

Monthly Report (00)

2024.08 Data Set

Saturday 14th September, 2024

Prepared for

Statistics for Physical and Engineering Sciences

by

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1 Introduction

The process of reporting monthly Sunspot numbers consists of submitting individual observer's daily counts for a specific month to the AAVSO Solar Section. These data are maintained in a SQL database. The monthly data then are extracted for analysis using the R statistics package (<http://www.R-project.org/>). This report is the portion of the analysis concerned with both the raw daily average counts and the data Accuracy, Consistency, and Completeness measures for a particular month. The checks are used to scrub or filter the data to assure only error-free data are used to determine the monthly sunspot number.

This report consists of four sections: the raw daily average counts (Section 2), the known data errors (Section 3), the processed counts using a Generalized Linear Mixed Model to produce the relative sunspot numbers (Section 4), and supporting information on the model construction (Section 5).

The raw daily average of counts consist of submitted counts from all observers who provided data in the particular month. These averaged counts are reported by the day of the month, and are either from data not scrubbed or corrected data. The table captions indicate which. The errors, if any, are reported according to type.

The Error Tables section contains reported errors on missing data, inconsistencies in year and month, inconsistencies in the reported day number (1-31), seeing coding errors, number of annual observations by observer, and inconsistencies between the reported Wolf number and the calculated Wolf number from the group counts and sunspot counts, among other errors that are given in that section.

The relative sunspot numbers R_a section contains the sunspot numbers after the submitted data are scrubbed and modeled by a Generalized Linear Mixed Model (GLMM). The GLMM is a statistical model that accounts for variation due to random effects and fixed effects. For the R_a model random effects include the AAVSO observer as these observers are a selection from all possible observers, and the fixed effects include seeing conditions at one of four possible levels. More details on GLMM are available in a paper (GLMM05) on the sunspot counts research page. The paper title is *A Generalized Linear Mixed Model for Enumerated Sunspots*.

The supporting information for the model is provided for clarification.

2 Raw Daily Average Counts

The reported raw daily average counts have been checked for errors and inconsistencies, and no known errors are present. All observers whose submissions qualify through this month's scrubbing process are represented in Figure 1 and Table 1.

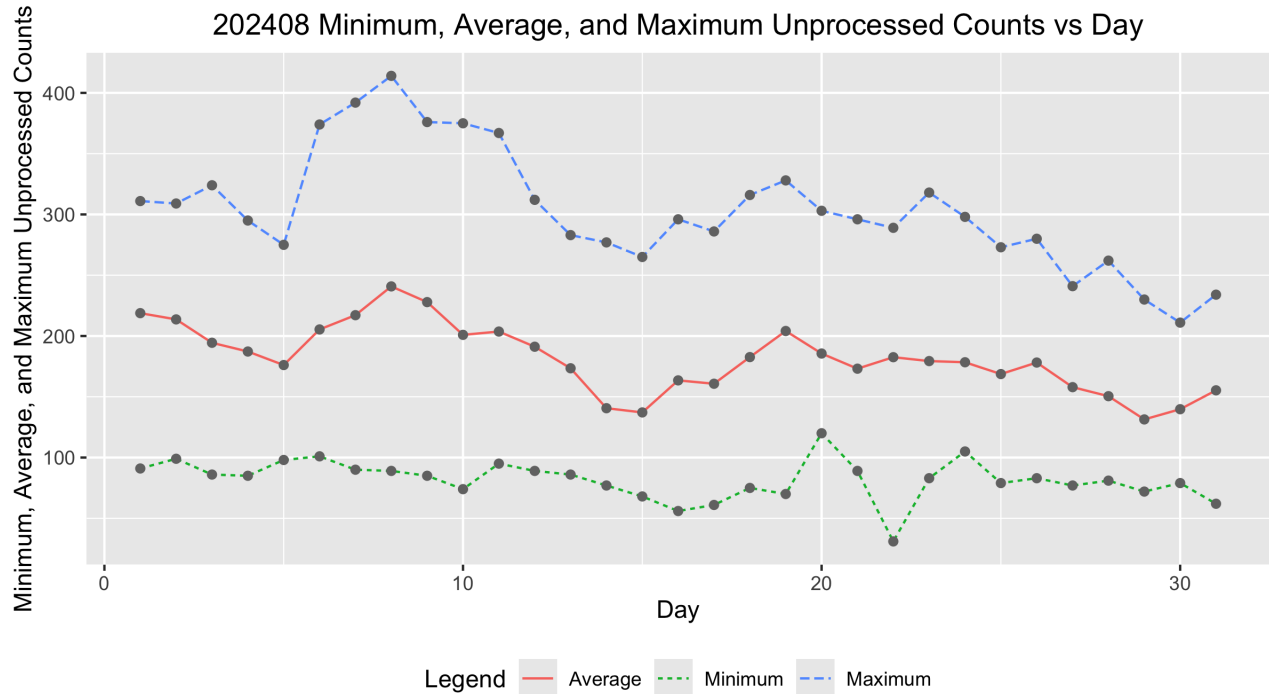


Figure 1: Raw average sunspot count by day of the month.

Table 1: 202408 Daily Raw Counts

Day	Submissions	Minimum	Average	Maximum
1.0000	39.0000	91.0000	218.7949	311.0000
2.0000	34.0000	99.0000	213.6471	309.0000
3.0000	36.0000	86.0000	194.4167	324.0000
4.0000	36.0000	85.0000	187.2222	295.0000
5.0000	41.0000	98.0000	176.0976	275.0000
6.0000	39.0000	101.0000	205.3846	374.0000
7.0000	39.0000	90.0000	217.1282	392.0000
8.0000	35.0000	89.0000	240.8000	414.0000
9.0000	42.0000	85.0000	227.8810	376.0000
10.0000	43.0000	74.0000	200.9302	375.0000
11.0000	41.0000	95.0000	203.6585	367.0000
12.0000	45.0000	89.0000	191.1778	312.0000
13.0000	41.0000	86.0000	173.4390	283.0000
14.0000	37.0000	77.0000	140.5946	277.0000
15.0000	35.0000	68.0000	137.1143	265.0000
16.0000	37.0000	56.0000	163.4865	296.0000
17.0000	35.0000	61.0000	160.7143	286.0000
18.0000	25.0000	75.0000	182.6400	316.0000
19.0000	34.0000	70.0000	204.1176	328.0000
20.0000	38.0000	120.0000	185.5789	303.0000
21.0000	37.0000	89.0000	173.1081	296.0000
22.0000	39.0000	31.0000	182.5641	289.0000
23.0000	38.0000	83.0000	179.3684	318.0000
24.0000	33.0000	105.0000	178.3939	298.0000
25.0000	38.0000	79.0000	168.6842	273.0000
26.0000	38.0000	83.0000	178.1579	280.0000
27.0000	39.0000	77.0000	157.9231	241.0000
28.0000	39.0000	81.0000	150.4872	262.0000
29.0000	38.0000	72.0000	131.3684	230.0000
30.0000	31.0000	79.0000	139.7742	211.0000
31.0000	30.0000	62.0000	155.3000	234.0000

3 Error Tables

Data are for the month of August 2024. No errors were found, and hence no errors are reported.

4 Relative Sunspot Numbers

All data errors, if any, have been corrected prior to determining the following relative sunspot numbers. A Generalized Linear Mixed Model (GLMM) was constructed to provide monthly sunspot numbers (see Table 2). The GLMM treats observer as a random effect, with year, month, seeing conditions, observer rank, and dual submission to both AAVSO and SILSO as fixed effects.

Figure 2 shows the monthly R_a numbers for the years and months (ym) in Table 2. The solid cyan curve that connects the cyan X's are the GLMM model estimates given in 2. The dotted black curves on either side of the cyan curve depict a 99% confidence band about the GLMM estimates. The confidence band uses the large sample approximation based on the Gaussian distribution. The dashed red curve connecting the red O's are the SILSO values for the monthly sequence.

The tan box plots for each month are the actual observations submitted by the AAVSO observers. The heavy solid lines approximately midway in the boxes represent the count medians. The box of the box plot represents the InterQuartile Range (IQR), which depicts from the 25th through the 75th quartiles. The lower and upper whiskers extend 1.5 times the IQR below the 25th quartile, and 1.5 times the IQR above the 75th quartile. The black circles below and above the whiskers traditionally are considered outliers, but with GLMM modeling, they are observations that comprise overdispersion. Overdispersion skews the counts data from a true Poisson distribution. The GLMM adjusts for this overdispersion.

Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2008.12	2.7705	2.4316	3.1094	0.5000	1.0000
2009.01	5.2359	4.7055	5.7663	1.3000	1.3000
2009.02	4.7038	4.2116	5.1959	0.7000	1.2000
2009.03	5.9341	5.7157	6.1526	0.3000	0.6000
2009.04	6.5788	6.3615	6.7960	0.4000	1.2000
2009.05	7.0534	6.7933	7.3136	1.6000	2.9000
2009.06	7.1258	6.7946	7.4570	3.2000	6.3000
2009.07	6.8947	6.6264	7.1630	3.6000	5.5000
2009.08	7.0002	6.7564	7.2441	0.0000	0.0000
2009.09	7.3825	7.1380	7.6271	4.5000	7.1000
2009.10	6.6673	6.3290	7.0056	4.5000	7.7000
2009.11	6.7160	6.5207	6.9113	3.3000	6.9000
2009.12	7.2776	7.0529	7.5022	10.4000	16.3000
2010.01	19.4179	17.3586	21.4772	13.3000	19.5000
2010.02	15.7761	13.7859	17.7663	19.4000	28.5000

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Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2010.03	17.0916	15.1105	19.0727	15.4000	24.0000
2010.04	18.5839	16.5385	20.6294	7.0000	10.4000
2010.05	22.8070	22.3668	23.2472	8.4000	8.7000
2010.06	21.7883	21.3742	22.2023	11.0000	13.6000
2010.07	22.9808	22.5856	23.3761	15.2000	16.1000
2010.08	22.4328	21.9948	22.8708	18.3000	19.6000
2010.09	24.7837	24.2981	25.2694	22.8000	25.2000
2010.10	22.7722	22.2936	23.2508	21.0000	23.5000
2010.11	23.2271	22.7536	23.7007	20.9000	21.6000
2010.12	24.3448	23.7970	24.8926	13.9000	14.5000
2011.01	69.8103	68.2295	71.3912	17.7000	18.7000
2011.02	61.6874	60.2272	63.1476	29.1000	29.6000
2011.03	64.4477	63.0692	65.8261	48.0000	55.8000
2011.04	71.5705	70.0229	73.1181	47.3000	54.4000
2011.05	76.3887	74.8934	77.8840	37.3000	41.5000
2011.06	72.4081	70.9681	73.8482	35.2000	37.0000
2011.07	75.2798	73.8625	76.6971	41.5000	43.8000
2011.08	74.2023	72.8634	75.5412	42.4000	50.5000
2011.09	81.1648	79.5645	82.7652	73.8000	78.0000
2011.10	74.2487	72.8349	75.6626	78.9000	88.0000
2011.11	75.8739	74.2019	77.5459	84.6000	96.7000
2011.12	77.6746	75.9894	79.3598	65.8000	73.0000
2012.01	75.0280	73.4454	76.6106	55.8000	58.2000
2012.02	65.3191	63.8766	66.7617	29.2000	33.1000
2012.03	68.6994	67.3985	70.0003	53.1000	64.1000
2012.04	74.6659	73.2001	76.1317	51.4000	55.2000
2012.05	81.6458	80.1348	83.1569	61.8000	69.0000
2012.06	77.0713	75.6242	78.5184	59.7000	64.5000
2012.07	80.8583	79.3796	82.3371	64.2000	51.3000
2012.08	76.6688	75.2897	78.0479	57.7000	63.1000
2012.09	84.0063	82.4331	85.5795	57.7000	61.5000
2012.10	77.8776	76.3349	79.4202	48.3000	53.3000
2012.11	79.8811	78.1781	81.5841	56.7000	61.4000
2012.12	81.6353	79.7903	83.4803	37.4000	40.8000
2013.01	83.0066	81.3245	84.6887	63.8000	62.9000
2013.02	72.4192	70.8500	73.9885	37.8000	38.0000
2013.03	73.9114	72.3180	75.5048	50.6000	57.9000
2013.04	81.3118	79.7607	82.8629	70.6000	72.4000
2013.05	86.8270	85.1189	88.5352	77.4000	78.7000

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Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2013.06	83.6779	82.0299	85.3260	51.0000	52.5000
2013.07	86.8350	85.2727	88.3972	57.0000	57.0000
2013.08	84.1405	82.6415	85.6394	60.0000	66.0000
2013.09	90.6424	88.8937	92.3911	34.6000	36.9000
2013.10	82.8437	81.1864	84.5010	74.5000	85.6000
2013.11	83.8202	81.7861	85.8543	73.9000	77.6000
2013.12	87.9877	86.0322	89.9432	77.8000	90.3000
2014.01	97.1411	94.9960	99.2862	77.4000	82.0000
2014.02	86.5592	84.6911	88.4272	93.9000	102.8000
2014.03	90.2965	88.5315	92.0616	80.9000	92.2000
2014.04	99.4595	97.5528	101.3663	76.9000	84.7000
2014.05	106.8169	104.8461	108.7876	72.3000	75.2000
2014.06	102.7523	100.8248	104.6799	67.2000	71.0000
2014.07	106.1745	104.2113	108.1378	72.5000	72.5000
2014.08	102.8902	101.1277	104.6527	71.2000	74.7000
2014.09	112.1314	109.9615	114.3012	83.2000	87.6000
2014.10	101.9611	99.9565	103.9656	59.5000	60.6000
2014.11	104.1064	101.7786	106.4342	65.8000	71.1000
2014.12	106.5928	104.0735	109.1120	75.8000	78.0000
2015.01	60.1021	58.8564	61.3478	65.9000	67.0000
2015.02	52.4723	51.2102	53.7343	42.4000	44.8000
2015.03	55.5152	54.4259	56.6044	38.0000	38.4000
2015.04	60.8283	59.6322	62.0245	49.0000	54.4000
2015.05	65.2357	64.0676	66.4037	56.3000	58.8000
2015.06	62.2406	61.0868	63.3944	50.2000	68.3000
2015.07	63.6275	62.5372	64.7179	47.9000	65.8000
2015.08	62.9091	61.8434	63.9748	39.5000	57.2000
2015.09	67.9399	66.6939	69.1859	49.2000	72.1000
2015.10	62.2300	61.0183	63.4417	39.3000	48.3000
2015.11	64.0068	62.5888	65.4249	39.6000	55.9000
2015.12	66.3415	64.8467	67.8364	36.4000	44.8000
2016.01	32.8741	32.1763	33.5720	33.7000	43.3000
2016.02	28.6408	28.0331	29.2484	38.3000	46.8000
2016.03	29.8909	29.2831	30.4986	30.5000	38.9000
2016.04	32.4927	31.8626	33.1227	26.6000	30.9000
2016.05	35.0302	34.3843	35.6761	33.7000	48.4000
2016.06	33.2283	32.6549	33.8016	13.1000	19.5000
2016.07	34.7241	34.1595	35.2888	21.2000	27.5000
2016.08	33.8817	33.2774	34.4861	33.0000	47.9000

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Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2016.09	37.3935	36.7015	38.0854	27.7000	37.1000
2016.10	33.9813	33.3180	34.6446	22.7000	31.7000
2016.11	34.5867	33.8554	35.3180	14.0000	22.2000
2016.12	36.2639	35.4757	37.0521	11.1000	20.0000
2017.01	17.7329	17.3537	18.1120	18.4000	26.2000
2017.02	15.5213	15.1739	15.8688	14.4000	20.6000
2017.03	16.2906	15.9744	16.6069	11.3000	15.5000
2017.04	17.8925	17.5718	18.2132	21.6000	33.2000
2017.05	19.0625	18.7281	19.3970	12.5000	18.1000
2017.06	18.0360	17.7341	18.3378	15.5000	19.3000
2017.07	18.9188	18.6128	19.2247	11.5000	16.3000
2017.08	18.4516	18.1274	18.7758	22.8000	35.7000
2017.09	20.6456	20.2113	21.0800	34.6000	42.9000
2017.10	18.2534	17.8776	18.6292	10.5000	11.0000
2017.11	18.5077	18.1132	18.9021	4.2000	5.6000
2017.12	19.3079	19.0118	19.6041	4.0000	4.6000
2018.01	4.9086	4.8025	5.0147	3.1000	6.3000
2018.02	4.2525	4.1493	4.3557	6.8000	11.8000
2018.03	4.4056	4.3163	4.4950	1.1000	1.2000
2018.04	4.7813	4.6848	4.8778	4.7000	7.5000
2018.05	5.1663	5.0700	5.2626	8.4000	14.0000
2018.06	4.9104	4.8234	4.9973	10.2000	13.6000
2018.07	5.1648	5.1072	5.2224	0.5000	1.7000
2018.08	4.9739	4.8890	5.0587	5.9000	9.5000
2018.09	5.3753	5.2752	5.4753	1.6000	2.9000
2018.10	4.9989	4.9017	5.0960	2.5000	5.6000
2018.11	5.0720	4.9658	5.1781	3.1000	4.2000
2018.12	5.3837	5.2787	5.4887	1.6000	2.3000
2019.01	3.2766	3.2139	3.3393	5.4000	2.3000
2019.02	2.8924	2.8351	2.9497	0.1000	1.2000
2019.03	2.9652	2.9147	3.0156	6.1000	12.1000
2019.04	3.2598	3.1988	3.3208	6.2000	9.3000
2019.05	3.4113	3.3522	3.4705	7.0000	11.9000
2019.06	3.2603	3.2055	3.3151	0.7000	1.5000
2019.07	3.4174	3.3668	3.4680	0.4000	2.2000
2019.08	3.3411	3.2918	3.3903	0.3000	0.8000
2019.09	3.6833	3.6257	3.7408	0.5000	1.0000
2019.10	3.3310	3.2748	3.3872	0.2000	0.5000
2019.11	3.4560	3.3896	3.5224	0.3000	0.6000

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Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2019.12	3.5768	3.5049	3.6488	0.8000	1.0000
2020.01	7.2485	7.1067	7.3904	4.0000	5.3000
2020.02	6.3457	6.2186	6.4727	0.1000	0.0000
2020.03	6.5565	6.4342	6.6788	1.2000	1.5000
2020.04	7.2585	7.1408	7.3762	3.0000	5.1000
2020.05	7.6504	7.5322	7.7686	0.1000	0.4000
2020.06	7.3563	7.2436	7.4690	3.9000	6.4000
2020.07	7.6074	7.4953	7.7194	4.2000	7.7000
2020.08	7.3396	7.2383	7.4409	5.3000	7.8000
2020.09	8.0583	7.9290	8.1875	0.4000	0.9000
2020.10	7.4533	7.3304	7.5763	9.9000	13.6000
2020.11	7.6328	7.5071	7.7586	21.2000	33.1000
2020.12	7.9273	7.7832	8.0713	15.4000	19.8000
2021.01	25.2341	24.7799	25.6882	7.0000	15.8000
2021.02	22.5368	22.1369	22.9367	5.8000	10.7000
2021.03	23.4267	23.0560	23.7973	11.0000	17.2000
2021.04	26.1221	25.6493	26.5949	18.5000	28.8000
2021.05	27.8549	27.3949	28.3149	15.9000	22.9000
2021.06	26.6123	26.1646	27.0599	19.9000	24.1000
2021.07	27.4270	26.9507	27.9033	23.8000	35.6000
2021.08	27.3182	26.8487	27.7877	15.7000	19.5000
2021.09	29.6651	29.1334	30.1969	39.1000	52.5000
2021.10	27.7831	27.2730	28.2933	27.1000	37.0000
2021.11	28.0647	27.5257	28.6037	27.2000	35.1000
2021.12	30.0138	29.3772	30.6505	50.6000	69.0000
2022.01	72.1996	70.8230	73.5762	43.9000	62.0000
2022.02	64.0117	62.7495	65.2739	48.8000	60.5000
2022.03	67.2917	65.9797	68.6036	58.4000	80.6000
2022.04	71.4402	70.1981	72.6823	59.1000	83.9000
2022.05	78.7851	77.4313	80.1389	72.5000	0.4000
2022.06	73.0841	71.8601	74.3080	58.9000	0.4000
2022.07	77.4203	76.0681	78.7725	76.7000	102.5000
2022.08	75.6642	74.3831	76.9454	63.3000	86.0000
2022.09	82.1812	80.5625	83.7998	72.6000	94.5000
2022.10	75.5063	74.0880	76.9245	66.4000	112.1000
2022.11	76.7455	75.1698	78.3212	54.3000	82.1000
2022.12	80.4515	78.5796	82.3234	93.7000	165.0000
2023.01	118.9651	116.2112	121.7190	112.9000	173.8000
2023.02	103.0109	100.7088	105.3130	89.6000	152.3000

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Table 2: Year Month (ym) Relative Sunspot Numbers with 99% CI

ym	Ra	lci99	uci99	aavso	sidc
2023.03	104.8010	102.5057	107.0963	85.0000	126.8000
2023.04	115.4318	113.1205	117.7431	72.1000	114.3000
2023.05	123.9030	121.4087	126.3973	105.0000	140.0000
2023.06	119.9765	118.6098	121.3433	118.5000	173.0000
2023.07	121.2462	118.9813	123.5110	124.7000	161.2000
2023.08	118.9474	116.7206	121.1741	90.6000	132.5000
2023.09	131.1800	128.6011	133.7589	110.4000	156.8000
2023.10	120.2020	117.5698	122.8343	78.4000	119.6000
2023.11	119.2662	116.5016	122.0308	88.6000	105.1000
2023.12	128.0844	125.0095	131.1594	98.2000	115.0000
2024.01	140.9975	137.3453	144.6497	102.8000	120.0000
2024.02	120.1953	117.4060	122.9846	94.8000	124.6000
2024.03	126.7185	123.9233	129.5137	84.8000	119.4000
2024.04	137.4906	134.5013	140.4799	107.1000	136.5000
2024.05	146.8905	143.9115	149.8696	120.5000	171.7000
2024.06	138.3609	135.7060	141.0159	124.8000	164.2000
2024.07	143.9195	141.0370	146.8021	146.7000	196.5000
2024.08	143.4489	140.6193	146.2784	158.4000	215.5000

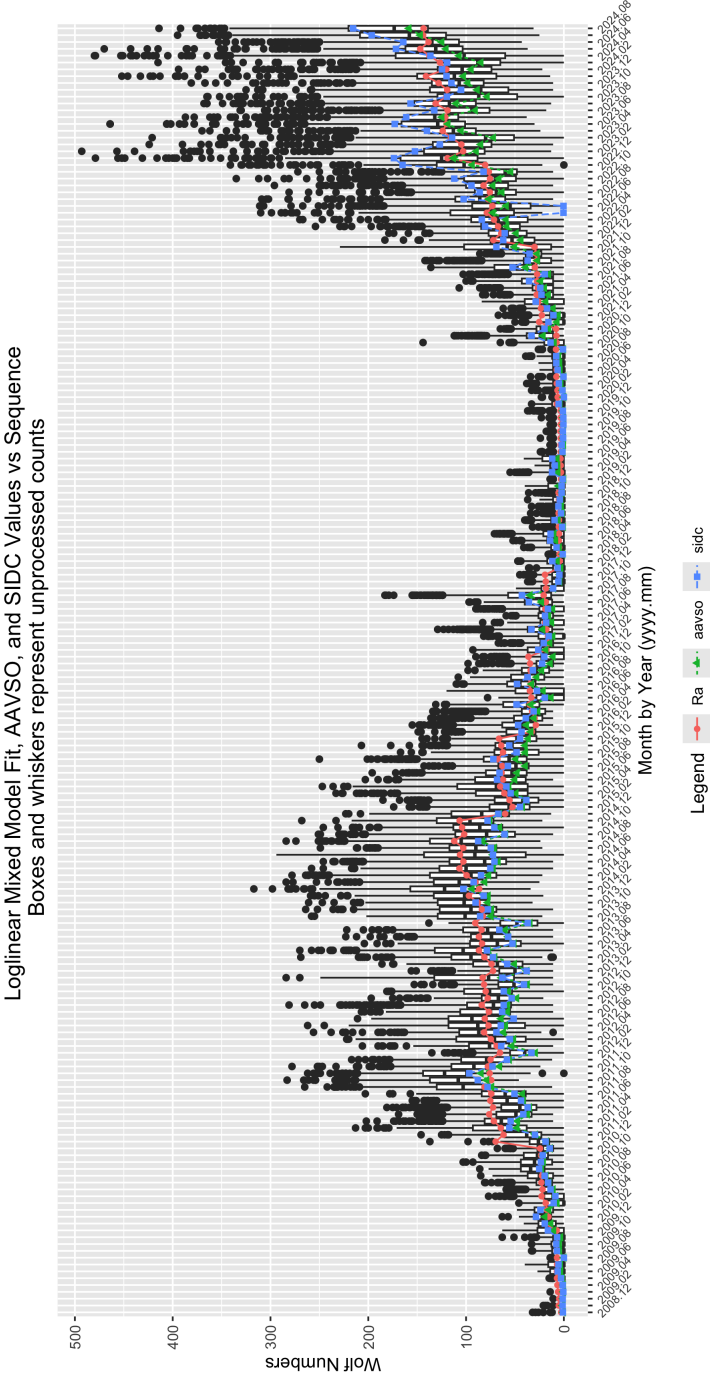


Figure 2: GLMM fitted data for R_a . AAVSO data: <https://www.aavso.org/category/tags/solar-bulletin>. SILSO data: WDC-SILSO, Royal Observatory of Belgium, Brussels

The GLMM parameter estimates and measures of importance in the determining the monthly R_a values are given in Table 3. The parameter estimates and levels of statistical significance are determined for the residual error size combined with the observer random effect error size. Thus, the parameter estimates are adjusted for the random effect of observer. The significance level is set at 0.05. Any $\Pr(>|z|)$ values equal to or less than 0.05 are considered statistically significant.

The year effect levels are given as year2011, year2012, and year2013. The yearly effect is significant as $\Pr(>|z|) < 0.05$. So the year in which the observations are made is commensurate with the expected rise toward and anticipated sunspot number maximum. Similarly, the monthly effect, denoted as mon2 through mon12, is significant at the 0.05 level.

The seeing conditions account for a significant amount of deviation in sunspot numbers. The seeing conditions are denoted as seeF (Fair), seeG (Good), and seeP (Poor), and are significant at the 0.05 level. Therefore, seeing conditions influence the reported sunspot numbers, as intuition anticipates.

The level of observer experience (denoted r1000B through r5000H, which is least to most experience) is not significant at the 0.05 significance level. It therefore does not contribute to changes in the monthly sunspot numbers.

Whether an observer contributes counts to the SILSO as well as the AAVSO (silsoy) is not significant at the 0.05 level, and hence we conclude that those observers who contribution to both institutions tend to differ from those observers contributing only to the AAVSO.

5 Supporting Information

Table 3: 202408 Parameter Estimates

	Estimate	Std. Error	t-value	Pr(> t)
(Intercept)	1.1707	0.3171	3.6926	0.0002
seeG	-0.1065	0.0040	-26.7920	0.0000
seeF	-0.2183	0.0046	-47.7003	0.0000
seeP	-0.3135	0.0066	-47.3291	0.0000
seeM	-0.1719	0.0244	-7.0435	0.0000
sidc1	0.0549	0.0095	5.7853	0.0000
year2009	0.7628	0.3187	2.3937	0.0167
year2010	1.9779	0.3164	6.2504	0.0000
year2011	3.1353	0.3163	9.9111	0.0000
year2012	3.1815	0.3163	10.0573	0.0000
year2013	3.2755	0.3163	10.3545	0.0000
year2014	3.4754	0.3163	10.9867	0.0000
year2015	2.9975	0.3163	9.4754	0.0000
year2016	2.3818	0.3164	7.5283	0.0000
year2017	1.7701	0.3164	5.5943	0.0000
year2018	0.4794	0.3167	1.5136	0.1301
year2019	0.0733	0.3169	0.2314	0.8170
year2020	0.8794	0.3166	2.7781	0.0055
year2021	2.1595	0.3164	6.8255	0.0000
year2022	3.1521	0.3163	9.9640	0.0000
year2023	3.6259	0.3163	11.4621	0.0000
year2024	3.8132	0.3164	12.0534	0.0000
mon2	-0.1293	0.0072	-18.0181	0.0000
mon3	-0.0916	0.0069	-13.3635	0.0000
mon4	-0.0088	0.0066	-1.3202	0.1868
mon5	0.0561	0.0064	8.7340	0.0000
mon6	0.0079	0.0063	1.2707	0.2039
mon7	0.0416	0.0064	6.5074	0.0000
mon8	0.0184	0.0064	2.8859	0.0039
mon9	0.1140	0.0067	17.1066	0.0000
mon10	0.0272	0.0069	3.9492	0.0001
mon11	0.0606	0.0071	8.4927	0.0000
mon12	0.1038	0.0071	14.6200	0.0000

Table 4: 202408 Summary of Sunspot Numbers

year	mon	day	obs	sidc
Min. :2008	Min. : 1.000	Min. : 0.00	Length:186256	Min. :0.000
1st Qu.:2014	1st Qu.: 4.000	1st Qu.: 8.00	Class :character	1st Qu.:0.000
Median :2017	Median : 7.000	Median :16.00	Mode :character	Median :0.000
Mean :2017	Mean : 6.552	Mean :15.71		Mean :0.235
3rd Qu.:2021	3rd Qu.: 9.000	3rd Qu.:23.00		3rd Qu.:0.000
Max. :2024	Max. :12.000	Max. :31.00		Max. :1.000

Table 5: 202408 Summary of Sunspot Numbers

g	s	w	see	method
Min. : 0.000	Min. : 0.00	Min. : 0.00	E:39474	Length:186256
1st Qu.: 1.000	1st Qu.: 1.00	1st Qu.: 11.00	G:76601	Class :character
Median : 3.000	Median : 11.00	Median : 40.00	F:54023	Mode :character
Mean : 3.428	Mean : 20.06	Mean : 54.34	P:15373	
3rd Qu.: 5.000	3rd Qu.: 30.00	3rd Qu.: 86.00	M: 785	
Max. :31.000	Max. :295.00	Max. :493.00		

Table 6: 202408 Summary of Sunspot Numbers

inst	filter	unit
Length:186256	Length:186256	Length:186256
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Table 7: 202408 Summary of Sunspot Numbers

aperture	eyep	foclen	mag
Min. : 0.00	Min. : 0.00	Min. : 0.0	Min. : 0.0
1st Qu.: 60.00	1st Qu.: 4.00	1st Qu.: 400.0	1st Qu.: 40.0
Median : 80.00	Median : 14.00	Median : 900.0	Median : 55.0
Mean : 94.14	Mean : 40.96	Mean : 889.3	Mean : 180.5
3rd Qu.: 104.00	3rd Qu.: 23.00	3rd Qu.:1200.0	3rd Qu.: 72.0
Max. :1524.00	Max. :2010.00	Max. :9990.0	Max. :4591.0

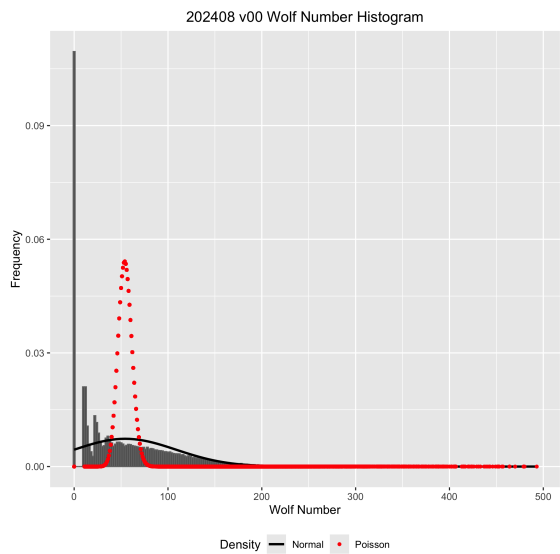


Figure 3: Box plots of raw Wolf number (w) by observer rank.

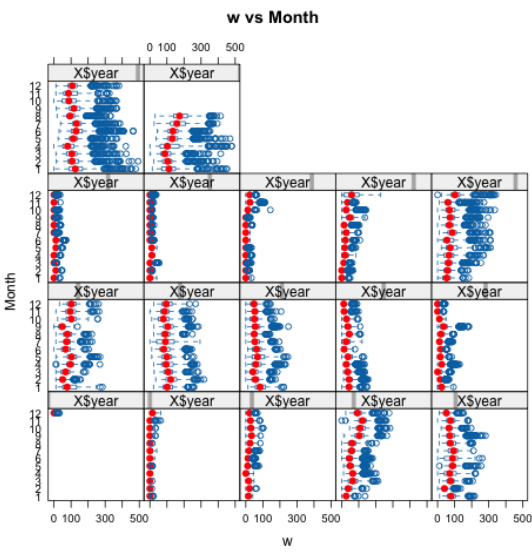


Figure 4: Box plots of raw Wolf number (w) by month and year.

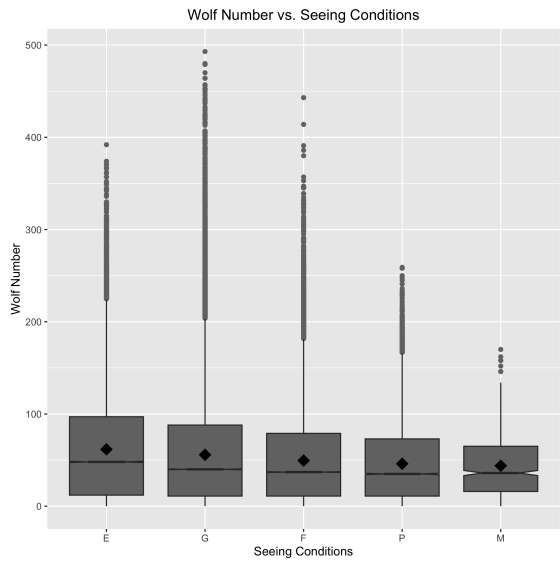


Figure 5: Box plots of raw Wolf number (w) by seeing condition.

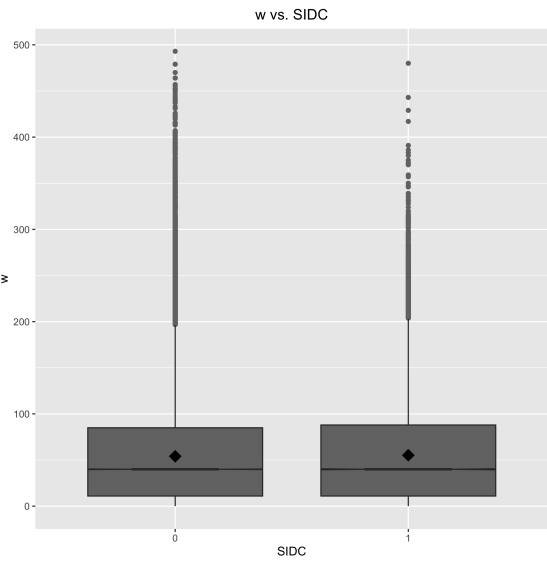


Figure 6: Box plots of raw Wolf number (w) by organization.

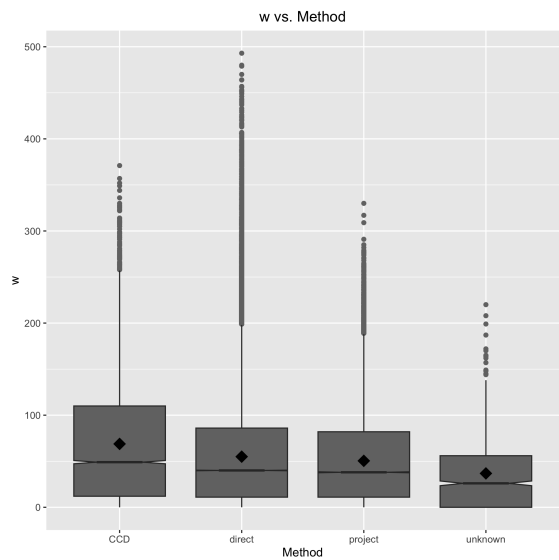


Figure 7: Box plots of raw Wolf number (w) by observer rank.

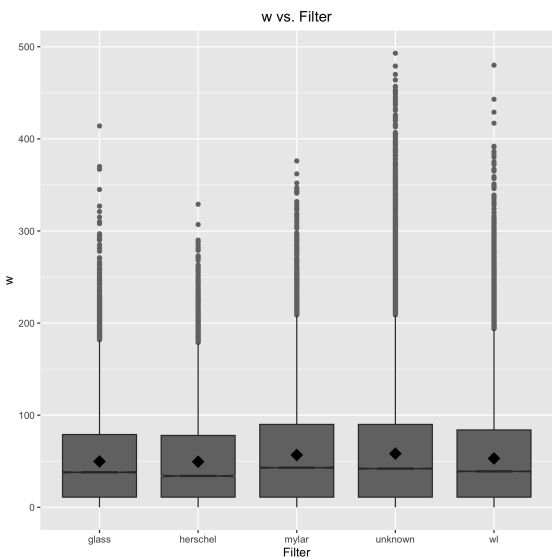


Figure 8: Box plots of raw Wolf number (w) by month and year.

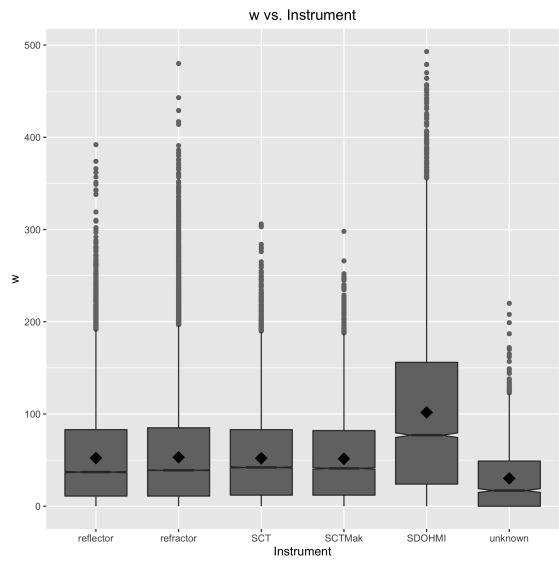


Figure 9: Box plots of raw Wolf number (w) by seeing condition.

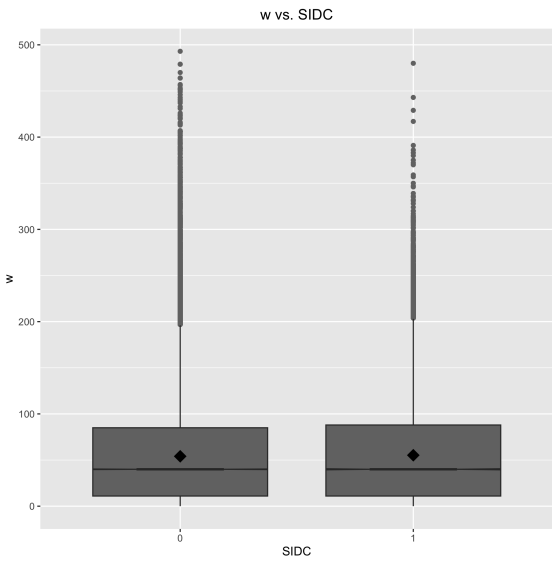


Figure 10: Box plots of raw Wolf number (w) by organization.

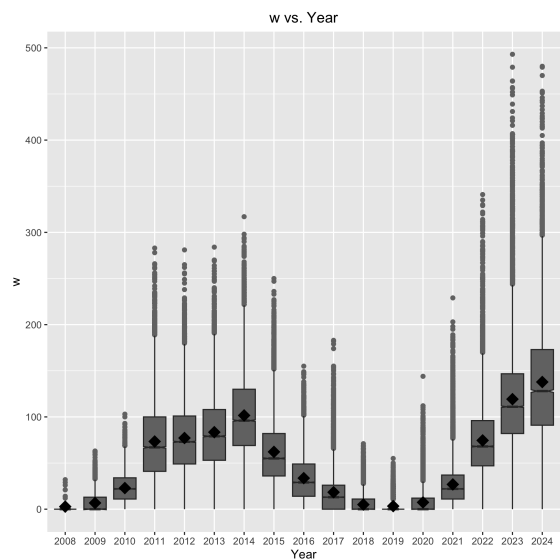


Figure 11: Box plots of raw Wolf number (w) by year.

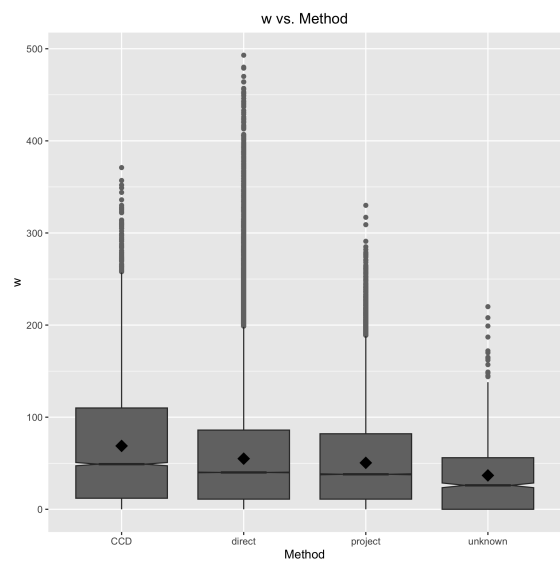


Figure 12: Box plots of raw Wolf number (w) by observing method.