

Monthly Report (00)

2024.09 Data Set

Sunday 13th October, 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.

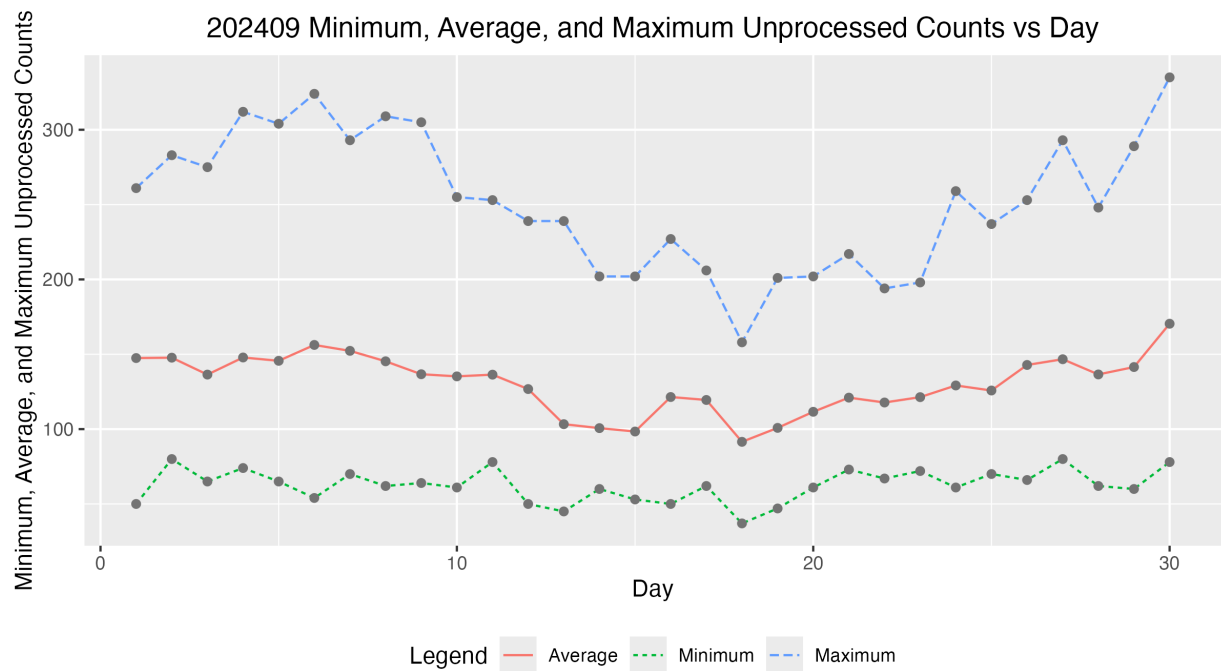


Figure 1: Raw average sunspot count by day of the month.

Table 1: 202409 Daily Raw Counts

Day	Submissions	Minimum	Average	Maximum
1.0000	36.0000	50.0000	147.4722	261.0000
2.0000	33.0000	80.0000	147.7273	283.0000
3.0000	35.0000	65.0000	136.4286	275.0000
4.0000	34.0000	74.0000	147.8529	312.0000
5.0000	30.0000	65.0000	145.6333	304.0000
6.0000	29.0000	54.0000	156.2414	324.0000
7.0000	31.0000	70.0000	152.2903	293.0000
8.0000	33.0000	62.0000	145.3030	309.0000
9.0000	33.0000	64.0000	136.6667	305.0000
10.0000	39.0000	61.0000	135.2308	255.0000
11.0000	26.0000	78.0000	136.3846	253.0000
12.0000	25.0000	50.0000	126.7600	239.0000
13.0000	29.0000	45.0000	103.3103	239.0000
14.0000	38.0000	60.0000	100.6579	202.0000
15.0000	38.0000	53.0000	98.3947	202.0000
16.0000	34.0000	50.0000	121.4412	227.0000
17.0000	34.0000	62.0000	119.4706	206.0000
18.0000	32.0000	37.0000	91.5000	158.0000
19.0000	35.0000	47.0000	100.8286	201.0000
20.0000	35.0000	61.0000	111.5714	202.0000
21.0000	33.0000	73.0000	121.0303	217.0000
22.0000	27.0000	67.0000	117.7778	194.0000
23.0000	28.0000	72.0000	121.3571	198.0000
24.0000	29.0000	61.0000	129.1724	259.0000
25.0000	29.0000	70.0000	125.7931	237.0000
26.0000	28.0000	66.0000	142.8571	253.0000
27.0000	26.0000	80.0000	146.6923	293.0000
28.0000	36.0000	62.0000	136.5278	248.0000
29.0000	34.0000	60.0000	141.4706	289.0000
30.0000	27.0000	78.0000	170.4074	335.0000

3 Error Tables

Data are for the month of September 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	2.4307	3.1103	0.5000	1.0000
2009.01	5.2506	4.7173	5.7839	1.3000	1.3000
2009.02	4.7197	4.2244	5.2149	0.7000	1.2000
2009.03	5.9556	5.7371	6.1742	0.3000	0.6000
2009.04	6.6025	6.3851	6.8199	0.4000	1.2000
2009.05	7.0791	6.8189	7.3393	1.6000	2.9000
2009.06	7.1460	6.8151	7.4770	3.2000	6.3000
2009.07	6.9200	6.6514	7.1886	3.6000	5.5000
2009.08	7.0248	6.7811	7.2686	0.0000	0.0000
2009.09	7.2211	6.9826	7.4597	4.5000	7.1000
2009.10	6.6690	6.3313	7.0066	4.5000	7.7000
2009.11	6.7158	6.5201	6.9116	3.3000	6.9000
2009.12	7.2770	7.0519	7.5021	10.4000	16.3000
2010.01	19.4990	17.4256	21.5724	13.3000	19.5000
2010.02	15.8457	13.8410	17.8504	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	17.1634	15.1690	19.1579	15.4000	24.0000
2010.04	18.6629	16.6036	20.7222	7.0000	10.4000
2010.05	22.9067	22.4637	23.3497	8.4000	8.7000
2010.06	21.8776	21.4614	22.2939	11.0000	13.6000
2010.07	23.0854	22.6879	23.4828	15.2000	16.1000
2010.08	22.5350	22.0945	22.9756	18.3000	19.6000
2010.09	24.2668	23.7906	24.7430	22.8000	25.2000
2010.10	22.8018	22.3217	23.2819	21.0000	23.5000
2010.11	23.2543	22.7794	23.7291	20.9000	21.6000
2010.12	24.3734	23.8237	24.9232	13.9000	14.5000
2011.01	70.0348	68.4449	71.6248	17.7000	18.7000
2011.02	61.9229	60.4540	63.3917	29.1000	29.6000
2011.03	64.6710	63.2855	66.0565	48.0000	55.8000
2011.04	71.8259	70.2709	73.3809	47.3000	54.4000
2011.05	76.6464	75.1426	78.1502	37.3000	41.5000
2011.06	72.6195	71.1726	74.0664	35.2000	37.0000
2011.07	75.5452	74.1206	76.9697	41.5000	43.8000
2011.08	74.4568	73.1109	75.8027	42.4000	50.5000
2011.09	79.4244	77.8536	80.9952	73.8000	78.0000
2011.10	74.2634	72.8471	75.6797	78.9000	88.0000
2011.11	75.8887	74.2146	77.5628	84.6000	96.7000
2011.12	77.6853	75.9977	79.3729	65.8000	73.0000
2012.01	75.2643	73.6743	76.8543	55.8000	58.2000
2012.02	65.5590	64.1092	67.0087	29.2000	33.1000
2012.03	68.9295	67.6224	70.2366	53.1000	64.1000
2012.04	74.9244	73.4520	76.3969	51.4000	55.2000
2012.05	81.9233	80.4052	83.4415	61.8000	69.0000
2012.06	77.2940	75.8406	78.7474	59.7000	64.5000
2012.07	81.1310	79.6449	82.6171	64.2000	51.3000
2012.08	76.9312	75.5464	78.3161	57.7000	63.1000
2012.09	82.1595	80.6195	83.6994	57.7000	61.5000
2012.10	77.8879	76.3431	79.4326	48.3000	53.3000
2012.11	79.8878	78.1828	81.5928	56.7000	61.4000
2012.12	81.6381	79.7911	83.4851	37.4000	40.8000
2013.01	83.2540	81.5650	84.9430	63.8000	62.9000
2013.02	72.6757	71.0985	74.2529	37.8000	38.0000
2013.03	74.1546	72.5544	75.7548	50.6000	57.9000
2013.04	81.5815	80.0240	83.1391	70.6000	72.4000
2013.05	87.1161	85.4008	88.8314	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	83.9102	82.2558	85.5646	51.0000	52.5000
2013.07	87.1272	85.5583	88.6962	57.0000	57.0000
2013.08	84.4142	82.9091	85.9192	60.0000	66.0000
2013.09	88.6422	86.9310	90.3534	34.6000	36.9000
2013.10	82.8477	81.1887	84.5067	74.5000	85.6000
2013.11	83.8215	81.7856	85.8574	73.9000	77.6000
2013.12	87.9850	86.0280	89.9419	77.8000	90.3000
2014.01	97.4322	95.2785	99.5858	77.4000	82.0000
2014.02	86.8626	84.9857	88.7396	93.9000	102.8000
2014.03	90.5868	88.8144	92.3592	80.9000	92.2000
2014.04	99.7769	97.8622	101.6917	76.9000	84.7000
2014.05	107.1599	105.1809	109.1389	72.3000	75.2000
2014.06	103.0328	101.0975	104.9680	67.2000	71.0000
2014.07	106.5194	104.5473	108.4914	72.5000	72.5000
2014.08	103.2205	101.4507	104.9903	71.2000	74.7000
2014.09	109.6548	107.5309	111.7786	83.2000	87.6000
2014.10	101.9536	99.9471	103.9602	59.5000	60.6000
2014.11	104.0973	101.7671	106.4276	65.8000	71.1000
2014.12	106.5858	104.0643	109.1073	75.8000	78.0000
2015.01	60.2894	59.0387	61.5401	65.9000	67.0000
2015.02	52.6607	51.3923	53.9290	42.4000	44.8000
2015.03	55.6973	54.6032	56.7914	38.0000	38.4000
2015.04	61.0280	59.8263	62.2296	49.0000	54.4000
2015.05	65.4526	64.2794	66.6257	56.3000	58.8000
2015.06	62.4050	61.2467	63.5633	50.2000	68.3000
2015.07	63.8395	62.7444	64.9345	47.9000	65.8000
2015.08	63.1140	62.0438	64.1842	39.5000	57.2000
2015.09	66.4406	65.2210	67.6602	49.2000	72.1000
2015.10	62.2335	61.0208	63.4463	39.3000	48.3000
2015.11	64.0031	62.5839	65.4224	39.6000	55.9000
2015.12	66.3411	64.8453	67.8369	36.4000	44.8000
2016.01	32.9744	32.2737	33.6752	33.7000	43.3000
2016.02	28.7440	28.1337	29.3544	38.3000	46.8000
2016.03	29.9901	29.3797	30.6004	30.5000	38.9000
2016.04	32.6002	31.9675	33.2328	26.6000	30.9000
2016.05	35.1442	34.4956	35.7927	33.7000	48.4000
2016.06	33.3184	32.7430	33.8938	13.1000	19.5000
2016.07	34.8385	34.2716	35.4054	21.2000	27.5000
2016.08	33.9893	33.3827	34.5960	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	36.5622	35.8851	37.2394	27.7000	37.1000
2016.10	33.9776	33.3136	34.6416	22.7000	31.7000
2016.11	34.5804	33.8484	35.3124	14.0000	22.2000
2016.12	36.2562	35.4674	37.0450	11.1000	20.0000
2017.01	17.7870	17.4063	18.1677	18.4000	26.2000
2017.02	15.5775	15.2283	15.9268	14.4000	20.6000
2017.03	16.3457	16.0280	16.6635	11.3000	15.5000
2017.04	17.9530	17.6309	18.2751	21.6000	33.2000
2017.05	19.1281	18.7922	19.4640	12.5000	18.1000
2017.06	18.0882	17.7854	18.3910	15.5000	19.3000
2017.07	18.9837	18.6766	19.2909	11.5000	16.3000
2017.08	18.5160	18.1902	18.8418	22.8000	35.7000
2017.09	20.1975	19.7704	20.6246	34.6000	42.9000
2017.10	18.2571	17.8805	18.6337	10.5000	11.0000
2017.11	18.5093	18.1144	18.9041	4.2000	5.6000
2017.12	19.3106	19.0143	19.6070	4.0000	4.6000
2018.01	4.9213	4.8146	5.0279	3.1000	6.3000
2018.02	4.2661	4.1623	4.3700	6.8000	11.8000
2018.03	4.4186	4.3289	4.5082	1.1000	1.2000
2018.04	4.7960	4.6989	4.8931	4.7000	7.5000
2018.05	5.1822	5.0853	5.2790	8.4000	14.0000
2018.06	4.9223	4.8350	5.0097	10.2000	13.6000
2018.07	5.1800	5.1221	5.2378	0.5000	1.7000
2018.08	4.9881	4.9028	5.0733	5.9000	9.5000
2018.09	5.2540	5.1561	5.3519	1.6000	2.9000
2018.10	4.9968	4.8997	5.0940	2.5000	5.6000
2018.11	5.0694	4.9632	5.1756	3.1000	4.2000
2018.12	5.3808	5.2757	5.4858	1.6000	2.3000
2019.01	3.2870	3.2241	3.3500	5.4000	2.3000
2019.02	2.9029	2.8453	2.9605	0.1000	1.2000
2019.03	2.9754	2.9247	3.0262	6.1000	12.1000
2019.04	3.2711	3.2098	3.3325	6.2000	9.3000
2019.05	3.4231	3.3636	3.4825	7.0000	11.9000
2019.06	3.2695	3.2145	3.3245	0.7000	1.5000
2019.07	3.4292	3.3784	3.4800	0.4000	2.2000
2019.08	3.3521	3.3026	3.4016	0.3000	0.8000
2019.09	3.6017	3.5454	3.6581	0.5000	1.0000
2019.10	3.3310	3.2748	3.3873	0.2000	0.5000
2019.11	3.4559	3.3894	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	3.5047	3.6488	0.8000	1.0000
2020.01	7.2710	7.1285	7.4134	4.0000	5.3000
2020.02	6.3678	6.2402	6.4954	0.1000	0.0000
2020.03	6.5781	6.4553	6.7009	1.2000	1.5000
2020.04	7.2831	7.1650	7.4013	3.0000	5.1000
2020.05	7.6760	7.5573	7.7947	0.1000	0.4000
2020.06	7.3774	7.2642	7.4906	3.9000	6.4000
2020.07	7.6337	7.5211	7.7463	4.2000	7.7000
2020.08	7.3641	7.2624	7.4659	5.3000	7.8000
2020.09	7.8804	7.7539	8.0069	0.4000	0.9000
2020.10	7.4534	7.3303	7.5765	9.9000	13.6000
2020.11	7.6330	7.5069	7.7590	21.2000	33.1000
2020.12	7.9277	7.7836	8.0718	15.4000	19.8000
2021.01	25.3104	24.8541	25.7667	7.0000	15.8000
2021.02	22.6155	22.2140	23.0169	5.8000	10.7000
2021.03	23.5028	23.1310	23.8746	11.0000	17.2000
2021.04	26.2030	25.7284	26.6776	18.5000	28.8000
2021.05	27.9426	27.4808	28.4045	15.9000	22.9000
2021.06	26.6802	26.2307	27.1298	19.9000	24.1000
2021.07	27.5153	27.0371	27.9935	23.8000	35.6000
2021.08	27.4023	26.9307	27.8739	15.7000	19.5000
2021.09	29.0050	28.4843	29.5257	39.1000	52.5000
2021.10	27.7780	27.2675	28.2885	27.1000	37.0000
2021.11	28.0611	27.5213	28.6009	27.2000	35.1000
2021.12	30.0175	29.3801	30.6549	50.6000	69.0000
2022.01	72.3937	71.0127	73.7747	43.9000	62.0000
2022.02	64.2190	62.9523	65.4857	48.8000	60.5000
2022.03	67.4836	66.1659	68.8012	58.4000	80.6000
2022.04	71.6568	70.4100	72.9035	59.1000	83.9000
2022.05	79.0172	77.6582	80.3762	72.5000	0.4000
2022.06	73.2649	72.0373	74.4924	58.9000	0.4000
2022.07	77.6513	76.2944	79.0082	76.7000	102.5000
2022.08	75.8906	74.6046	77.1765	63.3000	86.0000
2022.09	80.3417	78.7569	81.9266	72.6000	94.5000
2022.10	75.4816	74.0626	76.9005	66.4000	112.1000
2022.11	76.7138	75.1381	78.2895	54.3000	82.1000
2022.12	80.4245	78.5507	82.2984	93.7000	165.0000
2023.01	119.2413	116.4786	122.0041	112.9000	173.8000
2023.02	103.3142	101.0035	105.6249	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	105.1134	102.8120	107.4149	85.0000	126.8000
2023.04	115.7640	113.4458	118.0821	72.1000	114.3000
2023.05	124.2804	121.7788	126.7820	105.0000	140.0000
2023.06	120.2654	118.8955	121.6353	118.5000	173.0000
2023.07	121.5426	119.2686	123.8166	124.7000	161.2000
2023.08	119.3173	117.0859	121.5487	90.6000	132.5000
2023.09	128.3365	125.8201	130.8530	110.4000	156.8000
2023.10	120.1922	117.5641	122.8203	78.4000	119.6000
2023.11	119.2856	116.5269	122.0442	88.6000	105.1000
2023.12	128.0884	125.0180	131.1588	98.2000	115.0000
2024.01	138.6325	135.0524	142.2127	102.8000	120.0000
2024.02	118.2183	115.4833	120.9534	94.8000	124.6000
2024.03	124.5507	121.8079	127.2934	84.8000	119.4000
2024.04	135.0805	132.1363	138.0248	107.1000	136.5000
2024.05	144.3666	141.4341	147.2991	120.5000	171.7000
2024.06	135.8398	133.2339	138.4456	124.8000	164.2000
2024.07	141.4355	138.6048	144.2662	146.7000	196.5000
2024.08	140.9337	138.1554	143.7120	158.4000	215.5000
2024.09	149.7190	146.4364	153.0016	109.9000	141.4000

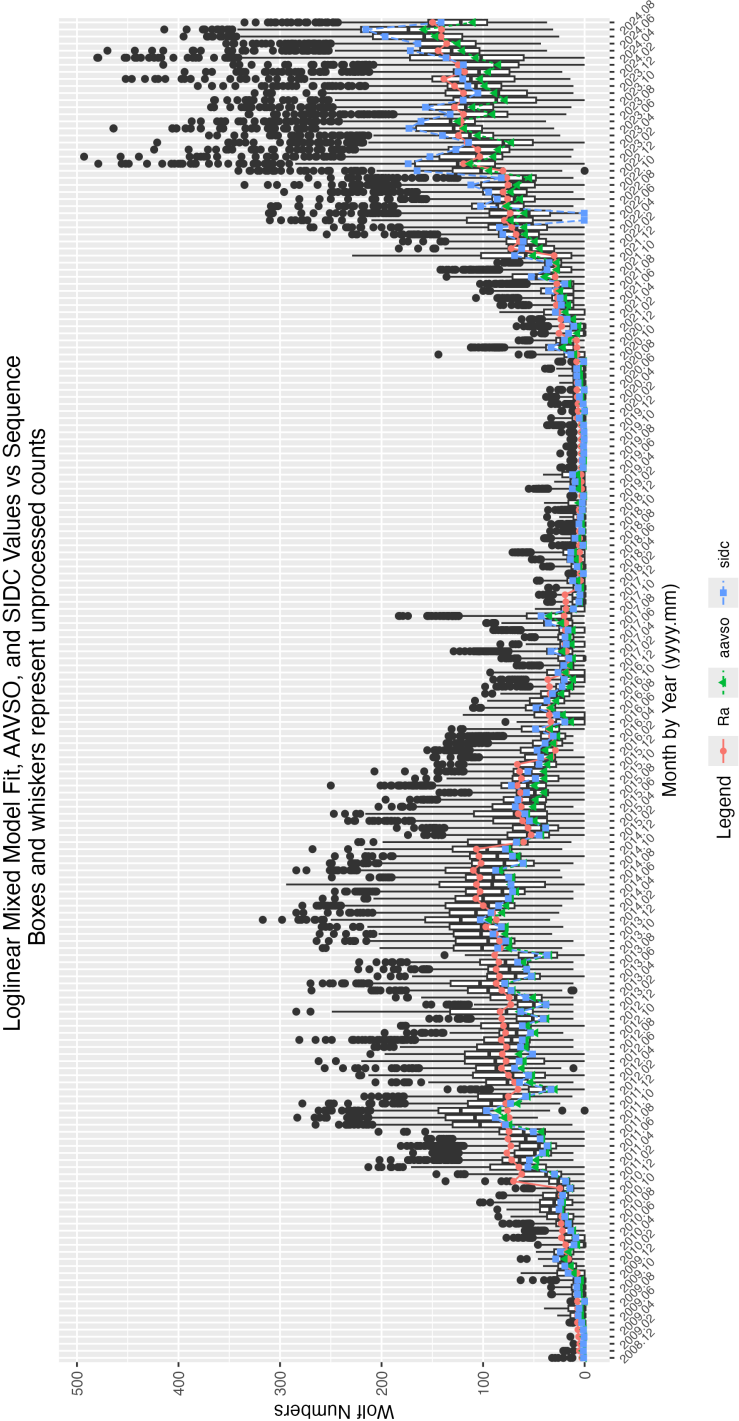


Figure 2: GLMM fitted data for R_a . AAVSO data: <https://www.aavso.org/category/tags/solar-bulletin>. SILSO data: WDC-SILSO, Royal Observatory of Belgium, Brussels

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: 202409 Parameter Estimates

	Estimate	Std. Error	t-value	Pr(> t)
(Intercept)	1.1745	0.3168	3.7078	0.0002
seeG	-0.1063	0.0040	-26.8921	0.0000
seeF	-0.2176	0.0045	-47.8549	0.0000
seeP	-0.3128	0.0066	-47.5017	0.0000
seeM	-0.1735	0.0244	-7.1157	0.0000
sidc1	0.0569	0.0094	6.0634	0.0000
year2009	0.7624	0.3184	2.3948	0.0166
year2010	1.9788	0.3161	6.2590	0.0000
year2011	3.1353	0.3160	9.9203	0.0000
year2012	3.1812	0.3160	10.0659	0.0000
year2013	3.2751	0.3160	10.3630	0.0000
year2014	3.4750	0.3160	10.9956	0.0000
year2015	2.9970	0.3160	9.4830	0.0000
year2016	2.3814	0.3161	7.5342	0.0000
year2017	1.7699	0.3161	5.5988	0.0000
year2018	0.4785	0.3164	1.5124	0.1304
year2019	0.0730	0.3166	0.2306	0.8176
year2020	0.8790	0.3163	2.7793	0.0054
year2021	2.1589	0.3161	6.8300	0.0000
year2022	3.1508	0.3160	9.9695	0.0000
year2023	3.6242	0.3160	11.4675	0.0000
year2024	3.7907	0.3161	11.9939	0.0000
mon2	-0.1288	0.0072	-17.9661	0.0000
mon3	-0.0913	0.0068	-13.3373	0.0000
mon4	-0.0085	0.0066	-1.2778	0.2013
mon5	0.0564	0.0064	8.7922	0.0000
mon6	0.0077	0.0062	1.2365	0.2163
mon7	0.0419	0.0064	6.5702	0.0000
mon8	0.0186	0.0064	2.9294	0.0034
mon9	0.0886	0.0064	13.7608	0.0000
mon10	0.0241	0.0069	3.5130	0.0004
mon11	0.0575	0.0071	8.0688	0.0000
mon12	0.1006	0.0071	14.2009	0.0000

Table 4: 202409 Summary of Sunspot Numbers

year	mon	day	obs	sidc
Min. :2008	Min. : 1.000	Min. : 0.0	Length:187212	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 : 6.564	Mean :15.7		Mean :0.2346
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: 202409 Summary of Sunspot Numbers

g	s	w	see	method
Min. : 0.00	Min. : 0.00	Min. : 0.00	E:39713	Length:187212
1st Qu.: 1.00	1st Qu.: 1.00	1st Qu.: 11.00	G:77020	Class :character
Median : 3.00	Median : 11.00	Median : 40.00	F:54250	Mode :character
Mean : 3.45	Mean : 20.22	Mean : 54.73	P:15444	
3rd Qu.: 5.00	3rd Qu.: 30.00	3rd Qu.: 86.00	M: 785	
Max. :31.00	Max. :295.00	Max. :493.00		

Table 6: 202409 Summary of Sunspot Numbers

inst	filter	unit
Length:187212	Length:187212	Length:187212
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Table 7: 202409 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 : 94.19	Mean : 41.13	Mean : 889.2	Mean : 180.6
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

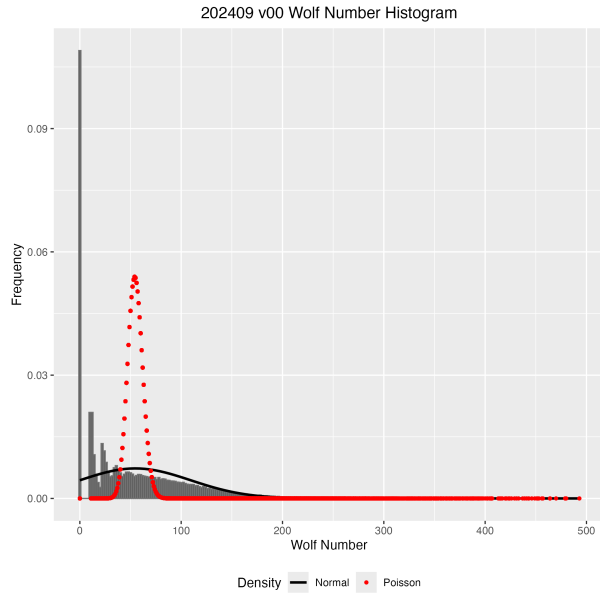


Figure 3: Box plots of raw Wolf number (w) by observer rank.

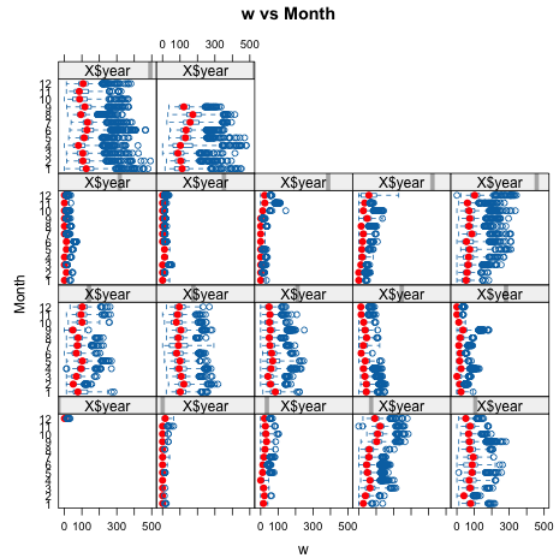


Figure 4: Box plots of raw Wolf number (w) by month and year.

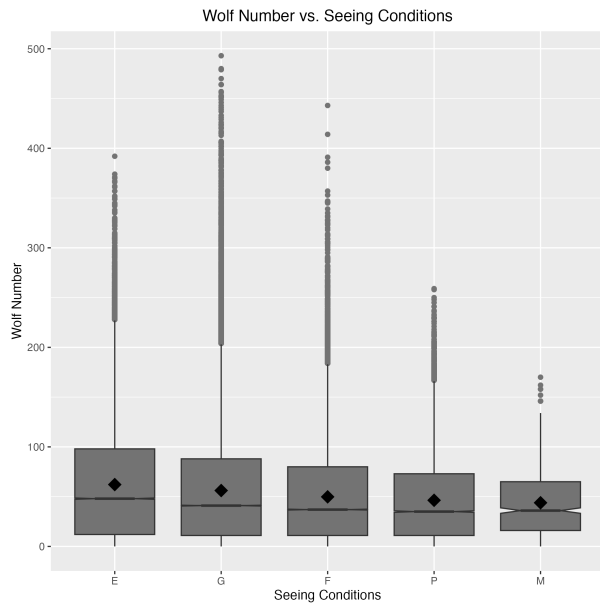


Figure 5: Box plots of raw Wolf number (w) by seeing condition.

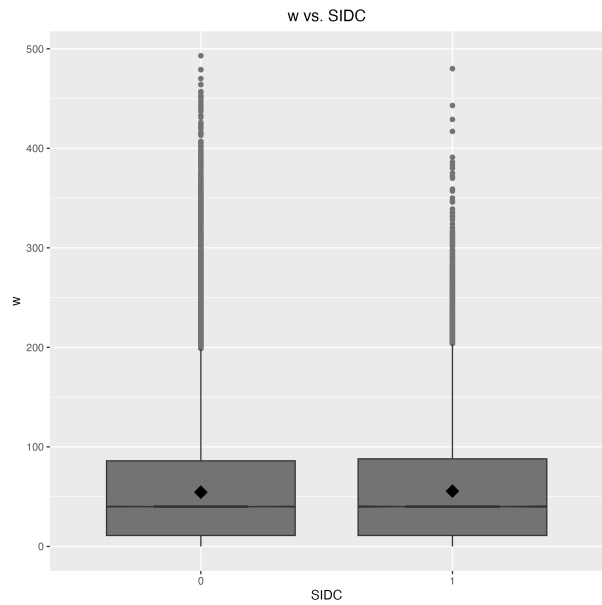


Figure 6: Box plots of raw Wolf number (w) by organization.

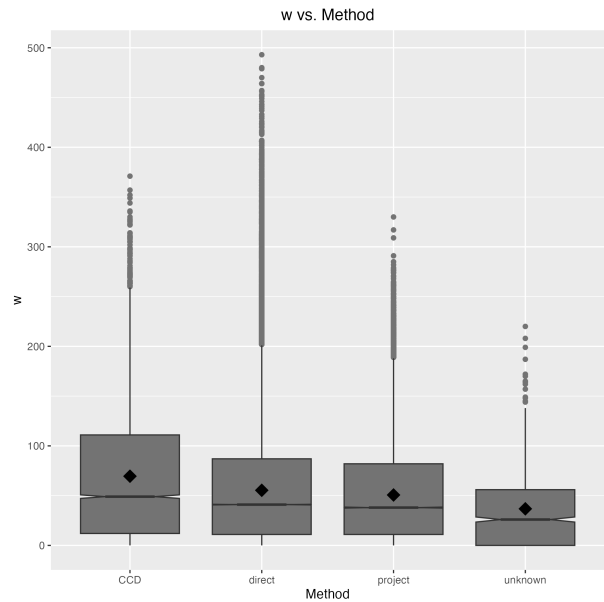


Figure 7: Box plots of raw Wolf number (w) by observer rank.

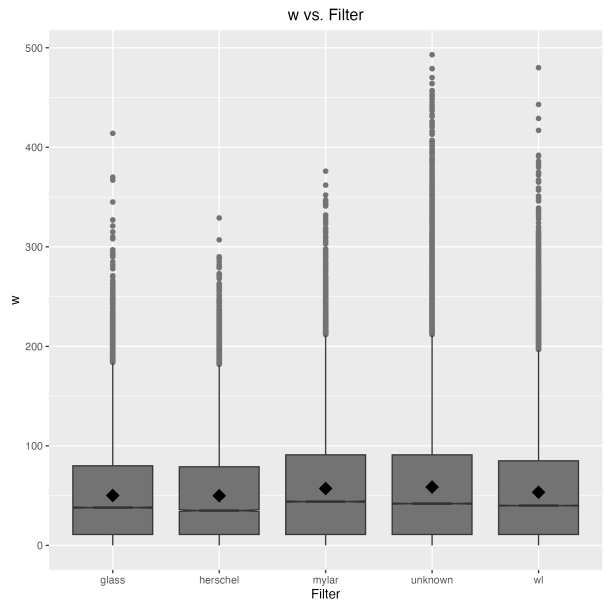


Figure 8: Box plots of raw Wolf number (w) by month and year.

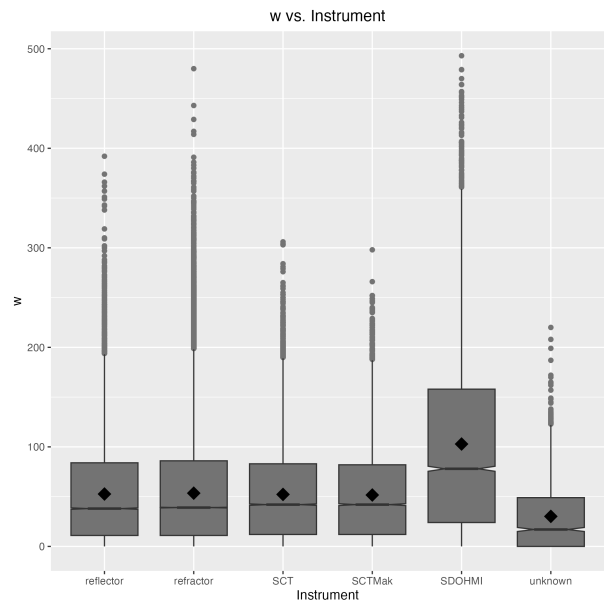


Figure 9: Box plots of raw Wolf number (w) by seeing condition.

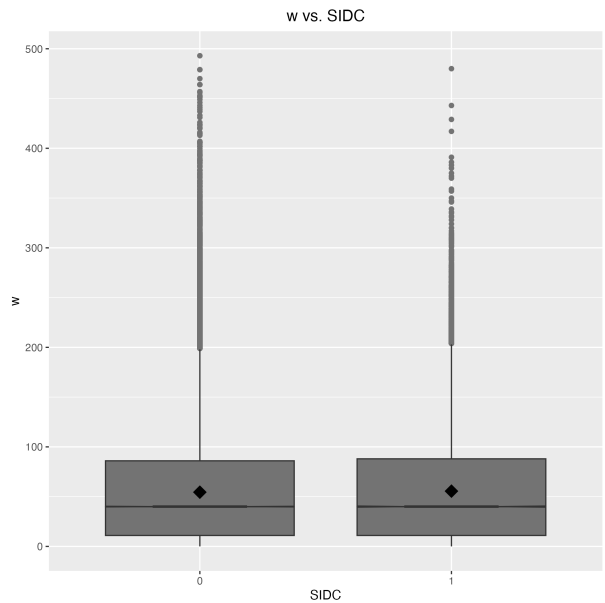


Figure 10: Box plots of raw Wolf number (w) by organization.

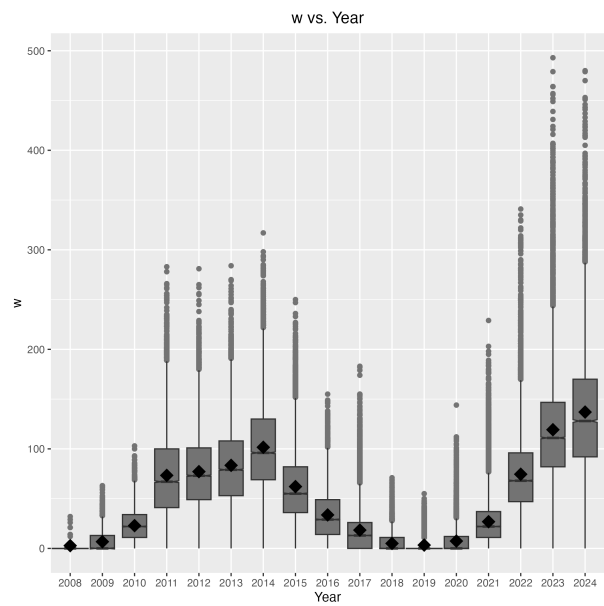


Figure 11: Box plots of raw Wolf number (w) by year.

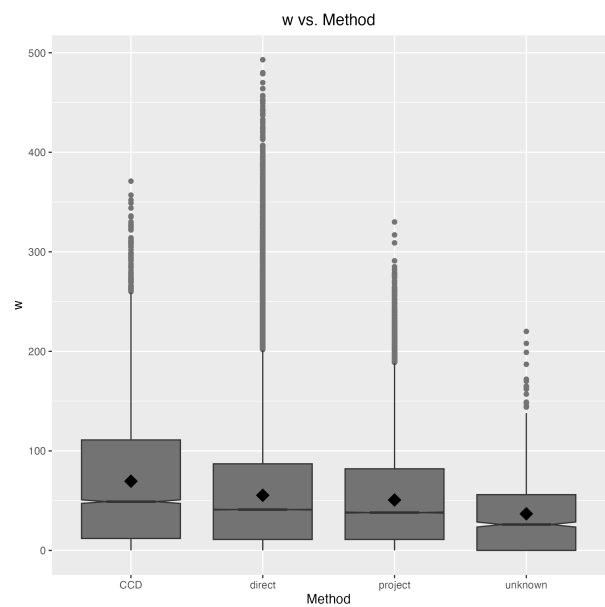


Figure 12: Box plots of raw Wolf number (w) by observing method.