Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS
SOLAR COMMITTEE

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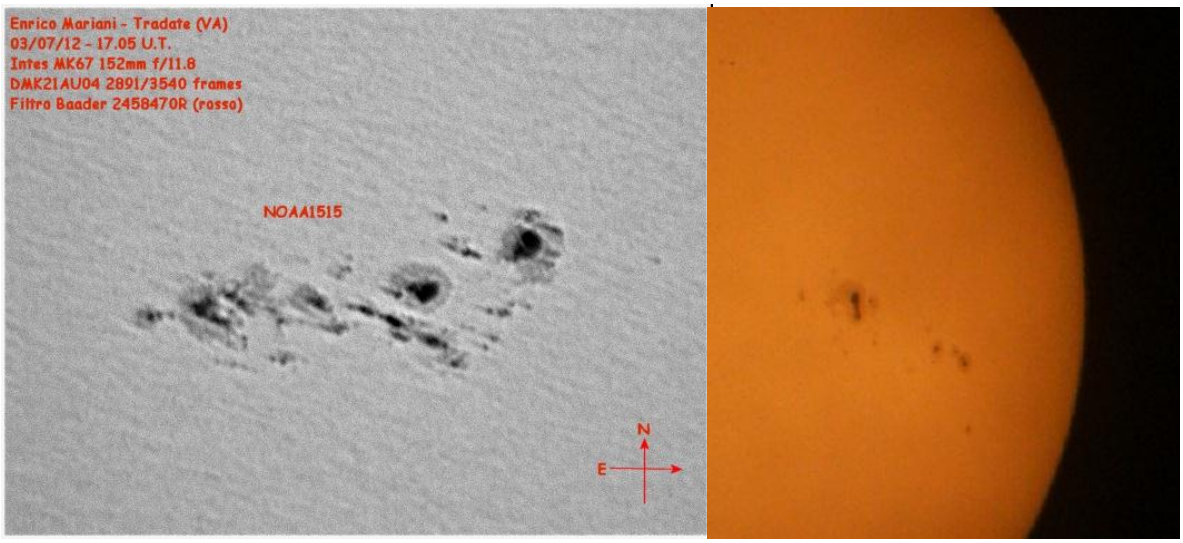
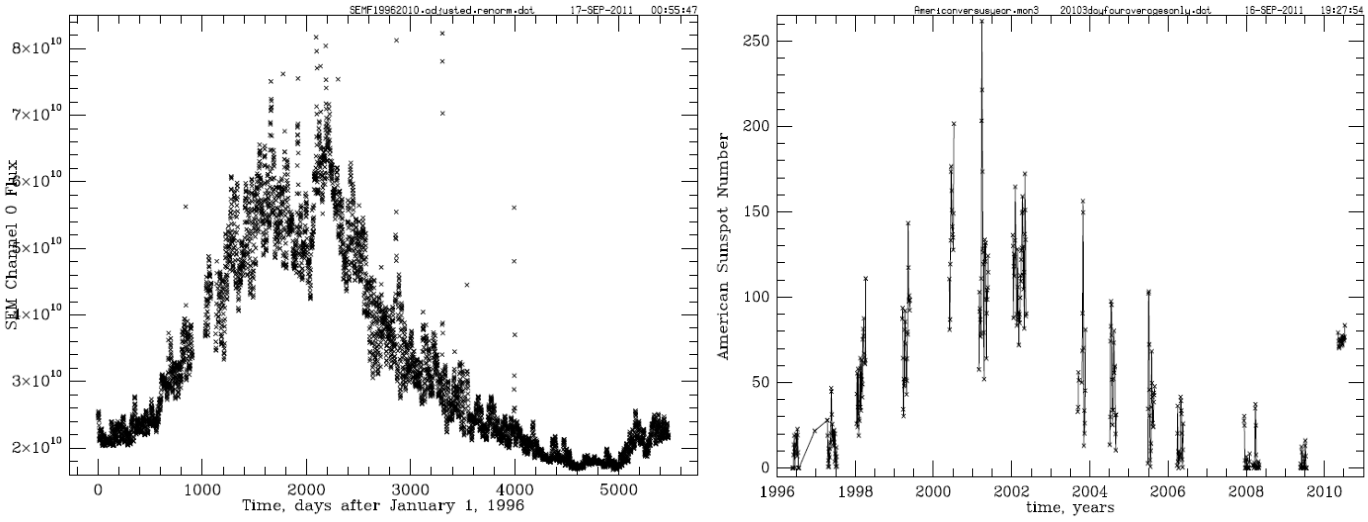
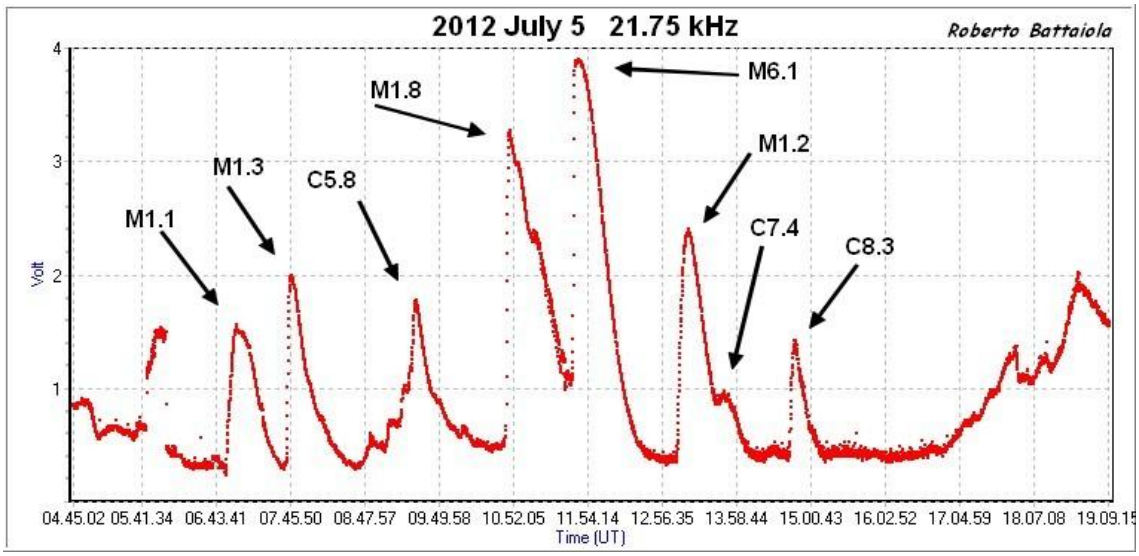


Ernest Richardson took the right image of AR1520 on the 14th July by holding the digital camera to the eye piece.



Ed Rhodes, professor at USC, has been using our observer's historical American Sunspot Numbers to compare with SOHO spacecraft data from the SEM and MDI detectors for the same period. The left plot shows daily average values of the Channel 0 Flux of Solar Extreme Ultraviolet Monitor from the SOHO spacecraft. http://umtof.umd.edu/semflux/ the plot runs from January 1, 1996, through December 31, 2010. The plot on the right shows groups of daily values of the American Sunspot Number for all 15 time intervals of the annual Dynamics Runs of the Michelson Doppler Imager (MDI) Experiment on the SOHO spacecraft. http://soi.stanford.edu/data/ MDI full-disk Doppler grams, i.e., full-disk surface line-of-sight velocity maps. Once we had computed the three-day averages of each activity indicator, we subtracted those three-day averages from one another to generate annual sets of solar activity differences. (More details on the next to the last page of this Solar Bulletin).



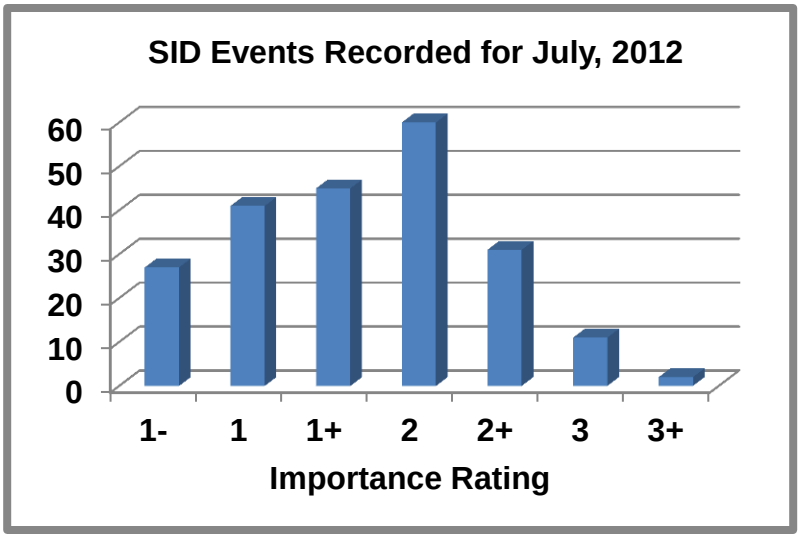
A very active day for solar flares!

Sudden Ionospheric Disturbances (SID) Records During July , 2012

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
120701	0715	1	120705	1756	1-	120709	2310	2+
120701	1545	1+	120705	1822	1+	120710	0344	1-
120701	1813	1	120705	1944	1+	120710	0439	1
120701	1917	2+	120705	2014	2	120710	0510	2+
120702	0523	2	120705	2022	2	120710	0626	2+
120702	0709	1-	120705	2148	2+	120710	0757	1+
120702	0857	1+	120705	2340	1	120710	0831	2
120702	1039	1-	120706	0142	2	120710	0907	1
120702	1052	1+	120706	0232	1+	120710	1026	2
120702	1100	3	120706	0252	2+	120710	1227	1+
120702	1346	1+	120706	0410	1-	120710	1344	2
120702	1445	1+	120706	0436	1-	120710	1350	2
120702	1601	2	120706	0500	1	120710	1546	2+
120702	1644	2	120706	0708	1	120710	2012	1
120702	1751	1+	120706	0824	2	120711	0516	1-
120702	1813	1+	120706	0920	1	120711	0537	1
120702	1855	1+	120706	1030	2	120711	0833	2
120702	2006	2	120706	1331	2	120711	1441	2
120702	2215	1	120706	1501	2	120712	0630	3+
120703	0607	1-	120706	1609	1-	120712	0733	1
120703	1310	1	120706	1714	1-	120712	0807	2
120703	1333	1	120706	1744	1+	120712	1516	1+
120703	1401	1-	120706	1854	1+	120712	1632	3
120703	1442	1+	120706	1925	2	120712	1641	3
120703	1613	2	120706	2307	2	120713	0629	1
120703	1704	2	120707	0317	3	120713	1225	1

120703	2044	1+	120707	0424	2	120713	2210	1+
120703	2331	2	120707	0640	2	120714	0458	2
120704	0144	2	120707	0710	2+	120714	1037	2
120704	0408	1+	120707	0814	3	120714	1417	2
120704	0440	2+	120707	0829	2	120714	1545	1
120704	0715	2+	120707	1002	1+	120715	1847	1
120704	0822	2+	120707	1044	1	120715	1950	1
120704	0845	1-	120707	1103	2	120716	0503	1+
120704	0906	1+	120707	1111	2+	120716	1308	1
120704	0956	2+	120707	1214	1-	120716	1608	2+
120704	1015	2+	120707	1307	1-	120716	1942	2+
120704	1118	1+	120707	1315	1	120717	0410	2
120704	1213	2+	120707	1349	1+	120717	0410	2
120704	1222	2+	120707	1447	1+	120717	1351	2+
120704	1413	1	120708	0011	1-	120717	1528	3+
120704	1442	2	120708	0206	1-	120717	1540	3
120704	1450	3	120708	0334	1	120717	1700	2+
120704	1521	1-	120708	0420	1-	120717	1708	2+
120704	1552	1-	120708	0533	1-	120718	0606	2
120704	1614	1	120708	0549	1+	120719	0522	3
120704	1642	2	120708	0628	1	120719	0544	3
120704	1731	1	120708	0954	1+	120719	1428	2
120704	2129	3	120708	1031	2	120723	1129	2
120704	2211	2	120708	1049	1+	120723	1540	2
120705	0113	2+	120708	1211	1+	120724	1031	1+
120705	0212	1-	120708	1302	2	120724	1145	2
120705	0244	2	120708	1354	1	120724	1355	2
120705	0340	2+	120708	1444	2	120724	1905	1
120705	0448	1-	120708	1450	1+	120725	1041	1+
120705	0505	1	120708	1632	2+	120727	1150	1
120705	0557	1	120708	1639	3	120727	1404	1+
120705	0618	1-	120708	1734	2	120727	1727	2+
120705	0655	1+	120708	1908	1-	120727	2030	2
120705	0702	1	120708	1925	1-	120728	2059	1+
120705	0746	1	120709	0348	1+	120729	0623	2
120705	0905	1-	120709	0531	1	120729	1201	1+
120705	0930	2	120709	0627	1+	120729	1507	2
120705	1010	1-	120709	0712	1	120730	0617	1
120705	1049	2	120709	0825	2+	120730	1037	1+
120705	1145	2	120709	0831	2+	120730	1405	2
120705	1158	2+	120709	0933	2+	120730	1549	2
120705	1315	1+	120709	1050	2	120731	1128	2+
120705	1321	2	120709	1222	2	120731	1425	2
120705	1349	1+	120709	1358	2	120731	1517	1+
120705	1429	1	120709	1538	2+	120731	1605	1
120705	1448	1+	120709	1546	2	120731	1727	1
120705	1602	1+	120709	1952	1			

Solar Events

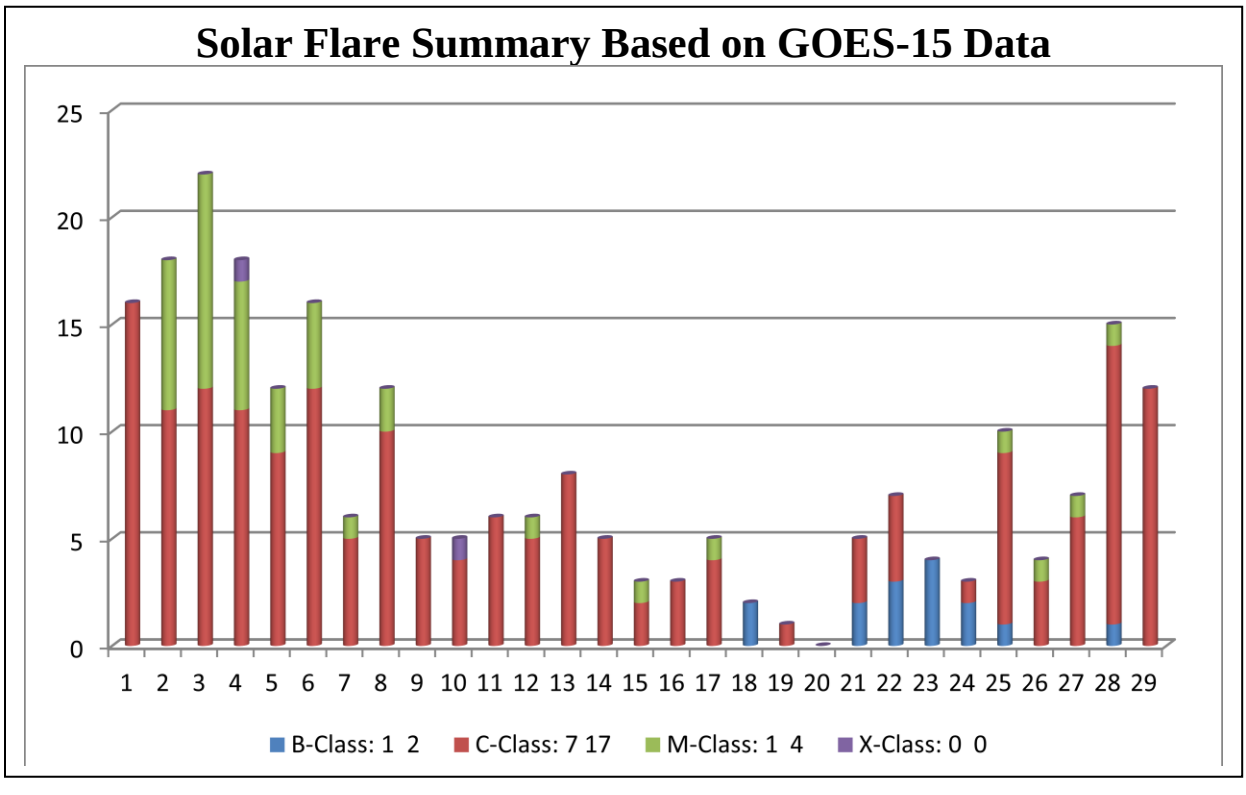


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: >125

Sudden Ionospheric Disturbances (SID) Observers During July , 2012

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	G Myers	A124	NLK
R Battaiola	A96	HWU	S Oatney	A125	NML NPM
J Wallace	A97	NAA	K Cotar	A129	DHO GBZ
A Son	A112	DHO	J Karlovsky	A131	DHO
L Loudet	A118	GBZ NAA TBB	E Soubrouillar	A132	DHO FTA HWU
J Godet	A119	GBZ GQD	T Santo	A133	NWC
F Adamson	A122	NWC	R Green	A134	NWC

There were 268 solar flares measured by GOES-15 for July , 2012. There were 2 X class and 44 M class flares, 204 C class and 18 B class flares. The sun was VERY active compared to June, 2012. There were 14 AAVSO SID Observers who submitted reports this month.



American Relative Sunspot Numbers (Ra) for July, 2012 [**boldface = maximum, minimum**]

DAY	NumObs	RAW	Ra
1	36	116	87
2	39	122	**89**
3	34	120	86
4	38	118	85
5	31	115	82
6	33	121	87
7	36	117	84
8	38	110	76
9	37	106	77
10	36	95	68
11	30	90	64
12	31	101	77
13	32	110	80
14	37	108	80
15	41	104	76
16	35	92	66
17	37	70	50
18	38	52	37
19	31	34	25
20	29	27	18
21	35	22	**17**
22	39	27	21
23	39	51	37
24	37	61	45
25	33	67	45
26	35	85	60
27	30	99	70
28	36	98	71
29	36	102	72
30	40	111	81
31	34	115	78
Average	35.3	89.2	64.3

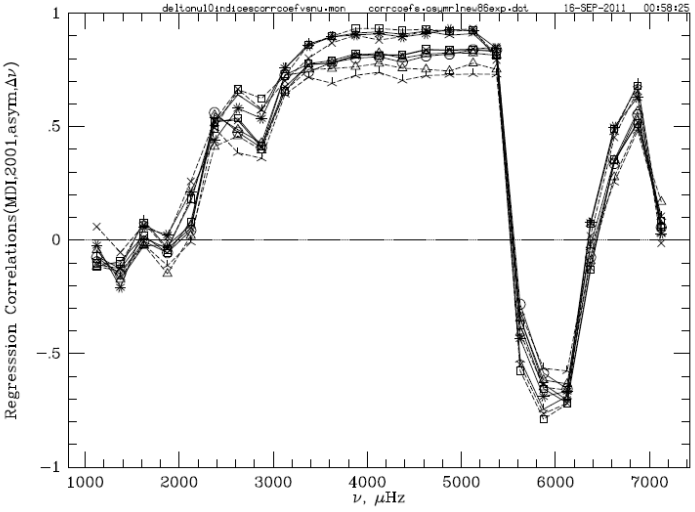
Observer	#Obs	Name
AAP	4	A. Patrick Abbott
AAX	14	Alexandre Amorim
AJV	23	J. Alonso
ARAG	31	Gema Araujo
ASA	12	Salvador Aguirre
BARH	9	Howard Barnes
BATR	2	Roberto Battaiola
BEB	21	Ray Berg
BERJ	8	Jose Alberto Berdejo
BMF	24	Michael Boschat
BRAB	31	Brenda Branchett
BRAF	28	Raffaello Braga
BROB	31	Robert Brown
CHAG	30	German Morales Chavez
CIOA	20	Ioannis Chouinavas
CKB	27	Brian Cudnik
CLZ	5	Laurent Corp
CNT	6	Dean Chantiles
CVJ	18	Jose Carvajal
DELS	7	Susan Delaney
DGP	31	Gerald Dyck
DJOB	22	Jorge del Rosario
DUBF	29	Franky Dubois
FAM	11	Fabio Mariuzza
FERJ	23	Javier Ruiz Fernandez
FLET	22	Tom Fleming
FLF	20	Fredirico Luiz Funari
FUJK	18	K. Fujimori
HALB	11	Brian Halls
HAYK	21	Kim Hay
HMQ	7	Mark Harris
HOWR	29	Rodney Howe
HRUT	24	Timothy Hrutkay
JASK	22	Krystyna Wirkus
JGE	9	Gerardo Jimenez Lopez
KAND	29	Kandilli Observatory
KAPJ	30	John Kaplan
KNJS	20	James & Shirley Knight
LEVM	9	Monty Leventhal
LKR	14	Kristine Larsen
KROL	7	Larry Krozel
MARE	9	Enrico Mariani
MCE	21	Etsuiku Mochizuki
MILJ	13	Jay Miller
MJHA	30	John McCammon
MMI	29	Michael Moeller
MUDG	26	George Mudry
OATS	24	Susan Oatney
OBSO	16	IPS Observatory
RICE	18	E. C. Richardson
SIMC	12	Clyde Simpson
SONA	14	Andries Son
SUZM	22	Miyoshi Suzuki
TESD	26	David Teske
URBP	28	Piotr Urbanski
VARG	23	A. Gonzalo Vargas
WILW	27	William M. Wilson

Total Observers 58
Total Observations 1100

Reporting Addresses:

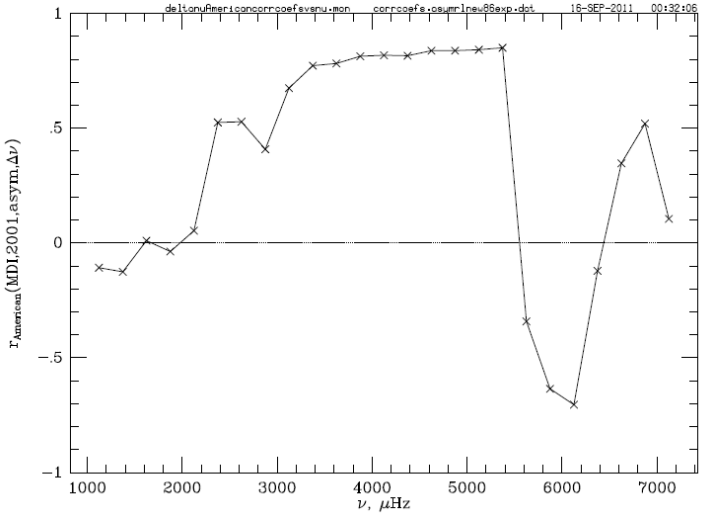
Sunspot Reports – Kim Hay
Email: solar.aavso@gmail.com

SID Solar Flare Reports – Rodney Howe
Email**: ahowe@frii.com**



The curve for the American Sunspot Number is one of the four middle curves, with the International Sunspot Number curve being nearly identical to it. The curve for the minus/plus zero-crossing frequency (MPSI) differences is shown here as one of the four highest curves. This difference in correlation coefficients shows that the solar oscillation frequencies correlated slightly better with the magnetically-derived activity indicators than was the case for the sunspot numbers. The differences in the absolute magnitudes of the correlation coefficients computed using the MPSI differences and the American Sunspot Number differences suggest that the frequencies are dependent upon the actual strengths of the solar magnetic field than they are upon the numbers of sunspots alone.

This next plot shows the frequency dependence of the correlation coefficients of the 25 different linear regression analyses of the frequency shifts in the 25 different bins. For most of the bins that were centered at frequencies that were less than 5500 micro Hertz, the frequency shifts were positively correlated with the changing levels of the American Sunspot Number. However, for the bins located between 5500 micro Hertz and 6500 micro Hertz the frequency shifts were anti-correlated with the American Sunspot Number differences. We refer to the frequency where the correlation coefficient changes from being positive to being negative as the plus/minus zero-crossing frequency. Similarly, we refer to the frequency where the correlations shift back from being negative to being positive as the minus/plus zero-crossing frequency.



I have just finished working with three of my students to download all of the monthly American Sunspot Number tables from November 2009 through June 2011. We previously found International Sunspot Numbers and 10.7-cm Coronal Fluxes from the NOAA website, and we have obtained Solar Extreme Ultraviolet Monitor fluxes from my colleague Prof. Darrell Judge, and we have also downloaded the MPSI and MWSI values from the UCLA Solar Astronomy group's website. Lastly, we have also downloaded the SORCE Total Solar Irradiance values for the same time interval. Hence, in one evening, we were able to double the number of solar activity indicators from only four to a total of eight.

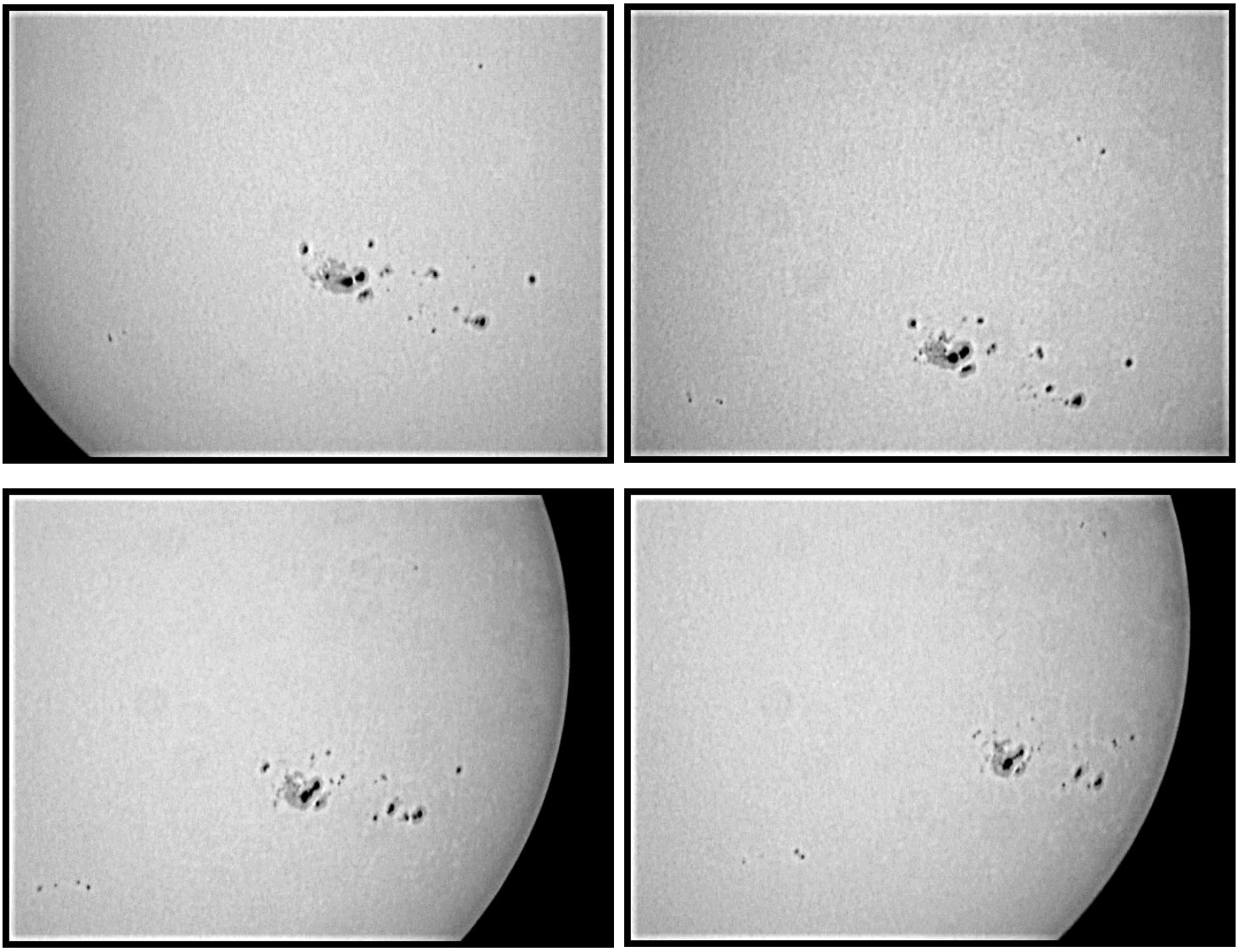
Because we are analyzing differences in solar oscillation frequencies, amplitudes, widths, and asymmetries that were computed from three-day time series of MDI and HMI observations from the SOHO and SDO spacecraft, respectively, we then computed three-day averages of all eight of the activity indices. We then computed sets of differences in those three-day averages. We will next be performing linear regression analyses of the binned oscillation parameter differences upon the differences in the averages of all eight activity indicators.

In our analyses of the MDI observations taken in previous years, we have seen subtle differences in the levels of correlation of the solar oscillation parameters with the different activity indicators that we are trying to understand.

Thank you very much for taking the time to respond to my earlier request
Sincerely yours,

Ed Rhodes
Professor of Astronomy
Dana and David Dornsife College of Letters, Arts, and Sciences
University of Southern California

http://dornsife.usc.edu/cf/faculty-and-staff/faculty.cfm?pid=1003635



Active Region AR1520 - 521 and the smaller group AR1523 (off to the left) for July 12, 13,14 and 15 showing the evolution of these three groups of sunspots as they rotate toward the right limb: images taken by Dan Vidican