Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS
SOLAR SECTION

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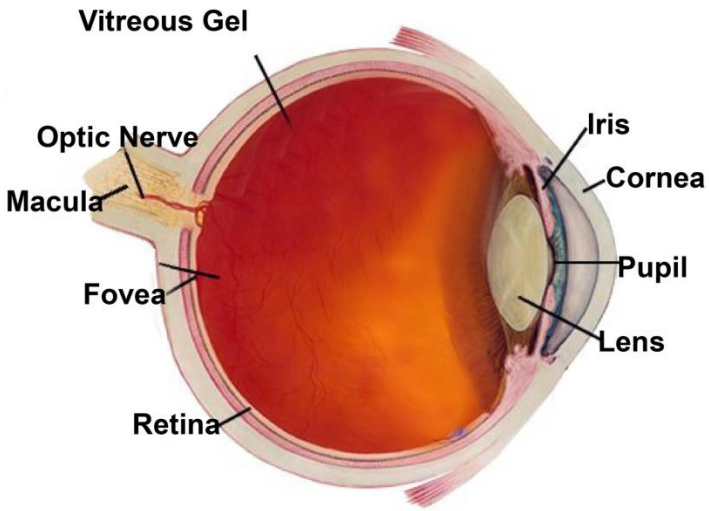
"Sunlight enters the eye by passing through the *cornea*, where the image is focused. The brightness of the image is controlled by the varying diameter of the *pupil*, the aperture of the optical system. The average size of the exposed pupil varies throughout life, but averages between 6 and 7 millimeters. The *iris* regulates the amount of light passing through the pupil, acting like a camera shutter. As the amount of light entering the eye diminishes, the iris muscle pulls away from the center, causing the pupil to dilate and allowing more light to pass. The image is given a fine focus by the *lens*. Finally the image falls on the *retina*, where the real power of the eye is located (Figure below). At any given instant, the retina can resolve a contrast ratio of 100:1.

The retina is a thin layer composed of five types of cells lining the back of the eye. The cells are arranged in four layers. Using the outermost two, the retina can turn parts of itself on and off as it analyzes the image. The photoreceptors are located behind. The ones that allow us to see color are the cones, with their concentration moving outwards from an area of the retina called *fovea centralis* through the central part of the retina, called the *macula*. A few degrees from the *fovea* appear the rods, outnumbering the cones by 20 to 1, and acting as light collectors. These elements respond to light by generating electrical impulses that travel out of the eye through the optic nerve to the brain.

The sensitivity of the eye ranges over about 14 orders of magnitude from a minimum threshold to a light level that could possibly cause damage. The *photopic* (cone) threshold is almost four magnitudes above the minimum. The next two magnitudes are called the *mesopic* range and it is here that both rods and cones contribute to vision. The *scotopic* peak sensitivity (of rod cells) is at about 500 nm, while *photopic* sensitivity peaks at around 550nm. Wavelengths shorter than 315nm are absorbed by the cornea (causing injury) and do not reach the retina."



The Sun Recorded Through History
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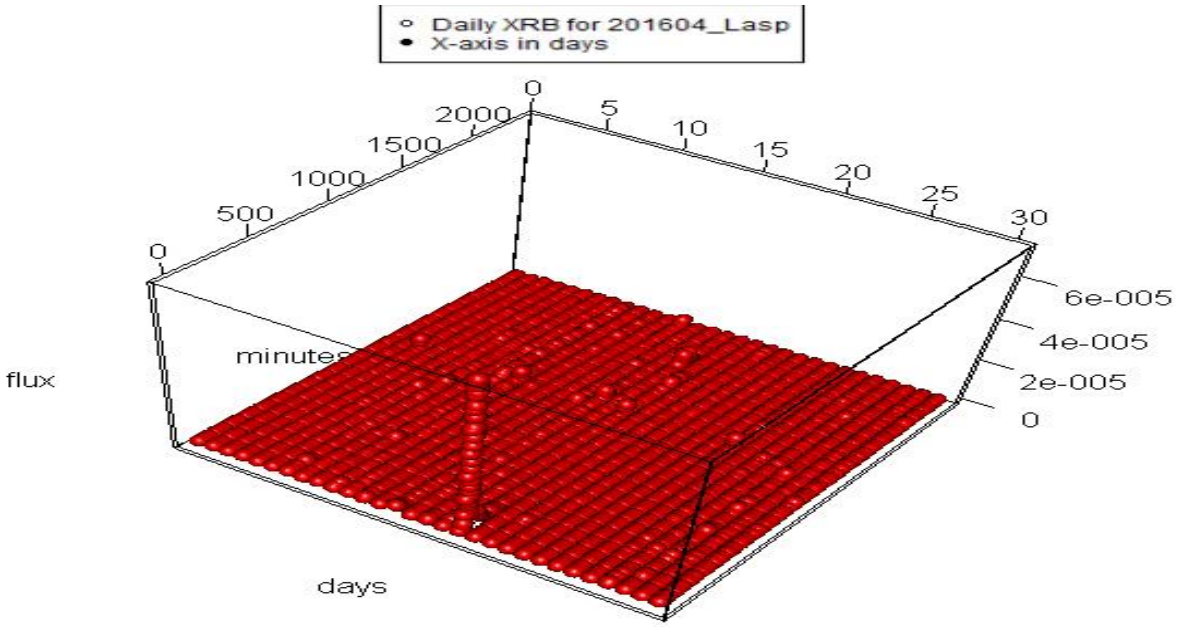
http://www.alpineeyecare.com/wp-content/uploads/eyejpg.jpg

Sudden Ionospheric Disturbance Report

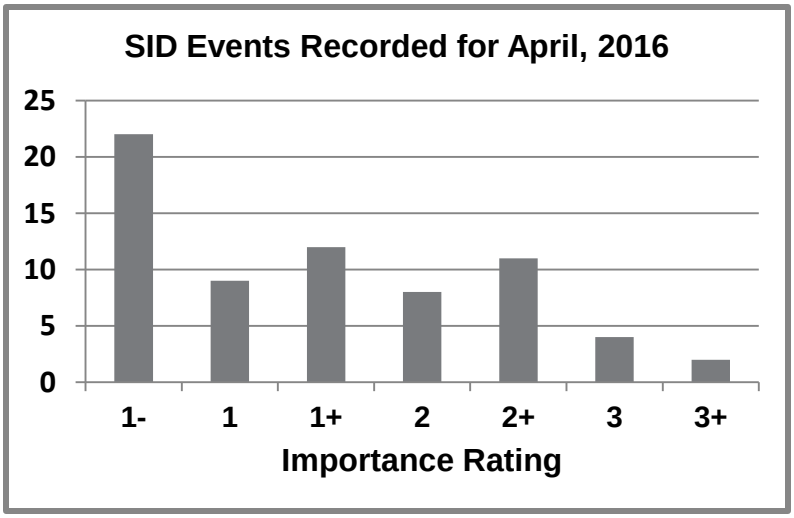


Here are EVE Lasp data for April, 2016. The M 6.7 flare event on the 18th dwarfs all other flares for April
http://lasp.colorado.edu/home/eve/

Sudden Ionospheric Disturbances (SID) Records During April, 2016

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
160402	1803	3	160409	1310	3	160425	820	-1
160402	1807	3	160409	1328	3	160426	1150	2+
160406	1007	2	160409	1901	2	160426	1332	-1
160406	1648	1+	160412	751	1+	160428	348	-1
160406	1652	1+	160413	1149	2+	160428	602	-1
160407	119	-1	160414	1330	1+	160428	621	1+
160407	554	-1	160414	1810	1+	160428	852	1
160407	950	-1	160415	1430	2	160428	1252	1+
160407	1113	1+	160416	1437	1	160429	1640	1
160407	1338	-1	160416	1610	2	160429	1641	2+
160408	1637	-1	160416	1959	2+	160429	2143	-1
160408	1643	2	160417	1729	1+	160429	2143	-1
160409	527	1	160418	21	2+	160429	2225	-1
160409	1040	-1	160418	44	2+	160430	1253	2+
			160424	1633	2+	160430	2005	3+
						160430	2005	3+

Solar Events

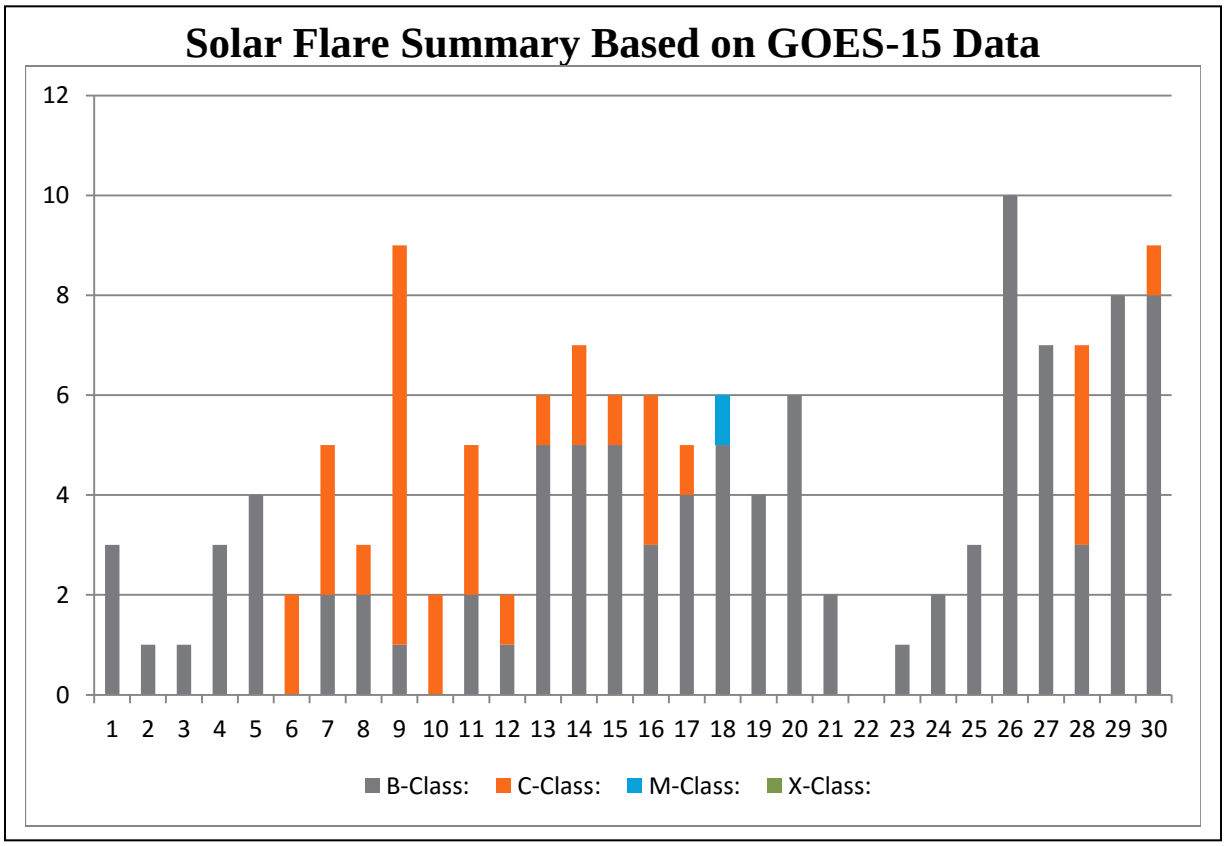


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: 125

Sudden Ionospheric Disturbances (SID) Observers During April, 2016

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	R Green	A134	NWC
R Battaiola	A96	HWU	R Mrllak	A136	GQD NSY
J Wallace	A97	NAA	S Aguirre	A138	NPM
L Loudet	A118	DHO	G Silvis	A141	HWU NLK NPM
J Godet	A119	GBZ GQD ICV	I Ryumshin	A142	DHO GQD
F Adamson	A122	NWC	R Rogge	A143	DHO GQD ICV
S Oatney	A125	NML	K Menzies	A146	NAA
J Karlovsky	A131	DHO NSY	D Russel	A147	NML

There were 135 solar flares measured by GOES-15 for April, 2016: One M class, 33 C class and 101 B class flares. Almost twice the flaring this month compared to last month.
There were 16 AAVSO SID observers who submitted reports this month.



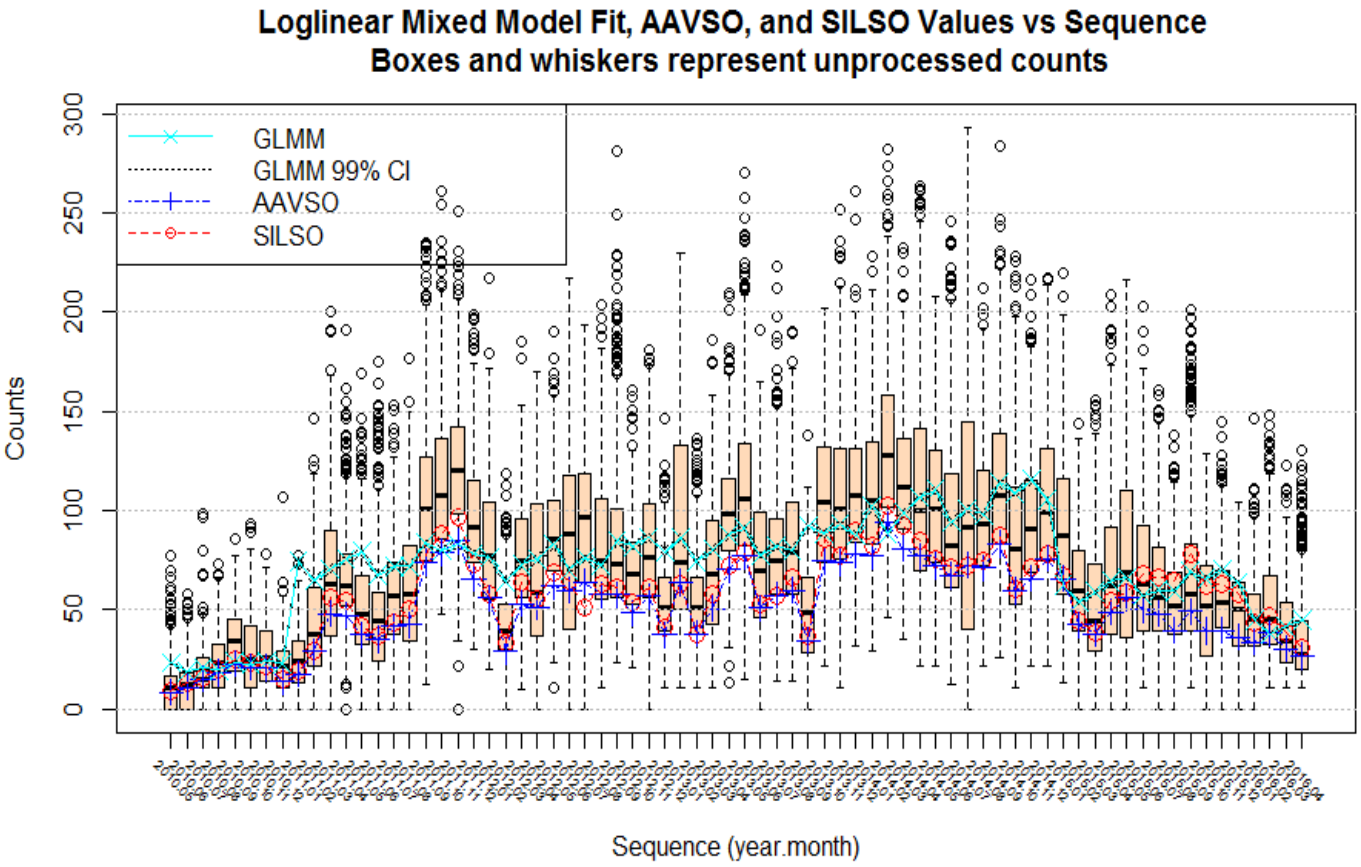
American Relative Sunspot Numbers (Ra) for April, 2016 [**boldface = maximum, minimum**]

DAY	NumObs	RAW	Ra
1	34	12	**10**
2	32	12	**10**
3	37	23	18
4	31	28	22
5	35	26	20
6	31	17	14
7	26	20	16
8	26	22	18
9	34	23	18
10	32	29	23
11	32	38	30
12	31	35	28
13	33	41	33
14	36	36	27
15	34	36	26
16	31	37	27
17	35	33	25
18	38	29	24
19	38	25	21
20	38	24	20
21	37	24	20
22	32	13	**10**
23	34	16	13
24	36	32	25
25	34	39	29
26	27	54	41
27	30	61	49
28	32	78	60
29	27	72	57
30	28	85	**63**
Average	**32.7**	**34.1**	**26.6**

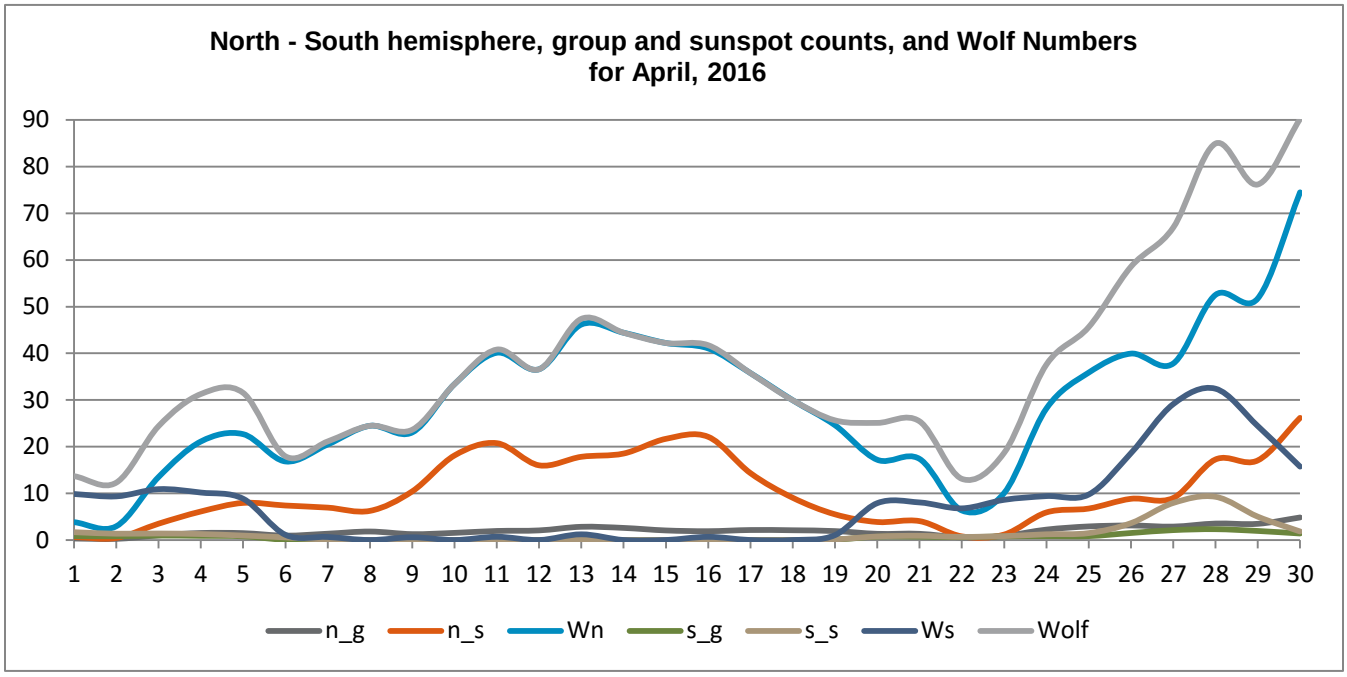
Obs	#Obs	Name
AAX	16	Alexandre Amorim
AJV	22	J. Alonso
ARAG	30	Gema Araujo
ASA	24	Salvador Aguirre
BARH	12	Howard Barnes
BATR	7	Roberto Battaiola
BERJ	21	Jose Alberto Berdejo
BLAJ	3	John A. Blackwell
BRAB	30	Brenda Branchett
BRAF	16	Raffaello Braga
BROB	26	Robert Brown
BSAB	27	Santanu Basu
BXD	9	Alexandru Burda
CHAG	29	German Morales Chavez
CIOA	9	Ioannis Chouinavas
CKB	25	Brian Cudnik
CNT	8	Dean Chantiles
DJOB	5	Jorge del Rosario
DUBF	29	Franky Dubois
FERJ	20	Javier Ruiz Fernandez
FLET	14	Tom Fleming
FLF	22	Fredirico Luiz Funari
FTAA	16	Tadeusz Figiel
FUJK	19	K. Fujimori
HAYK	18	Kim Hay
HMQ	3	Mark Harris
HOWR	23	Rodney Howe
JASK	20	Krystyna Wirkus
JDAC	17	David Jackson
JGE	2	Gerardo Jimenez Lopez
JJMA	9	Jessica M.Johnson
KAND	28	Kandilli Observatory
KAPJ	14	John Kaplan
KNJS	27	James & Shirley Knight
KROL	22	Larry Krozel
LEVM	19	Monty Leventhal
LKR	10	Kristine Larsen
LRRA	23	Robert LIttle
MARE	11	Enrico Mariani
MILJ	11	Jay Miller
MJAF	30	Juan Antonio Moreno Quesada
MJHA	25	John McCammon
MUDG	3	George Mudry
OATS	3	Susan Oatney
ONJ	8	John O'Neill
RLM	11	Mat Raymonde
SCGL	28	Gerd-Lutz Schott
SDHO	30	Jan Alvested (SDO)
SIMC	3	Clyde Simpson
SMNA	3	Michael Stephanou
SONA	10	Andries Son
STAB	29	Brian Gordon-States
SUZM	18	Miyoshi Suzuki
TESD	26	David Teske
URBP	22	Piotr Urbanski
VARG	28	A. Gonzalo Vargas
VIDD	12	Dan Vidican
VRUA	8	Ruben Verboven

WAU	1	Artur Wargin
WGI	1	Guido Wollenhaupt
WILW	18	William M. Wilson
WRP	3	Russell Wheeler

Total Observers: 62
Total Observations: 1016



The above graph, made from raw AAVSO sunspot and group counts data, is developed by Dr. Jamie Riggs and shows the comparison of the SILSO International Sunspot Number (ISN) along with the AAVSO American Relative (Ra) number, as well as her Generalized Log-linear Mixed Model (GLMM). AAVSO data go back to the beginning of this solar cycle 24 (2010). A close look will show how the ISN and Ra numbers match up until July, 2015, when SILSO changed their method for calculating the ISN. https://www.aavso.org/silso-warning-major-changes-sunspot-number-reference-series http://www.sidc.be/silso/ Now the SILSO numbers are beginning to match up to the American Ra and not match as close to Jamie's GLMM, which does not use the AAVSO k – factors, only raw daily counts. The SILSO relative mean sunspot number is 30.9 for April, 2016. (See last page of their April Solar Bulletin). http://www.sidc.be/sunspots/bulletins/monthly/monthlybull201604.pdf



There were 40 out of 62 observers who counted northern and southern hemisphere groups and sunspots this month. The northern hemisphere was predominant with days of crossover on the 3rd, 22nd, 23rd.

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Please note the new email address for Kim Hay