Monthly Report (00)

2024.06 Data Set

Monday 15th July, 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.

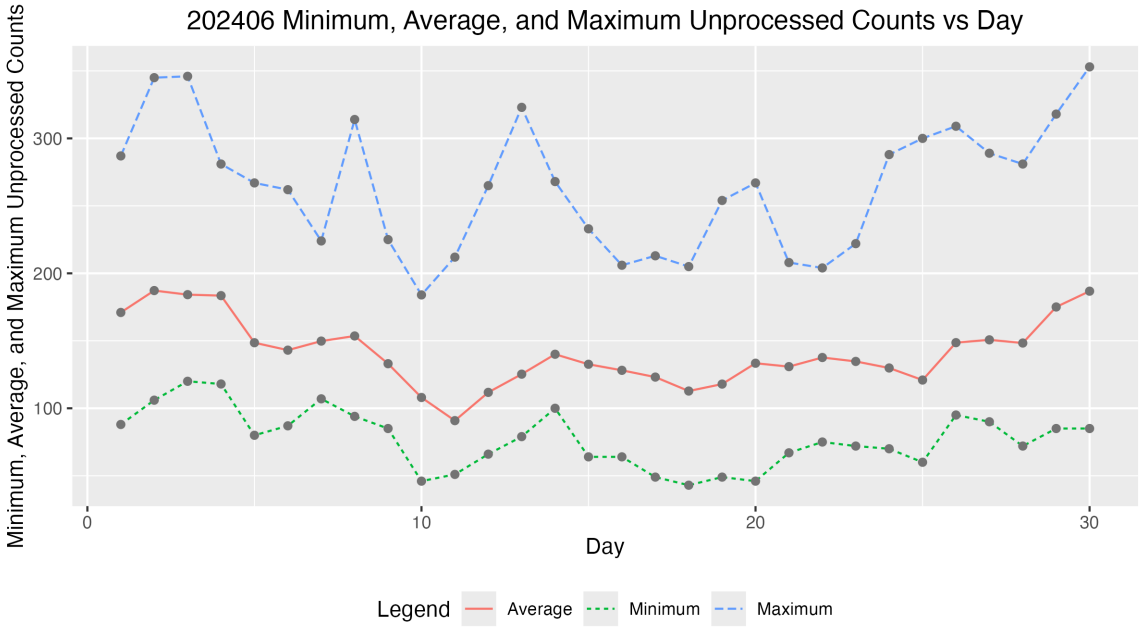

Figure 1: Raw average sunspot count by day of the month.

Table 1: 202406 Daily Raw Counts

Day	Submissions	Minimum	Average	Maximum
1.0000	37.0000	88.0000	171.0000	287.0000
2.0000	30.0000	106.0000	187.2333	345.0000
3.0000	35.0000	120.0000	184.2000	346.0000
4.0000	35.0000	118.0000	183.4857	281.0000
5.0000	44.0000	80.0000	148.5909	267.0000
6.0000	41.0000	87.0000	143.0732	262.0000
7.0000	43.0000	107.0000	149.7907	224.0000
8.0000	31.0000	94.0000	153.5806	314.0000
9.0000	32.0000	85.0000	133.0312	225.0000
10.0000	35.0000	46.0000	108.0000	184.0000
11.0000	33.0000	51.0000	90.8485	212.0000
12.0000	38.0000	66.0000	111.7895	265.0000
13.0000	42.0000	79.0000	125.2857	323.0000
14.0000	30.0000	100.0000	140.0333	268.0000
15.0000	41.0000	64.0000	132.6098	233.0000
16.0000	31.0000	64.0000	128.1290	206.0000
17.0000	43.0000	49.0000	123.1163	213.0000
18.0000	41.0000	43.0000	112.7805	205.0000
19.0000	28.0000	49.0000	117.9286	254.0000
20.0000	31.0000	46.0000	133.3871	267.0000
21.0000	38.0000	67.0000	130.8684	208.0000
22.0000	32.0000	75.0000	137.6250	204.0000
23.0000	39.0000	72.0000	134.7179	222.0000
24.0000	41.0000	70.0000	129.8537	288.0000
25.0000	43.0000	60.0000	120.9302	300.0000
26.0000	33.0000	95.0000	148.6364	309.0000
27.0000	36.0000	90.0000	150.7222	289.0000
28.0000	42.0000	72.0000	148.3571	281.0000
29.0000	30.0000	85.0000	175.0667	318.0000
30.0000	31.0000	85.0000	186.7742	353.0000

3 Error Tables

Data are for the month of June 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 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	2.4271	3.1139	0.5000	1.0000
2009.01	5.2948	4.7514	5.8382	1.3000	1.3000
2009.02	4.7708	4.2655	5.2761	0.7000	1.2000
2009.03	6.0319	5.8099	6.2538	0.3000	0.6000
2009.04	6.6845	6.4638	6.9053	0.4000	1.2000
2009.05	7.1644	6.8984	7.4304	1.6000	2.9000
2009.06	7.2302	6.8908	7.5696	3.2000	6.3000
2009.07	6.6770	6.4172	6.9367	3.6000	5.5000
2009.08	6.6420	6.4072	6.8768	0.0000	0.0000
2009.09	7.3785	7.1339	7.6230	4.5000	7.1000
2009.10	6.6617	6.3236	6.9999	4.5000	7.7000
2009.11	6.7231	6.5261	6.9200	3.3000	6.9000
2009.12	7.2858	7.0591	7.5125	10.4000	16.3000
2010.01	19.7532	17.6310	21.8755	13.3000	19.5000
2010.02	16.0853	14.0273	18.1433	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	17.4042	15.3585	19.4499	15.4000	24.0000
2010.04	18.9157	16.8047	21.0268	7.0000	10.4000
2010.05	23.3459	22.8914	23.8004	8.4000	8.7000
2010.06	22.2499	21.8246	22.6753	11.0000	13.6000
2010.07	22.4361	22.0466	22.8256	15.2000	16.1000
2010.08	21.4738	21.0521	21.8955	18.3000	19.6000
2010.09	24.9725	24.4791	25.4658	22.8000	25.2000
2010.10	22.9439	22.4581	23.4297	21.0000	23.5000
2010.11	23.3735	22.8943	23.8526	20.9000	21.6000
2010.12	24.4946	23.9396	25.0496	13.9000	14.5000
2011.01	70.9117	69.2989	72.5244	17.7000	18.7000
2011.02	62.8309	61.3305	64.3313	29.1000	29.6000
2011.03	65.5750	64.1662	66.9837	48.0000	55.8000
2011.04	72.8314	71.2454	74.4173	47.3000	54.4000
2011.05	77.7533	76.2207	79.2859	37.3000	41.5000
2011.06	73.5296	72.0609	74.9983	35.2000	37.0000
2011.07	73.0819	71.7027	74.4612	41.5000	43.8000
2011.08	70.6306	69.3532	71.9081	42.4000	50.5000
2011.09	81.2934	79.6830	82.9037	73.8000	78.0000
2011.10	74.3408	72.9183	75.7634	78.9000	88.0000
2011.11	75.9508	74.2735	77.6281	84.6000	96.7000
2011.12	77.7521	76.0617	79.4426	65.8000	73.0000
2012.01	76.2053	74.5929	77.8176	55.8000	58.2000
2012.02	66.5479	65.0744	68.0214	29.2000	33.1000
2012.03	69.9137	68.5862	71.2412	53.1000	64.1000
2012.04	75.9546	74.4566	77.4527	51.4000	55.2000
2012.05	83.0991	81.5550	84.6433	61.8000	69.0000
2012.06	78.2165	76.7437	79.6894	59.7000	64.5000
2012.07	78.4574	77.0187	79.8961	64.2000	51.3000
2012.08	72.9126	71.5953	74.2298	57.7000	63.1000
2012.09	84.0764	82.4988	85.6540	57.7000	61.5000
2012.10	77.9293	76.3813	79.4772	48.3000	53.3000
2012.11	79.9201	78.2137	81.6265	56.7000	61.4000
2012.12	81.6430	79.7963	83.4896	37.4000	40.8000
2013.01	84.3621	82.6495	86.0748	63.8000	62.9000
2013.02	73.8029	72.2011	75.4046	37.8000	38.0000
2013.03	75.2220	73.5969	76.8470	50.6000	57.9000
2013.04	82.7315	81.1459	84.3172	70.6000	72.4000
2013.05	88.3604	86.6158	90.1050	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	84.9234	83.2435	86.6033	51.0000	52.5000
2013.07	84.2374	82.7155	85.7593	57.0000	57.0000
2013.08	80.0190	78.5892	81.4487	60.0000	66.0000
2013.09	90.7149	88.9615	92.4683	34.6000	36.9000
2013.10	82.9002	81.2387	84.5616	74.5000	85.6000
2013.11	83.8696	81.8304	85.9087	73.9000	77.6000
2013.12	88.0173	86.0594	89.9752	77.8000	90.3000
2014.01	98.6730	96.4909	100.8550	77.4000	82.0000
2014.02	88.2137	86.3064	90.1211	93.9000	102.8000
2014.03	91.8698	90.0700	93.6697	80.9000	92.2000
2014.04	101.1647	99.2181	103.1114	76.9000	84.7000
2014.05	108.6719	106.6603	110.6834	72.3000	75.2000
2014.06	104.2712	102.3102	106.2321	67.2000	71.0000
2014.07	102.9854	101.0753	104.8955	72.5000	72.5000
2014.08	97.8256	96.1446	99.5067	71.2000	74.7000
2014.09	112.2242	110.0477	114.4007	83.2000	87.6000
2014.10	101.9954	99.9856	104.0051	59.5000	60.6000
2014.11	104.1312	101.7986	106.4638	65.8000	71.1000
2014.12	106.5824	104.0668	109.0979	75.8000	78.0000
2015.01	61.0270	59.7627	62.2912	65.9000	67.0000
2015.02	53.4396	52.1525	54.7266	42.4000	44.8000
2015.03	56.4628	55.3531	57.5725	38.0000	38.4000
2015.04	61.8631	60.6427	63.0835	49.0000	54.4000
2015.05	66.3665	65.1764	67.5566	56.3000	58.8000
2015.06	63.1251	61.9551	64.2951	50.2000	68.3000
2015.07	61.6683	60.6121	62.7246	47.9000	65.8000
2015.08	59.7761	58.7644	60.7879	39.5000	57.2000
2015.09	67.9412	66.6954	69.1870	49.2000	72.1000
2015.10	62.2100	60.9998	63.4202	39.3000	48.3000
2015.11	63.9914	62.5744	65.4083	39.6000	55.9000
2015.12	66.3161	64.8218	67.8105	36.4000	44.8000
2016.01	33.3931	32.6853	34.1009	33.7000	43.3000
2016.02	29.1805	28.5624	29.7987	38.3000	46.8000
2016.03	30.4066	29.7890	31.0241	30.5000	38.9000
2016.04	33.0507	32.4108	33.6907	26.6000	30.9000
2016.05	35.6427	34.9859	36.2995	33.7000	48.4000
2016.06	33.7099	33.1279	34.2920	13.1000	19.5000
2016.07	33.6719	33.1248	34.2190	21.2000	27.5000
2016.08	32.2077	31.6333	32.7820	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	37.4146	36.7230	38.1062	27.7000	37.1000
2016.10	33.9908	33.3284	34.6532	22.7000	31.7000
2016.11	34.6036	33.8732	35.3339	14.0000	22.2000
2016.12	36.2731	35.4852	37.0610	11.1000	20.0000
2017.01	18.0141	17.6291	18.3990	18.4000	26.2000
2017.02	15.8094	15.4562	16.1626	14.4000	20.6000
2017.03	16.5696	16.2481	16.8911	11.3000	15.5000
2017.04	18.1984	17.8725	18.5243	21.6000	33.2000
2017.05	19.3900	19.0501	19.7299	12.5000	18.1000
2017.06	18.2941	17.9879	18.6002	15.5000	19.3000
2017.07	18.3439	18.0477	18.6401	11.5000	16.3000
2017.08	17.5363	17.2282	17.8444	22.8000	35.7000
2017.09	20.6599	20.2256	21.0942	34.6000	42.9000
2017.10	18.2500	17.8737	18.6262	10.5000	11.0000
2017.11	18.5067	18.1123	18.9010	4.2000	5.6000
2017.12	19.3079	19.0119	19.6040	4.0000	4.6000
2018.01	5.0042	4.8961	5.1123	3.1000	6.3000
2018.02	4.3476	4.2421	4.4531	6.8000	11.8000
2018.03	4.4953	4.4040	4.5866	1.1000	1.2000
2018.04	4.8787	4.7803	4.9772	4.7000	7.5000
2018.05	5.2733	5.1751	5.3715	8.4000	14.0000
2018.06	4.9973	4.9088	5.0857	10.2000	13.6000
2018.07	5.0232	4.9671	5.0793	0.5000	1.7000
2018.08	4.7421	4.6611	4.8231	5.9000	9.5000
2018.09	5.3943	5.2937	5.4950	1.6000	2.9000
2018.10	5.0157	4.9180	5.1135	2.5000	5.6000
2018.11	5.0894	4.9827	5.1962	3.1000	4.2000
2018.12	5.4012	5.2958	5.5066	1.6000	2.3000
2019.01	3.3287	3.2650	3.3924	5.4000	2.3000
2019.02	2.9478	2.8893	3.0062	0.1000	1.2000
2019.03	3.0173	2.9659	3.0686	6.1000	12.1000
2019.04	3.3154	3.2532	3.3776	6.2000	9.3000
2019.05	3.4704	3.4100	3.5307	7.0000	11.9000
2019.06	3.3068	3.2511	3.3625	0.7000	1.5000
2019.07	3.3126	3.2635	3.3616	0.4000	2.2000
2019.08	3.1758	3.1289	3.2228	0.3000	0.8000
2019.09	3.6862	3.6285	3.7439	0.5000	1.0000
2019.10	3.3320	3.2757	3.3882	0.2000	0.5000
2019.11	3.4583	3.3918	3.5247	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	3.5784	3.5064	3.6504	0.8000	1.0000
2020.01	7.3629	7.2186	7.5072	4.0000	5.3000
2020.02	6.4652	6.3356	6.5949	0.1000	0.0000
2020.03	6.6688	6.5442	6.7935	1.2000	1.5000
2020.04	7.3800	7.2598	7.5001	3.0000	5.1000
2020.05	7.7821	7.6616	7.9026	0.1000	0.4000
2020.06	7.4606	7.3462	7.5750	3.9000	6.4000
2020.07	7.3723	7.2636	7.4811	4.2000	7.7000
2020.08	6.9734	6.8770	7.0699	5.3000	7.8000
2020.09	8.0594	7.9300	8.1889	0.4000	0.9000
2020.10	7.4538	7.3308	7.5767	9.9000	13.6000
2020.11	7.6382	7.5126	7.7639	21.2000	33.1000
2020.12	7.9332	7.7892	8.0772	15.4000	19.8000
2021.01	25.6179	25.1571	26.0788	7.0000	15.8000
2021.02	22.9332	22.5254	23.3410	5.8000	10.7000
2021.03	23.8079	23.4310	24.1849	11.0000	17.2000
2021.04	26.5584	26.0739	27.0429	18.5000	28.8000
2021.05	28.3251	27.8543	28.7959	15.9000	22.9000
2021.06	26.9779	26.5220	27.4338	19.9000	24.1000
2021.07	26.5679	26.1041	27.0318	23.8000	35.6000
2021.08	25.9390	25.4910	26.3871	15.7000	19.5000
2021.09	29.6629	29.1283	30.1975	39.1000	52.5000
2021.10	27.7638	27.2514	28.2761	27.1000	37.0000
2021.11	28.0447	27.5031	28.5862	27.2000	35.1000
2021.12	29.9838	29.3442	30.6234	50.6000	69.0000
2022.01	73.3249	71.9191	74.7307	43.9000	62.0000
2022.02	65.1908	63.8981	66.4835	48.8000	60.5000
2022.03	68.4262	67.0836	69.7688	58.4000	80.6000
2022.04	72.6165	71.3481	73.8849	59.1000	83.9000
2022.05	80.0956	78.7176	81.4737	72.5000	0.4000
2022.06	74.0843	72.8425	75.3261	58.9000	0.4000
2022.07	75.0048	73.6919	76.3177	76.7000	102.5000
2022.08	71.8700	70.6504	73.0896	63.3000	86.0000
2022.09	82.1573	80.5305	83.7841	72.6000	94.5000
2022.10	75.4835	74.0587	76.9083	66.4000	112.1000
2022.11	76.7565	75.1728	78.3402	54.3000	82.1000
2022.12	80.4464	78.5604	82.3324	93.7000	165.0000
2023.01	120.8662	118.0548	123.6775	112.9000	173.8000
2023.02	104.8639	102.5036	107.2241	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	106.5267	104.1777	108.8757	85.0000	126.8000
2023.04	117.2123	114.8434	119.5813	72.1000	114.3000
2023.05	125.9084	123.3644	128.4523	105.0000	140.0000
2023.06	121.4856	120.0933	122.8779	118.5000	173.0000
2023.07	117.3861	115.1852	119.5869	124.7000	161.2000
2023.08	112.6484	110.5191	114.7778	90.6000	132.5000
2023.09	130.6680	128.0781	133.2578	110.4000	156.8000
2023.10	119.8943	117.2452	122.5433	78.4000	119.6000
2023.11	118.9854	116.1950	121.7758	88.6000	105.1000
2023.12	127.9037	124.7957	131.0118	98.2000	115.0000
2024.01	128.0528	124.6989	131.4067	102.8000	120.0000
2024.02	109.4728	106.9032	112.0424	94.8000	124.6000
2024.03	115.0748	112.4977	117.6518	84.8000	119.4000
2024.04	124.8650	122.1378	127.5922	107.1000	136.5000
2024.05	133.3919	130.6724	136.1113	120.5000	171.7000
2024.06	124.9891	122.5811	127.3972	124.8000	164.2000

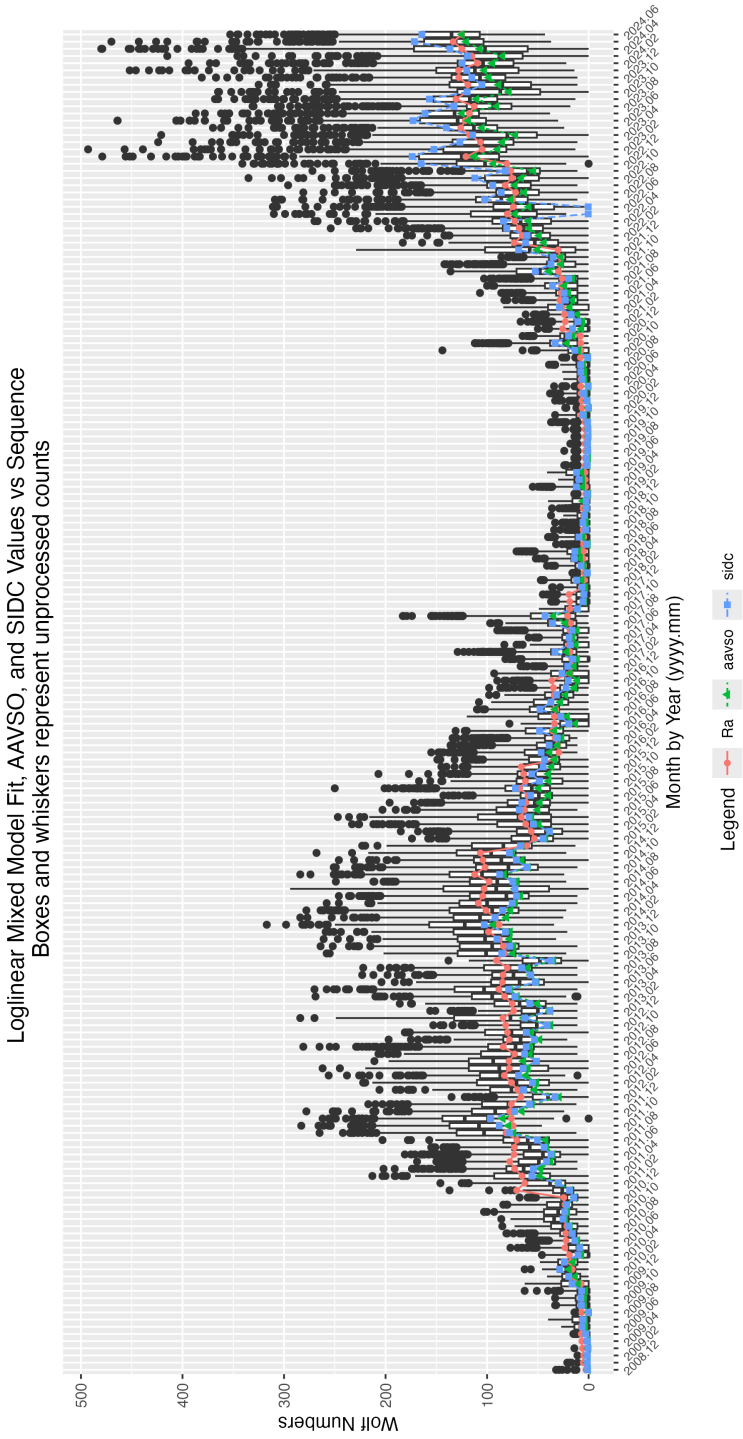

Figure 2: GLMM fitted data for R_a. AAVSO data: https://www.aavso.org/category/tags/solar-bulletin. SILSO data: WDC-SILSO, Royal Observatory of Belgium, Brussels

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: 202406 Parameter Estimates

	Estimate	Std. Error	t-value	Pr(>|t|)
(Intercept)	1.1941	0.3162	3.7760	0.0002
seeG	-0.1081	0.0041	-26.6583	0.0000
seeF	-0.2223	0.0047	-47.7926	0.0000
seeP	-0.3168	0.0067	-47.1564	0.0000
seeM	-0.1811	0.0244	-7.4374	0.0000
sidc1	0.0501	0.0098	5.1042	0.0000
year2009	0.7584	0.3178	2.3863	0.0170
year2010	1.9793	0.3156	6.2712	0.0000
year2011	3.1301	0.3155	9.9205	0.0000
year2012	3.1750	0.3155	10.0633	0.0000
year2013	3.2693	0.3155	10.3620	0.0000
year2014	3.4688	0.3155	10.9946	0.0000
year2015	2.9908	0.3155	9.4790	0.0000
year2016	2.3755	0.3155	7.5284	0.0000
year2017	1.7637	0.3156	5.5887	0.0000
year2018	0.4769	0.3159	1.5099	0.1311
year2019	0.0679	0.3161	0.2147	0.8300
year2020	0.8738	0.3157	2.7676	0.0056
year2021	2.1528	0.3156	6.8221	0.0000
year2022	3.1465	0.3155	9.9724	0.0000
year2023	3.6202	0.3155	11.4740	0.0000
year2024	3.6971	0.3155	11.7164	0.0000
mon2	-0.1265	0.0072	-17.6672	0.0000
mon3	-0.0903	0.0068	-13.2089	0.0000
mon4	-0.0079	0.0066	-1.1980	0.2309
mon5	0.0570	0.0064	8.9010	0.0000
mon6	0.0058	0.0062	0.9298	0.3525
mon7	-0.0057	0.0067	-0.8592	0.3902
mon8	-0.0489	0.0067	-7.2999	0.0000
mon9	0.0981	0.0067	14.7389	0.0000
mon10	0.0112	0.0069	1.6332	0.1024
mon11	0.0450	0.0071	6.3089	0.0000
mon12	0.0881	0.0071	12.4334	0.0000

Table 4: 202406 Summary of Sunspot Numbers

year	mon	day	obs	sidc
Min. :2008	Min. : 1.00	Min. : 0.0	Length:183969	Min. :0.0000
1st Qu.:2014	1st Qu.: 4.00	1st Qu.: 8.0	Class :character	1st Qu.:0.0000
Median :2017	Median : 7.00	Median :16.0	Mode :character	Median :0.0000
Mean :2017	Mean : 6.54	Mean :15.7		Mean :0.2361
3rd Qu.:2021	3rd Qu.: 9.00	3rd Qu.:23.0		3rd Qu.:0.0000
Max. :2024	Max. :12.00	Max. :31.0		Max. :1.0000

Table 5: 202406 Summary of Sunspot Numbers

g	s	w	see	method
Min. : 0.000	Min. : 0.0	Min. : 0.00	E:38821	Length:183969
1st Qu.: 1.000	1st Qu.: 1.0	1st Qu.: 11.00	G:75621	Class :character
Median : 3.000	Median : 11.0	Median : 39.00	F:53495	Mode :character
Mean : 3.344	Mean : 19.4	Mean : 52.84	P:15247	
3rd Qu.: 5.000	3rd Qu.: 29.0	3rd Qu.: 84.00	M: 785	
Max. :31.000	Max. :295.0	Max. :493.00		

Table 6: 202406 Summary of Sunspot Numbers

inst	filter	unit
Length:183969	Length:183969	Length:183969
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Table 7: 202406 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.: 350.0	1st Qu.: 40.0
Median : 80.00	Median : 14.00	Median : 900.0	Median : 55.0
Mean : 94.04	Mean : 40.73	Mean : 889.5	Mean : 180.8
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

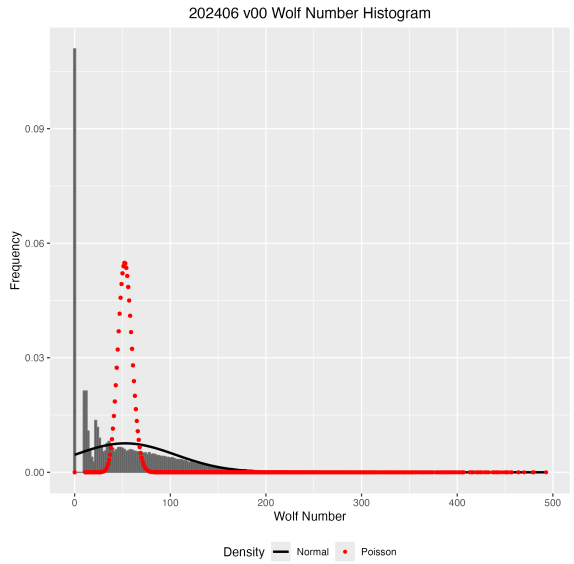

Figure 3: Box plots of raw Wolf number (w) by observer rank.

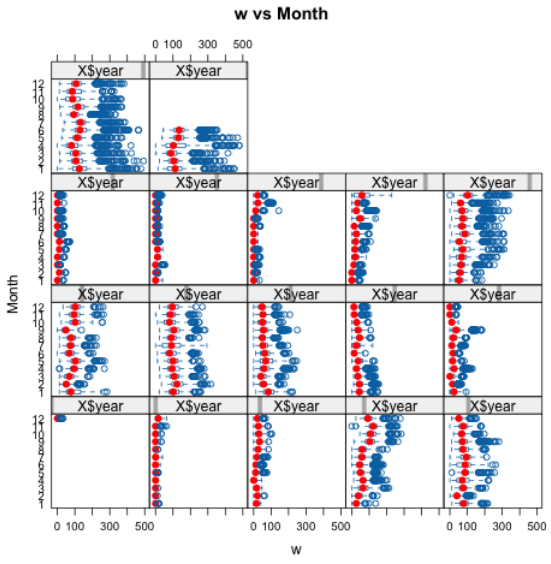

Figure 4: Box plots of raw Wolf number (w) by month and year.

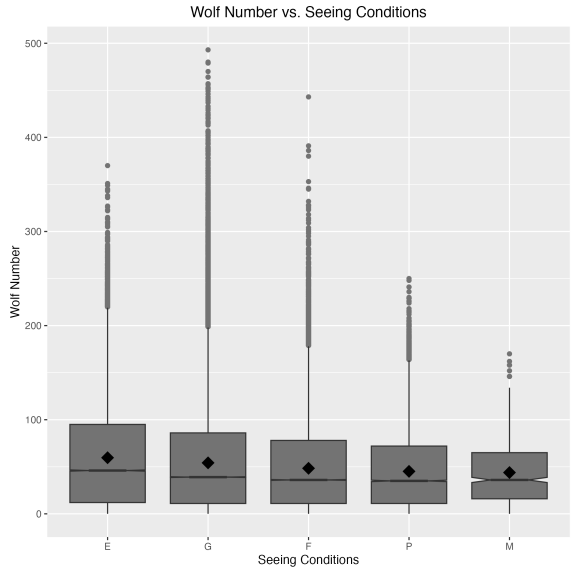

Figure 5: Box plots of raw Wolf number (w) by seeing condition.

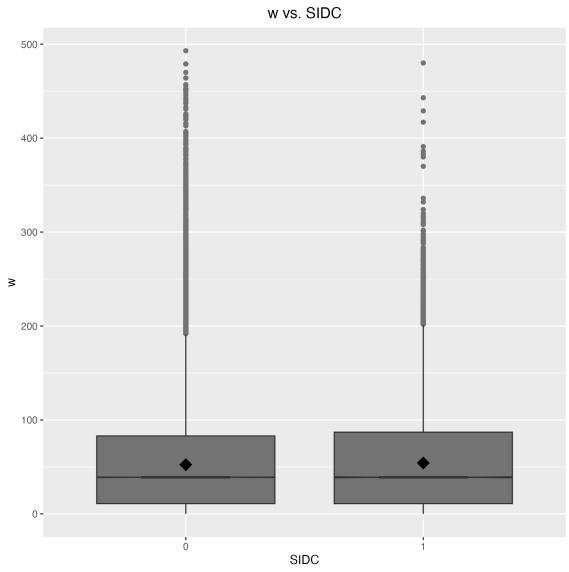

Figure 6: Box plots of raw Wolf number (w) by organization.

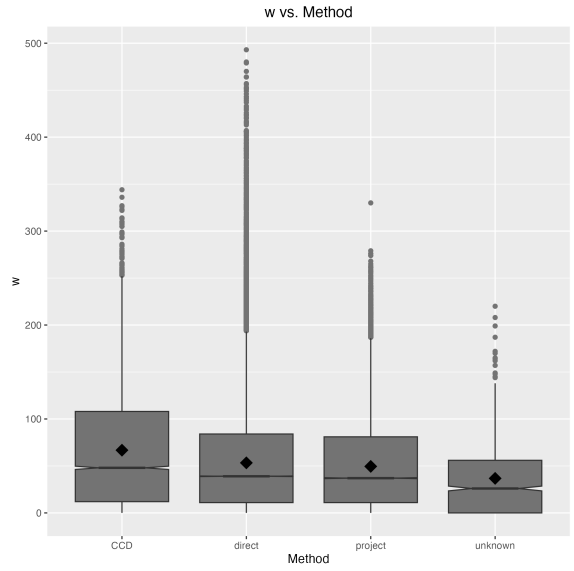

Figure 7: Box plots of raw Wolf number (w) by observer rank.

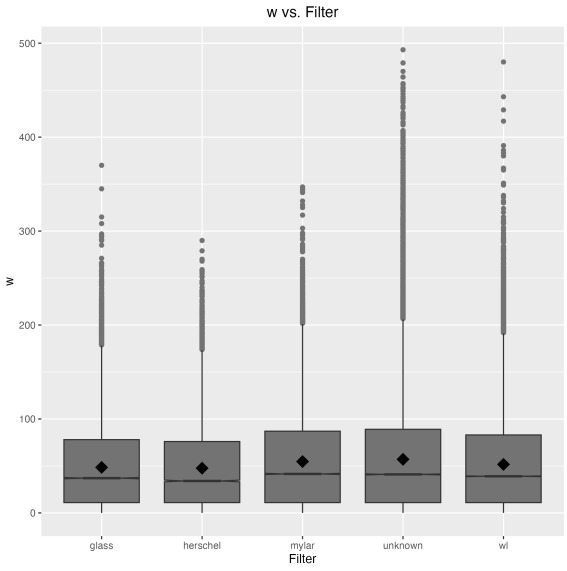

Figure 8: Box plots of raw Wolf number (w) by month and year.

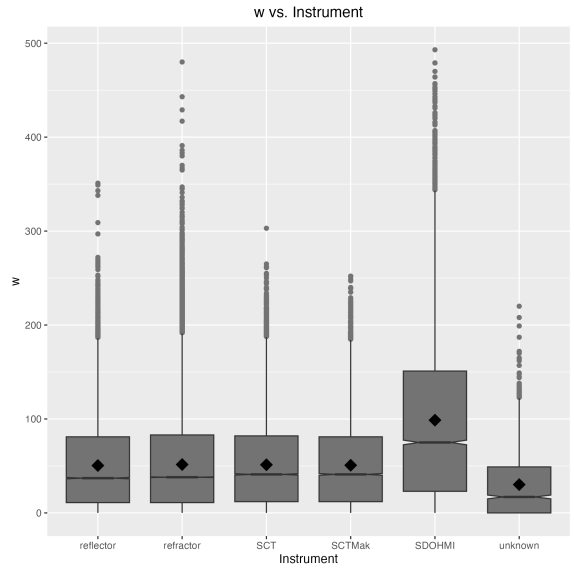

Figure 9: Box plots of raw Wolf number (w) by seeing condition.

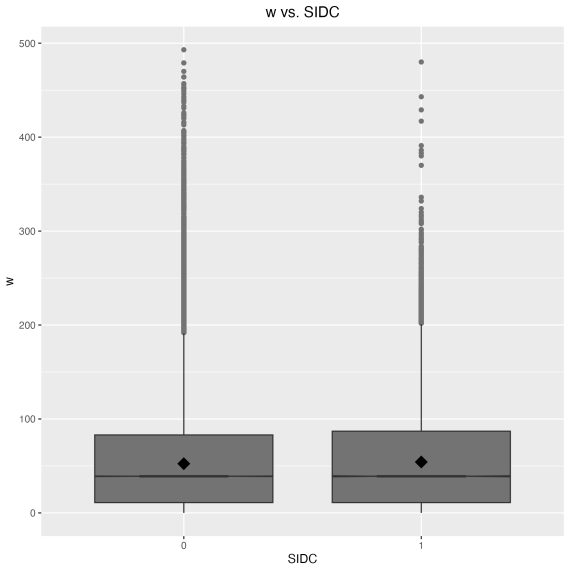

Figure 10: Box plots of raw Wolf number (w) by organization.

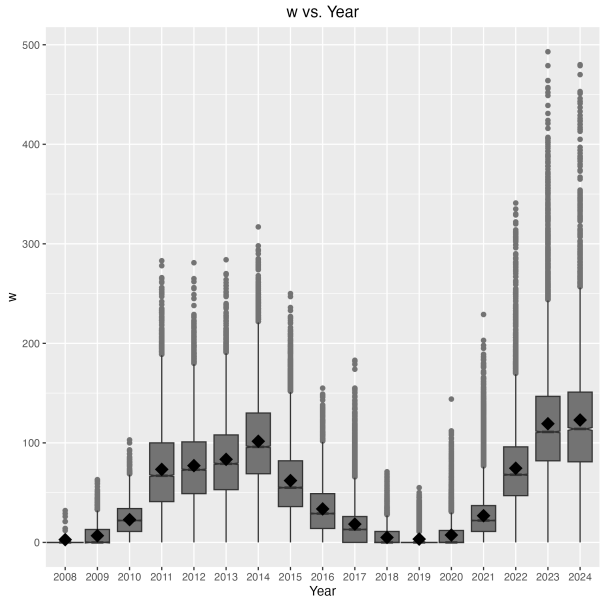

Figure 11: Box plots of raw Wolf number (w) by year.

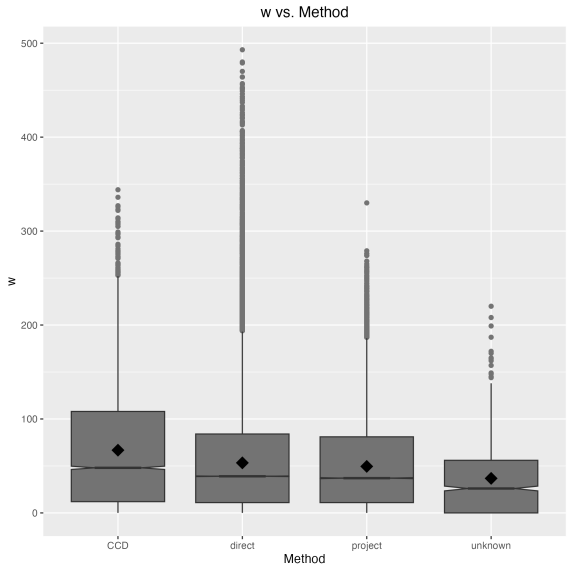

Figure 12: Box plots of raw Wolf number (w) by observing method.