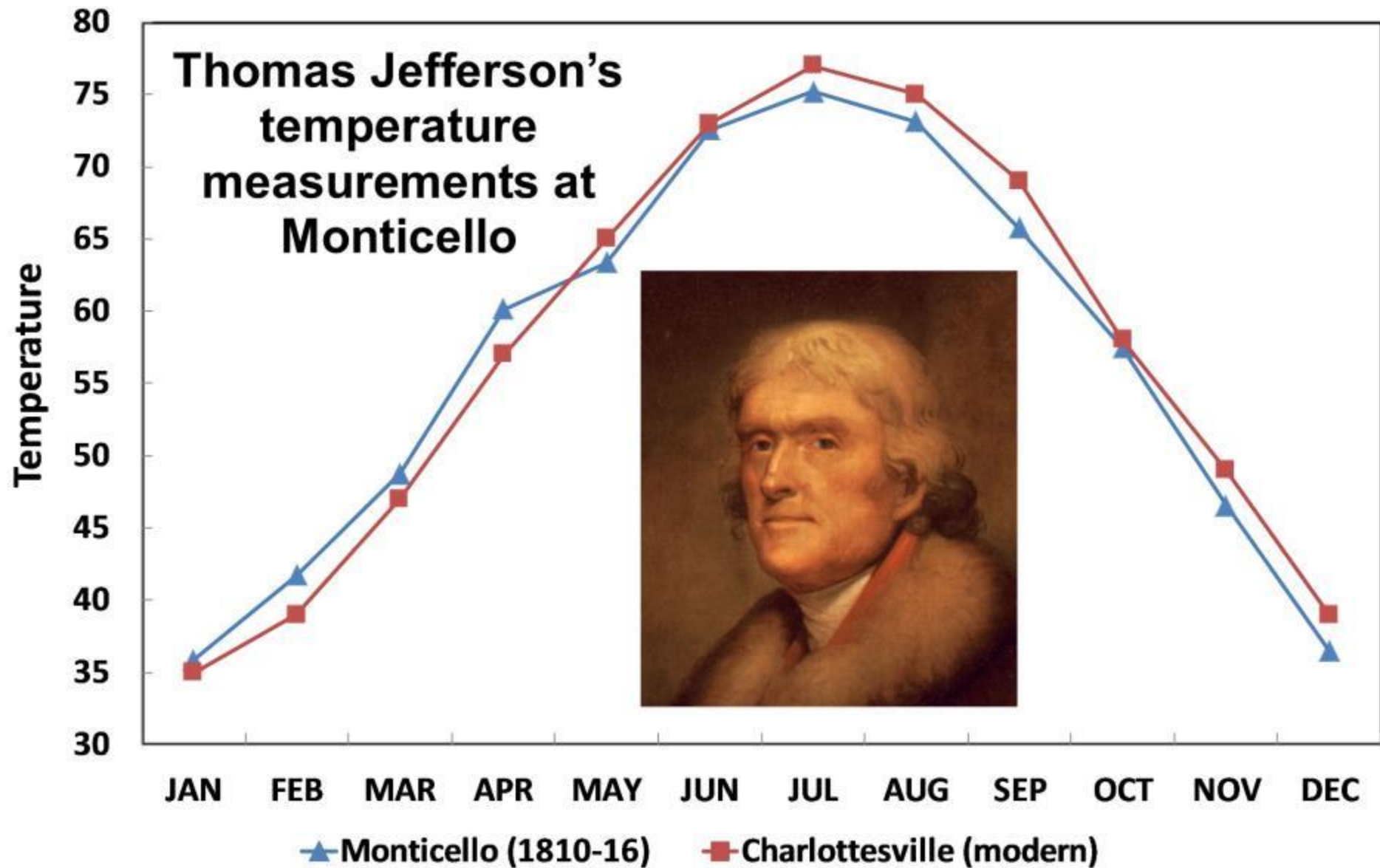
Surveyor
Horticulturist
Farmer
Astronomer
Locksmith
Architect
Paleontologist
Geographer
Weather observer
Founder, University of Virginia
Diplomat
Declaration of Independence
Secretary of State
Louisiana Purchase
Lewis and Clark Expedition
President of the United States











Thomas Jefferson and the Annular Solar Eclipse of 1811

18

Observation of the Annular eclipse of the ☉ Sep. 17. 1811. at Monticello.

I had a perfect observation of the passage of the sun over the meridian, & the eclipse commencing but a few minutes after, left little room for error in the time. This little was corrected by the known rate of going of the clock, but we as good as lost the first appulse by a want of sufficiently early attention to be at our places & composed. I have no confidence therefore by several seconds in the time noted for the 1st external contact. The last was better observed, yet even in that there was a certain term of uncertainty as to the precise moment at which the indentation on the limb of the sun, exactly vanished. It is therefore the forming of the annulus, & it's breaking which alone possess my entire & compleat confidence. I am certain there was not an error of an insient of time in the observation of either of them. Their result therefore should not be suffered to be affected by either of the others.

TO DR. ROBERT PATTERSON.

MONTICELLO, September 11, 1811.

Dear Sir, —

...

I extremely regret the not being provided with a time-piece equal to the observations of the approaching eclipse of the sun. Can you tell me what would be the cost in Philadelphia of a clock, the time-keeping part of which should be perfect? And what the difference of cost between a wooden and gridiron pendulum? To be of course without a striking apparatus, as it would be wanted for astronomical purposes only. Accept assurances of affectionate esteem and respect.

To Henry A. S. Dearborn
Monticello Nov. 15. 1811.

Sir

With respect to the eclipse of Sep. 17. I know of no observations made in this state but my own, altho' I have no doubt that others have observed it. I used myself an Equatorial telescope, & was aided by a friend, who happened to be with me, and observed thro' an achromatic telescope of Dollond's. Two others attended the timepieces. I had a perfect observation of the passage of the sun over the meridian, and the eclipse commencing but a few minutes after, left little room for error in our time. This little was corrected by the known rate of going of the clock. but we as good as lost the first appulse by a want of sufficiently early attention to be at our places, & composed. I have no confidence therefore, by several seconds, in the time noted. ...the four observations were as follows.

The 1st appulse 0-13-54 ————— }
annulus formed 1-53- 0 } central time of central time of the
annulus broken 1-59-25 annulus 1 H-56'-12½" two5 contacts 1 H-51'-28"
last osculation 3-29- 26 —————
Latitude7 of Monticello 38°-8'

...

Th: Jefferson

To Henry A. S. Dearborn
Monticello Nov. 15. 1811.

Sir

With respect to the eclipse of Sep. 17. I know of no observations made in this state but my own, altho' I have no doubt that others have observed it. I used myself an Equatorial telescope, & was aided by a friend, who happened to be with me, and observed thro' an achromatic telescope of Dollond's. Two others attended the timepieces. I had a perfect observation of the passage of the sun over the meridian, and the eclipse commencing but a few minutes after, left little room for error in our time. This little was corrected by the known rate of going of the clock. but we as good as lost the first appulse by a want of sufficiently early attention to be at our places, & composed. I have no confidence therefore, by several seconds, in the time noted. ...the four observations were as follows.

The 1st appulse 0-13-54 ————— }
annulus formed 1-53- 0 } central time of central time of the
annulus broken 1-59-25 annulus 1 H-56'-12½" two5 contacts 1 H-51'-28"
last osculation 3-29- 26 —————
Latitude7 of Monticello 38°-8'

...

Th: Jefferson

Lat. of Monticello, by observation $38.^{\circ} 8.' 0.''$ N. reduced, (320 to 319) 37.57.33.341.

Constant log. to reduce the Moon's equat. hor. parallax, for the lat. and ratio 9.9994827.

o ' ''

Obliquity of the Ecliptic, Sept. 17th 1811 23.27.42.690

h. m. Sec. ° ' ''

Estimated longitude of Monticello, supposed near the truth 5.15.20 = 78.50.0.W.

Two calculations of longitude by William Lambert were 8 to 20 miles west of Monticello.

2. Photographing Eclipses Through a Pinhole



Annular Solar Eclipse
May 20, 2012





Annular Solar Eclipse
May 20, 2012
Albuquerque, New Mexico
Forrest M. Mims III
www.forrestmims.org

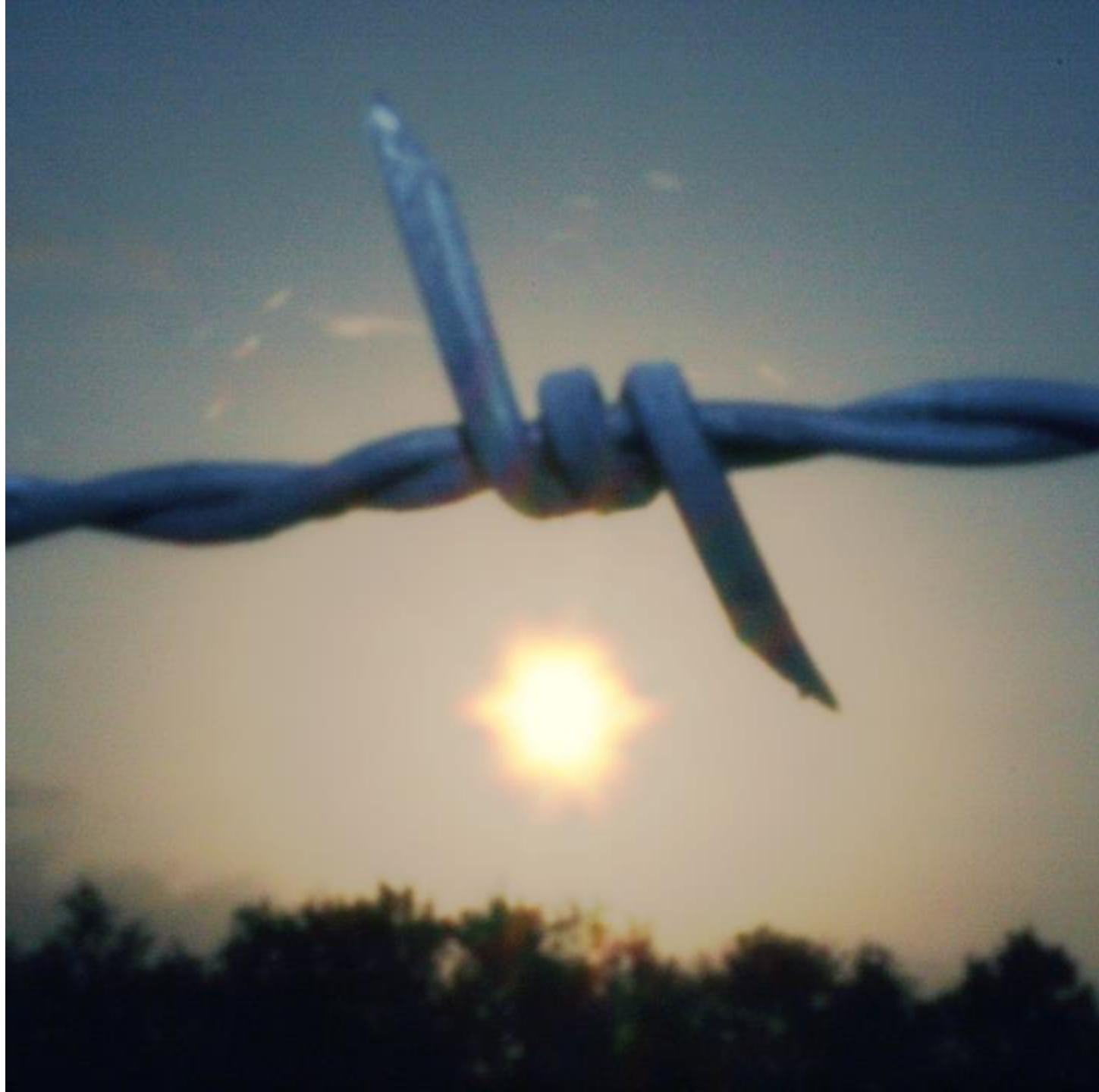
Three Exposures

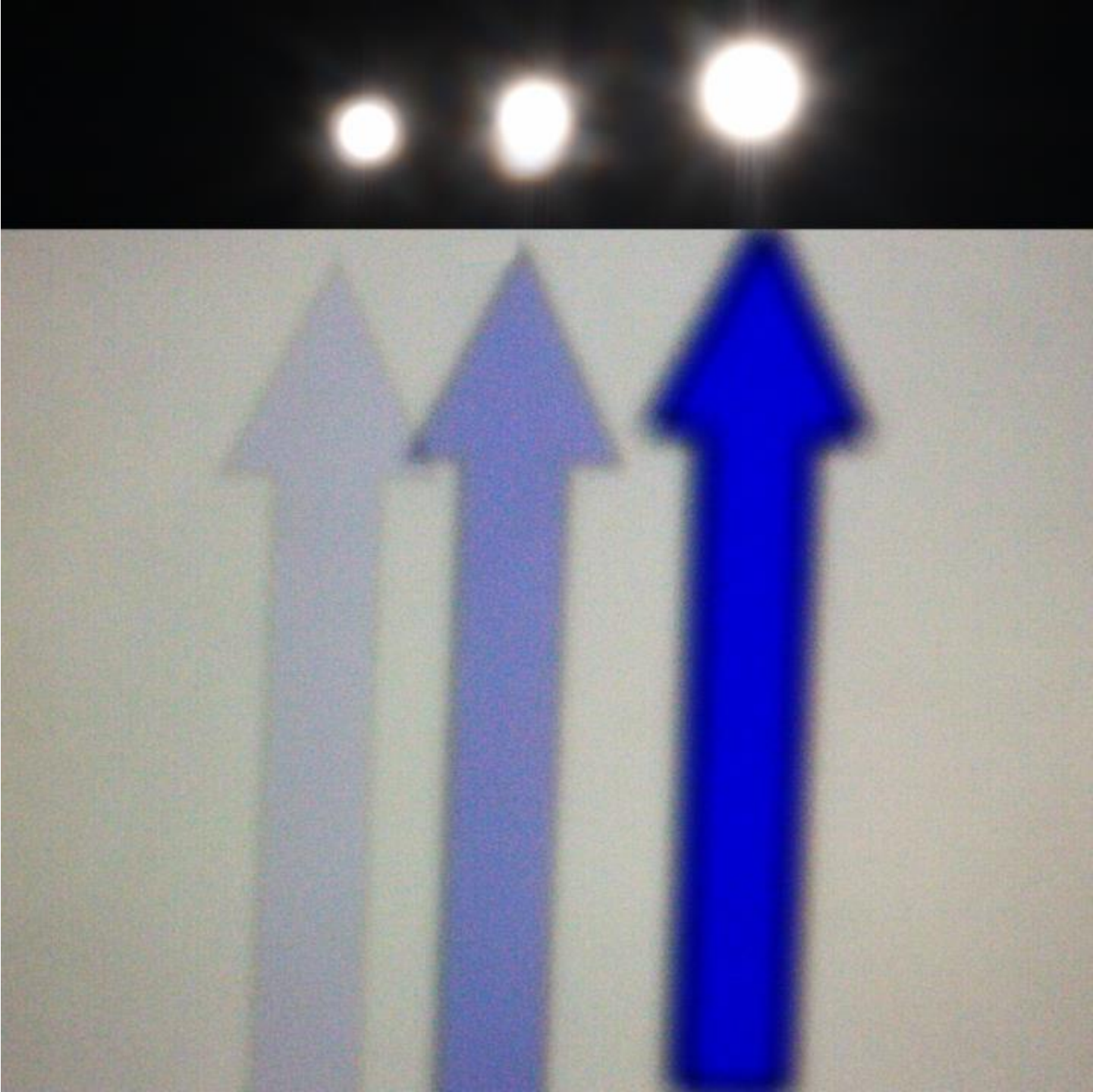




One Exposure

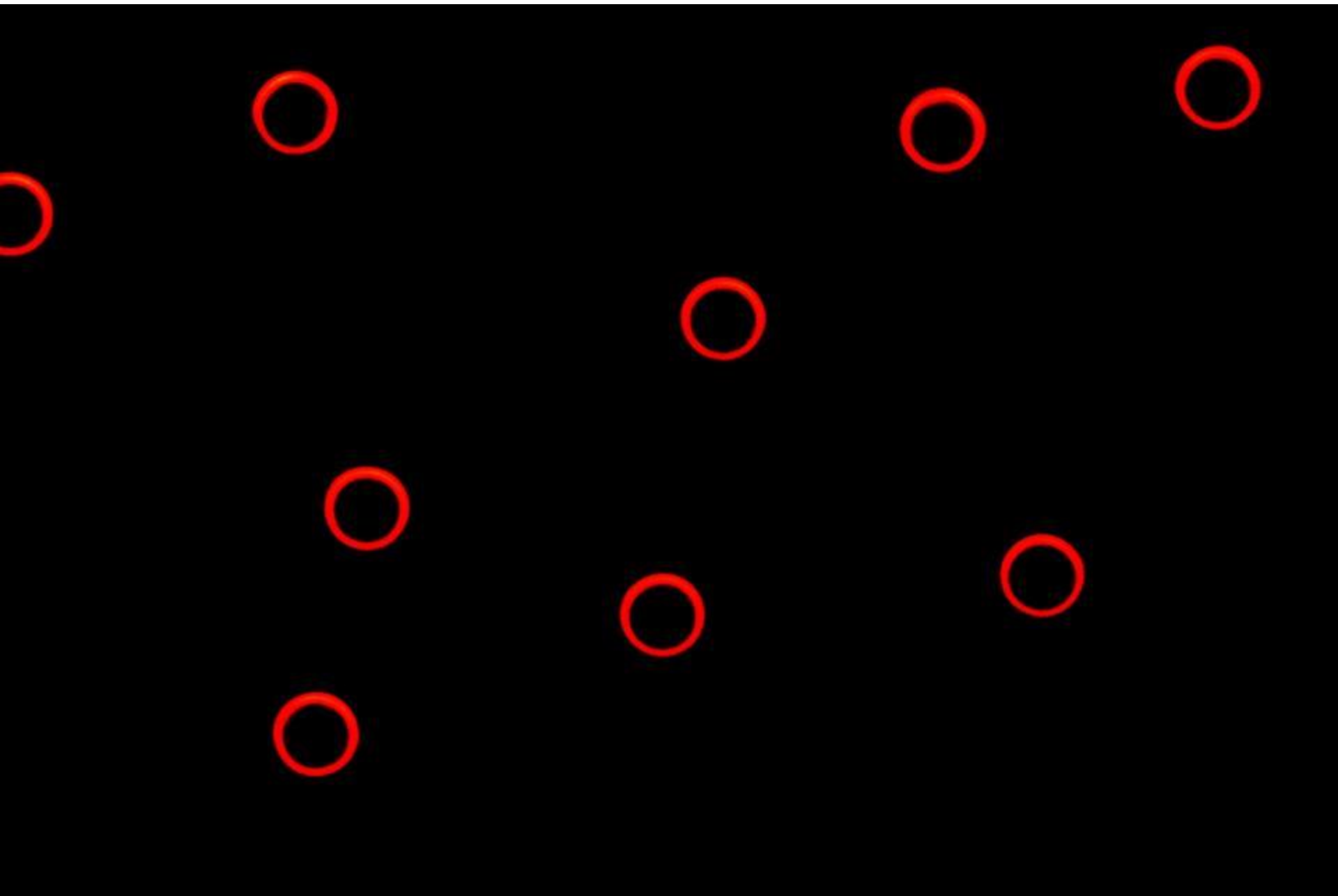




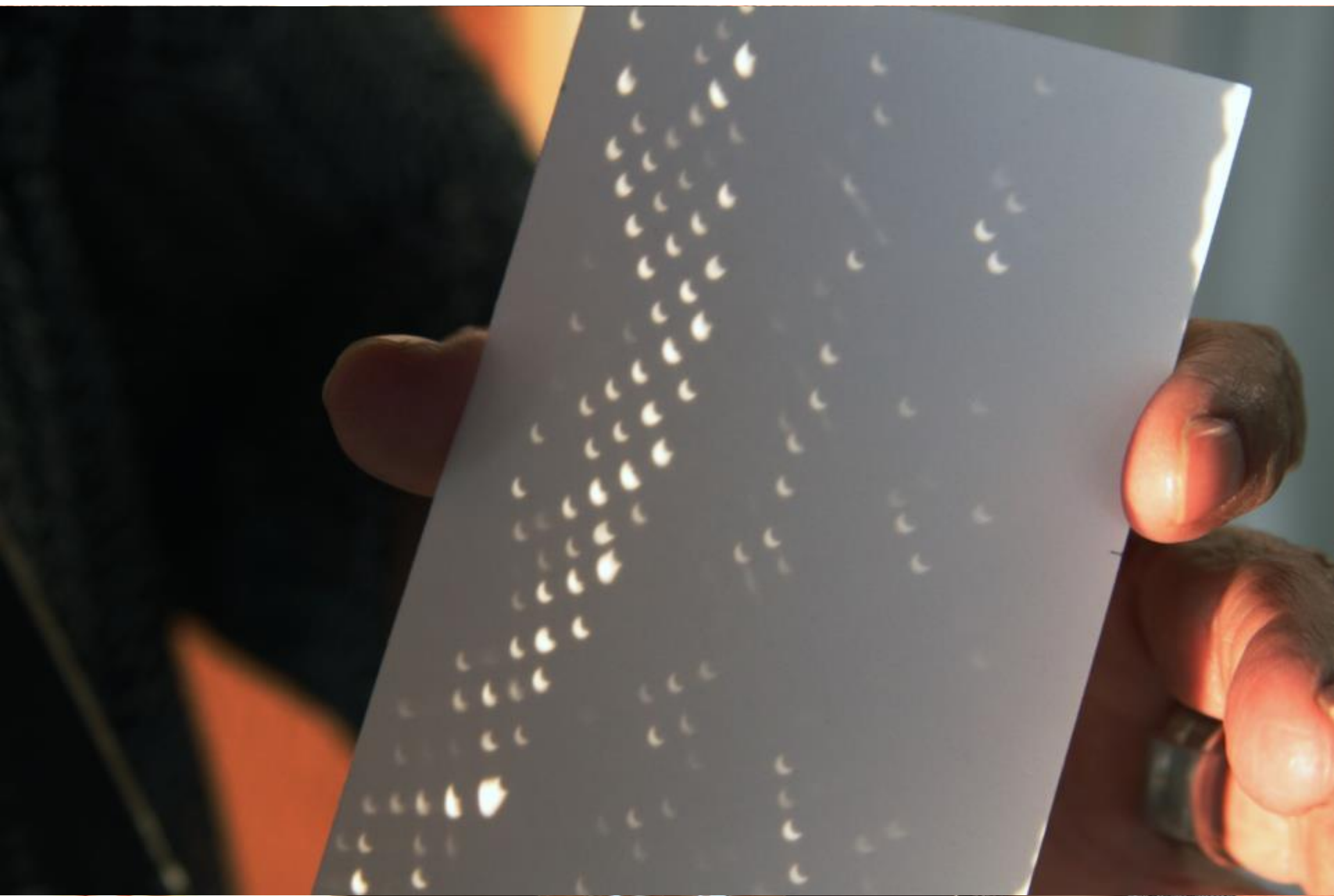


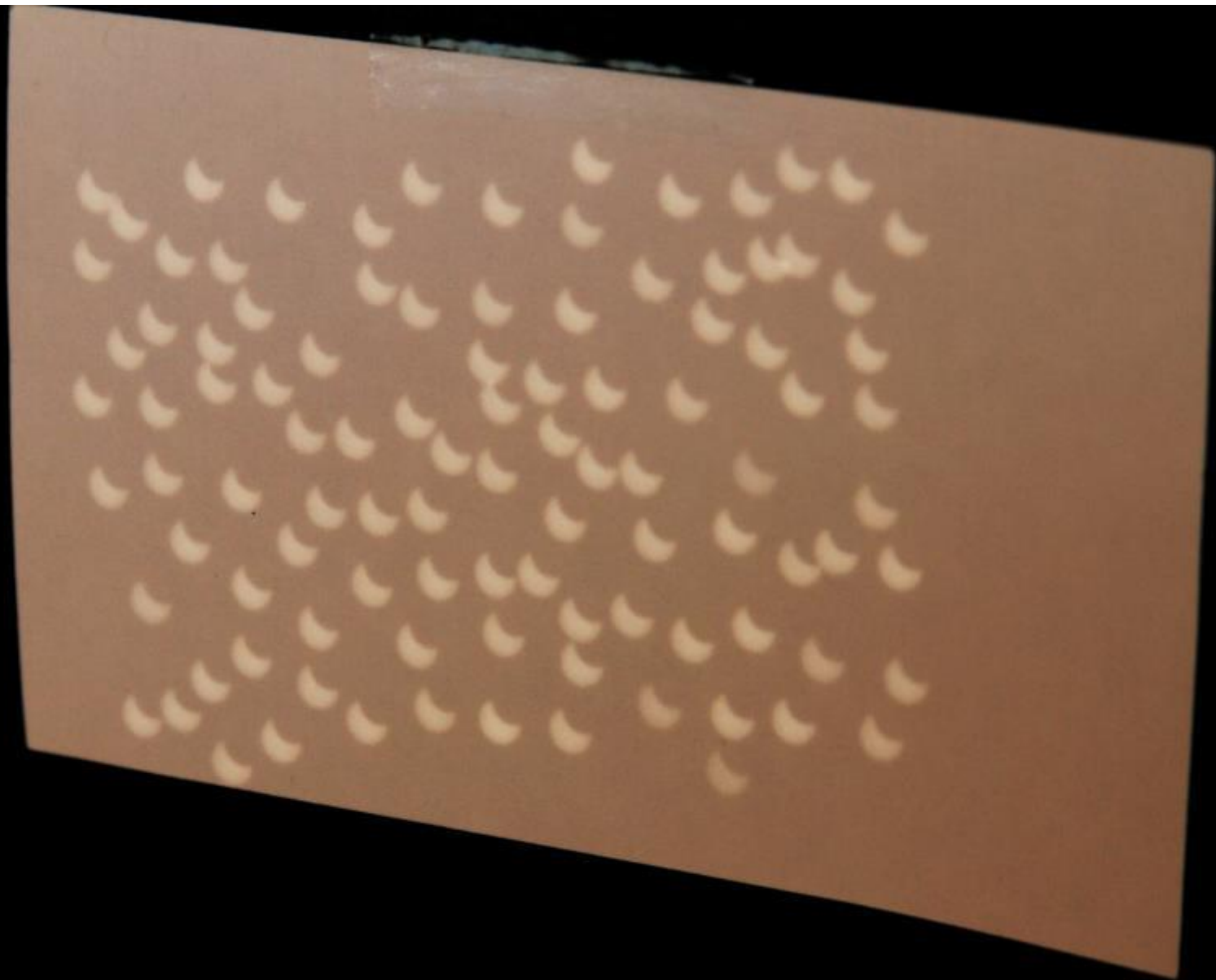


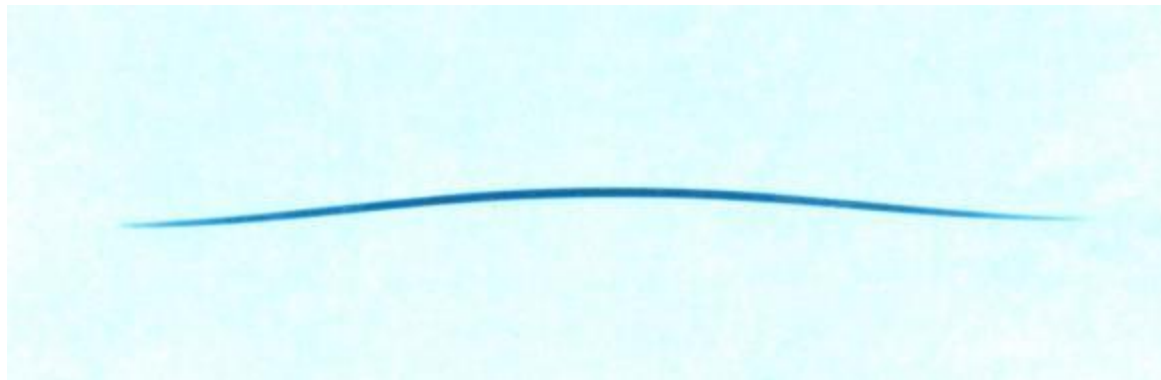


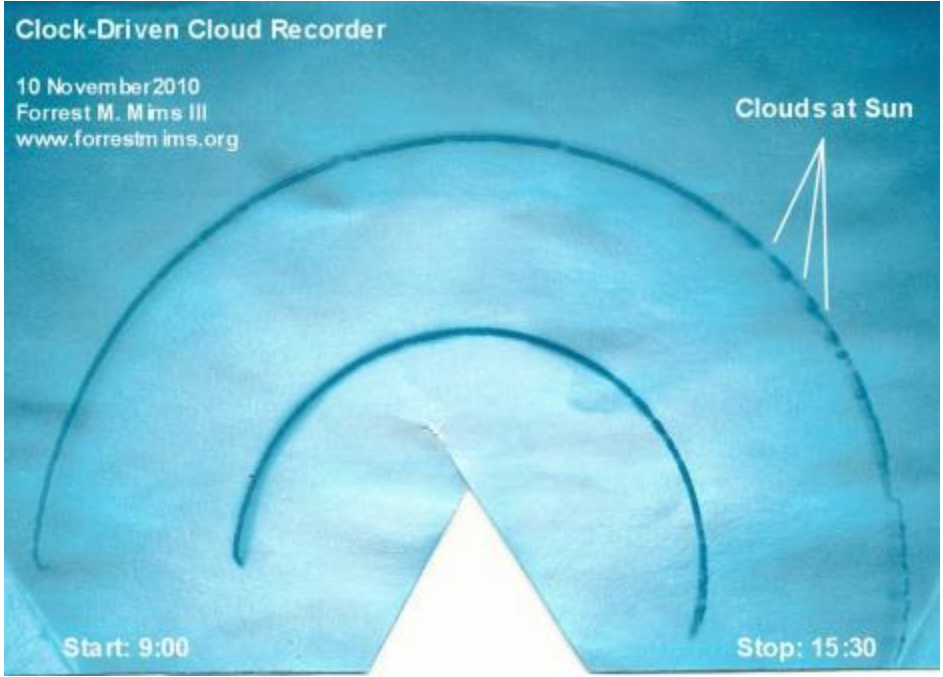




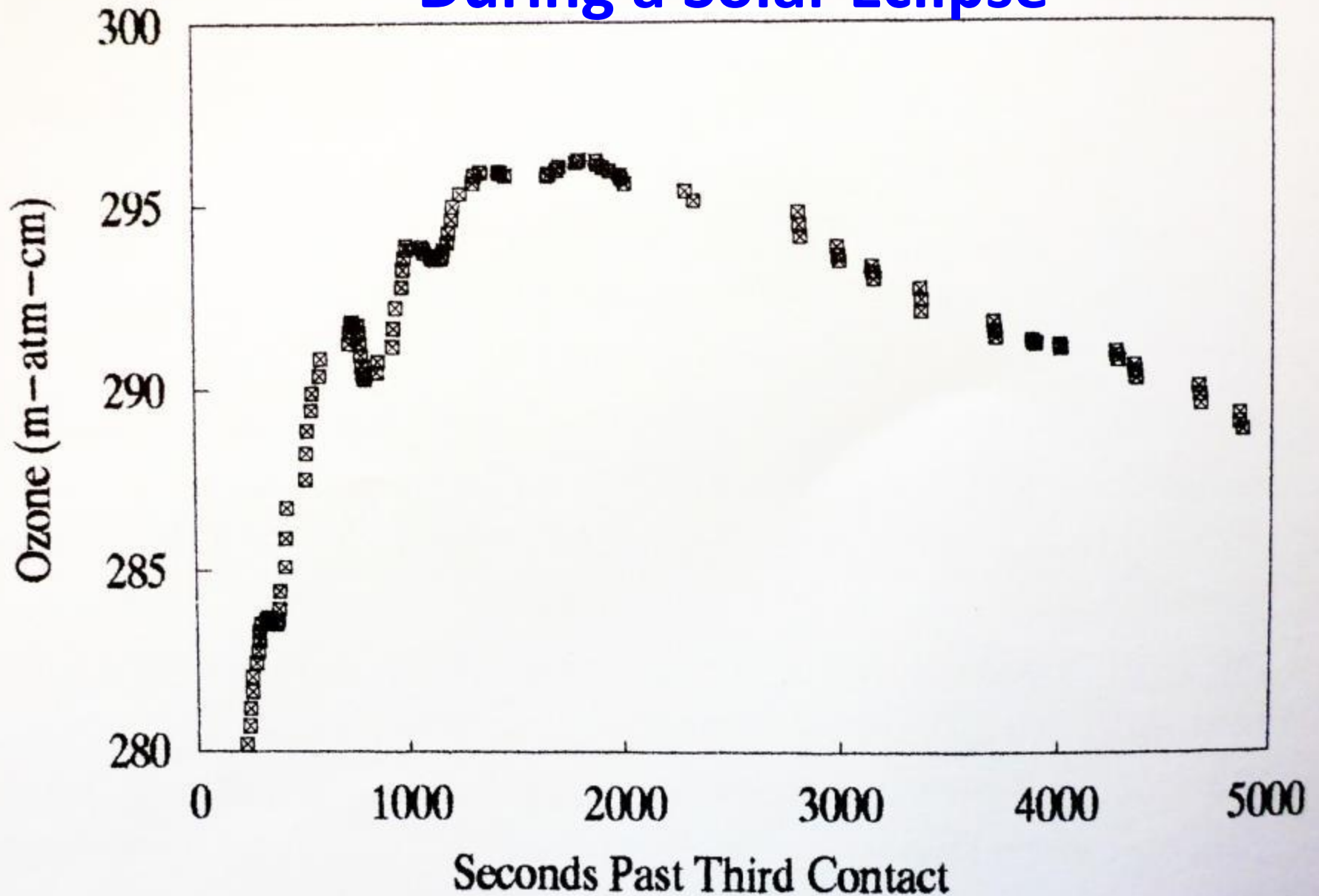








3. Waves in the Ozone Layer During a Solar Eclipse



SCIENCE

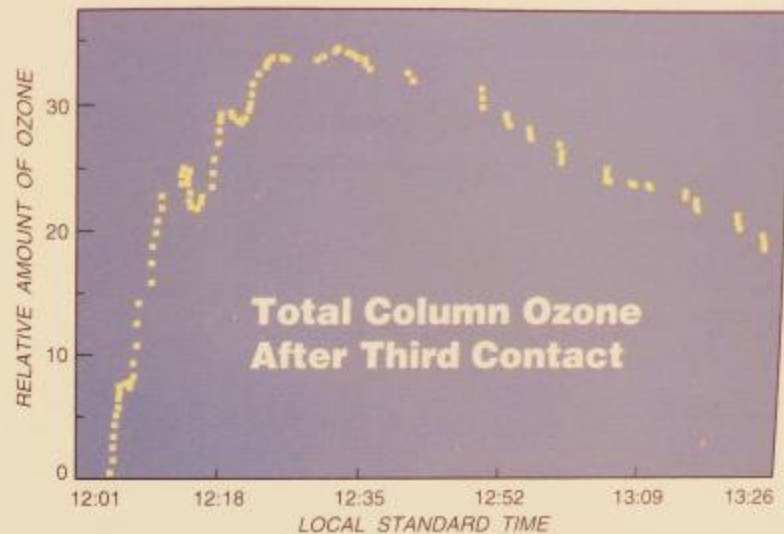
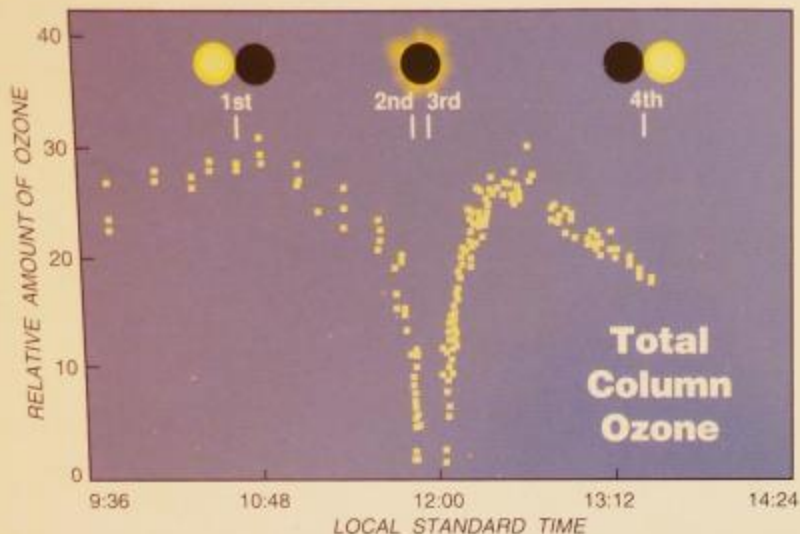
JANUARY 1992
GERNSBACK SPECIALTY SERIES
49604

PROBE!®

The Amateur Scientist's Journal

THE GREAT ECLIPSE OF 1991

Four articles about every aspect of the July 11, 1991 solar eclipse.



Left: During the July 1991 total solar eclipse, Mims recorded ozone in a column of atmosphere using his TOPS instrument aboard the *Viking Serenade* in the Gulf of California. **Right:** This plot shows fluctuations in smoothed total ozone amount immediately after third contact. Data courtesy of Mims.

Ave., Hayward, CA 94545; phone: 510-732-9229; about \$395), which measures temperature, wind speed and direction, pressure, and relative humidity. Although it is designed for indoor operation, an optional outdoor humidity and temperature module is available for \$125.

Weather Monitor II can be equipped with Weatherlink, an interface module (\$165) that connects to the serial port of a personal computer. Versions of Weatherlink are available for both IBM-compatible and Macintosh computers. Under software control, Weatherlink can sample and store observations as rapidly as once a minute. Real-time data are displayed on the computer's screen; stored data can be downloaded to the computer. Weather Monitor II can be powered by house current or a 12-volt automobile battery; it will also operate for several hours from an internal 9-volt battery. Be sure to shield the station

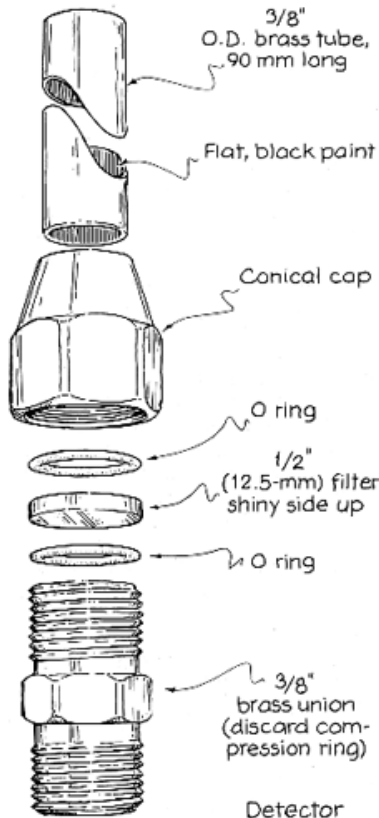


Ernest M. Mims III measures ozone

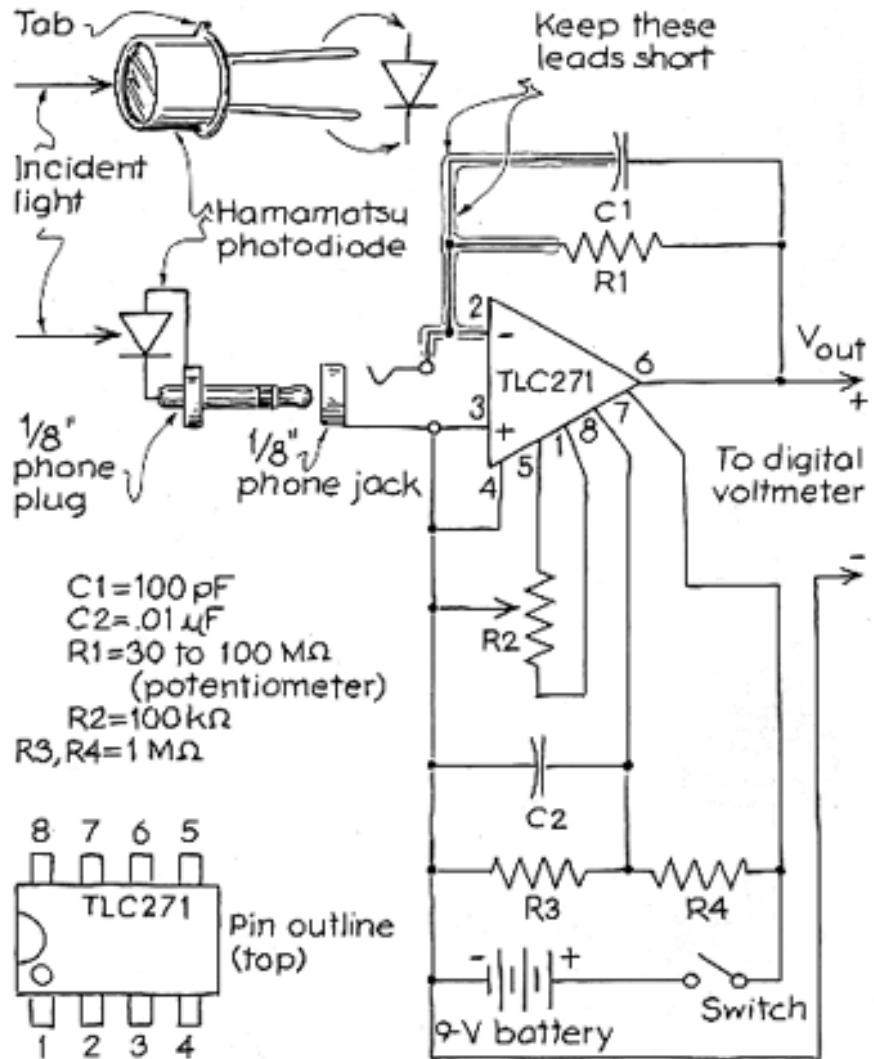
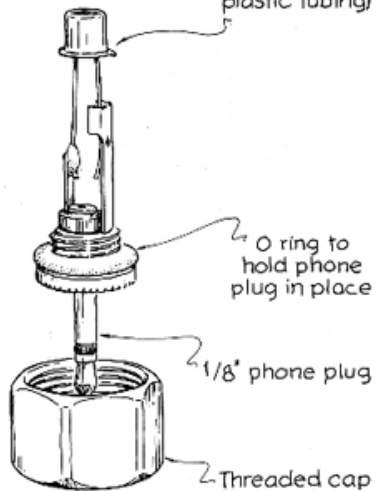
the eclipse, I recorded other similar events, so the one at totality may have been coincidental. Therefore I hope some Project Halo participants will try the same experiment on May 10th.

The RM-60 (Aware Electronics, P. O. Box 4299, Wilmington, DE 19807; phone: 800-729-5397 or 302-655-3800; \$149.50 plus \$4 shipping and handling) is a compact Geiger-counter probe designed specifically for connection to a computer's serial port. The instrument, which is powered from the port, does not have a built-in readout. The software provided with the RM-60 is outstanding.

Another suitable Geiger counter is the Radalert (International Medcom, 7497 Kennedy Rd., Sebastopol, CA 95472; phone: 707-823-0336; \$290 plus \$5 shipping and handling). The Radalert costs more than the RM-60, but the instrument is a complete Geiger counter



Detector (insulate leads with tape or plastic tubing)



C1=100 pF
 C2=.01 μF
 R1=30 to 100 MΩ (potentiometer)
 R2=100 kΩ
 R3,R4=1 MΩ

Scientific American, August 1990.

GEOPHYSICAL RESEARCH LETTERS, VOL. 20, NO. 5, PAGES 367-370, MARCH 5, 1993

FLUCTUATIONS IN COLUMN OZONE DURING THE
TOTAL SOLAR ECLIPSE OF JULY 11, 1991

Forrest M. Mims, III

Science Probe, Inc.

Eric R. Mims

Texas A&M University

Note: Ozone (Dobson Units)
subject to revision
with refinement of system.

Forrest M. Mims, III
SCIENCE PROBE
433 Twin Oak Rd.
Seguin, TX 78155

JULY 11, 1991

TOPS

TENTATIVE
(HP-2R)

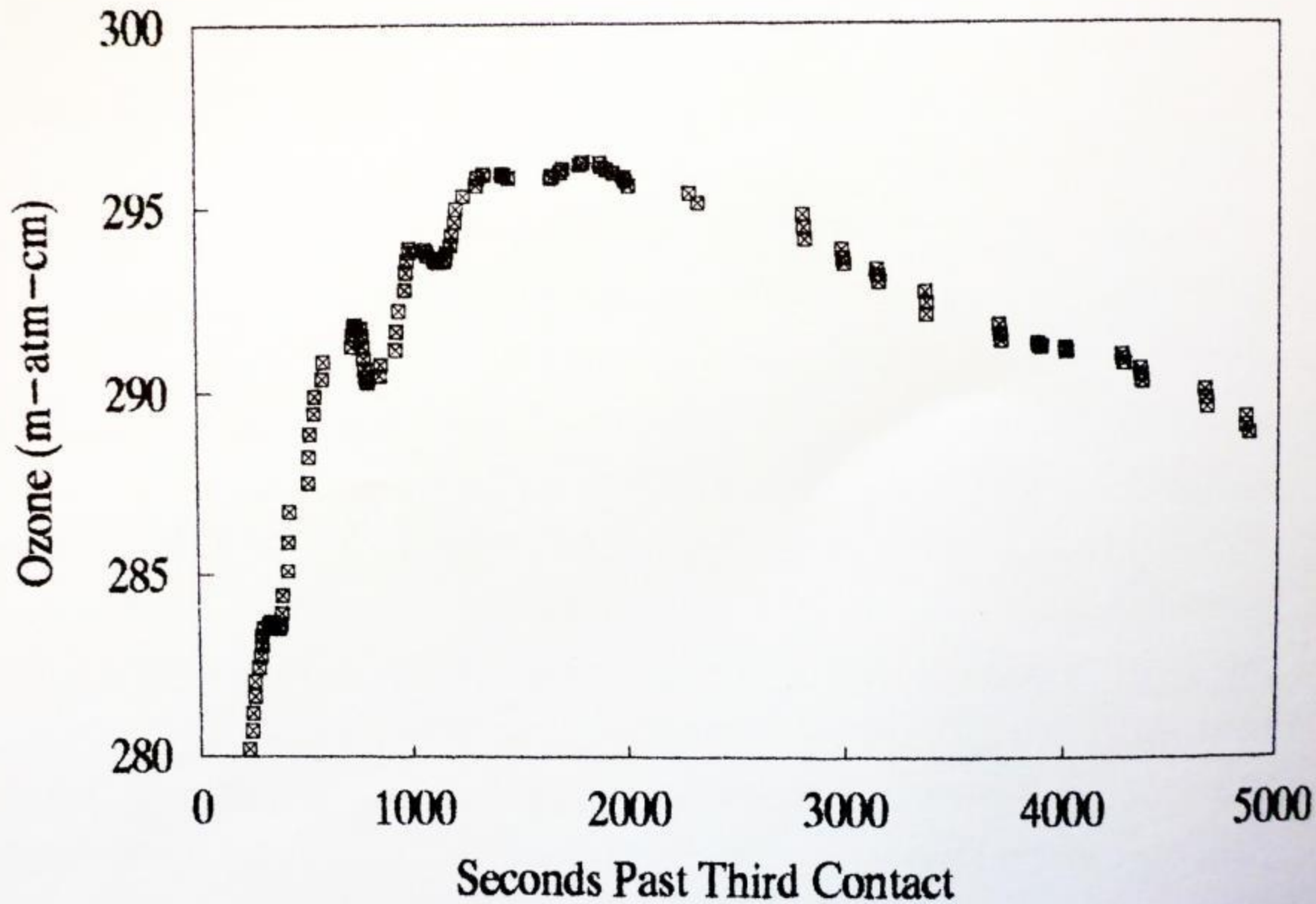
WAVE

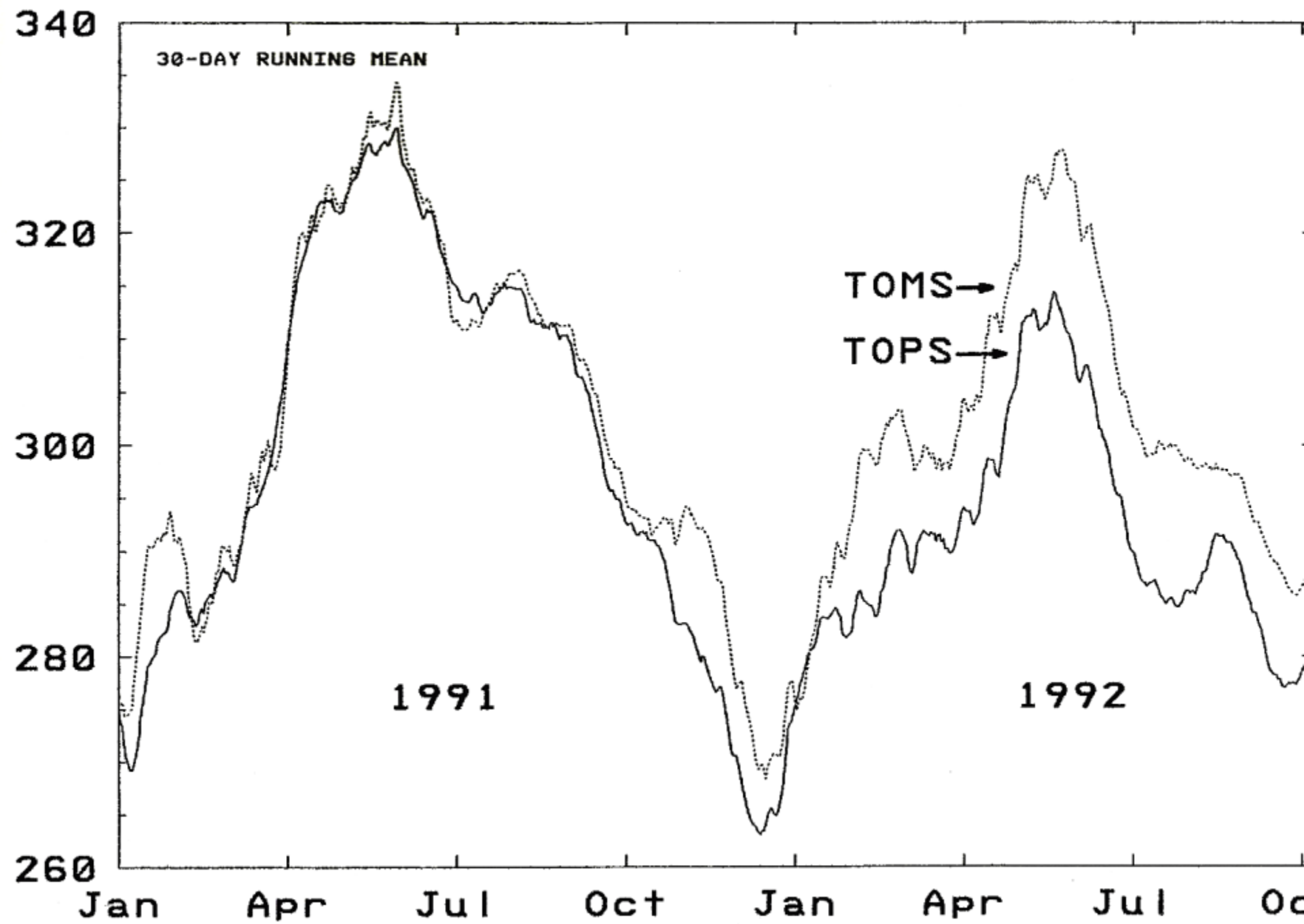
UTC	1 300	2 306	3 OZONE	4 940	5 850	6 RATIO 940/850	8 r x m	9 TEMP	10 RH (%)	11 PRES	SUN	AIR M
1503:00	1	.0039	.0089									
↓	2	.0039	.0089									
↓	3	.0040	.0089									
1504:35	4			.23	4.67	.44						
1505:00	5							79.7°	72%			
1516:40	6	.0061	.0125									
	7	.0061	.0125									
	8	.0061	.0125									
	9											
1606:00	10	.0196	.0302	VERY THIN	HAZE							
↓	11	.0197	.0303	"	"							
↓	12	.0198	.0300	"	"						CONTRASTS VISIBLE	
1607:00	13			.34	4.97	.56		83.5	70%	1023	- WARM	
	14											
1647:00	15	.0293	.0385	THIN	CIRRUS							
↓	16	.0291	.0375	↓								
	17	.0289	.0374									
	18	.0289	.0379									
↓	19	.0288	.0378									
1648-1705:00	20	SUN	ANGLE = 12/6	12/6	(WAVE)							63.43°
1706:45	21	.0335	.0413	560								
↓	22	.0324	.0399	574								
↓	23	.0321	.0396									
↓	24	.0340	.0418									
↓	25	.0342	.0422	551								
1708:00	26			.31	4.01	.68	(CLOUDS)					
1721:20	27	.0435	.0513									
	28	.0437	.0515									
	29	.0435	.0515	476								
1722:00	30			.39	4.71	.63						
1722:58	31	SUN	ANGLE = 12/5									

HARRISON
SCHMITS
↓

To Mims
and Schmitt
Forrest Mims
April 17

11:05 OCT/16/2014 38°









The Rolex Awards for Enterprise 1993

Created by
Montres Rolex S.A.
to encourage outstanding personal



accordance with decisions taken by The Selection
Rolex Awards For Enterprise, 1993, this certifies

Forrest Marion Mims, III

is hereby publicly acclaimed as one of the five international winners
of The Rolex Awards For Enterprise, 1993, for seeking to break new ground

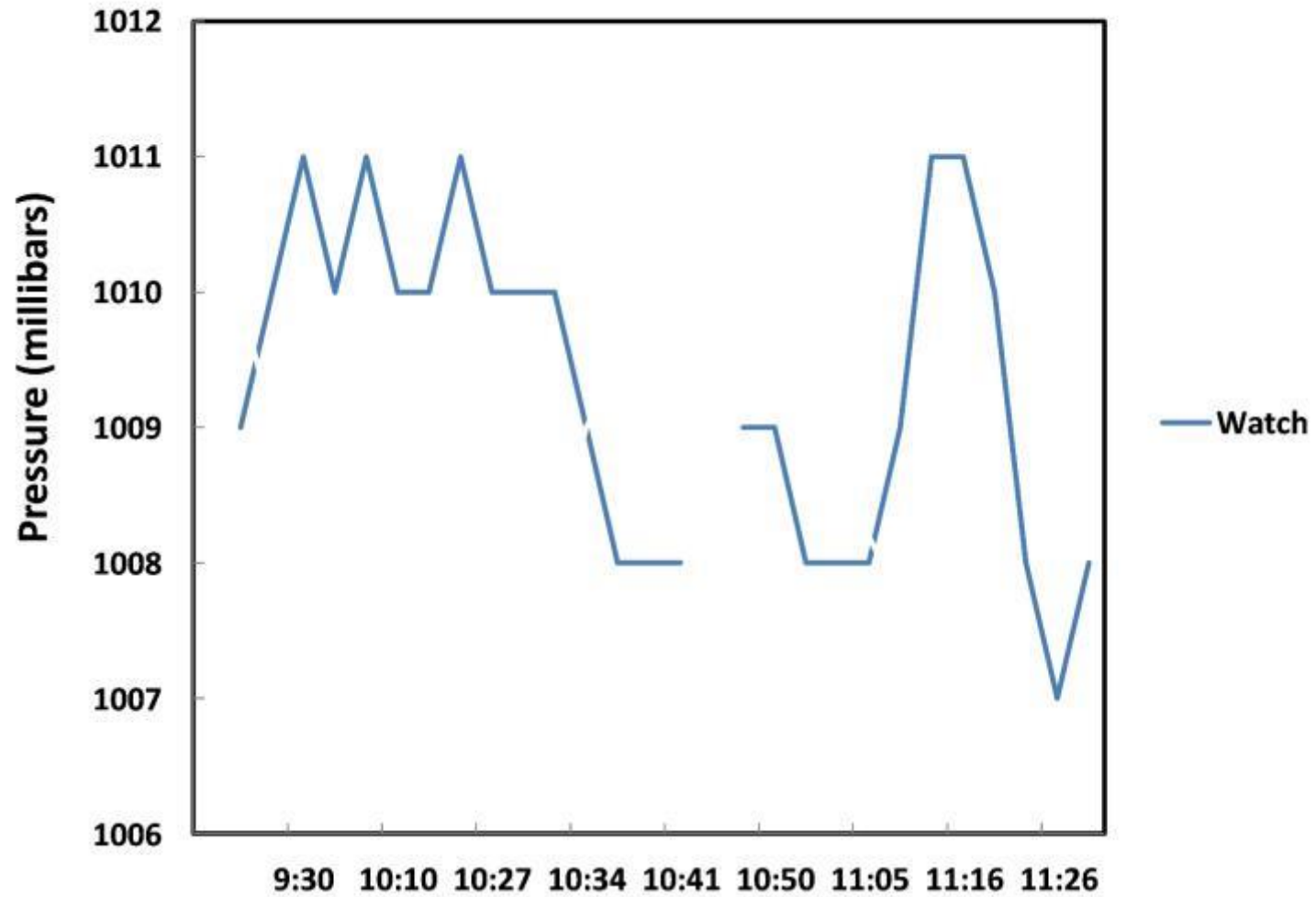




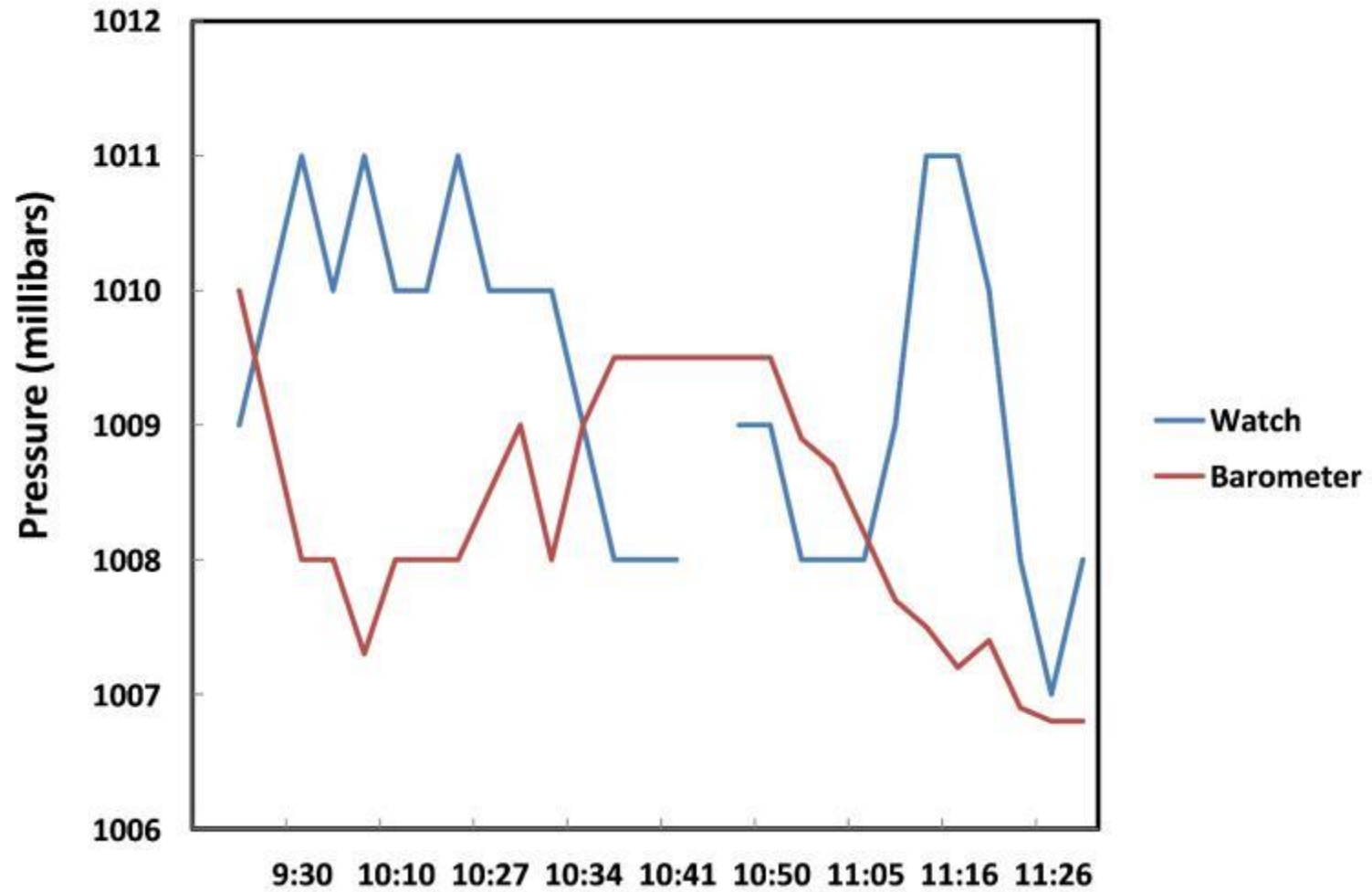
4. Children can do Science During a Solar Eclipse



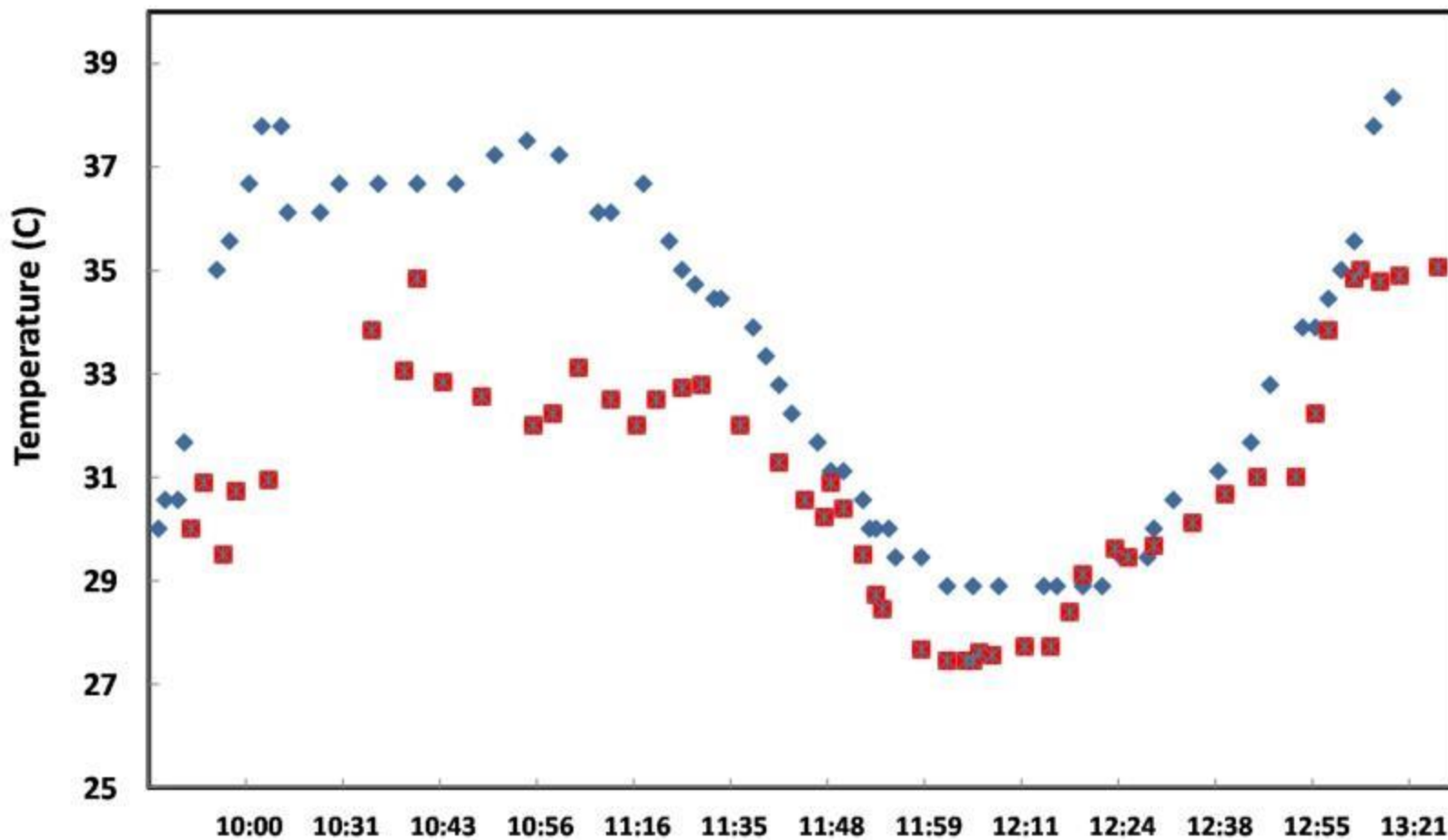
Barometric Pressure During Solar Eclipse (11 July 1991)



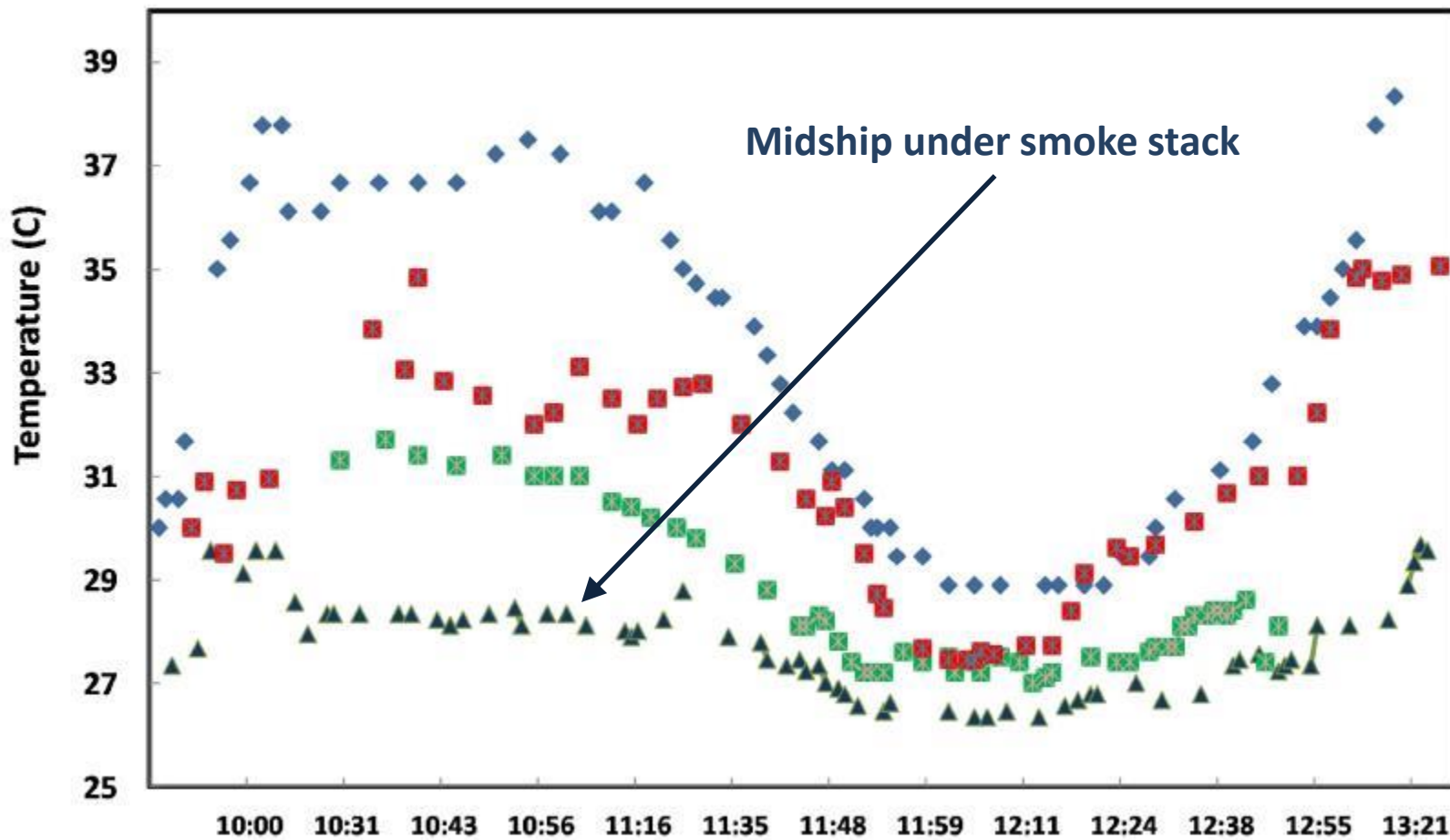
Barometric Pressure During Solar Eclipse (11 July 1991)



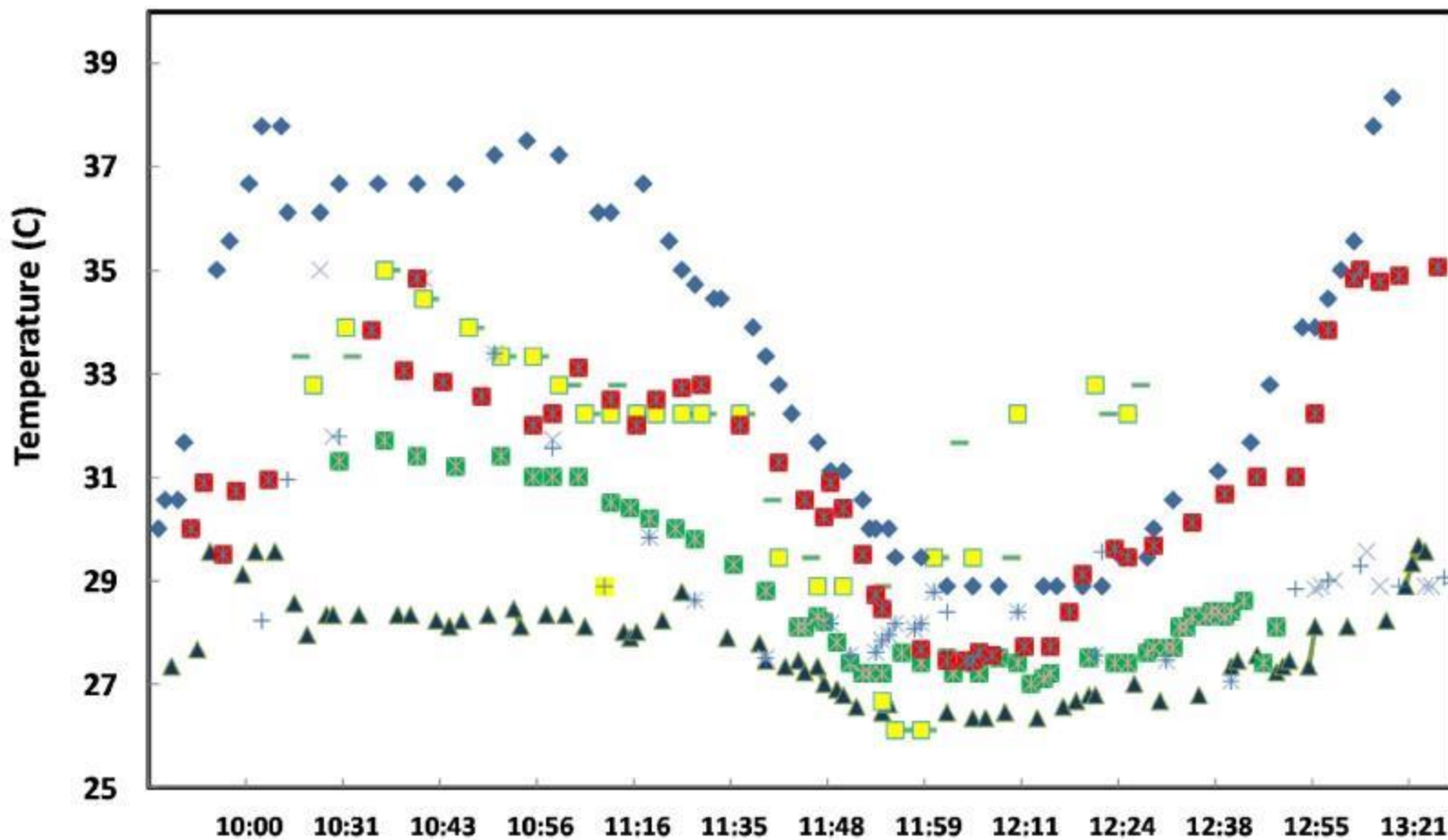
Temperature During Solar Eclipse (11 July 1991)



Temperature During Solar Eclipse (11 July 1991)



Temperature During Solar Eclipse (11 July 1991)



TEMPERATURE DURING SOLAR ECLIPSE

11 JULY 1991

1. Steven D. Shea (age 11)

Carolyn L. Shea (age 8)

Compass Deck, Stern

4. Greg Kieckhefer (age 7)

5. Gillian Marie Waldorf (age 11)

2. Michael Mottmann (3rd grade)

Midship (under smokestack)

6. Lila Rose Kaplan

7. Christina Scanlon (age 9)

3. Catherine Bluem

Deck 11, Starboard

8. Scot Drysdale & Helen Drysdale

1854
UTC

1901
UTC



Crowd Noise

“See the dark on the horizon?”

“.3,.2;.2,.1;.1,.1; stop data.”

“Whooooooooopppp!!”

“Ohhhhh!!”

“Oh, my God!!”

“Sharp streamers from the sun!”

“Oh, wow!!”

“Look at the planets lined up!”

“The horizon is orange-brown.”

“There’re flares!” “Flares!”

“Orange-red flares!”

“Babe, wanna look through
my binoculars?”

“Oh, wow!!”

“No Flashguns!!”

Ships horn during sysigy
(not quite)

Cheers and whistles

“You’re standing on my tripod!”

“Beautiful!! Wow!!”

“It’s just above Jupiter.”

Subdued talking

“That flare is awesome!”

Laughter

“We’re nearing the end of totality.”

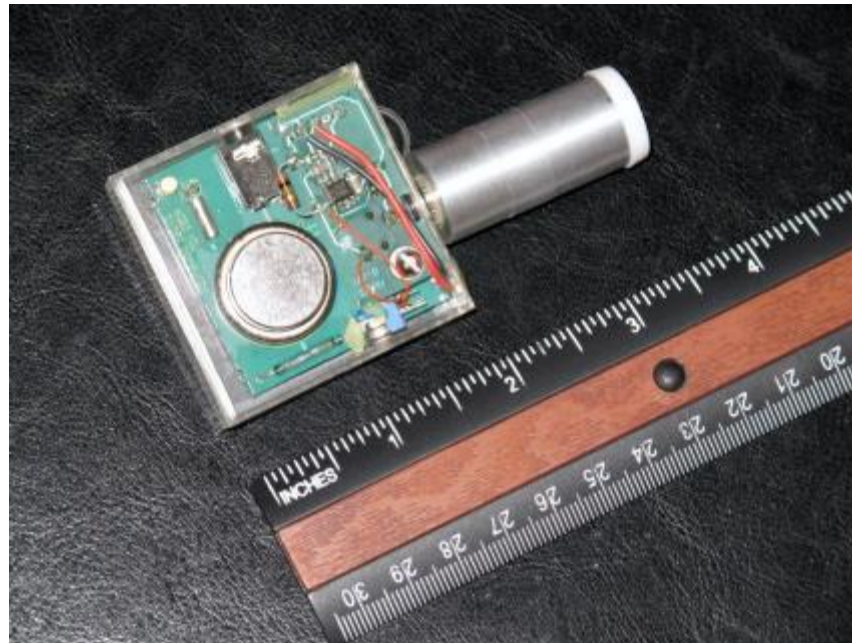
“Ooooooh!! Ohhhhhh!!”

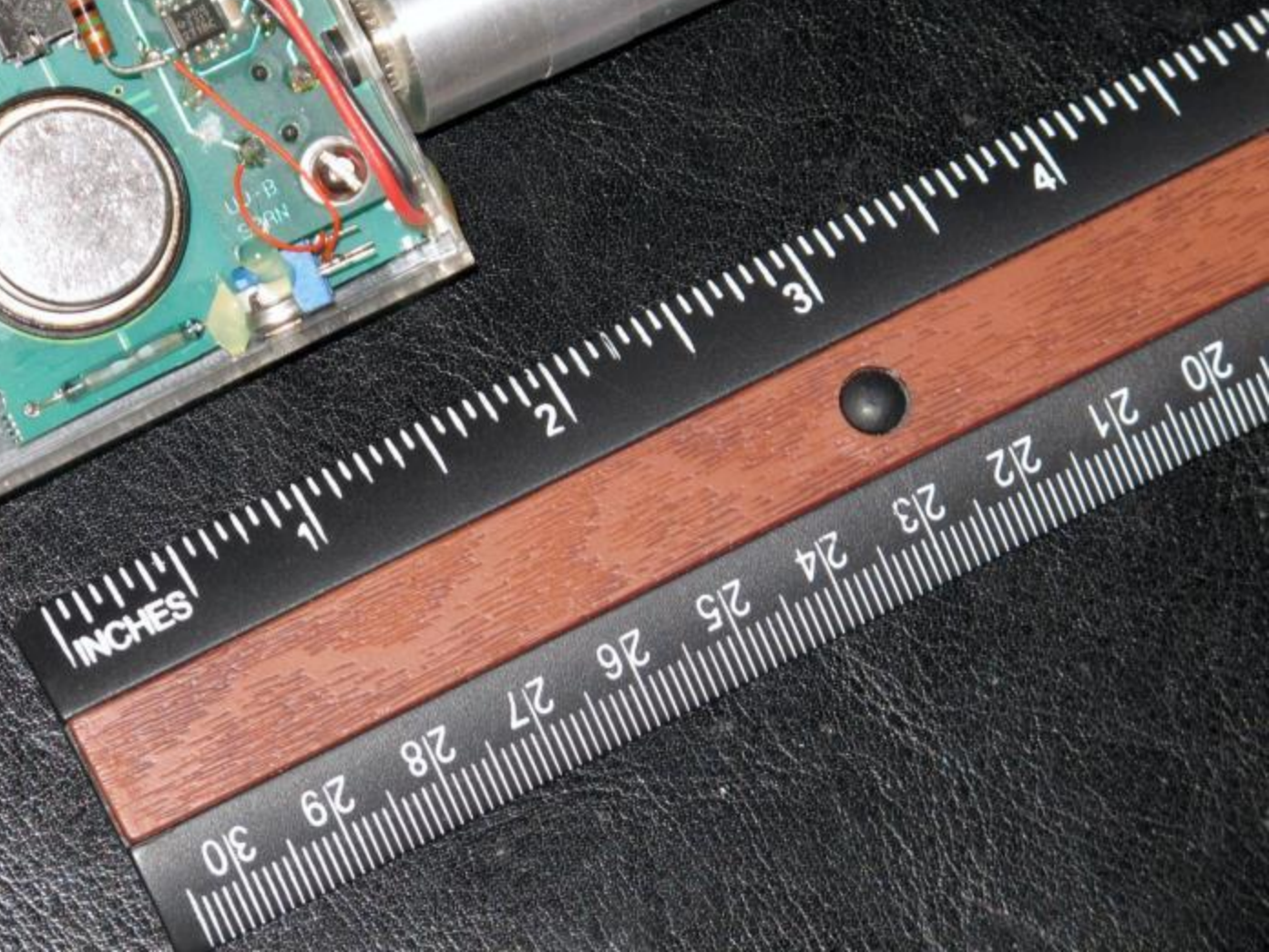
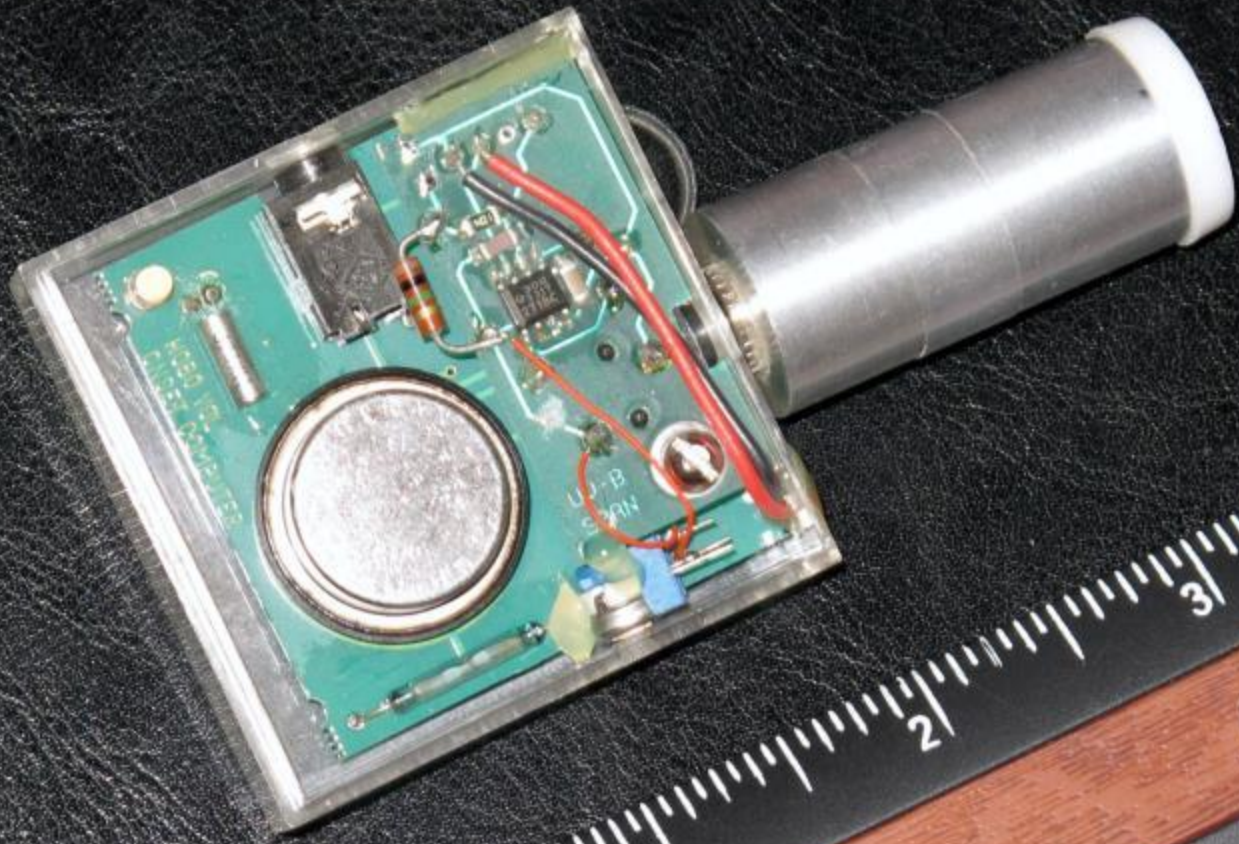
Assorted babbles and shrieks

“1901 UTC; go for ozone.”

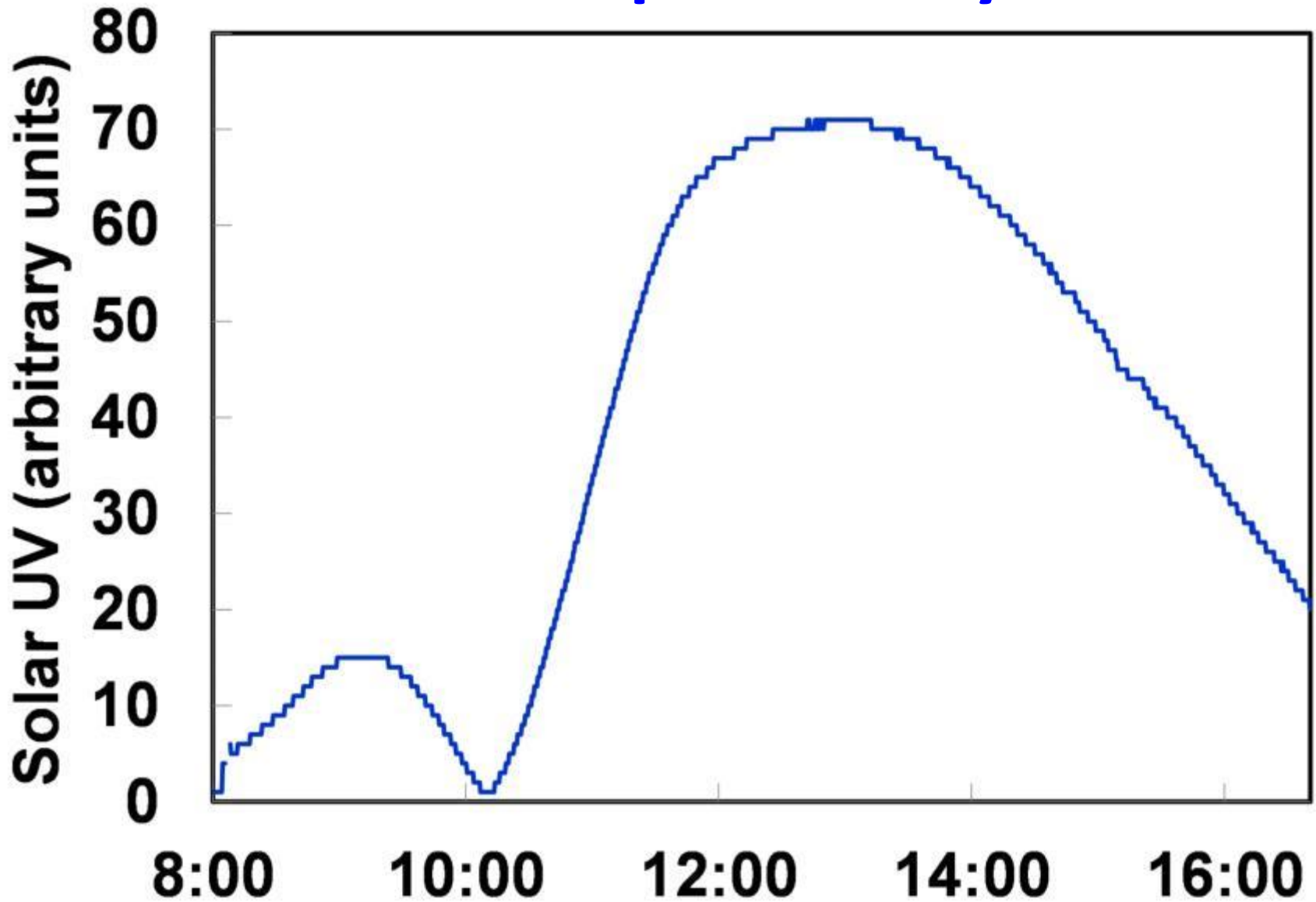
“1.6,1.4;1.8,1.7....”

5. Simple Methods for Logging Changes in Sunlight During a Solar Eclipse

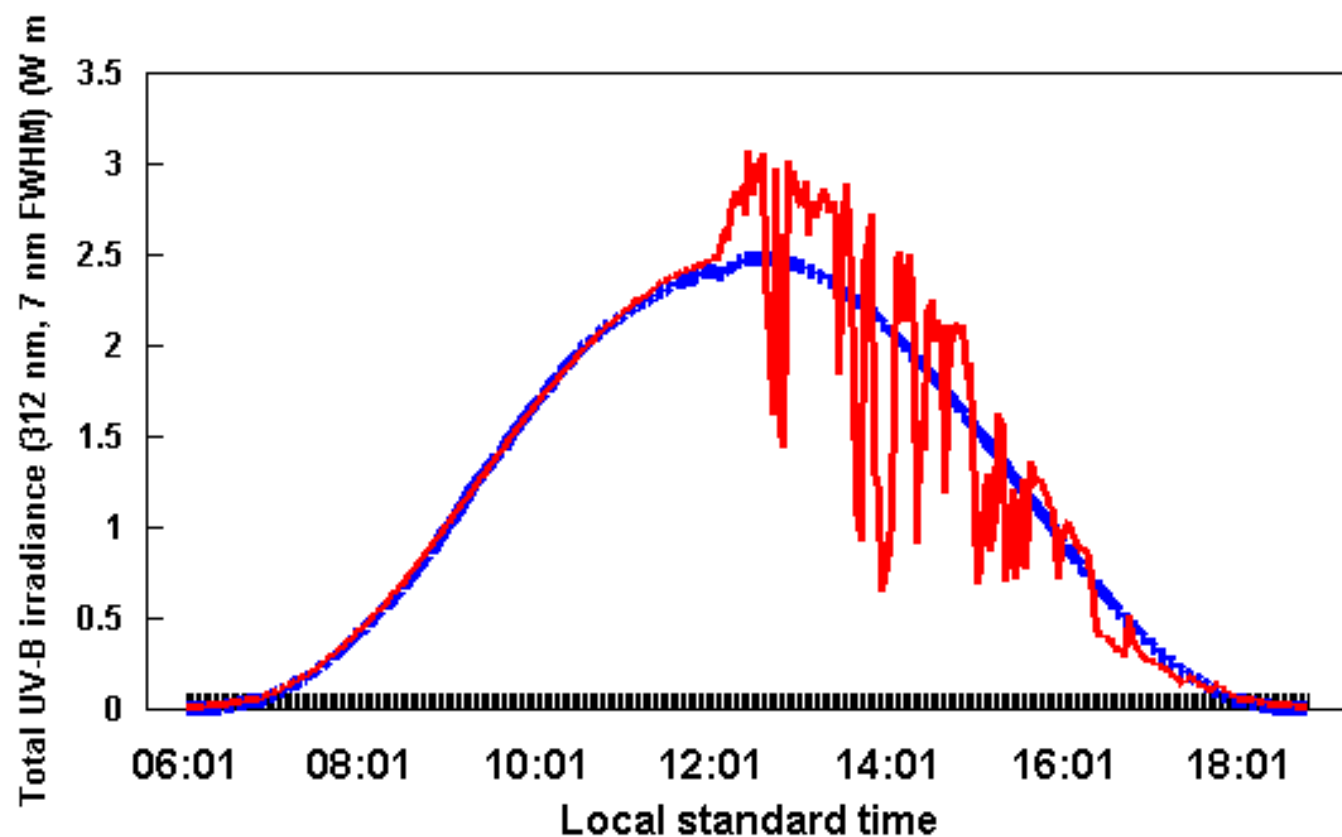




Annular Eclipse of May 1994



Significant enhancement by cumulus clouds of total UV Mauna Loa Observatory, Hawaii, 22 June 1994



■ 19 June 1994 ■ 22 June 1994

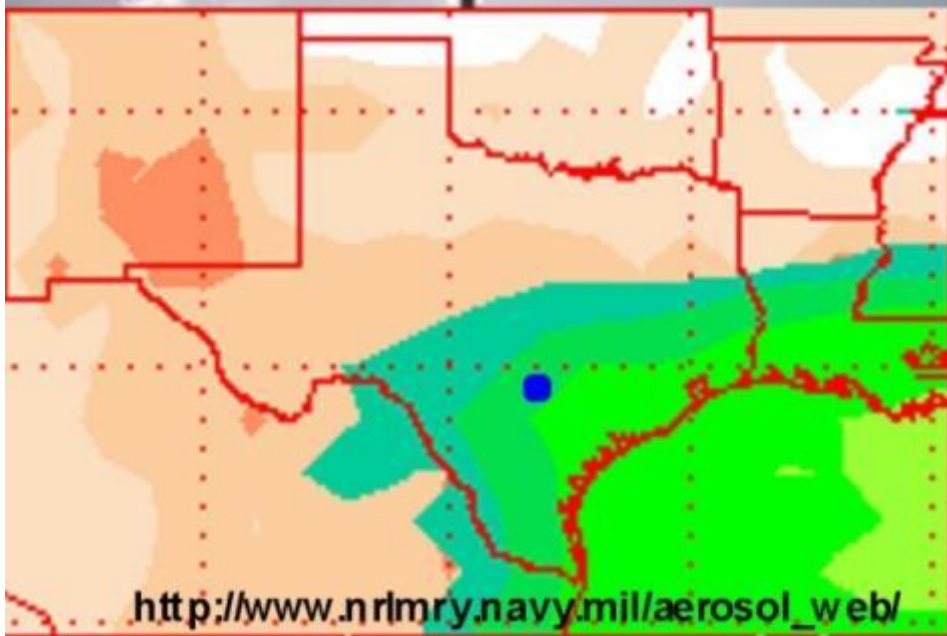
Instrument: No. 07 309 nm data logging Sun Probe
Observer: Forrest M. Mims III, SPAN (File: 07MLOALL.WK4)

6. DIY Solar “Eclipses” for Measuring Diffuse Sunlight (Skylight) and Haze



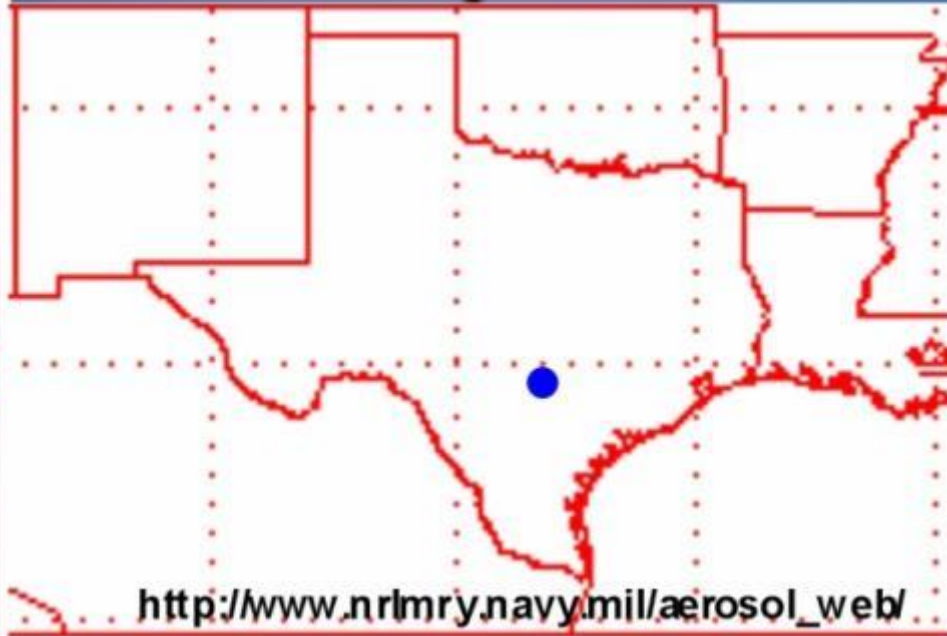


29 Jun 2008. African dust. Sunlight transmission at 525 nm (green): 60.1%



http://www.nrlmry.navy.mil/aerosol_web/

08 Oct 2008. Clear sky. Sunlight transmission at 525 nm (green): 94.3%



http://www.nrlmry.navy.mil/aerosol_web/



07122008 IMG_4316



07142008 IMG_4347



07152008 IMG_4359



07182008 IMG_4411



07192008 IMG_4421



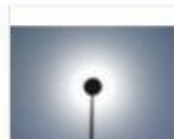
07212008 IMG_4465



07222008 IMG_4469



07262008 IMG_4485



07272008 IMG_4490



07292008 IMG_4498



08012008 IMG_4522



08032008 IMG_4532



08042008 IMG_4536



08072008 IMG_4549



08092008 IMG_4568



08102008 IMG_4572



08102008 IMG_4573



08142008 IMG_4590



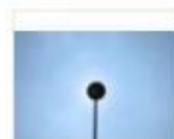
08152008 IMG_4594



08162008 IMG_4595



08162008 IMG_4596



08252008 IMG_4645



08262008 IMG_4652



08312008 IMG_4682



09032008 IMG_4698



09042008 IMG_4727



09052008 IMG_4733



09052008 IMG_4740



09082008 IMG_4767



09092008 IMG_4794



09132008 IMG_4812



09172008 IMG_4844



09192008 IMG_4902



09202008 IMG_4950



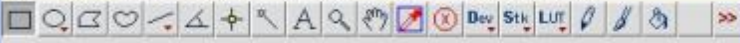
09212008 IMG_4951



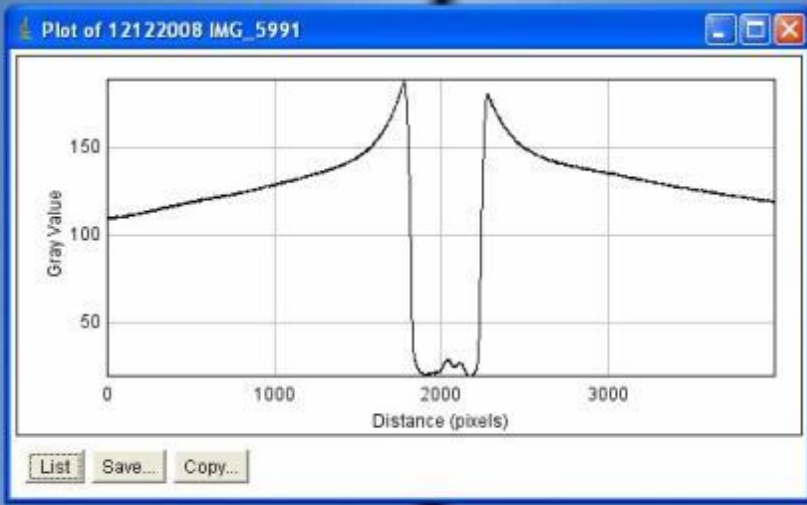
09222008 IMG_5007

Image.J

File Edit Image Process Analyze Plugins Window Help




x=1332, y=1500, value=94,135,179

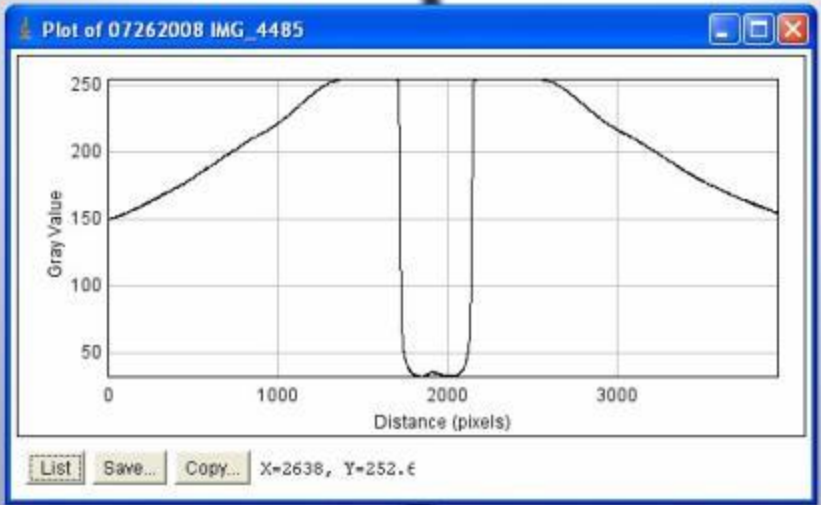


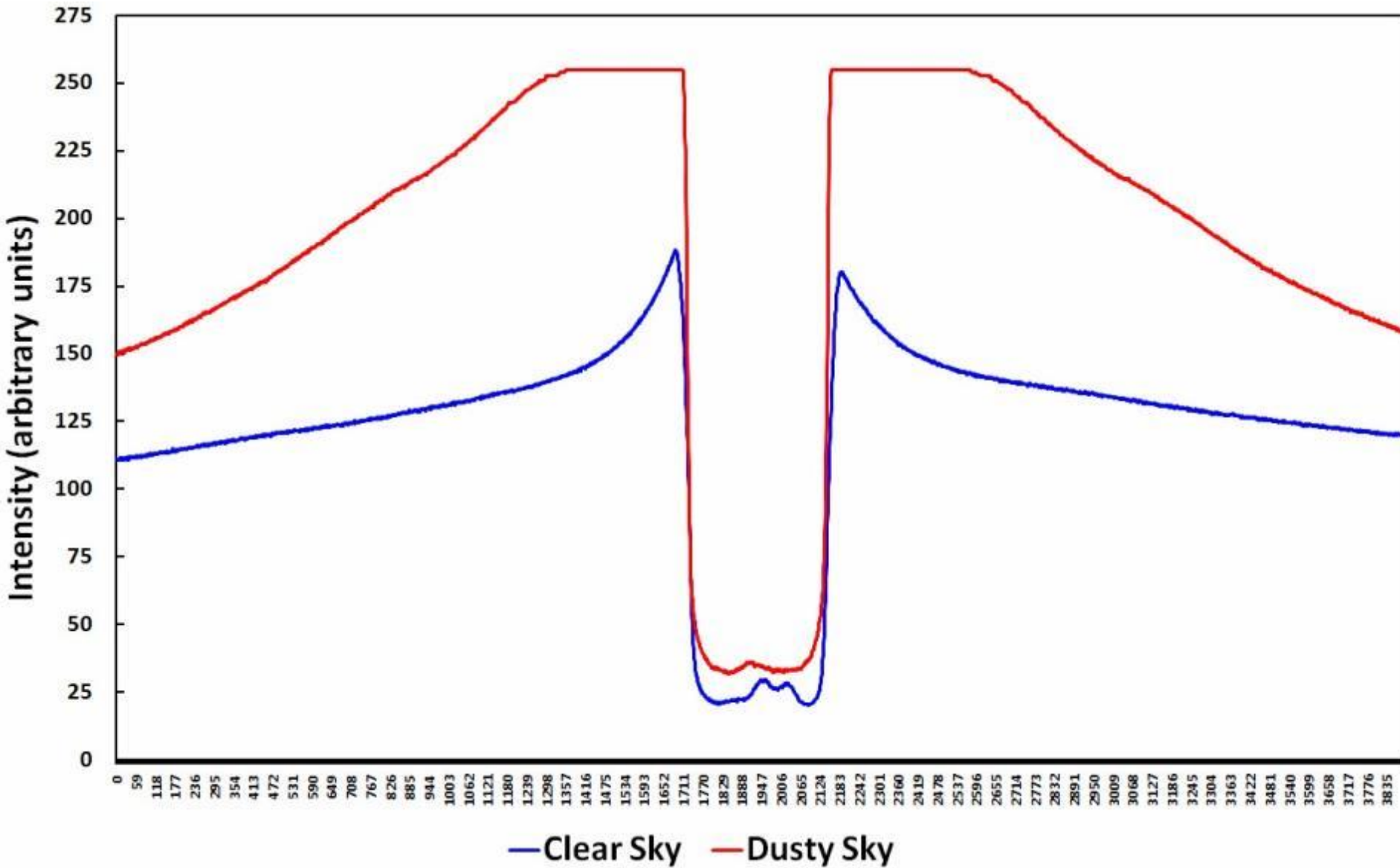
ImageJ

File Edit Image Process Analyze Plugins Window Help

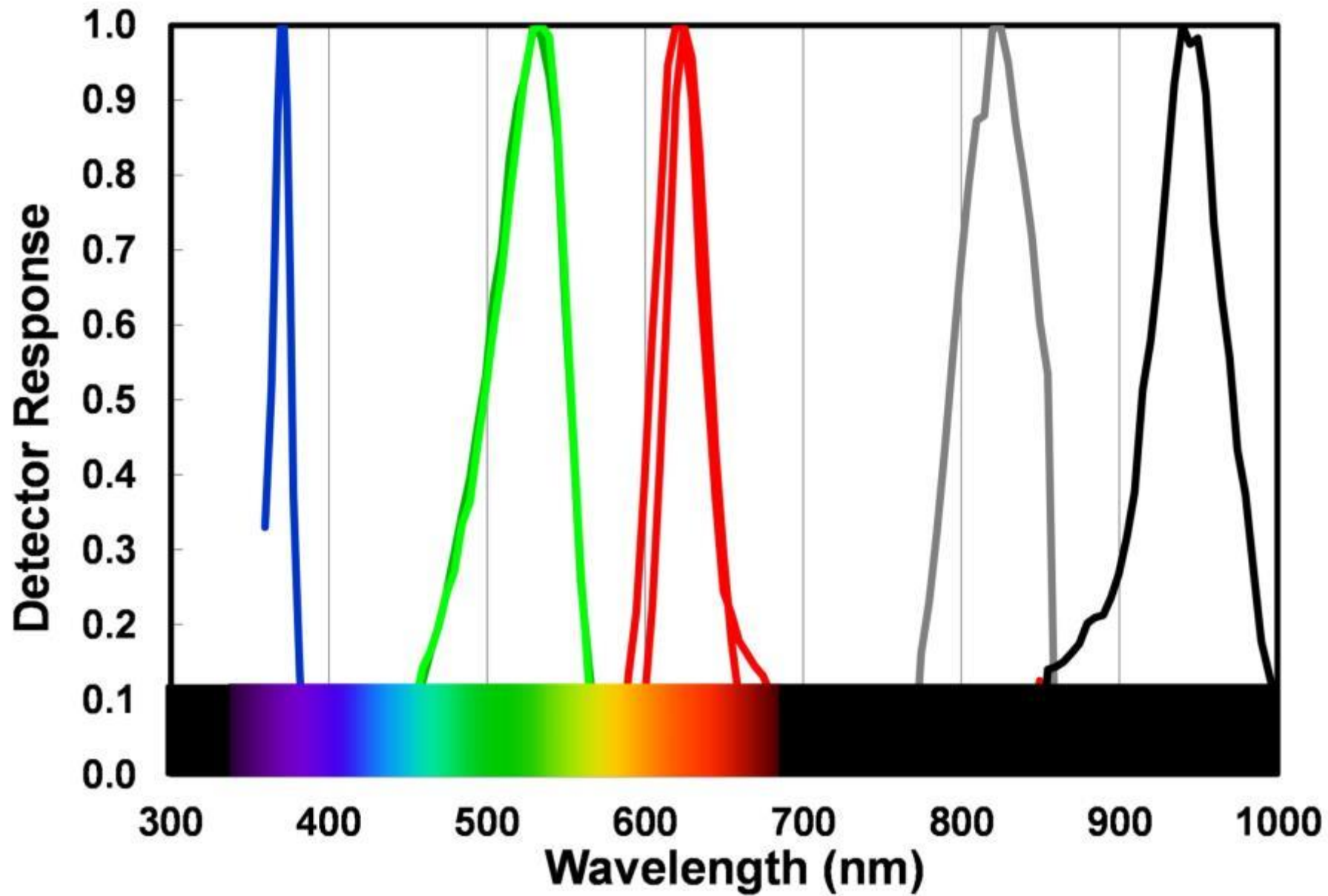


x=1509, y=1404, value=255,255,255











**Partial Solar Eclipse
23 October 2014
White Sands,
New Mexico**



**Forrest M. Mims III
www.forrest.mims.org
www.sunandsky.org
fmims@aol.com**