Monthly Report (00)

2025.01 Data Set

Friday 14th February, 2025

Prepared for

Statistics for Physical and Engineering Sciences

by

Jamie Riggs, Ph.D.

Principal Statistician
Statistics for Physical and Engineering Sciences Institute

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.

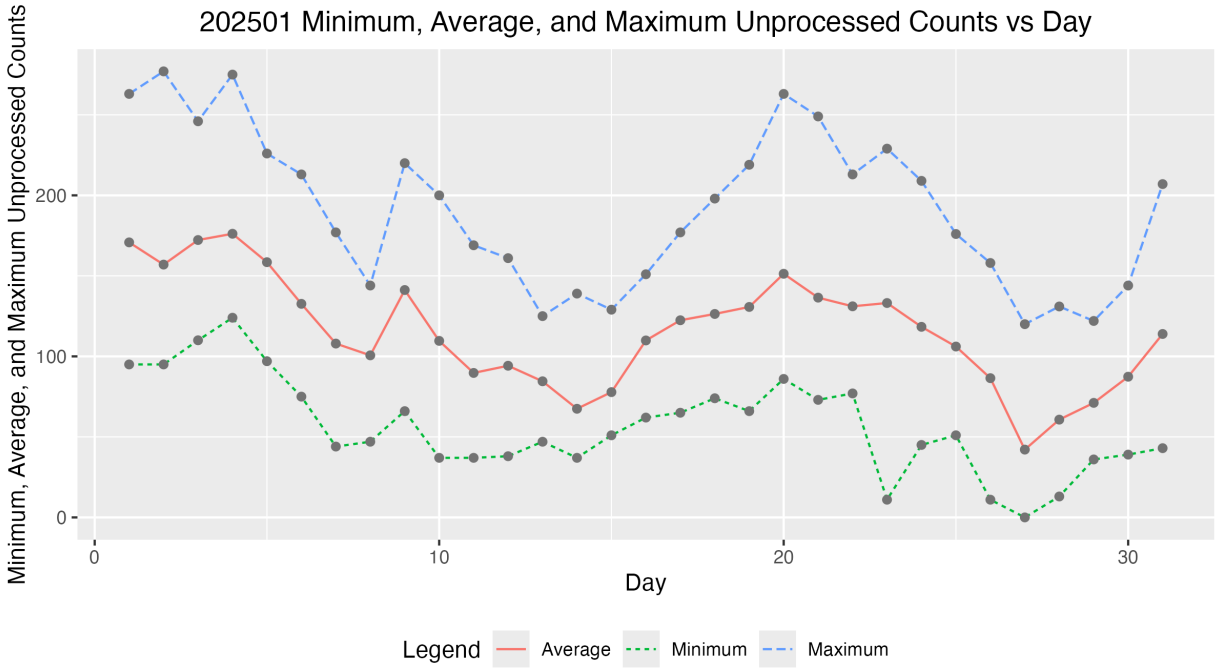

Figure 1: Raw average sunspot count by day of the month.

Table 1: 202501 Daily Raw Counts

Day	Submissions	Minimum	Average	Maximum
1.0000	20.0000	95.0000	170.8000	263.0000
2.0000	22.0000	95.0000	157.0000	277.0000
3.0000	27.0000	110.0000	172.2593	246.0000
4.0000	20.0000	124.0000	176.1500	275.0000
5.0000	20.0000	97.0000	158.5000	226.0000
6.0000	19.0000	75.0000	132.6316	213.0000
7.0000	21.0000	44.0000	107.9524	177.0000
8.0000	23.0000	47.0000	100.6522	144.0000
9.0000	23.0000	66.0000	141.2174	220.0000
10.0000	24.0000	37.0000	109.6250	200.0000
11.0000	25.0000	37.0000	89.7200	169.0000
12.0000	32.0000	38.0000	94.1875	161.0000
13.0000	28.0000	47.0000	84.5357	125.0000
14.0000	32.0000	37.0000	67.4688	139.0000
15.0000	26.0000	51.0000	77.8077	129.0000
16.0000	20.0000	62.0000	109.9000	151.0000
17.0000	23.0000	65.0000	122.4348	177.0000
18.0000	20.0000	74.0000	126.3500	198.0000
19.0000	20.0000	66.0000	130.7000	219.0000
20.0000	20.0000	86.0000	151.3000	263.0000
21.0000	23.0000	73.0000	136.4783	249.0000
22.0000	21.0000	77.0000	131.0952	213.0000
23.0000	28.0000	11.0000	133.1429	229.0000
24.0000	31.0000	45.0000	118.3548	209.0000
25.0000	26.0000	51.0000	106.1154	176.0000
26.0000	21.0000	11.0000	86.4762	158.0000
27.0000	27.0000	0.0000	42.1111	120.0000
28.0000	29.0000	13.0000	60.7241	131.0000
29.0000	23.0000	36.0000	71.1304	122.0000
30.0000	24.0000	39.0000	87.3750	144.0000
31.0000	26.0000	43.0000	113.9231	207.0000

3 Error Tables

Data are for the month of January 2025. 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 25^{th} through the 75^{th} quartiles. The lower and upper whiskers extend 1.5 times the IQR below the 25^{th} quartile, and 1.5 times the IQR above the 75^{th} 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	2.4299	3.1111	0.5000	1.0000
2009.01	5.2904	4.7515	5.8293	1.3000	1.3000
2009.02	4.7570	4.2562	5.2577	0.7000	1.2000
2009.03	6.0025	5.7824	6.2226	0.3000	0.6000
2009.04	6.6537	6.4348	6.8725	0.4000	1.2000
2009.05	7.1359	6.8747	7.3970	1.6000	2.9000
2009.06	7.1938	6.8622	7.5254	3.2000	6.3000
2009.07	6.9746	6.7044	7.2449	3.6000	5.5000
2009.08	7.0801	6.8362	7.3241	0.0000	0.0000
2009.09	7.2759	7.0358	7.5160	4.5000	7.1000
2009.10	6.7366	6.3958	7.0774	4.5000	7.7000
2009.11	6.6810	6.4857	6.8762	3.3000	6.9000
2009.12	7.2371	7.0128	7.4613	10.4000	16.3000
2010.01	19.5520	17.4671	21.6369	13.3000	19.5000
2010.02	15.8893	13.8731	17.9056	19.4000	28.5000

Continued on next page

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

ym	Ra	lci99	uci99	aavso	sidc
2010.03	17.2031	15.1998	19.2064	15.4000	24.0000
2010.04	18.7100	16.6410	20.7790	7.0000	10.4000
2010.05	22.9581	22.5132	23.4031	8.4000	8.7000
2010.06	21.9252	21.5077	22.3426	11.0000	13.6000
2010.07	23.1362	22.7381	23.5342	15.2000	16.1000
2010.08	22.5871	22.1453	23.0289	18.3000	19.6000
2010.09	24.3149	23.8378	24.7919	22.8000	25.2000
2010.10	22.9055	22.4236	23.3874	21.0000	23.5000
2010.11	23.0126	22.5412	23.4840	20.9000	21.6000
2010.12	24.1207	23.5749	24.6666	13.9000	14.5000
2011.01	70.1751	68.5768	71.7735	17.7000	18.7000
2011.02	62.0561	60.5808	63.5315	29.1000	29.6000
2011.03	64.7961	63.4062	66.1861	48.0000	55.8000
2011.04	71.9595	70.4042	73.5149	47.3000	54.4000
2011.05	76.7856	75.2798	78.2913	37.3000	41.5000
2011.06	72.6954	71.2468	74.1440	35.2000	37.0000
2011.07	75.6603	74.2326	77.0881	41.5000	43.8000
2011.08	74.5787	73.2311	75.9264	42.4000	50.5000
2011.09	79.5262	77.9548	81.0976	73.8000	78.0000
2011.10	74.5507	73.1285	75.9729	78.9000	88.0000
2011.11	75.0516	73.3934	76.7099	84.6000	96.7000
2011.12	76.8006	75.1291	78.4720	65.8000	73.0000
2012.01	75.4062	73.8086	77.0038	55.8000	58.2000
2012.02	65.6977	64.2414	67.1539	29.2000	33.1000
2012.03	69.0500	67.7387	70.3613	53.1000	64.1000
2012.04	75.0539	73.5785	76.5294	51.4000	55.2000
2012.05	82.0577	80.5364	83.5789	61.8000	69.0000
2012.06	77.3977	75.9413	78.8540	59.7000	64.5000
2012.07	81.2627	79.7731	82.7523	64.2000	51.3000
2012.08	77.0529	75.6661	78.4397	57.7000	63.1000
2012.09	82.2758	80.7308	83.8209	57.7000	61.5000
2012.10	78.1883	76.6356	79.7411	48.3000	53.3000
2012.11	78.9928	77.3036	80.6820	56.7000	61.4000
2012.12	80.7278	78.8954	82.5602	37.4000	40.8000
2013.01	83.3799	81.6835	85.0763	63.8000	62.9000
2013.02	72.8182	71.2325	74.4040	37.8000	38.0000
2013.03	74.2712	72.6649	75.8775	50.6000	57.9000
2013.04	81.7156	80.1547	83.2765	70.6000	72.4000
2013.05	87.2518	85.5327	88.9708	77.4000	78.7000

Continued on next page

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

ym	Ra	lci99	uci99	aavso	sidc
2013.06	84.0155	82.3576	85.6733	51.0000	52.5000
2013.07	87.2748	85.7020	88.8477	57.0000	57.0000
2013.08	84.5617	83.0530	86.0705	60.0000	66.0000
2013.09	88.7903	87.0731	90.5076	34.6000	36.9000
2013.10	83.1941	81.5252	84.8631	74.5000	85.6000
2013.11	82.8920	80.8742	84.9097	73.9000	77.6000
2013.12	87.0103	85.0694	88.9512	77.8000	90.3000
2014.01	97.5790	95.4162	99.7418	77.4000	82.0000
2014.02	87.0146	85.1306	88.8986	93.9000	102.8000
2014.03	90.7209	88.9430	92.4988	80.9000	92.2000
2014.04	99.9169	97.9979	101.8359	76.9000	84.7000
2014.05	107.3220	105.3391	109.3049	72.3000	75.2000
2014.06	103.1498	101.2107	105.0888	67.2000	71.0000
2014.07	106.6817	104.7062	108.6573	72.5000	72.5000
2014.08	103.4001	101.6267	105.1735	71.2000	74.7000
2014.09	109.8075	107.6782	111.9368	83.2000	87.6000
2014.10	102.3482	100.3305	104.3660	59.5000	60.6000
2014.11	102.9194	100.6095	105.2292	65.8000	71.1000
2014.12	105.4055	102.9006	107.9103	75.8000	78.0000
2015.01	60.4080	59.1502	61.6659	65.9000	67.0000
2015.02	52.7665	51.4919	54.0411	42.4000	44.8000
2015.03	55.7995	54.7008	56.8982	38.0000	38.4000
2015.04	61.1207	59.9159	62.3255	49.0000	54.4000
2015.05	65.5661	64.3887	66.7435	56.3000	58.8000
2015.06	62.4842	61.3207	63.6478	50.2000	68.3000
2015.07	63.9519	62.8502	65.0537	47.9000	65.8000
2015.08	63.2294	62.1530	64.3058	39.5000	57.2000
2015.09	66.5420	65.3157	67.7684	49.2000	72.1000
2015.10	62.4889	61.2663	63.7115	39.3000	48.3000
2015.11	63.2898	61.8807	64.6989	39.6000	55.9000
2015.12	65.6000	64.1159	67.0841	36.4000	44.8000
2016.01	33.0366	32.3311	33.7420	33.7000	43.3000
2016.02	28.8056	28.1910	29.4202	38.3000	46.8000
2016.03	30.0485	29.4346	30.6624	30.5000	38.9000
2016.04	32.6557	32.0196	33.2917	26.6000	30.9000
2016.05	35.2050	34.5533	35.8568	33.7000	48.4000
2016.06	33.3645	32.7864	33.9426	13.1000	19.5000
2016.07	34.9080	34.3381	35.4778	21.2000	27.5000
2016.08	34.0548	33.4451	34.6644	33.0000	47.9000

Continued on next page

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

ym	Ra	lci99	uci99	aavso	sidc
2016.09	36.6188	35.9381	37.2995	27.7000	37.1000
2016.10	34.1174	33.4479	34.7868	22.7000	31.7000
2016.11	34.1943	33.4674	34.9212	14.0000	22.2000
2016.12	35.8474	35.0642	36.6305	11.1000	20.0000
2017.01	17.8293	17.4462	18.2123	18.4000	26.2000
2017.02	15.6245	15.2725	15.9765	14.4000	20.6000
2017.03	16.3851	16.0653	16.7050	11.3000	15.5000
2017.04	17.9961	17.6720	18.3202	21.6000	33.2000
2017.05	19.1771	18.8391	19.5150	12.5000	18.1000
2017.06	18.1291	17.8248	18.4334	15.5000	19.3000
2017.07	19.0328	18.7239	19.3416	11.5000	16.3000
2017.08	18.5702	18.2425	18.8980	22.8000	35.7000
2017.09	20.2488	19.8191	20.6784	34.6000	42.9000
2017.10	18.3494	17.9697	18.7291	10.5000	11.0000
2017.11	18.3211	17.9289	18.7132	4.2000	5.6000
2017.12	19.1106	18.8163	19.4049	4.0000	4.6000
2018.01	4.9277	4.8206	5.0349	3.1000	6.3000
2018.02	4.2733	4.1691	4.3775	6.8000	11.8000
2018.03	4.4262	4.3361	4.5164	1.1000	1.2000
2018.04	4.8032	4.7057	4.9007	4.7000	7.5000
2018.05	5.1915	5.0943	5.2888	8.4000	14.0000
2018.06	4.9291	4.8414	5.0169	10.2000	13.6000
2018.07	5.1900	5.1319	5.2481	0.5000	1.7000
2018.08	4.9968	4.9113	5.0823	5.9000	9.5000
2018.09	5.2608	5.1625	5.3590	1.6000	2.9000
2018.10	5.0150	4.9172	5.1127	2.5000	5.6000
2018.11	5.0111	4.9057	5.1165	3.1000	4.2000
2018.12	5.3196	5.2153	5.4238	1.6000	2.3000
2019.01	3.2923	3.2289	3.3556	5.4000	2.3000
2019.02	2.9086	2.8507	2.9666	0.1000	1.2000
2019.03	2.9804	2.9295	3.0314	6.1000	12.1000
2019.04	3.2764	3.2148	3.3380	6.2000	9.3000
2019.05	3.4290	3.3693	3.4887	7.0000	11.9000
2019.06	3.2743	3.2190	3.3295	0.7000	1.5000
2019.07	3.4360	3.3848	3.4871	0.4000	2.2000
2019.08	3.3582	3.3084	3.4079	0.3000	0.8000
2019.09	3.6068	3.5502	3.6635	0.5000	1.0000
2019.10	3.3444	3.2878	3.4011	0.2000	0.5000
2019.11	3.4164	3.3505	3.4824	0.3000	0.6000

Continued on next page

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

ym	Ra	lci99	uci99	aavso	sidc
2019.12	3.5360	3.4644	3.6076	0.8000	1.0000
2020.01	7.2833	7.1402	7.4265	4.0000	5.3000
2020.02	6.3798	6.2516	6.5079	0.1000	0.0000
2020.03	6.5893	6.4658	6.7128	1.2000	1.5000
2020.04	7.2964	7.1777	7.4150	3.0000	5.1000
2020.05	7.6910	7.5717	7.8103	0.1000	0.4000
2020.06	7.3891	7.2753	7.5028	3.9000	6.4000
2020.07	7.6499	7.5365	7.7632	4.2000	7.7000
2020.08	7.3798	7.2775	7.4821	5.3000	7.8000
2020.09	7.8922	7.7650	8.0195	0.4000	0.9000
2020.10	7.4854	7.3612	7.6095	9.9000	13.6000
2020.11	7.5474	7.4222	7.6725	21.2000	33.1000
2020.12	7.8399	7.6970	7.9828	15.4000	19.8000
2021.01	25.3479	24.8893	25.8066	7.0000	15.8000
2021.02	22.6620	22.2582	23.0659	5.8000	10.7000
2021.03	23.5448	23.1713	23.9184	11.0000	17.2000
2021.04	26.2473	25.7725	26.7221	18.5000	28.8000
2021.05	27.9975	27.5347	28.4603	15.9000	22.9000
2021.06	26.7227	26.2719	27.1735	19.9000	24.1000
2021.07	27.5813	27.1013	28.0613	23.8000	35.6000
2021.08	27.4669	26.9932	27.9407	15.7000	19.5000
2021.09	29.0728	28.5495	29.5960	39.1000	52.5000
2021.10	27.8963	27.3841	28.4086	27.1000	37.0000
2021.11	27.7211	27.1874	28.2547	27.2000	35.1000
2021.12	29.6642	29.0342	30.2941	50.6000	69.0000
2022.01	72.4902	71.1057	73.8747	43.9000	62.0000
2022.02	64.3241	63.0546	65.5936	48.8000	60.5000
2022.03	67.6172	66.2966	68.9378	58.4000	80.6000
2022.04	71.7887	70.5389	73.0385	59.1000	83.9000
2022.05	79.1299	77.7674	80.4924	72.5000	0.4000
2022.06	73.3546	72.1251	74.5842	58.9000	0.4000
2022.07	77.7807	76.4211	79.1403	76.7000	102.5000
2022.08	76.0172	74.7283	77.3060	63.3000	86.0000
2022.09	80.4420	78.8539	82.0300	72.6000	94.5000
2022.10	75.7874	74.3623	77.2125	66.4000	112.1000
2022.11	75.8803	74.3234	77.4372	54.3000	82.1000
2022.12	79.5258	77.6727	81.3789	93.7000	165.0000
2023.01	119.3466	116.5812	122.1120	112.9000	173.8000
2023.02	103.4774	101.1647	105.7901	89.6000	152.3000

Continued on next page

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

ym	Ra	lci99	uci99	aavso	sidc
2023.03	105.2766	102.9766	107.5767	85.0000	126.8000
2023.04	115.9271	113.6100	118.2442	72.1000	114.3000
2023.05	124.4539	121.9521	126.9557	105.0000	140.0000
2023.06	120.4091	119.0402	121.7781	118.5000	173.0000
2023.07	121.6744	119.4018	123.9470	124.7000	161.2000
2023.08	119.5180	117.2884	121.7475	90.6000	132.5000
2023.09	128.5529	126.0404	131.0654	110.4000	156.8000
2023.10	120.6568	118.0255	123.2881	78.4000	119.6000
2023.11	117.9970	115.2814	120.7125	88.6000	105.1000
2023.12	126.7481	123.7221	129.7740	98.2000	115.0000
2024.01	137.3628	133.8301	140.8954	102.8000	120.0000
2024.02	117.1231	114.4277	119.8185	94.8000	124.6000
2024.03	123.3702	120.6681	126.0722	84.8000	119.4000
2024.04	133.8485	130.9452	136.7519	107.1000	136.5000
2024.05	143.0921	140.1968	145.9874	120.5000	171.7000
2024.06	134.6206	132.0444	137.1968	124.8000	164.2000
2024.07	140.1508	137.3575	142.9441	146.7000	196.5000
2024.08	139.5488	136.8060	142.2917	158.4000	215.5000
2024.09	148.3340	145.0981	151.5699	109.9000	141.4000
2024.10	139.2347	136.2382	142.2311	124.2000	166.3000
2024.11	142.5344	138.8745	146.1943	113.9000	152.5000
2024.12	142.6067	139.6219	145.5916	120.5000	154.5000
2025.01	112.4180	109.6095	115.2266	81.7000	137.0000

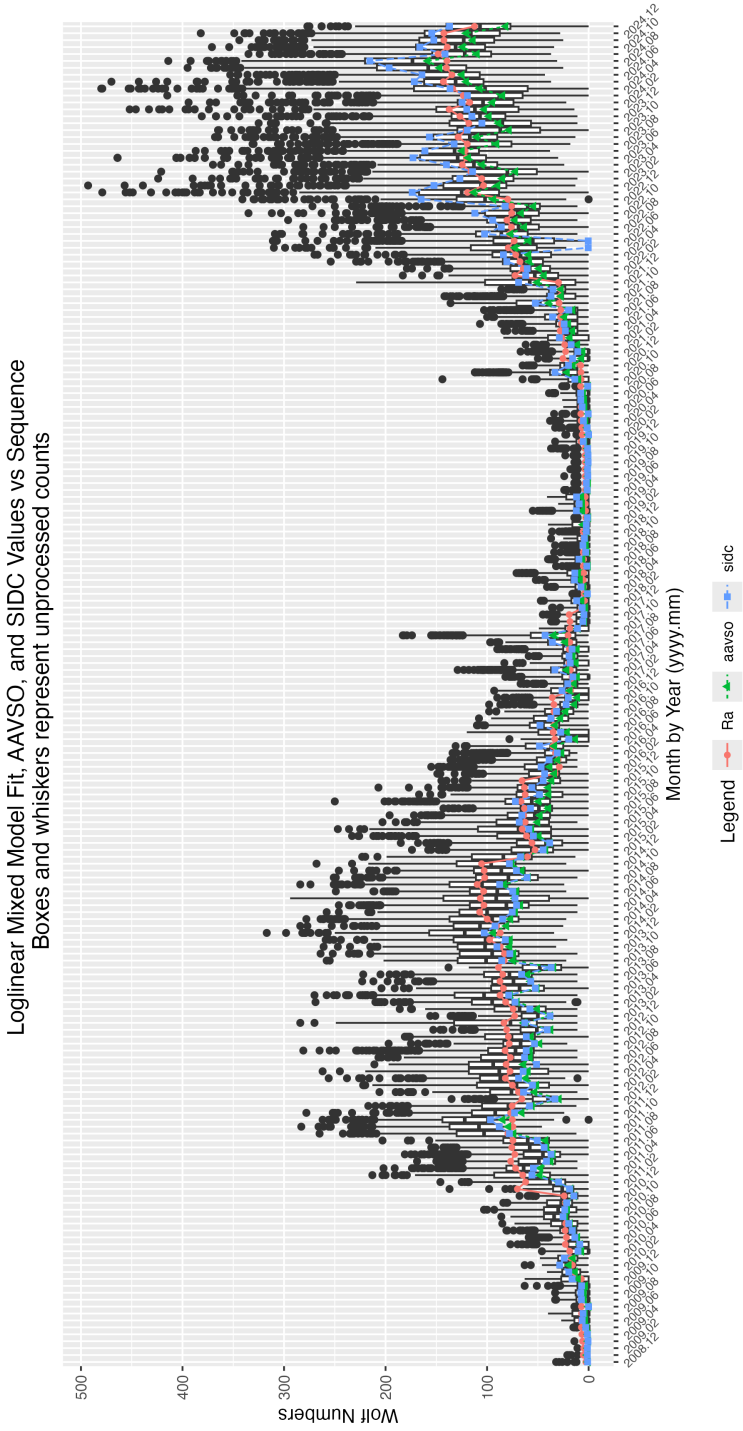

Figure 2: GLMM fitted data for R_a. AAVSO data: https://www.aavso.org/category/tags/solar-bulletin. SILSO data: WDC-SILSO, Royal Observatory of Belgium, Brussels

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: 202501 Parameter Estimates

	Estimate	Std. Error	t-value	Pr(>|t|)
(Intercept)	1.1875	0.3165	3.7523	0.0002
seeG	-0.1057	0.0039	-27.2420	0.0000
seeF	-0.2150	0.0045	-48.1887	0.0000
seeP	-0.3125	0.0064	-48.4823	0.0000
seeM	-0.1725	0.0244	-7.0824	0.0000
sidc1	0.0502	0.0090	5.5568	0.0000
year2009	0.7570	0.3181	2.3800	0.0173
year2010	1.9683	0.3159	6.2312	0.0000
year2011	3.1245	0.3158	9.8947	0.0000
year2012	3.1705	0.3158	10.0409	0.0000
year2013	3.2644	0.3158	10.3381	0.0000
year2014	3.4641	0.3158	10.9709	0.0000
year2015	2.9862	0.3158	9.4568	0.0000
year2016	2.3705	0.3158	7.5064	0.0000
year2017	1.7597	0.3158	5.5713	0.0000
year2018	0.4671	0.3161	1.4776	0.1395
year2019	0.0616	0.3163	0.1949	0.8455
year2020	0.8677	0.3160	2.7458	0.0060
year2021	2.1474	0.3158	6.7996	0.0000
year2022	3.1397	0.3158	9.9429	0.0000
year2023	3.6122	0.3158	11.4395	0.0000
year2024	3.7671	0.3158	11.9300	0.0000
year2025	3.5985	0.3161	11.3832	0.0000
mon2	-0.1285	0.0072	-17.9339	0.0000
mon3	-0.0912	0.0068	-13.3349	0.0000
mon4	-0.0082	0.0066	-1.2460	0.2128
mon5	0.0567	0.0064	8.8559	0.0000
mon6	0.0078	0.0062	1.2461	0.2127
mon7	0.0423	0.0064	6.6454	0.0000
mon8	0.0191	0.0064	3.0116	0.0026
mon9	0.0887	0.0064	13.7942	0.0000
mon10	0.0266	0.0066	4.0526	0.0001
mon11	0.0446	0.0068	6.5245	0.0000
mon12	0.0875	0.0068	12.8031	0.0000

Table 4: 202501 Summary of Sunspot Numbers

year	mon	day	obs	sidc
Min. :2008	Min. : 1.000	Min. : 0.0	Length:190347	Min. :0.0000
1st Qu.:2014	1st Qu.: 4.000	1st Qu.: 8.0	Class :character	1st Qu.:0.0000
Median :2018	Median : 7.000	Median :16.0	Mode :character	Median :0.0000
Mean :2017	Mean : 6.596	Mean :15.7		Mean :0.2335
3rd Qu.:2021	3rd Qu.: 9.000	3rd Qu.:23.0		3rd Qu.:0.0000
Max. :2025	Max. :12.000	Max. :31.0		Max. :1.0000

Table 5: 202501 Summary of Sunspot Numbers

g	s	w	see	method
Min. : 0.000	Min. : 0.00	Min. : 0.00	E:40345	Length:190347
1st Qu.: 1.000	1st Qu.: 1.00	1st Qu.: 11.00	G:78369	Class :character
Median : 3.000	Median : 12.00	Median : 42.00	F:55092	Mode :character
Mean : 3.524	Mean : 20.74	Mean : 55.98	P:15756	
3rd Qu.: 6.000	3rd Qu.: 31.00	3rd Qu.: 88.00	M: 785	
Max. :31.000	Max. :295.00	Max. :493.00		

Table 6: 202501 Summary of Sunspot Numbers

inst	filter	unit
Length:190347	Length:190347	Length:190347
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Table 7: 202501 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 : 94.35	Mean : 41.93	Mean : 889.1	Mean : 181.3
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

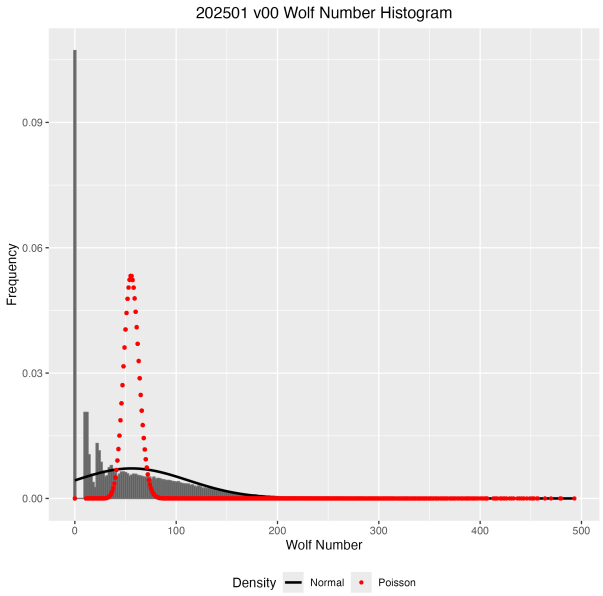

Figure 3: Box plots of raw Wolf number (w) by observer rank.

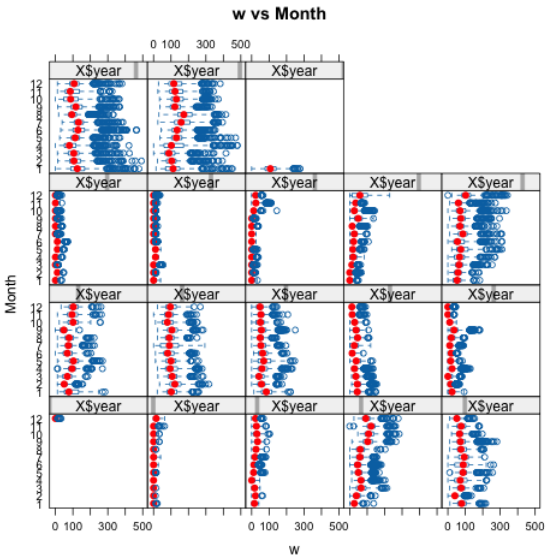

Figure 4: Box plots of raw Wolf number (w) by month and year.

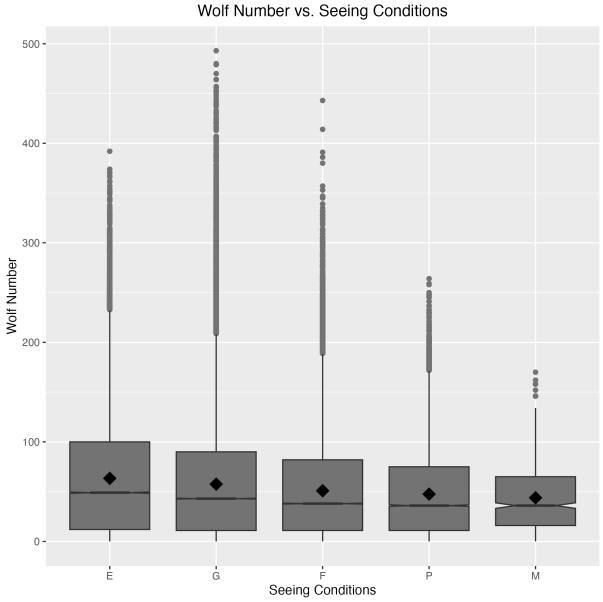

Figure 5: Box plots of raw Wolf number (w) by seeing condition.

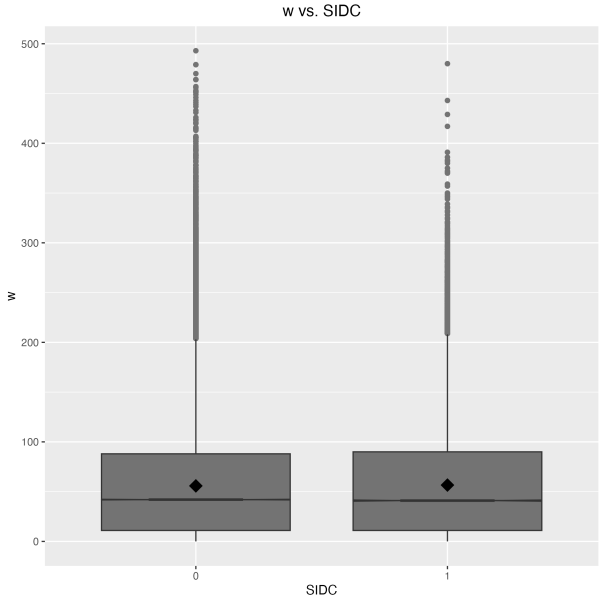

Figure 6: Box plots of raw Wolf number (w) by organization.

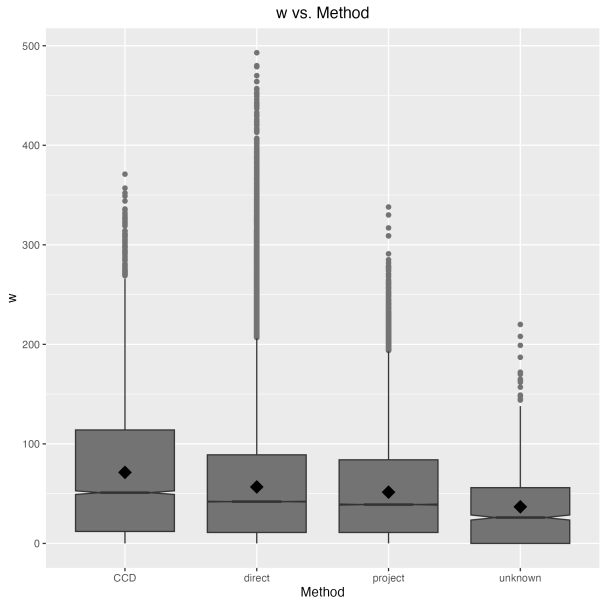

Figure 7: Box plots of raw Wolf number (w) by observer rank.

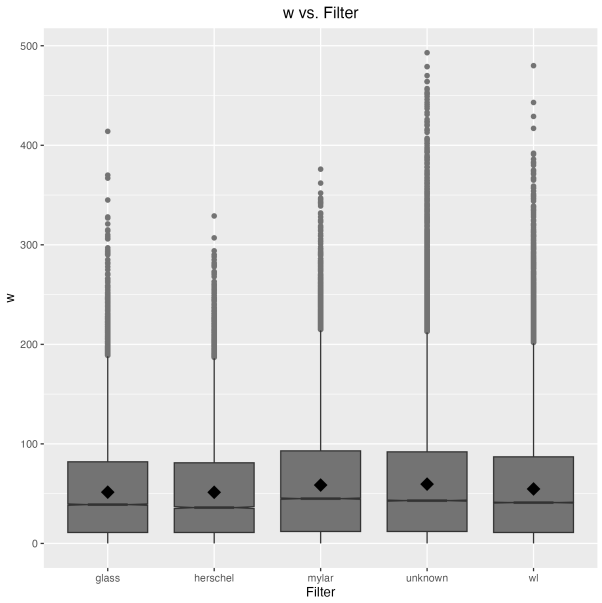

Figure 8: Box plots of raw Wolf number (w) by month and year.

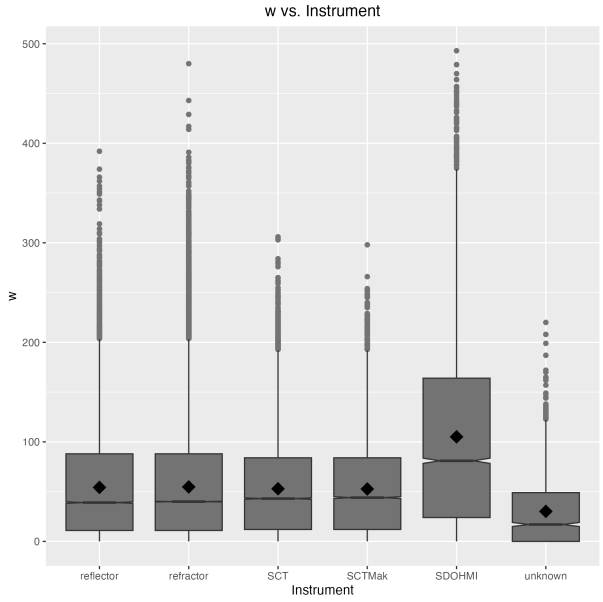

Figure 9: Box plots of raw Wolf number (w) by seeing condition.

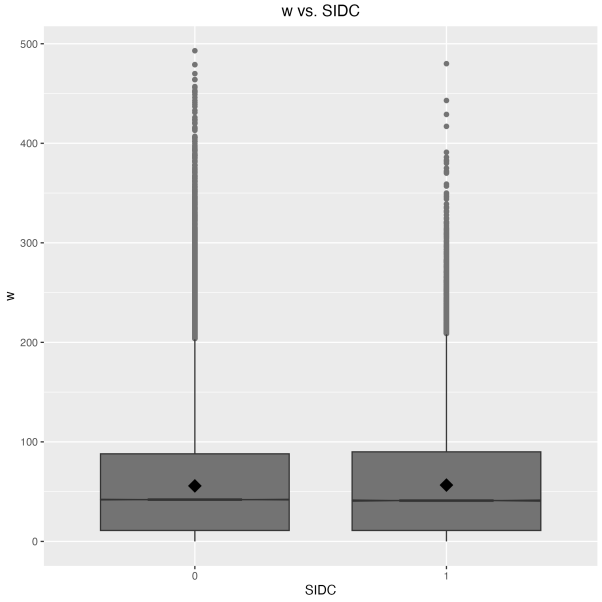

Figure 10: Box plots of raw Wolf number (w) by organization.

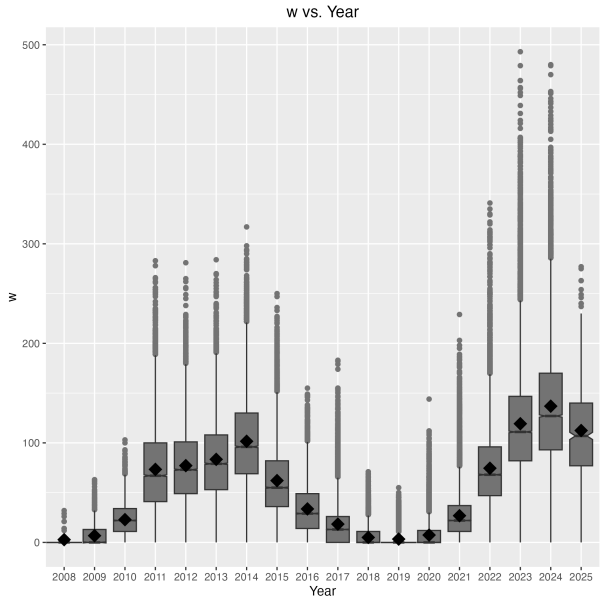

Figure 11: Box plots of raw Wolf number (w) by year.

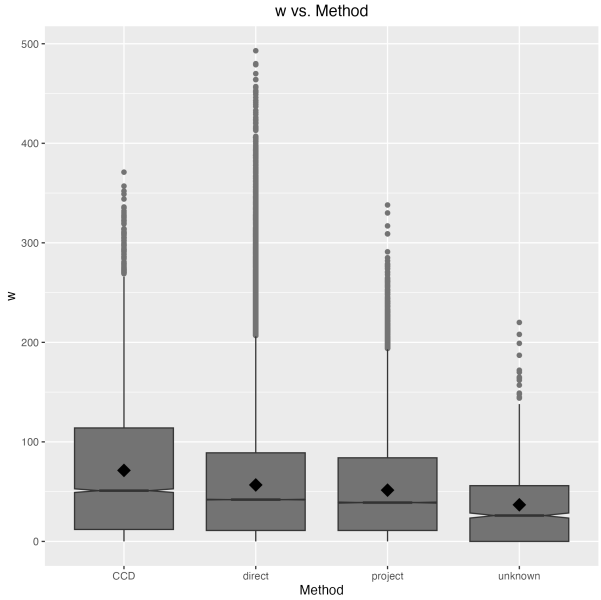

Figure 12: Box plots of raw Wolf number (w) by observing method.