

Monthly Report (00)

2024.05 Data Set

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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.

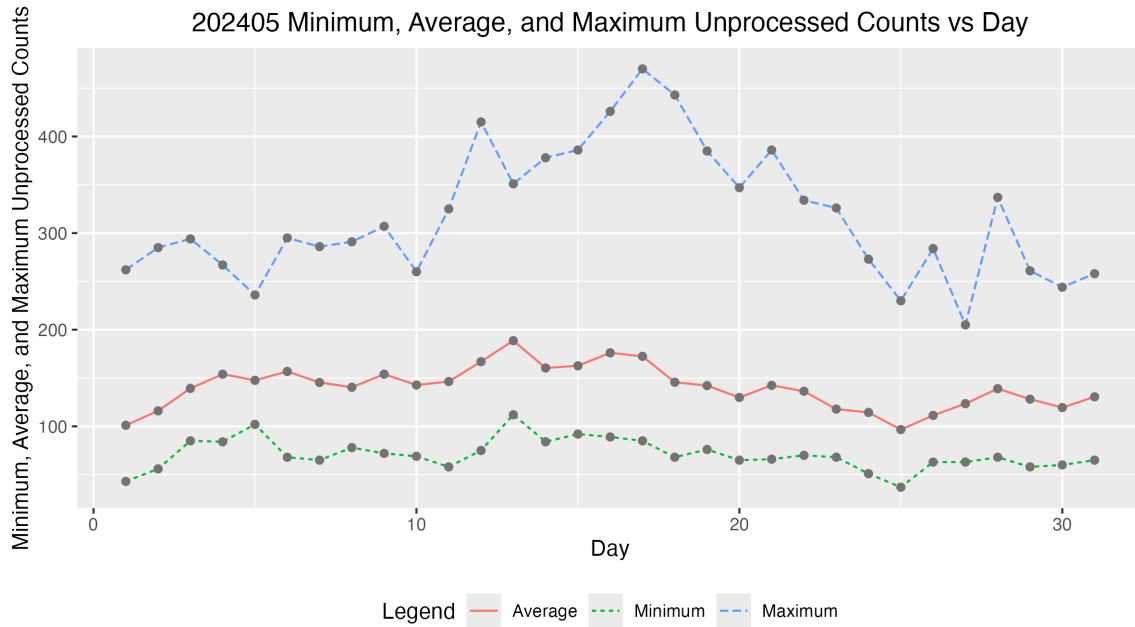


Figure 1: Raw average sunspot count by day of the month.

Table 1: 202405 Daily Raw Counts

Day	Submissions	Minimum	Average	Maximum
1.0000	35.0000	43.0000	101.0857	262.0000
2.0000	32.0000	56.0000	116.0000	285.0000
3.0000	27.0000	85.0000	139.2593	294.0000
4.0000	37.0000	84.0000	154.0000	267.0000
5.0000	34.0000	102.0000	147.6176	236.0000
6.0000	26.0000	68.0000	156.8077	295.0000
7.0000	39.0000	65.0000	145.4103	286.0000
8.0000	34.0000	78.0000	140.3824	291.0000
9.0000	40.0000	72.0000	154.0000	307.0000
10.0000	41.0000	69.0000	142.7317	260.0000
11.0000	43.0000	58.0000	146.3488	325.0000
12.0000	34.0000	75.0000	166.9412	415.0000
13.0000	35.0000	112.0000	188.6571	351.0000
14.0000	30.0000	84.0000	160.4000	378.0000
15.0000	32.0000	92.0000	162.6875	386.0000
16.0000	32.0000	89.0000	176.0938	426.0000
17.0000	37.0000	85.0000	172.4595	470.0000
18.0000	29.0000	68.0000	145.6552	443.0000
19.0000	38.0000	76.0000	142.1842	385.0000
20.0000	40.0000	65.0000	129.8750	347.0000
21.0000	39.0000	66.0000	142.3846	386.0000
22.0000	38.0000	70.0000	136.3158	334.0000
23.0000	43.0000	68.0000	117.8605	326.0000
24.0000	40.0000	51.0000	114.3750	273.0000
25.0000	42.0000	37.0000	96.6190	230.0000
26.0000	38.0000	63.0000	111.2895	284.0000
27.0000	27.0000	63.0000	123.4444	205.0000
28.0000	31.0000	68.0000	138.9677	337.0000
29.0000	35.0000	58.0000	128.1143	261.0000
30.0000	34.0000	60.0000	119.4412	244.0000
31.0000	29.0000	65.0000	130.5517	258.0000

3 Error Tables

Data are for the month of May 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	2.4255	3.1154	0.5000	1.0000
2009.01	5.3100	4.7627	5.8574	1.3000	1.3000
2009.02	4.7891	4.2798	5.2985	0.7000	1.2000
2009.03	6.0590	5.8355	6.2825	0.3000	0.6000
2009.04	6.7160	6.4937	6.9383	0.4000	1.2000
2009.05	7.1971	6.9284	7.4657	1.6000	2.9000
2009.06	7.1120	6.7764	7.4476	3.2000	6.3000
2009.07	6.6732	6.4128	6.9337	3.6000	5.5000
2009.08	6.6408	6.4044	6.8773	0.0000	0.0000
2009.09	7.3758	7.1307	7.6210	4.5000	7.1000
2009.10	6.6586	6.3194	6.9978	4.5000	7.7000
2009.11	6.7230	6.5258	6.9202	3.3000	6.9000
2009.12	7.2842	7.0574	7.5110	10.4000	16.3000
2010.01	19.8387	17.6986	21.9788	13.3000	19.5000
2010.02	16.1632	14.0862	18.2402	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	17.4903	15.4247	19.5559	15.4000	24.0000
2010.04	19.0066	16.8754	21.1378	7.0000	10.4000
2010.05	23.4927	23.0347	23.9507	8.4000	8.7000
2010.06	21.9063	21.4873	22.3253	11.0000	13.6000
2010.07	22.4645	22.0743	22.8547	15.2000	16.1000
2010.08	21.5041	21.0820	21.9262	18.3000	19.6000
2010.09	25.0071	24.5131	25.5011	22.8000	25.2000
2010.10	22.9758	22.4900	23.4617	21.0000	23.5000
2010.11	23.4041	22.9246	23.8836	20.9000	21.6000
2010.12	24.5193	23.9639	25.0748	13.9000	14.5000
2011.01	71.1873	69.5688	72.8058	17.7000	18.7000
2011.02	63.1255	61.6179	64.6330	29.1000	29.6000
2011.03	65.8820	64.4671	67.2970	48.0000	55.8000
2011.04	73.1744	71.5818	74.7671	47.3000	54.4000
2011.05	78.1215	76.5820	79.6611	37.3000	41.5000
2011.06	72.2920	70.8486	73.7354	35.2000	37.0000
2011.07	73.0653	71.6869	74.4438	41.5000	43.8000
2011.08	70.6274	69.3508	71.9041	42.4000	50.5000
2011.09	81.2839	79.6745	82.8932	73.8000	78.0000
2011.10	74.3333	72.9122	75.7545	78.9000	88.0000
2011.11	75.9497	74.2733	77.6260	84.6000	96.7000
2011.12	77.7511	76.0610	79.4412	65.8000	73.0000
2012.01	76.5109	74.8915	78.1304	55.8000	58.2000
2012.02	66.8686	65.3874	68.3498	29.2000	33.1000
2012.03	70.2394	68.9055	71.5732	53.1000	64.1000
2012.04	76.2967	74.7913	77.8021	51.4000	55.2000
2012.05	83.4877	81.9368	85.0387	61.8000	69.0000
2012.06	76.8824	75.4352	78.3297	59.7000	64.5000
2012.07	78.4208	76.9831	79.8584	64.2000	51.3000
2012.08	72.8826	71.5656	74.1997	57.7000	63.1000
2012.09	84.0369	82.4603	85.6136	57.7000	61.5000
2012.10	77.8899	76.3423	79.4374	48.3000	53.3000
2012.11	79.8929	78.1868	81.5990	56.7000	61.4000
2012.12	81.5978	79.7508	83.4449	37.4000	40.8000
2013.01	84.7158	82.9954	86.4361	63.8000	62.9000
2013.02	74.1642	72.5547	75.7736	37.8000	38.0000
2013.03	75.5652	73.9322	77.1982	50.6000	57.9000
2013.04	83.1159	81.5219	84.7098	70.6000	72.4000
2013.05	88.7655	87.0124	90.5186	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	83.4742	81.8224	85.1259	51.0000	52.5000
2013.07	84.1916	82.6702	85.7131	57.0000	57.0000
2013.08	79.9894	78.5602	81.4186	60.0000	66.0000
2013.09	90.6731	88.9206	92.4256	34.6000	36.9000
2013.10	82.8644	81.2041	84.5247	74.5000	85.6000
2013.11	83.8418	81.8032	85.8805	73.9000	77.6000
2013.12	87.9871	86.0291	89.9451	77.8000	90.3000
2014.01	99.0691	96.8775	101.2608	77.4000	82.0000
2014.02	88.6375	86.7223	90.5528	93.9000	102.8000
2014.03	92.2826	90.4742	94.0911	80.9000	92.2000
2014.04	101.6202	99.6643	103.5760	76.9000	84.7000
2014.05	109.1657	107.1453	111.1860	72.3000	75.2000
2014.06	102.4822	100.5557	104.4086	67.2000	71.0000
2014.07	102.9229	101.0145	104.8313	72.5000	72.5000
2014.08	97.7781	96.0980	99.4582	71.2000	74.7000
2014.09	112.1724	109.9979	114.3470	83.2000	87.6000
2014.10	101.9481	99.9392	103.9569	59.5000	60.6000
2014.11	104.0908	101.7590	106.4227	65.8000	71.1000
2014.12	106.5374	104.0208	109.0540	75.8000	78.0000
2015.01	61.2665	59.9967	62.5363	65.9000	67.0000
2015.02	53.6893	52.3963	54.9824	42.4000	44.8000
2015.03	56.7117	55.5969	57.8266	38.0000	38.4000
2015.04	62.1417	60.9157	63.3678	49.0000	54.4000
2015.05	66.6670	65.4713	67.8626	56.3000	58.8000
2015.06	62.0445	60.8936	63.1954	50.2000	68.3000
2015.07	61.6221	60.5652	62.6791	47.9000	65.8000
2015.08	59.7499	58.7373	60.7625	39.5000	57.2000
2015.09	67.9105	66.6638	69.1572	49.2000	72.1000
2015.10	62.1760	60.9653	63.3867	39.3000	48.3000
2015.11	63.9746	62.5567	65.3926	39.6000	55.9000
2015.12	66.2905	64.7947	67.7863	36.4000	44.8000
2016.01	33.5313	32.8198	34.2428	33.7000	43.3000
2016.02	29.3272	28.7055	29.9489	38.3000	46.8000
2016.03	30.5480	29.9269	31.1691	30.5000	38.9000
2016.04	33.2100	32.5662	33.8537	26.6000	30.9000
2016.05	35.8134	35.1526	36.4743	33.7000	48.4000
2016.06	33.1305	32.5573	33.7038	13.1000	19.5000
2016.07	33.6512	33.1035	34.1989	21.2000	27.5000
2016.08	32.1988	31.6239	32.7737	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	37.4033	36.7110	38.0956	27.7000	37.1000
2016.10	33.9780	33.3152	34.6408	22.7000	31.7000
2016.11	34.5997	33.8689	35.3306	14.0000	22.2000
2016.12	36.2623	35.4736	37.0510	11.1000	20.0000
2017.01	18.0917	17.7045	18.4788	18.4000	26.2000
2017.02	15.8890	15.5337	16.2442	14.4000	20.6000
2017.03	16.6488	16.3254	16.9722	11.3000	15.5000
2017.04	18.2858	17.9579	18.6136	21.6000	33.2000
2017.05	19.4830	19.1411	19.8249	12.5000	18.1000
2017.06	17.9803	17.6789	18.2817	15.5000	19.3000
2017.07	18.3349	18.0384	18.6313	11.5000	16.3000
2017.08	17.5296	17.2212	17.8380	22.8000	35.7000
2017.09	20.6561	20.2211	21.0911	34.6000	42.9000
2017.10	18.2449	17.8683	18.6215	10.5000	11.0000
2017.11	18.5052	18.1106	18.8998	4.2000	5.6000
2017.12	19.3052	19.0089	19.6015	4.0000	4.6000
2018.01	5.0256	4.9169	5.1343	3.1000	6.3000
2018.02	4.3700	4.2638	4.4762	6.8000	11.8000
2018.03	4.5159	4.4241	4.6077	1.1000	1.2000
2018.04	4.9021	4.8031	5.0012	4.7000	7.5000
2018.05	5.2984	5.1996	5.3971	8.4000	14.0000
2018.06	4.9117	4.8247	4.9987	10.2000	13.6000
2018.07	5.0210	4.9649	5.0772	0.5000	1.7000
2018.08	4.7408	4.6597	4.8220	5.9000	9.5000
2018.09	5.3933	5.2925	5.4942	1.6000	2.9000
2018.10	5.0147	4.9169	5.1126	2.5000	5.6000
2018.11	5.0890	4.9822	5.1959	3.1000	4.2000
2018.12	5.4000	5.2945	5.5055	1.6000	2.3000
2019.01	3.3424	3.2784	3.4064	5.4000	2.3000
2019.02	2.9626	2.9038	3.0214	0.1000	1.2000
2019.03	3.0312	2.9795	3.0828	6.1000	12.1000
2019.04	3.3304	3.2678	3.3931	6.2000	9.3000
2019.05	3.4862	3.4255	3.5469	7.0000	11.9000
2019.06	3.2496	3.1948	3.3044	0.7000	1.5000
2019.07	3.3102	3.2611	3.3593	0.4000	2.2000
2019.08	3.1744	3.1274	3.2214	0.3000	0.8000
2019.09	3.6845	3.6267	3.7422	0.5000	1.0000
2019.10	3.3303	3.2739	3.3866	0.2000	0.5000
2019.11	3.4576	3.3911	3.5241	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	3.5774	3.5053	3.6495	0.8000	1.0000
2020.01	7.3941	7.2490	7.5393	4.0000	5.3000
2020.02	6.4981	6.3676	6.6286	0.1000	0.0000
2020.03	6.6999	6.5744	6.8253	1.2000	1.5000
2020.04	7.4148	7.2938	7.5358	3.0000	5.1000
2020.05	7.8189	7.6976	7.9401	0.1000	0.4000
2020.06	7.3331	7.2204	7.4457	3.9000	6.4000
2020.07	7.3678	7.2589	7.4767	4.2000	7.7000
2020.08	6.9698	6.8732	7.0665	5.3000	7.8000
2020.09	8.0551	7.9254	8.1849	0.4000	0.9000
2020.10	7.4493	7.3262	7.5724	9.9000	13.6000
2020.11	7.6369	7.5109	7.7628	21.2000	33.1000
2020.12	7.9304	7.7862	8.0746	15.4000	19.8000
2021.01	25.7213	25.2576	26.1849	7.0000	15.8000
2021.02	23.0452	22.6347	23.4557	5.8000	10.7000
2021.03	23.9187	23.5396	24.2979	11.0000	17.2000
2021.04	26.6783	26.1912	27.1654	18.5000	28.8000
2021.05	28.4578	27.9846	28.9310	15.9000	22.9000
2021.06	26.5178	26.0695	26.9661	19.9000	24.1000
2021.07	26.5526	26.0883	27.0169	23.8000	35.6000
2021.08	25.9262	25.4775	26.3749	15.7000	19.5000
2021.09	29.6523	29.1168	30.1877	39.1000	52.5000
2021.10	27.7540	27.2411	28.2670	27.1000	37.0000
2021.11	28.0337	27.4917	28.5756	27.2000	35.1000
2021.12	29.9699	29.3302	30.6096	50.6000	69.0000
2022.01	73.6188	72.2057	75.0318	43.9000	62.0000
2022.02	65.5098	64.2095	66.8101	48.8000	60.5000
2022.03	68.7473	67.3973	70.0972	58.4000	80.6000
2022.04	72.9435	71.6685	74.2185	59.1000	83.9000
2022.05	80.4724	79.0858	81.8590	72.5000	0.4000
2022.06	72.7993	71.5764	74.0222	58.9000	0.4000
2022.07	74.9543	73.6399	76.2687	76.7000	102.5000
2022.08	71.8428	70.6209	73.0647	63.3000	86.0000
2022.09	82.1272	80.4981	83.7562	72.6000	94.5000
2022.10	75.4587	74.0330	76.8845	66.4000	112.1000
2022.11	76.7370	75.1529	78.3212	54.3000	82.1000
2022.12	80.4102	78.5226	82.2979	93.7000	165.0000
2023.01	121.7494	118.9155	124.5834	112.9000	173.8000
2023.02	105.6998	103.3158	108.0838	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	107.3111	104.9390	109.6832	85.0000	126.8000
2023.04	118.0438	115.6499	120.4376	72.1000	114.3000
2023.05	126.8738	124.3009	129.4467	105.0000	140.0000
2023.06	119.7395	118.3610	121.1180	118.5000	173.0000
2023.07	117.6786	115.4637	119.8934	124.7000	161.2000
2023.08	112.8324	110.6850	114.9799	90.6000	132.5000
2023.09	130.8701	128.2579	133.4822	110.4000	156.8000
2023.10	120.0987	117.4317	122.7658	78.4000	119.6000
2023.11	119.1081	116.2956	121.9206	88.6000	105.1000
2023.12	128.1055	124.9714	131.2397	98.2000	115.0000
2024.01	124.2334	120.9577	127.5091	102.8000	120.0000
2024.02	106.3048	103.7924	108.8171	94.8000	124.6000
2024.03	111.5981	109.0762	114.1200	84.8000	119.4000
2024.04	121.0735	118.4056	123.7415	107.1000	136.5000
2024.05	129.2766	126.6146	131.9386	120.5000	171.7000

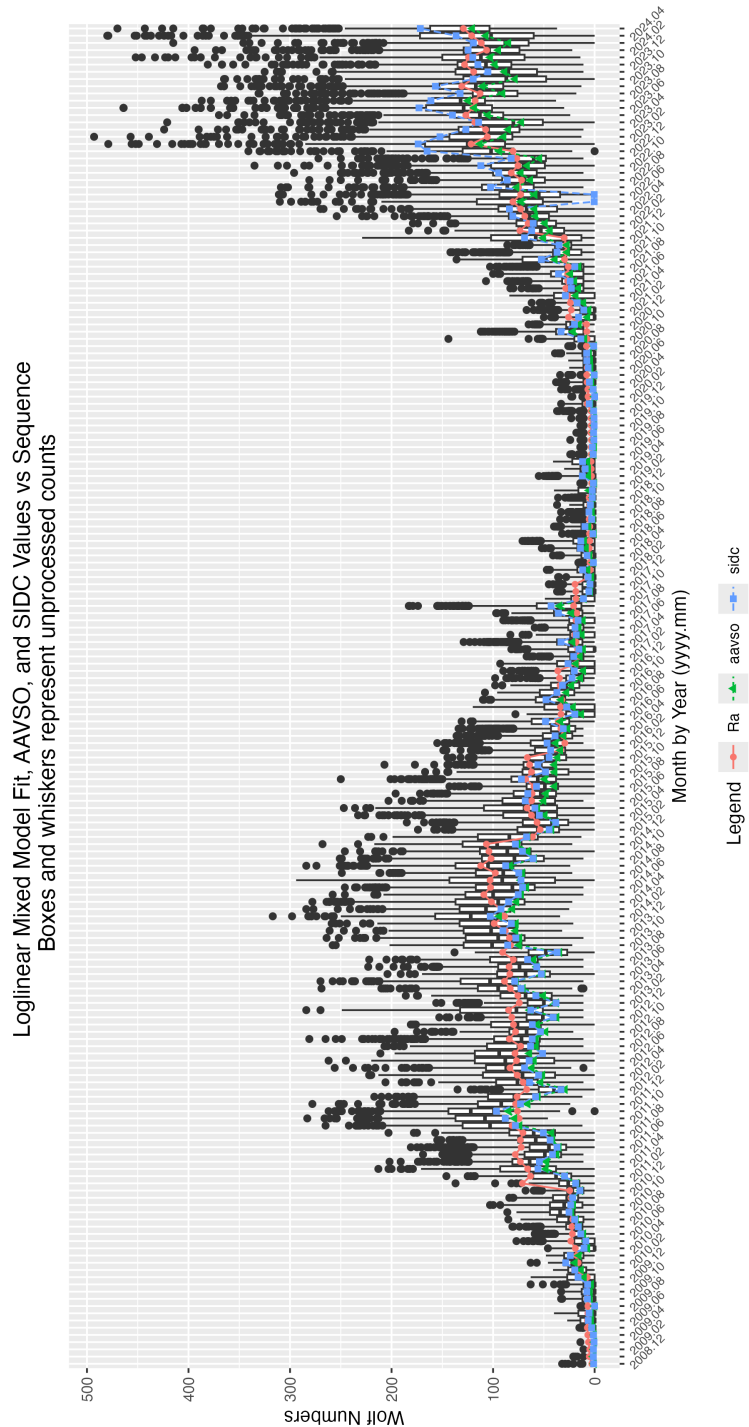


Figure 2: GLMM fitted data for R_a . AAVSO data: <https://www.aavso.org/category/tags/solar-bulletin>. SILSO data: WDC-SILSO, Royal Observatory of Belgium, Brussels

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: 202405 Parameter Estimates

	Estimate	Std. Error	t-value	Pr(> t)
(Intercept)	1.2006	0.3166	3.7928	0.0001
seeG	-0.1085	0.0041	-26.5278	0.0000
seeF	-0.2248	0.0047	-47.8991	0.0000
seeP	-0.3195	0.0068	-47.1558	0.0000
seeM	-0.1832	0.0244	-7.5157	0.0000
sidc1	0.0493	0.0100	4.9177	0.0000
year2009	0.7568	0.3181	2.3788	0.0174
year2010	1.9790	0.3159	6.2640	0.0000
year2011	3.1280	0.3158	9.9043	0.0000
year2012	3.1725	0.3158	10.0454	0.0000
year2013	3.2669	0.3158	10.3442	0.0000
year2014	3.4663	0.3158	10.9756	0.0000
year2015	2.9882	0.3158	9.4616	0.0000
year2016	2.3732	0.3159	7.5134	0.0000
year2017	1.7614	0.3159	5.5759	0.0000
year2018	0.4747	0.3162	1.5013	0.1333
year2019	0.0655	0.3164	0.2071	0.8359
year2020	0.8716	0.3161	2.7578	0.0058
year2021	2.1506	0.3159	6.8086	0.0000
year2022	3.1445	0.3158	9.9561	0.0000
year2023	3.6213	0.3158	11.4663	0.0000
year2024	3.6618	0.3159	11.5927	0.0000
mon2	-0.1257	0.0072	-17.5389	0.0000
mon3	-0.0900	0.0068	-13.1440	0.0000
mon4	-0.0077	0.0066	-1.1572	0.2472
mon5	0.0572	0.0064	8.9231	0.0000
mon6	-0.0160	0.0065	-2.4652	0.0137
mon7	-0.0108	0.0067	-1.6115	0.1071
mon8	-0.0537	0.0067	-8.0097	0.0000
mon9	0.0933	0.0067	13.9816	0.0000
mon10	0.0065	0.0069	0.9440	0.3452
mon11	0.0406	0.0071	5.6768	0.0000
mon12	0.0837	0.0071	11.7814	0.0000

Table 4: 202405 Summary of Sunspot Numbers

year	mon	day	obs	sidc
Min. :2008	Min. : 1.000	Min. : 0.0	Length:182883	Min. :0.0000
1st Qu.:2014	1st Qu.: 4.000	1st Qu.: 8.0	Class :character	1st Qu.:0.0000
Median :2017	Median : 7.000	Median :16.0	Mode :character	Median :0.0000
Mean :2017	Mean : 6.543	Mean :15.7		Mean :0.2366
3rd Qu.:2021	3rd Qu.: 9.000	3rd Qu.:23.0		3rd Qu.:0.0000
Max. :2024	Max. :12.000	Max. :31.0		Max. :1.0000

Table 5: 202405 Summary of Sunspot Numbers

g	s	w	see	method
Min. : 0.000	Min. : 0.00	Min. : 0.00	E:38528	Length:182883
1st Qu.: 1.000	1st Qu.: 1.00	1st Qu.: 11.00	G:75207	Class :character
Median : 3.000	Median : 11.00	Median : 38.00	F:53195	Mode :character
Mean : 3.313	Mean : 19.19	Mean : 52.32	P:15168	
3rd Qu.: 5.000	3rd Qu.: 29.00	3rd Qu.: 83.00	M: 785	
Max. :31.000	Max. :295.00	Max. :493.00		

Table 6: 202405 Summary of Sunspot Numbers

inst	filter	unit
Length:182883	Length:182883	Length:182883
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Table 7: 202405 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 : 93.93	Mean : 40.59	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

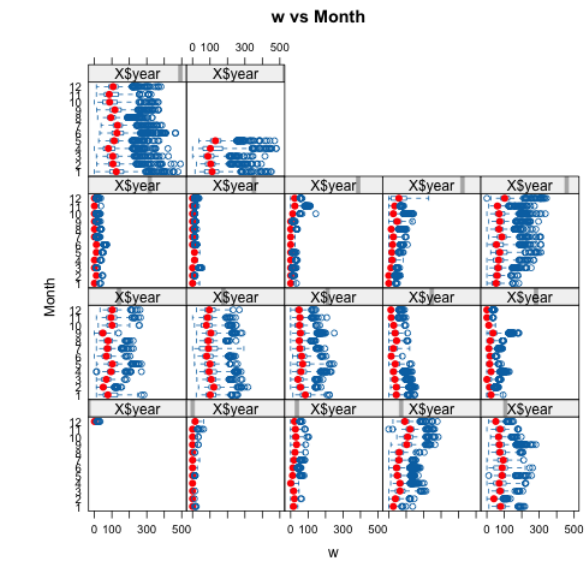
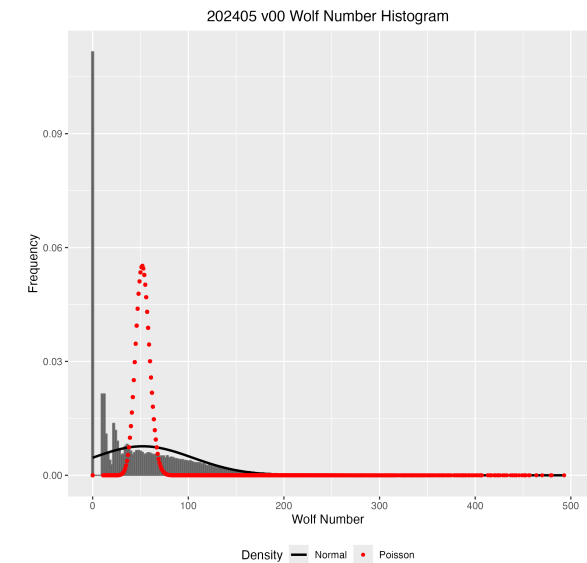


Figure 3: Box plots of raw Wolf number (w) by observer rank.

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

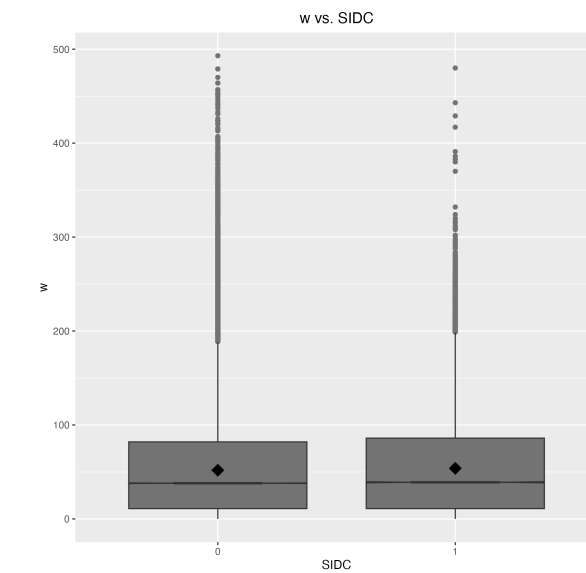
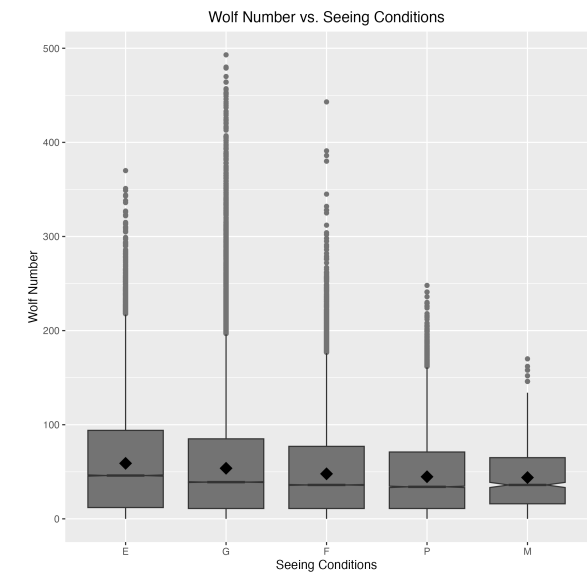


Figure 5: Box plots of raw Wolf number (w) by seeing condition.

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

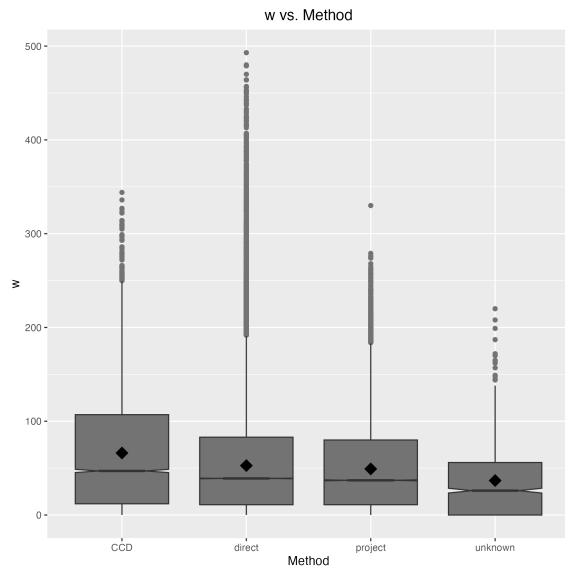


Figure 7: Box plots of raw Wolf number (w) by observer rank.

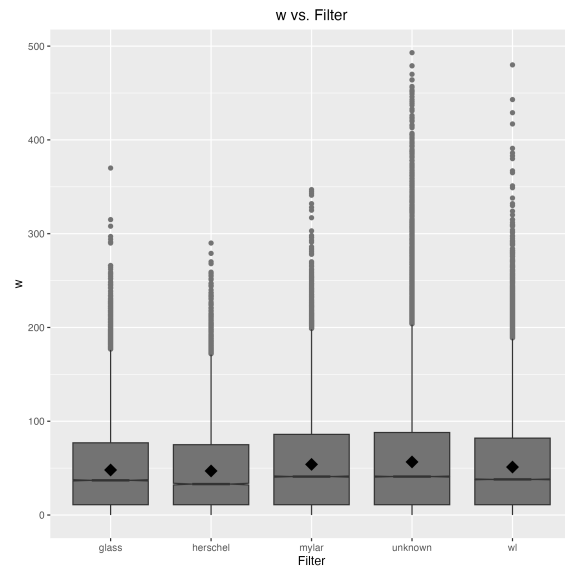


Figure 8: Box plots of raw Wolf number (w) by month and year.

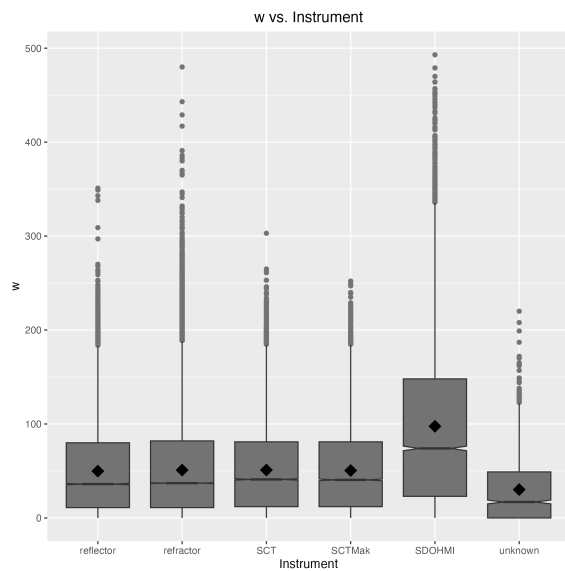


Figure 9: Box plots of raw Wolf number (w) by seeing condition.

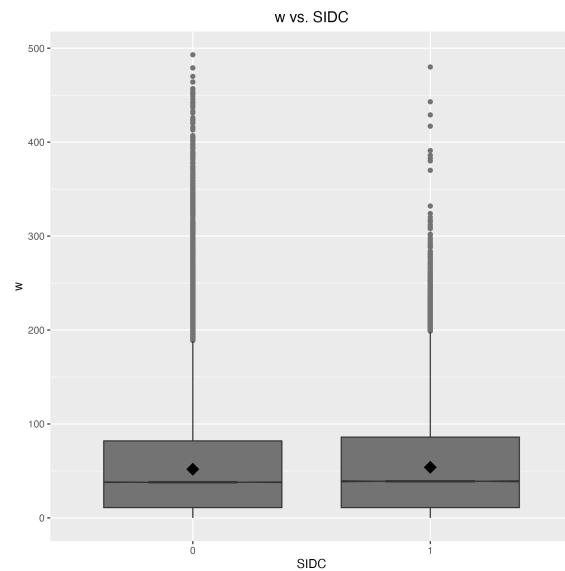


Figure 10: Box plots of raw Wolf number (w) by organization.

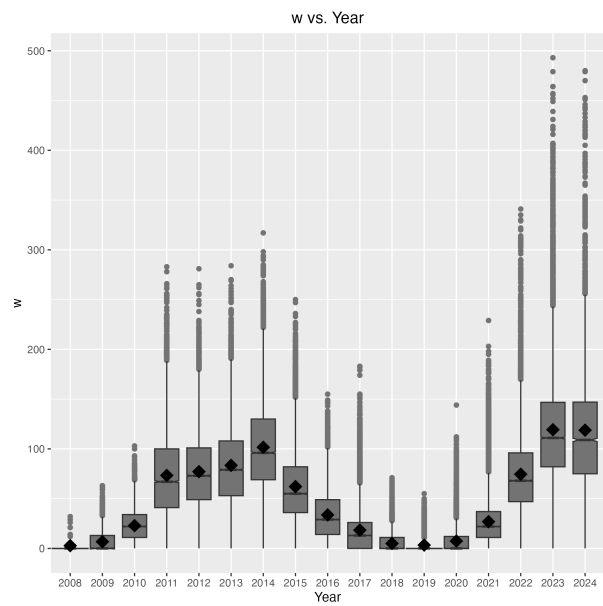


Figure 11: Box plots of raw Wolf number (w) by year.

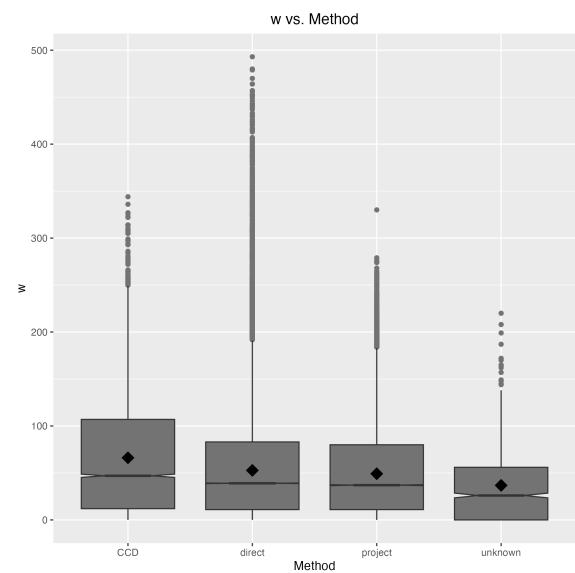


Figure 12: Box plots of raw Wolf number (w) by observing method.