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A Guidance Report for the Power Industry

GEOMAGNETIC STORMS DURING THE DECLINE OF SOLAR CYCLES

Solar Terrestrial Dispatch (STD)
P.O. Box 357
Stirling, Alberta
T0K 2E0
STD@Spacew.Com

INTRODUCTION

At the request of NYISO, we have prepared the following report. It is hoped this report may help guide the electrical power industry toward a better understanding of the relationship between solar cycles and severe geomagnetic storm intervals capable of producing significant Geomagnetically Induced Current (GIC) activity.

It was requested that we assemble a list of historic geomagnetic storm events that occurred during the declining phase of the solar cycles, to better illustrate the fact that the occurrence of significant geomagnetic storms are not limited to the sunspot maximum phase of the solar cycle. Refer to Appendix A for the complete list of storm events that occurred in the declining phases of the previous solar cycles. Appendix B contains an entire list of all storm events during all phases of the solar cycle that were associated with severe storm intervals.

DATA

We examined all available official geomagnetic data records from 1932 to the present (formal recording of planetary geomagnetic activity commenced officially in 1932). We selected those dates where severe planetary geomagnetic storm intervals were observed. We define a "severe geomagnetic storm interval" as any interval where the 3-hour planetary geomagnetic Kp index reaches or exceeds 7.

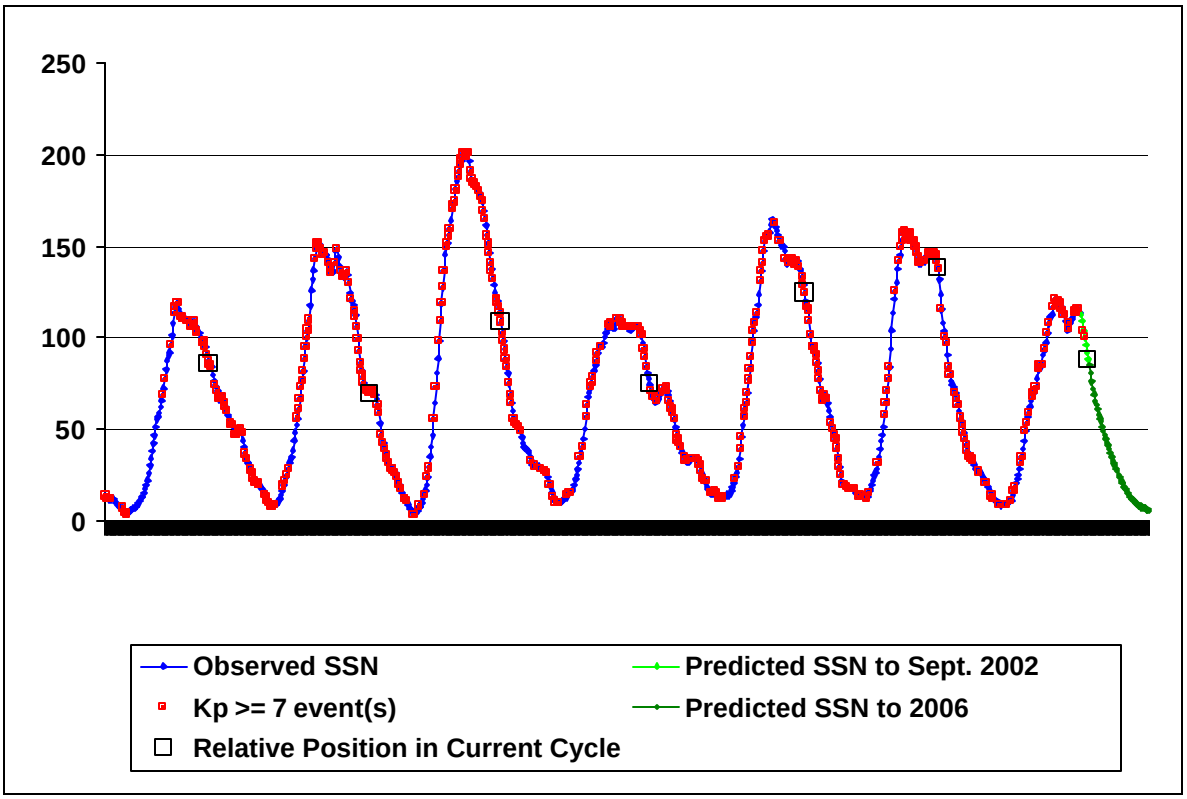
A value of 7 on the Kp scale is officially the lowest level required for a storm interval to be considered "severe." In order for a planetary Kp index to reach 7 in the official records, a majority of planetary stations (high, middle and low latitude stations) must also report Kp values of 7 or higher.

This selection criteria ensures that severe geomagnetic storming occurred on a true planetary scale for at least one or more three-hour intervals during the date selected, not just at a single isolated site. This criteria also represents the minimum Kp level generally accepted as required to produce GIC activity of concern to operators and owners of critical infrastructure systems.

The planetary Kp index was used as opposed to the planetary Ap index because the Kp index has a much higher time resolution (one data point every 3 hours). The Ap index is computed using the arithmetic mean of the individual Kp values (converted to equivalent a-indices). The Ap index converts the entire days' activity into a single value. As a result, the Ap index does not have the resolution to adequately describe the peak strength of individual storm events (or global substorm events). For example, if the peak storm strength lasts only 3 hours and the rest of the day is dominated by generally unsettled conditions, the Ap index will reflect an unsettled to active day – it will not identify the day as having been associated with a strong storm interval. This can be avoided by using the planetary Kp index.

RESULTS AND DISCUSSION

The results of this analysis can be summarized in the form of several graphical charts as follows.

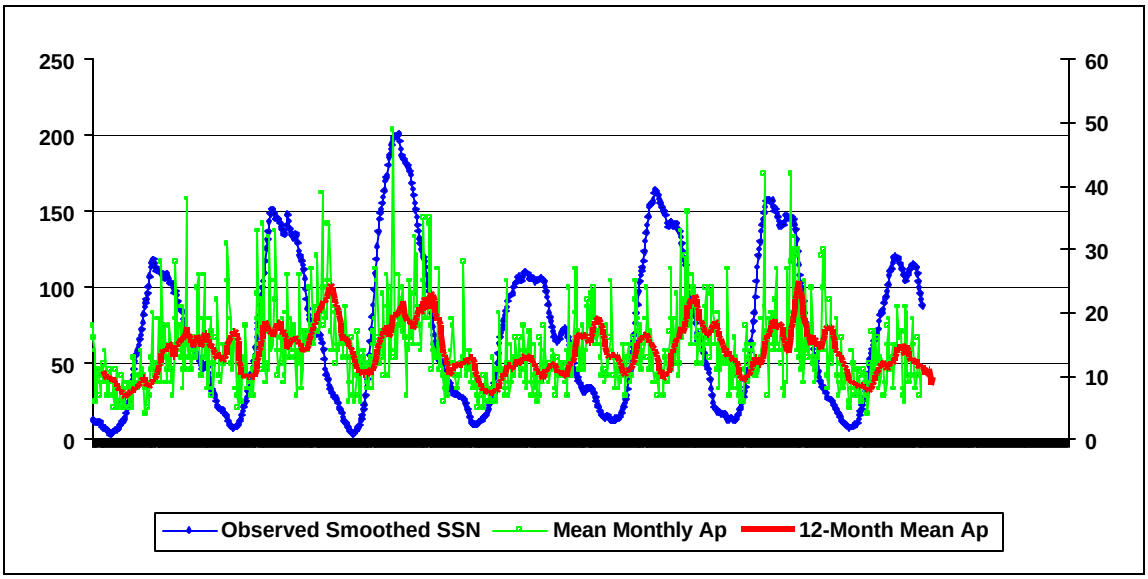


This is a plot showing the dates (in red) where occurrences of severe geomagnetic storming (Kp values of at least 7 or higher) were observed during the last six solar cycles (after 1932). The blue line is the smoothed sunspot number for each of the solar cycles. It lags behind the current date by 6 months by virtue of the way the smoothed sunspot number is computed. The light-green segment of the sunspot number plot represents the last six months of predicted smoothed sunspot numbers. The intersection of the light and dark green plots is the current date (September 2002), which is also marked by a box. The dark-green plot line represents the predicted smoothed sunspot numbers from September 2002 through late 2006 when the next solar minimum is predicted to occur.

We are currently (as of September 2002) in the 28th month following the sunspot number maximum of this solar cycle. In other words, 28 months ago the highest sunspot number for this solar cycle was observed. Each of the black squares in the chart above marks the time 28-months after each sunspot number maximum. It therefore shows our relative position with respect to the previous solar cycles.

It is evident from this plot that we are now in the declining phase of the solar *sunspot* cycle. However, we are **not** in the declining phase of the "*geomagnetic activity*" solar cycle. The peak of the solar cycle in terms of Earth-based geomagnetic activity is expected to occur within the next year or two and gradually decline through the minimum of the solar cycle around 2006. The **minimum** of the geomagnetic activity cycle is not expected until the **ascending phase of the next solar cycle** (around 2008).

The following chart illustrates the offset behavior of the geomagnetic activity cycle by plotting the smoothed sunspot numbers together with the smoothed geomagnetic activity Ap index.



The red line shows the 12-month mean Ap value from 1932 to the present. The green plot shows how significantly the monthly mean Ap value can vary about the 12-month mean. The blue plot line again represents the smoothed sunspot number from 1932 to the present (including the last 6 months of predicted smoothed sunspot values). The smoothed sunspot numbers are shown on the left and the Ap values on the right.

As this chart clearly indicates, the 12-month mean peak of the geomagnetic activity solar cycle occurs several years **after** the peak of the sunspot number maximum of the solar cycle. In some cases it occurs very near the minimum of the solar cycle and in other cases it occurs in the declining phase of the solar cycle. But it invariably occurs **after the sunspot maximum**.

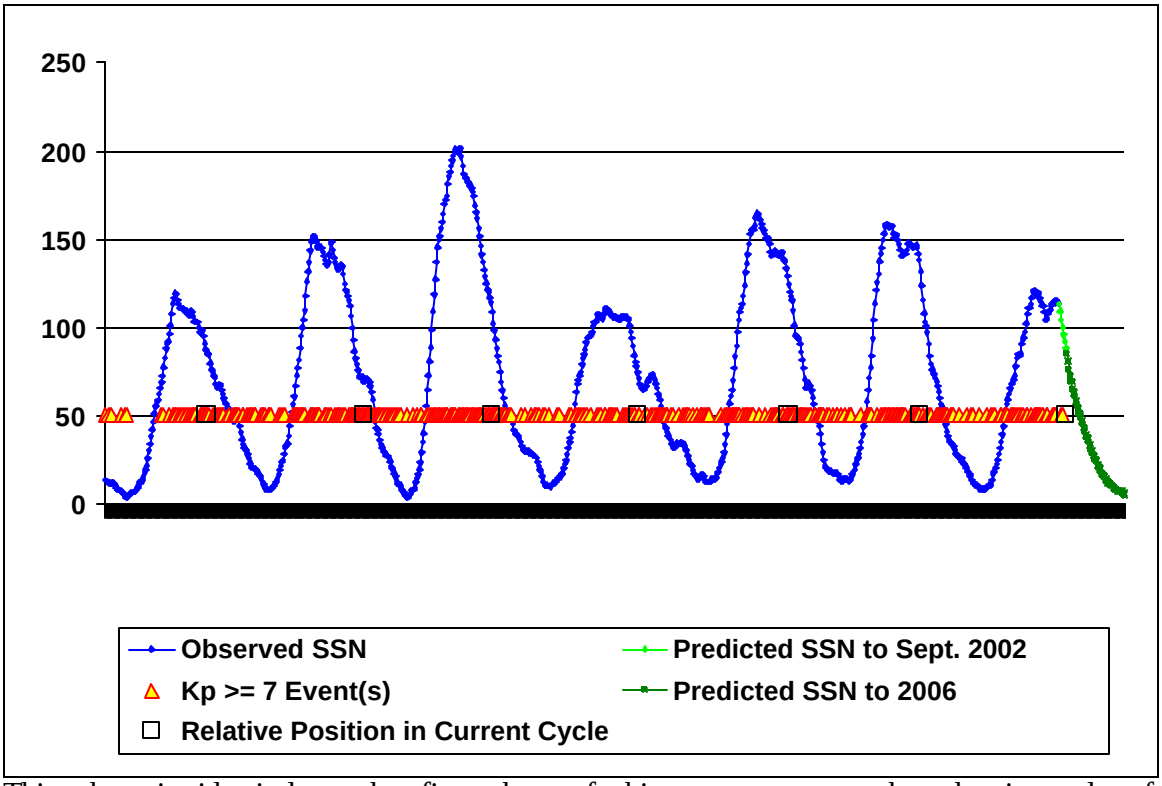
When dealing with solar cycles with respect to potential GIC activity, it is necessary to define the "solar maximum" as that period of time when geomagnetic activity (not sunspot activity or

even solar flare activity) reaches a maximum. We have not yet (as of September 2002) observed the maximum phase of the geomagnetic activity cycle.

On average (from 1932 to the present), there were 103.5 intervals of severe geomagnetic storming (Kp values of 7 or higher) during the declining phase of the previous solar cycles. Thus far in the present solar cycle (through September 2002), there have been only 42 events observed where the Kp index has reached or exceeded 7. This suggests that we may have observed less than half (currently only about 40.5%) of the total number of severe storm intervals in the current solar cycle. In other words, most of the severe geomagnetic storm intervals have yet to occur.

To add further weight to this argument, we performed a similar analysis on the same dataset, but this time included only those events where a Kp value of 8 or higher was observed. On average, there are 36 severe geomagnetic storm intervals in the declining phases of the solar cycles where Kp values of 8 or higher are observed. However, in the current declining phase of the existing solar cycle, we have only observed 15 events where Kp values have reached 8 or higher. Again, this suggests that we may have observed less than half (in this case, only about 41.8%) of the total number of severe storm intervals in the current solar cycle capable of producing planetary K-indices of 8 or higher. So even most of the strongest severe geomagnetic storm intervals have yet to be observed.

This may be better illustrated in the following graphical depiction.

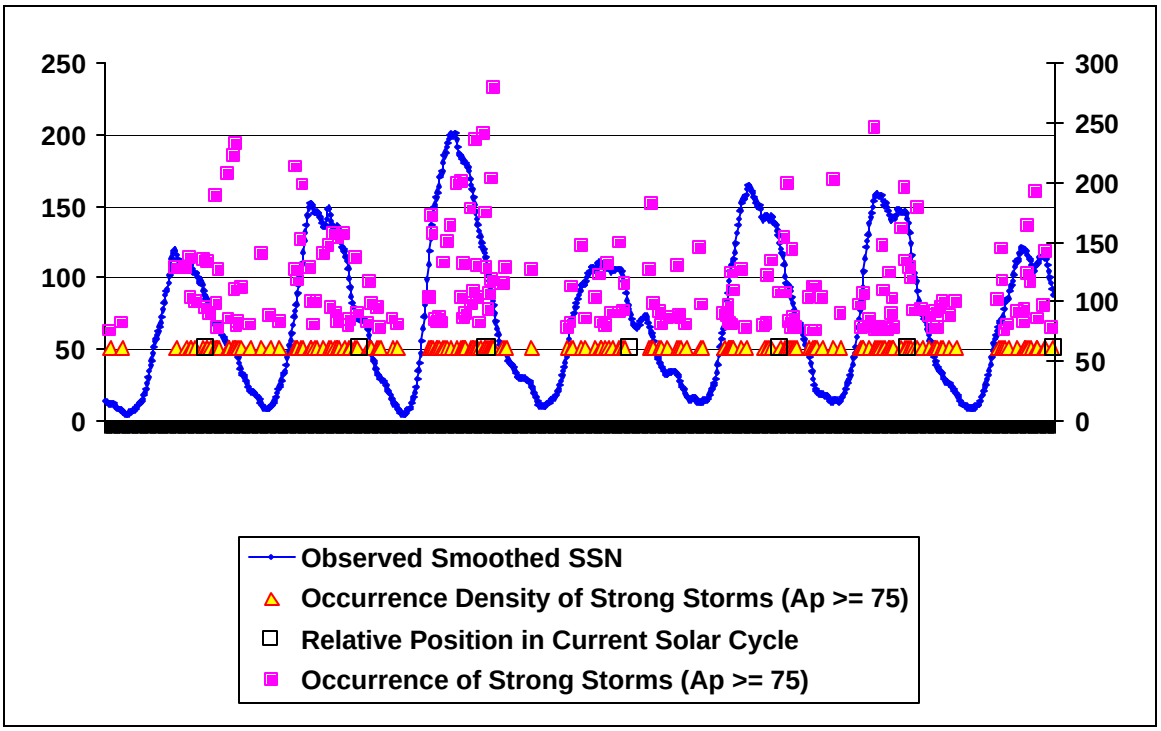


This chart is identical to the first chart of this report, except that the intervals of severe geomagnetic storming (Kp values of 7 or higher) are plotted horizontally. Comparing our current position in the solar cycle (28 months past each sunspot number maximum) with the previous

solar cycles since 1932, it is clear that most of the severe geomagnetic storm intervals have yet to occur between the marked squares and the minimum of each solar cycle.

The occurrence of significant severe storm intervals remains ever-present, even during the solar minimum and ascending phases. This supports the known fact that significant geomagnetic storms capable of driving GICs can occur at any time during the solar cycle.

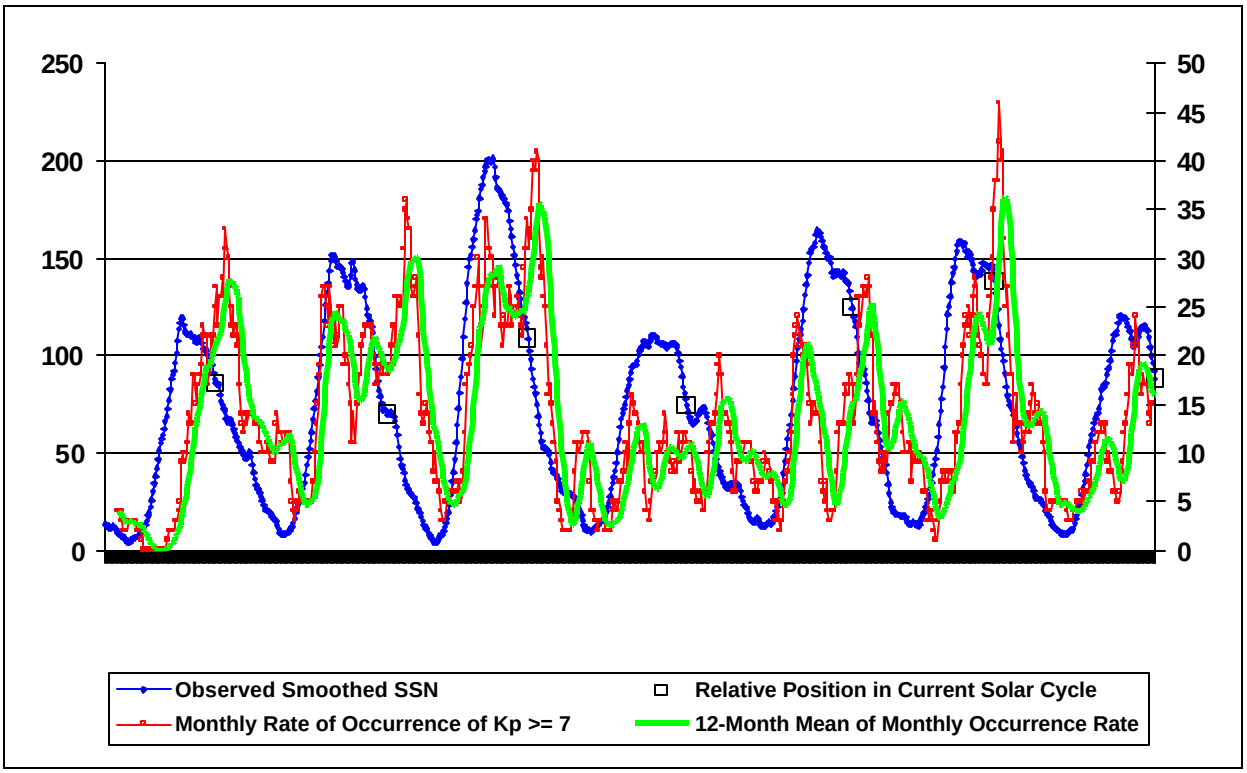
The longer a storm remains capable of producing severe geomagnetic fluctuations, the higher the probability GIC activity may occur capable of damaging power grid equipment. Since many of the events in the charts above may have been associated with isolated severe intervals of geomagnetic storming, we performed a final analysis on the dataset and examined only those events where the planetary Ap index (the daily summary of geomagnetic activity) reached or exceeded 75 (which officially marks a disturbance that is mid-way between a major and a severe geomagnetic storm). In order for the Ap index to reach 75, a longer period (many hours) of major to severe geomagnetic storm intervals would have had to be observed. The result is presented below.



In this chart, the magenta-colored boxes represent individual geomagnetic storm events where the planetary Ap index reached values of 75 or higher (representing moderately strong major to severe geomagnetic storm activity). The scale on the left represents sunspot numbers and the scale on the right represents Ap values. The boxes represent our relative position within each of the historic solar cycles. It is clearly evident from this and the preceding charts that we are still years away from observing less frequent intervals of major to severe geomagnetic storming.

Even during the solar minimum years, significant geomagnetic storming can occur. For example, the severe geomagnetic storm of 31 August 1943 produced peak planetary Kp values of 8+ and a

planetary A-index of 140 – only 6 months before the minimum in sunspot numbers was observed (76 months after the solar maximum). On 26 March 1976, a severe geomagnetic storm was observed that produced Kp values of 8o and a planetary A-index of 145. Interestingly, March of 1976 was officially the month of the solar minimum for that solar cycle. And then again, on 01 April 1976 (one month after the minimum), another severe geomagnetic storm occurred producing Kp values of 8+ and a planetary Ap value of 118. There are numerous other examples (see Appendix B). Suffice it to say that significant geomagnetic storms are not limited only to the solar maximum years. They are more plentiful during the solar maximum years, but are not exclusively confined to those years.



This plot depicts how often severe storm intervals (Kp values of 7 or higher) are observed throughout the solar cycle. It shows (again) that the peak in the **rate of occurrence** of severe geomagnetic storm intervals (Kp values of 7 or higher) occurs **after** the peak of the sunspot number maximum.

In addition, this plot suggests that we might not have yet observed the peak monthly or the peak yearly (12-month mean plot above) occurrence rate in severe storm intervals. In almost every cycle, there has been an early preliminary peak followed by a stronger maximum many to several years after the preliminary peak in the occurrence rate of severe storm intervals. We believe the current observed maximum rate of occurrence of severe storm intervals for the current solar cycle is the preliminary peak and will be followed within the next year or two by a stronger maximum – similar to what was observed in solar cycles 18, 19, 21 and 22.

CONCLUSIONS

Operators and owners of critical infrastructure systems such as substantial power grids will always face the potential for significant space weather storms capable of driving strong GICs into their equipment, regardless of the phase of the solar cycle.

The most significant phase of the solar cycle for geomagnetic storm related GIC activity is not just during the maximum phase of the sunspot number cycle. The strongest geomagnetic storm intervals in history have also occurred in the declining phases of the solar cycles. Indeed, if the frequency of occurrence of severe storm intervals is of greatest concern (as it should be), then the evidence in this report should be sufficient to encourage continued caution within the power industry.

The following generalized conclusions can be drawn from the foregoing discussion:

- We have currently observed less than half (about 40 %) of the total number of severe geomagnetic storm intervals that can be expected in the current solar cycle. Most of the severe geomagnetic storm events are expected to occur between now (September 2002) and 2008.
- Severe geomagnetic disturbance intervals (Kp values of 7 or higher) do not cluster only around the solar maximum (as conventionally defined relating to sunspot numbers). Indeed, they tend to cluster around the declining phase of the solar cycle.
- The rate of occurrence of severe storm intervals (Kp values of 7 or higher) reaches a maximum **after** the sunspot maximum, during the declining phase of the solar cycle. There is evidence suggesting we probably have not yet observed this maximum in the rate of occurrence of severe storming for the current solar cycle.
- The power industry needs to shift their definition of the "solar maximum" from one based on sunspot numbers to one based on the geomagnetic activity cycle which lags the sunspot maximum by several years and is more closely correlated with the peak rate of occurrence of severe storm intervals.
- The geomagnetic activity cycle lags behind the sunspot number cycle by several years. It reaches a maximum in the declining phase of the sunspot cycle and a minimum in the ascending phase of the following sunspot cycle.

Operators and owners of critical infrastructure systems are encouraged to treat the occurrence of potential GIC activity similar to the way severe terrestrial weather activity affects the power grids. Significant terrestrial storms can affect power grids at any time of the year, not just during the lightning season. Snow and ice storms can produce effects as bothersome as lightning. Similarly, space weather storms are not limited specifically to the "season" around the sunspot number maximum. They can occur at any time in the solar cycle and are not limited to a particular "season." Care should therefore be taken to enact protective measures against the damaging effects of space weather storms throughout the solar cycle, not just during the solar maximum years.

APPENDIX A

The following is a comprehensive list of geomagnetic disturbances that produced at least one or more severe geomagnetic storm intervals where the planetary Kp index reached or exceeded 7.

Only those events that occurred during the declining phase of the solar cycle (after the solar maximum) are included here.

The date (YYYY/MM/DD) is given first, followed by the planetary Ap index, followed by the number of months that had elapsed **after** the peak (and **before** the minimum) observed sunspot number of the solar cycle. The peak observed planetary Kp index for that date then concludes the line.

Again, it is important to remember that these values are final **planetary** K-index values based on a large number of magnetic observatories around the world. The severe storm intervals recorded here were observed by a majority of global stations. At least minor GIC conditions were possible with each of these events.

A Kp value of 7- is smaller in magnitude than a 7o, which in turn is smaller in magnitude than a 7+.

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1937/05/05 Ap= 65,  After max: 01. Before min: 81. Peak Kp=7o
1937/08/22 Ap= 74,  After max: 04. Before min: 78. Peak Kp=8o
1937/09/30 Ap= 36,  After max: 05. Before min: 77. Peak Kp=7-
1937/10/04 Ap= 71,  After max: 06. Before min: 76. Peak Kp=8-
1937/10/08 Ap= 38,  After max: 06. Before min: 76. Peak Kp=7-
1937/10/11 Ap= 46,  After max: 06. Before min: 76. Peak Kp=7o
1938/01/16 Ap= 34,  After max: 09. Before min: 73. Peak Kp=8-
1938/01/17 Ap=120,  After max: 09. Before min: 73. Peak Kp=8+
1938/01/22 Ap=128,  After max: 09. Before min: 73. Peak Kp=8+
1938/01/25 Ap=107,  After max: 09. Before min: 73. Peak Kp=9-
1938/01/26 Ap= 62,  After max: 09. Before min: 73. Peak Kp=8+
1938/02/06 Ap= 51,  After max: 10. Before min: 72. Peak Kp=7-
1938/04/13 Ap= 36,  After max: 12. Before min: 70. Peak Kp=7-
1938/04/14 Ap= 60,  After max: 12. Before min: 70. Peak Kp=7o
1938/04/16 Ap=136,  After max: 12. Before min: 70. Peak Kp=9o
1938/05/04 Ap= 44,  After max: 13. Before min: 69. Peak Kp=7o
1938/05/11 Ap=103,  After max: 13. Before min: 69. Peak Kp=9-
1938/05/12 Ap= 76,  After max: 13. Before min: 69. Peak Kp=7+
1938/07/15 Ap= 67,  After max: 15. Before min: 67. Peak Kp=7o
1938/08/03 Ap= 27,  After max: 16. Before min: 66. Peak Kp=7+
1938/08/04 Ap= 50,  After max: 16. Before min: 66. Peak Kp=7-
1938/09/15 Ap=100,  After max: 17. Before min: 65. Peak Kp=7+
1938/09/27 Ap= 30,  After max: 17. Before min: 65. Peak Kp=7o
1938/09/28 Ap= 56,  After max: 17. Before min: 65. Peak Kp=8-
1938/09/30 Ap= 32,  After max: 17. Before min: 65. Peak Kp=7-
1938/10/01 Ap= 45,  After max: 18. Before min: 64. Peak Kp=7+
1938/10/07 Ap= 67,  After max: 18. Before min: 64. Peak Kp=7o
1938/10/08 Ap= 58,  After max: 18. Before min: 64. Peak Kp=7o
1939/02/24 Ap= 55,  After max: 22. Before min: 60. Peak Kp=7+
1939/02/25 Ap= 73,  After max: 22. Before min: 60. Peak Kp=7+
1939/03/28 Ap= 56,  After max: 23. Before min: 59. Peak Kp=7-
1939/04/17 Ap=135,  After max: 24. Before min: 58. Peak Kp=8o
1939/04/19 Ap= 45,  After max: 24. Before min: 58. Peak Kp=7-
1939/04/23 Ap= 92,  After max: 24. Before min: 58. Peak Kp=8-
1939/04/24 Ap= 79,  After max: 24. Before min: 58. Peak Kp=9-
1939/04/25 Ap= 61,  After max: 24. Before min: 58. Peak Kp=7+
1939/05/01 Ap= 56,  After max: 25. Before min: 57. Peak Kp=7-
1939/05/07 Ap= 51,  After max: 25. Before min: 57. Peak Kp=7-
1939/06/14 Ap= 61,  After max: 26. Before min: 56. Peak Kp=7o
1939/06/16 Ap= 35,  After max: 26. Before min: 56. Peak Kp=7-
1939/07/03 Ap= 45,  After max: 27. Before min: 55. Peak Kp=7-
1939/07/04 Ap= 43,  After max: 27. Before min: 55. Peak Kp=7-
1939/07/05 Ap= 94,  After max: 27. Before min: 55. Peak Kp=7+
1939/07/21 Ap= 36,  After max: 27. Before min: 55. Peak Kp=7+
1939/08/12 Ap= 88,  After max: 28. Before min: 54. Peak Kp=8-
1939/08/16 Ap= 62,  After max: 28. Before min: 54. Peak Kp=8-
1939/08/22 Ap=133,  After max: 28. Before min: 54. Peak Kp=8-
1939/08/23 Ap= 89,  After max: 28. Before min: 54. Peak Kp=8-
1939/09/17 Ap= 55,  After max: 29. Before min: 53. Peak Kp=7o
1939/10/04 Ap= 51,  After max: 30. Before min: 52. Peak Kp=7+
1939/10/09 Ap= 32,  After max: 30. Before min: 52. Peak Kp=7-
1939/10/13 Ap= 89,  After max: 30. Before min: 52. Peak Kp=8o
1939/10/14 Ap= 74,  After max: 30. Before min: 52. Peak Kp=7-
1939/10/15 Ap= 68,  After max: 30. Before min: 52. Peak Kp=8o
1940/01/03 Ap= 47,  After max: 33. Before min: 49. Peak Kp=8-
1940/01/18 Ap= 38,  After max: 33. Before min: 49. Peak Kp=7-
1940/03/23 Ap= 51,  After max: 35. Before min: 47. Peak Kp=7+
1940/03/24 Ap=187,  After max: 35. Before min: 47. Peak Kp=9o
1940/03/25 Ap=184,  After max: 35. Before min: 47. Peak Kp=9-
1940/03/26 Ap= 53,  After max: 35. Before min: 47. Peak Kp=7+
1940/03/29 Ap=100,  After max: 35. Before min: 47. Peak Kp=8+
1940/03/30 Ap=189,  After max: 35. Before min: 47. Peak Kp=9-
1940/03/31 Ap=128,  After max: 35. Before min: 47. Peak Kp=8+
1940/04/01 Ap= 66,  After max: 36. Before min: 46. Peak Kp=7-
1940/04/02 Ap= 34,  After max: 36. Before min: 46. Peak Kp=7o
1940/04/03 Ap= 98,  After max: 36. Before min: 46. Peak Kp=8o
1940/04/25 Ap= 70,  After max: 36. Before min: 46. Peak Kp=8o
1940/04/26 Ap= 43,  After max: 36. Before min: 46. Peak Kp=7o
1940/05/24 Ap= 78,  After max: 37. Before min: 45. Peak Kp=8-
1940/06/25 Ap=126,  After max: 38. Before min: 44. Peak Kp=8+
1940/07/13 Ap= 58,  After max: 39. Before min: 43. Peak Kp=8-
1940/09/26 Ap= 44,  After max: 41. Before min: 41. Peak Kp=8-
1940/09/27 Ap= 45,  After max: 41. Before min: 41. Peak Kp=7-
1940/10/01 Ap= 40,  After max: 42. Before min: 40. Peak Kp=7o
1940/10/07 Ap= 61,  After max: 42. Before min: 40. Peak Kp=7o
1940/10/08 Ap= 49,  After max: 42. Before min: 40. Peak Kp=7-
1940/11/13 Ap= 49,  After max: 43. Before min: 39. Peak Kp=7-
1941/03/01 Ap=207,  After max: 47. Before min: 35. Peak Kp=9o
1941/03/14 Ap= 79,  After max: 47. Before min: 35. Peak Kp=7o
1941/03/30 Ap= 85,  After max: 47. Before min: 35. Peak Kp=8-
1941/03/31 Ap= 76,  After max: 47. Before min: 35. Peak Kp=8-
1941/04/24 Ap= 63,  After max: 48. Before min: 34. Peak Kp=7-
1941/07/05 Ap=222,  After max: 51. Before min: 31. Peak Kp=9o
1941/07/07 Ap= 54,  After max: 51. Before min: 31. Peak Kp=7o
1941/08/04 Ap=110,  After max: 52. Before min: 30. Peak Kp=8+
1941/09/18 Ap=232,  After max: 53. Before min: 29. Peak Kp=9-
1941/09/19 Ap=176,  After max: 53. Before min: 29. Peak Kp=9o
1941/10/11 Ap= 42,  After max: 54. Before min: 28. Peak Kp=7-
1941/10/31 Ap= 47,  After max: 54. Before min: 28. Peak Kp=7-
1941/11/01 Ap= 79,  After max: 55. Before min: 27. Peak Kp=8-
1941/12/01 Ap= 83,  After max: 56. Before min: 26. Peak Kp=8-
1942/03/01 Ap=111,  After max: 59. Before min: 23. Peak Kp=8o
1942/03/02 Ap= 45,  After max: 59. Before min: 23. Peak Kp=7+
1942/03/05 Ap= 52,  After max: 59. Before min: 23. Peak Kp=7o
1942/04/04 Ap= 70,  After max: 60. Before min: 22. Peak Kp=7+
1942/08/16 Ap= 35,  After max: 64. Before min: 18. Peak Kp=7-
1942/09/12 Ap= 54,  After max: 65. Before min: 17. Peak Kp=7-
1942/10/02 Ap= 48,  After max: 66. Before min: 16. Peak Kp=7-
1942/10/28 Ap= 56,  After max: 66. Before min: 16. Peak Kp=7o
1942/10/29 Ap= 80,  After max: 66. Before min: 16. Peak Kp=7+
1942/11/24 Ap= 62,  After max: 67. Before min: 15. Peak Kp=7-
1943/01/20 Ap= 40,  After max: 69. Before min: 13. Peak Kp=7-
1943/02/17 Ap= 41,  After max: 70. Before min: 12. Peak Kp=7-
1943/03/29 Ap= 38,  After max: 71. Before min: 11. Peak Kp=7o
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1943/08/08 Ap= 79,  After max: 76. Before min: 06. Peak Kp=7+
1943/08/09 Ap= 48,  After max: 76. Before min: 06. Peak Kp=8-
1943/08/28 Ap= 43,  After max: 76. Before min: 06. Peak Kp=7o
1943/08/30 Ap= 90,  After max: 76. Before min: 06. Peak Kp=7o
1943/08/31 Ap=140,  After max: 76. Before min: 06. Peak Kp=8+
1943/09/29 Ap= 61,  After max: 77. Before min: 05. Peak Kp=7-
1943/09/30 Ap= 66,  After max: 77. Before min: 05. Peak Kp=7o
1943/10/24 Ap= 42,  After max: 78. Before min: 04. Peak Kp=7-
1943/11/19 Ap= 57,  After max: 79. Before min: 03. Peak Kp=7-
1944/02/14 Ap= 49,  After max: 82. Before min: 00. Peak Kp=7-
1949/01/02 Ap= 45,  After max: 03. Before min: 63. Peak Kp=7-
1949/01/24 Ap= 38,  After max: 03. Before min: 63. Peak Kp=7+
1949/01/25 Ap=156,  After max: 03. Before min: 63. Peak Kp=9-
1949/01/26 Ap=100,  After max: 03. Before min: 63. Peak Kp=8+
1949/03/16 Ap= 36,  After max: 05. Before min: 61. Peak Kp=7+
1949/03/18 Ap= 37,  After max: 05. Before min: 61. Peak Kp=7-
1949/03/22 Ap= 90,  After max: 05. Before min: 61. Peak Kp=8-
1949/03/23 Ap= 47,  After max: 05. Before min: 61. Peak Kp=7o
1949/04/07 Ap= 32,  After max: 06. Before min: 60. Peak Kp=7+
1949/04/08 Ap= 83,  After max: 06. Before min: 60. Peak Kp=7o
1949/05/03 Ap= 26,  After max: 07. Before min: 59. Peak Kp=7o
1949/05/12 Ap=153,  After max: 07. Before min: 59. Peak Kp=9-
1949/05/13 Ap= 59,  After max: 07. Before min: 59. Peak Kp=8o
1949/05/30 Ap= 36,  After max: 07. Before min: 59. Peak Kp=7-
1949/06/04 Ap= 58,  After max: 08. Before min: 58. Peak Kp=7-
1949/08/03 Ap= 58,  After max: 10. Before min: 56. Peak Kp=7o
1949/08/04 Ap= 64,  After max: 10. Before min: 56. Peak Kp=7-
1949/08/08 Ap= 34,  After max: 10. Before min: 56. Peak Kp=7-
1949/10/07 Ap= 65,  After max: 12. Before min: 54. Peak Kp=7+
1949/10/08 Ap= 38,  After max: 12. Before min: 54. Peak Kp=7-
1949/10/14 Ap= 91,  After max: 12. Before min: 54. Peak Kp=8-
1949/10/15 Ap=156,  After max: 12. Before min: 54. Peak Kp=8+
1949/10/16 Ap= 62,  After max: 12. Before min: 54. Peak Kp=7o
1950/01/24 Ap= 42,  After max: 15. Before min: 51. Peak Kp=7-
1950/02/20 Ap= 79,  After max: 16. Before min: 50. Peak Kp=9-
1950/02/21 Ap= 79,  After max: 16. Before min: 50. Peak Kp=8-
1950/02/24 Ap= 46,  After max: 16. Before min: 50. Peak Kp=7o
1950/03/19 Ap= 84,  After max: 17. Before min: 49. Peak Kp=7+
1950/04/05 Ap= 53,  After max: 18. Before min: 48. Peak Kp=7-
1950/05/27 Ap= 40,  After max: 19. Before min: 47. Peak Kp=7o
1950/05/28 Ap= 63,  After max: 19. Before min: 47. Peak Kp=7o
1950/06/30 Ap= 39,  After max: 20. Before min: 46. Peak Kp=7-
1950/07/12 Ap= 47,  After max: 21. Before min: 45. Peak Kp=7o
1950/08/07 Ap= 42,  After max: 22. Before min: 44. Peak Kp=8-
1950/08/08 Ap= 71,  After max: 22. Before min: 44. Peak Kp=8-
1950/08/19 Ap=136,  After max: 22. Before min: 44. Peak Kp=8+
1950/08/20 Ap=108,  After max: 22. Before min: 44. Peak Kp=8+
1950/09/03 Ap= 56,  After max: 23. Before min: 43. Peak Kp=7o
1950/10/02 Ap= 79,  After max: 24. Before min: 42. Peak Kp=7-
1950/10/03 Ap= 52,  After max: 24. Before min: 42. Peak Kp=7-
1950/10/28 Ap= 90,  After max: 24. Before min: 42. Peak Kp=7+
1950/11/26 Ap= 64,  After max: 25. Before min: 41. Peak Kp=7-
1951/01/31 Ap= 49,  After max: 27. Before min: 39. Peak Kp=7-
1951/02/27 Ap= 48,  After max: 28. Before min: 38. Peak Kp=7o
1951/02/28 Ap= 55,  After max: 28. Before min: 38. Peak Kp=7o
1951/03/13 Ap= 51,  After max: 29. Before min: 37. Peak Kp=7-
1951/04/18 Ap= 66,  After max: 30. Before min: 36. Peak Kp=8-
1951/05/01 Ap= 63,  After max: 31. Before min: 35. Peak Kp=7+
1951/05/02 Ap= 68,  After max: 31. Before min: 35. Peak Kp=7+
1951/05/09 Ap= 35,  After max: 31. Before min: 35. Peak Kp=7+
1951/05/10 Ap= 47,  After max: 31. Before min: 35. Peak Kp=7-
1951/05/26 Ap= 42,  After max: 31. Before min: 35. Peak Kp=7o
1951/06/17 Ap= 38,  After max: 32. Before min: 34. Peak Kp=8o
1951/06/18 Ap= 54,  After max: 32. Before min: 34. Peak Kp=7+
1951/07/01 Ap= 31,  After max: 33. Before min: 33. Peak Kp=7o
1951/07/02 Ap= 82,  After max: 33. Before min: 33. Peak Kp=8-
1951/09/11 Ap= 40,  After max: 35. Before min: 31. Peak Kp=7o
1951/09/16 Ap= 82,  After max: 35. Before min: 31. Peak Kp=7-
1951/09/19 Ap= 59,  After max: 35. Before min: 31. Peak Kp=8-
1951/09/20 Ap=106,  After max: 35. Before min: 31. Peak Kp=7+
1951/09/21 Ap= 88,  After max: 35. Before min: 31. Peak Kp=7o
1951/09/22 Ap= 85,  After max: 35. Before min: 31. Peak Kp=7o
1951/09/25 Ap=116,  After max: 35. Before min: 31. Peak Kp=8+
1951/09/26 Ap= 73,  After max: 35. Before min: 31. Peak Kp=9-
1951/10/07 Ap= 37,  After max: 36. Before min: 30. Peak Kp=7-
1951/10/17 Ap= 91,  After max: 36. Before min: 30. Peak Kp=7o
1951/10/28 Ap= 98,  After max: 36. Before min: 30. Peak Kp=9-
1951/12/28 Ap= 68,  After max: 38. Before min: 28. Peak Kp=7o
1952/02/10 Ap= 35,  After max: 40. Before min: 26. Peak Kp=7-
1952/02/24 Ap= 72,  After max: 40. Before min: 26. Peak Kp=7o
1952/03/03 Ap= 42,  After max: 41. Before min: 25. Peak Kp=7-
1952/03/05 Ap= 94,  After max: 41. Before min: 25. Peak Kp=7+
1952/03/06 Ap= 82,  After max: 41. Before min: 25. Peak Kp=8o
1952/03/07 Ap= 58,  After max: 41. Before min: 25. Peak Kp=7-
1952/03/23 Ap= 48,  After max: 41. Before min: 25. Peak Kp=7o
1952/03/30 Ap= 45,  After max: 41. Before min: 25. Peak Kp=7-
1952/03/31 Ap= 80,  After max: 41. Before min: 25. Peak Kp=8-
1952/04/02 Ap= 77,  After max: 42. Before min: 24. Peak Kp=7o
1952/04/03 Ap= 82,  After max: 42. Before min: 24. Peak Kp=7-
1952/04/10 Ap= 33,  After max: 42. Before min: 24. Peak Kp=7-
1952/04/21 Ap= 94,  After max: 42. Before min: 24. Peak Kp=8+
1952/04/29 Ap= 87,  After max: 42. Before min: 24. Peak Kp=7+
1952/04/30 Ap= 66,  After max: 42. Before min: 24. Peak Kp=7-
1952/05/03 Ap= 56,  After max: 43. Before min: 23. Peak Kp=7o
1952/05/04 Ap= 47,  After max: 43. Before min: 23. Peak Kp=7-
1952/05/07 Ap= 74,  After max: 43. Before min: 23. Peak Kp=7o
1952/05/26 Ap= 52,  After max: 43. Before min: 23. Peak Kp=8-
1952/05/27 Ap= 72,  After max: 43. Before min: 23. Peak Kp=8o
1952/06/30 Ap= 78,  After max: 44. Before min: 22. Peak Kp=8o
1952/09/29 Ap= 71,  After max: 47. Before min: 19. Peak Kp=7o
1952/09/30 Ap= 48,  After max: 47. Before min: 19. Peak Kp=7+
1952/10/04 Ap= 69,  After max: 48. Before min: 18. Peak Kp=7-
1952/10/05 Ap= 68,  After max: 48. Before min: 18. Peak Kp=7-
1952/12/04 Ap= 38,  After max: 50. Before min: 16. Peak Kp=7-
1952/12/27 Ap= 23,  After max: 50. Before min: 16. Peak Kp=7-
1953/01/05 Ap= 51,  After max: 51. Before min: 15. Peak Kp=7-
1953/03/08 Ap= 30,  After max: 53. Before min: 13. Peak Kp=7-
1953/03/09 Ap= 39,  After max: 53. Before min: 13. Peak Kp=7-
1953/03/24 Ap= 63,  After max: 53. Before min: 13. Peak Kp=7-
1953/05/15 Ap= 55,  After max: 55. Before min: 11. Peak Kp=8-
1953/05/16 Ap= 85,  After max: 55. Before min: 11. Peak Kp=7+
1953/05/17 Ap= 28,  After max: 55. Before min: 11. Peak Kp=7-
1953/08/24 Ap= 58,  After max: 58. Before min: 08. Peak Kp=7-
1953/09/03 Ap= 40,  After max: 59. Before min: 07. Peak Kp=7+
1953/09/04 Ap= 61,  After max: 59. Before min: 07. Peak Kp=7+
1953/09/19 Ap= 80,  After max: 59. Before min: 07. Peak Kp=7-
1953/10/15 Ap= 46,  After max: 60. Before min: 06. Peak Kp=7+
1954/04/11 Ap= 35,  After max: 66. Before min: 00. Peak Kp=7+
1954/04/12 Ap= 56,  After max: 66. Before min: 00. Peak Kp=7+
1958/05/26 Ap= 39,  After max: 02. Before min: 77. Peak Kp=7-
1958/05/31 Ap= 72,  After max: 02. Before min: 77. Peak Kp=8o
1958/06/01 Ap= 60,  After max: 03. Before min: 76. Peak Kp=8-
1958/06/07 Ap= 77,  After max: 03. Before min: 76. Peak Kp=8-
1958/06/28 Ap= 55,  After max: 03. Before min: 76. Peak Kp=8-
1958/06/29 Ap=103,  After max: 03. Before min: 76. Peak Kp=8o
1958/07/08 Ap=200,  After max: 04. Before min: 75. Peak Kp=9o
1958/07/09 Ap= 75,  After max: 04. Before min: 75. Peak Kp=7o
1958/07/21 Ap= 53,  After max: 04. Before min: 75. Peak Kp=7+
1958/08/17 Ap= 82,  After max: 05. Before min: 74. Peak Kp=7+
1958/08/24 Ap= 85,  After max: 05. Before min: 74. Peak Kp=8-
1958/08/27 Ap= 64,  After max: 05. Before min: 74. Peak Kp=7-
1958/09/03 Ap= 64,  After max: 06. Before min: 73. Peak Kp=7-
1958/09/04 Ap=131,  After max: 06. Before min: 73. Peak Kp=9-
1958/09/05 Ap= 71,  After max: 06. Before min: 73. Peak Kp=8o
1958/09/25 Ap= 82,  After max: 06. Before min: 73. Peak Kp=7o
1958/10/24 Ap= 89,  After max: 07. Before min: 72. Peak Kp=7o
1958/12/04 Ap= 54,  After max: 09. Before min: 70. Peak Kp=7-
1958/12/05 Ap= 28,  After max: 09. Before min: 70. Peak Kp=7o
1958/12/18 Ap= 33,  After max: 09. Before min: 70. Peak Kp=7o
1959/02/25 Ap= 69,  After max: 11. Before min: 68. Peak Kp=7+
1959/03/26 Ap= 81,  After max: 12. Before min: 67. Peak Kp=8o
1959/03/27 Ap=178,  After max: 12. Before min: 67. Peak Kp=8+
1959/03/28 Ap= 87,  After max: 12. Before min: 67. Peak Kp=7+
1959/03/29 Ap= 73,  After max: 12. Before min: 67. Peak Kp=7-
1959/04/10 Ap= 98,  After max: 13. Before min: 66. Peak Kp=8-
1959/04/23 Ap= 40,  After max: 13. Before min: 66. Peak Kp=7-
1959/05/12 Ap=108,  After max: 14. Before min: 65. Peak Kp=8+
1959/05/24 Ap= 52,  After max: 14. Before min: 65. Peak Kp=7+
1959/07/11 Ap= 44,  After max: 16. Before min: 63. Peak Kp=7-
1959/07/15 Ap=236,  After max: 16. Before min: 63. Peak Kp=9o
1959/07/16 Ap= 47,  After max: 16. Before min: 63. Peak Kp=7+
1959/07/17 Ap=110,  After max: 16. Before min: 63. Peak Kp=9-
1959/07/18 Ap=119,  After max: 16. Before min: 63. Peak Kp=8o
1959/08/16 Ap=130,  After max: 17. Before min: 62. Peak Kp=8+
1959/08/17 Ap=114,  After max: 17. Before min: 62. Peak Kp=8+
1959/09/03 Ap= 39,  After max: 18. Before min: 61. Peak Kp=8-
1959/09/04 Ap=103,  After max: 18. Before min: 61. Peak Kp=7+
1959/09/21 Ap= 86,  After max: 18. Before min: 61. Peak Kp=7o
1959/09/22 Ap= 73,  After max: 18. Before min: 61. Peak Kp=7o
1959/10/03 Ap= 46,  After max: 19. Before min: 60. Peak Kp=7-
1959/10/04 Ap= 51,  After max: 19. Before min: 60. Peak Kp=7o
1959/11/28 Ap= 82,  After max: 20. Before min: 59. Peak Kp=8o
1959/12/05 Ap= 68,  After max: 21. Before min: 58. Peak Kp=8-
1960/03/16 Ap= 52,  After max: 24. Before min: 55. Peak Kp=7-
1960/03/31 Ap=129,  After max: 24. Before min: 55. Peak Kp=8+
1960/04/01 Ap=241,  After max: 25. Before min: 54. Peak Kp=9-
1960/04/02 Ap= 62,  After max: 25. Before min: 54. Peak Kp=7o
1960/04/03 Ap= 68,  After max: 25. Before min: 54. Peak Kp=7+
1960/04/10 Ap= 33,  After max: 25. Before min: 54. Peak Kp=7-
1960/04/24 Ap= 66,  After max: 25. Before min: 54. Peak Kp=7-
1960/04/25 Ap= 57,  After max: 25. Before min: 54. Peak Kp=7-
1960/04/27 Ap= 31,  After max: 25. Before min: 54. Peak Kp=7o
1960/04/28 Ap= 84,  After max: 25. Before min: 54. Peak Kp=7o
1960/04/30 Ap=174,  After max: 25. Before min: 54. Peak Kp=9o
1960/05/01 Ap= 49,  After max: 26. Before min: 53. Peak Kp=7-
1960/05/06 Ap= 60,  After max: 26. Before min: 53. Peak Kp=7+
1960/05/08 Ap=128,  After max: 26. Before min: 53. Peak Kp=8+
1960/05/11 Ap= 42,  After max: 26. Before min: 53. Peak Kp=7-
1960/05/29 Ap= 54,  After max: 26. Before min: 53. Peak Kp=8-
1960/06/27 Ap= 65,  After max: 27. Before min: 52. Peak Kp=7-
1960/06/29 Ap= 36,  After max: 27. Before min: 52. Peak Kp=7-
1960/06/30 Ap= 55,  After max: 27. Before min: 52. Peak Kp=7o
1960/07/15 Ap= 93,  After max: 28. Before min: 51. Peak Kp=8o
1960/07/16 Ap= 77,  After max: 28. Before min: 51. Peak Kp=8+
1960/08/16 Ap= 52,  After max: 29. Before min: 50. Peak Kp=7o
1960/08/17 Ap=106,  After max: 29. Before min: 50. Peak Kp=8-
1960/08/29 Ap= 45,  After max: 29. Before min: 50. Peak Kp=7-
1960/08/30 Ap= 58,  After max: 29. Before min: 50. Peak Kp=7o
1960/09/03 Ap= 35,  After max: 30. Before min: 49. Peak Kp=7-
1960/09/04 Ap= 95,  After max: 30. Before min: 49. Peak Kp=8o
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1960/09/05 Ap=118,  After max: 30. Before min: 49. Peak Kp=8-
1960/10/04 Ap= 36,  After max: 31. Before min: 48. Peak Kp=7-
1960/10/06 Ap=203,  After max: 31. Before min: 48. Peak Kp=9-
1960/10/07 Ap=186,  After max: 31. Before min: 48. Peak Kp=9o
1960/10/25 Ap= 76,  After max: 31. Before min: 48. Peak Kp=8-
1960/10/26 Ap= 63,  After max: 31. Before min: 48. Peak Kp=7-
1960/11/12 Ap= 67,  After max: 32. Before min: 47. Peak Kp=8o
1960/11/13 Ap=280,  After max: 32. Before min: 47. Peak Kp=9o
1960/11/14 Ap= 49,  After max: 32. Before min: 47. Peak Kp=7+
1960/11/15 Ap= 69,  After max: 32. Before min: 47. Peak Kp=8-
1960/11/16 Ap= 94,  After max: 32. Before min: 47. Peak Kp=8+
1960/12/01 Ap= 93,  After max: 33. Before min: 46. Peak Kp=8o
1961/02/04 Ap= 43,  After max: 35. Before min: 44. Peak Kp=7o
1961/02/18 Ap= 51,  After max: 35. Before min: 44. Peak Kp=7-
1961/03/06 Ap= 37,  After max: 36. Before min: 43. Peak Kp=7-
1961/03/10 Ap= 46,  After max: 36. Before min: 43. Peak Kp=7o
1961/04/14 Ap= 54,  After max: 37. Before min: 42. Peak Kp=7+
1961/04/15 Ap= 61,  After max: 37. Before min: 42. Peak Kp=8-
1961/06/21 Ap= 58,  After max: 39. Before min: 40. Peak Kp=7o
1961/06/22 Ap= 58,  After max: 39. Before min: 40. Peak Kp=7o
1961/07/13 Ap=102,  After max: 40. Before min: 39. Peak Kp=8+
1961/07/14 Ap= 98,  After max: 40. Before min: 39. Peak Kp=8+
1961/07/18 Ap= 93,  After max: 40. Before min: 39. Peak Kp=8-
1961/07/27 Ap=114,  After max: 40. Before min: 39. Peak Kp=8+
1961/09/30 Ap= 36,  After max: 42. Before min: 37. Peak Kp=8o
1961/10/01 Ap=114,  After max: 43. Before min: 36. Peak Kp=9-
1961/10/28 Ap=128,  After max: 43. Before min: 36. Peak Kp=9-
1961/12/01 Ap= 54,  After max: 45. Before min: 34. Peak Kp=8-
1961/12/03 Ap= 55,  After max: 45. Before min: 34. Peak Kp=7-
1962/09/12 Ap= 58,  After max: 54. Before min: 25. Peak Kp=7+
1962/12/17 Ap= 36,  After max: 57. Before min: 22. Peak Kp=7-
1963/06/07 Ap= 43,  After max: 63. Before min: 16. Peak Kp=7o
1963/08/20 Ap= 58,  After max: 65. Before min: 14. Peak Kp=7o
1963/09/14 Ap= 82,  After max: 66. Before min: 13. Peak Kp=7o
1963/09/21 Ap= 44,  After max: 66. Before min: 13. Peak Kp=7o
1963/09/22 Ap=126,  After max: 66. Before min: 13. Peak Kp=9-
1963/09/23 Ap= 78,  After max: 66. Before min: 13. Peak Kp=9-
1963/09/25 Ap= 60,  After max: 66. Before min: 13. Peak Kp=7+
1963/10/24 Ap= 63,  After max: 67. Before min: 12. Peak Kp=7+
1963/10/29 Ap= 74,  After max: 67. Before min: 12. Peak Kp=8o
1963/10/30 Ap= 35,  After max: 67. Before min: 12. Peak Kp=8-
1964/01/02 Ap= 53,  After max: 70. Before min: 09. Peak Kp=7-
1964/04/01 Ap= 46,  After max: 73. Before min: 06. Peak Kp=7+
1964/06/10 Ap= 49,  After max: 75. Before min: 04. Peak Kp=7-
1964/09/22 Ap= 44,  After max: 78. Before min: 01. Peak Kp=8-
1969/02/02 Ap= 47,  After max: 03. Before min: 85. Peak Kp=8o
1969/03/23 Ap= 47,  After max: 04. Before min: 84. Peak Kp=8o
1969/03/24 Ap= 79,  After max: 04. Before min: 84. Peak Kp=8o
1969/04/28 Ap= 60,  After max: 05. Before min: 83. Peak Kp=7+
1969/05/14 Ap= 50,  After max: 06. Before min: 82. Peak Kp=7-
1969/05/15 Ap=131,  After max: 06. Before min: 82. Peak Kp=8-
1969/07/27 Ap= 45,  After max: 08. Before min: 80. Peak Kp=7o
1969/09/28 Ap= 47,  After max: 10. Before min: 78. Peak Kp=7o
1969/09/29 Ap= 71,  After max: 10. Before min: 78. Peak Kp=7o
1969/09/30 Ap= 90,  After max: 10. Before min: 78. Peak Kp=8o
1970/03/08 Ap=149,  After max: 16. Before min: 72. Peak Kp=9o
1970/04/21 Ap= 90,  After max: 17. Before min: 71. Peak Kp=8+
1970/04/22 Ap= 41,  After max: 17. Before min: 71. Peak Kp=7o
1970/05/28 Ap= 45,  After max: 18. Before min: 70. Peak Kp=7o
1970/07/09 Ap= 87,  After max: 20. Before min: 68. Peak Kp=7+
1970/07/10 Ap= 34,  After max: 20. Before min: 68. Peak Kp=7-
1970/07/25 Ap= 92,  After max: 20. Before min: 68. Peak Kp=8-
1970/08/16 Ap= 21,  After max: 21. Before min: 67. Peak Kp=7o
1970/08/17 Ap=115,  After max: 21. Before min: 67. Peak Kp=9-
1970/10/18 Ap= 39,  After max: 23. Before min: 65. Peak Kp=7-
1970/11/07 Ap= 58,  After max: 24. Before min: 64. Peak Kp=7-
1970/12/14 Ap= 65,  After max: 25. Before min: 63. Peak Kp=8+
1971/04/14 Ap= 39,  After max: 29. Before min: 59. Peak Kp=8-
1971/04/15 Ap= 36,  After max: 29. Before min: 59. Peak Kp=7-
1971/05/17 Ap= 73,  After max: 30. Before min: 58. Peak Kp=7-
1971/09/18 Ap= 47,  After max: 34. Before min: 54. Peak Kp=7-
1971/12/17 Ap= 67,  After max: 37. Before min: 51. Peak Kp=7+
1972/03/06 Ap= 26,  After max: 40. Before min: 48. Peak Kp=7+
1972/05/15 Ap= 38,  After max: 42. Before min: 46. Peak Kp=8-
1972/06/17 Ap= 62,  After max: 43. Before min: 45. Peak Kp=7+
1972/06/18 Ap=126,  After max: 43. Before min: 45. Peak Kp=8+
1972/08/04 Ap=132,  After max: 45. Before min: 43. Peak Kp=9o
1972/08/05 Ap=182,  After max: 45. Before min: 43. Peak Kp=9-
1972/08/06 Ap= 87,  After max: 45. Before min: 43. Peak Kp=7+
1972/08/09 Ap= 74,  After max: 45. Before min: 43. Peak Kp=8+
1972/09/13 Ap= 53,  After max: 46. Before min: 42. Peak Kp=7+
1972/09/14 Ap= 54,  After max: 46. Before min: 42. Peak Kp=8o
1972/10/31 Ap= 29,  After max: 47. Before min: 41. Peak Kp=7-
1972/11/01 Ap= 98,  After max: 48. Before min: 40. Peak Kp=8o
1972/12/15 Ap= 29,  After max: 49. Before min: 39. Peak Kp=7-
1973/02/21 Ap= 49,  After max: 51. Before min: 37. Peak Kp=7+
1973/03/19 Ap= 82,  After max: 52. Before min: 36. Peak Kp=7o
1973/03/20 Ap= 80,  After max: 52. Before min: 36. Peak Kp=7-
1973/04/01 Ap= 91,  After max: 53. Before min: 35. Peak Kp=8+
1973/04/02 Ap= 54,  After max: 53. Before min: 35. Peak Kp=7o
1973/04/13 Ap= 46,  After max: 53. Before min: 35. Peak Kp=7+
1973/04/14 Ap= 57,  After max: 53. Before min: 35. Peak Kp=8-
1973/05/14 Ap= 80,  After max: 54. Before min: 34. Peak Kp=8-
1973/05/21 Ap= 48,  After max: 54. Before min: 34. Peak Kp=7o
1973/09/09 Ap= 44,  After max: 58. Before min: 30. Peak Kp=8-
1973/09/23 Ap= 63,  After max: 58. Before min: 30. Peak Kp=7o
1973/10/03 Ap= 48,  After max: 59. Before min: 29. Peak Kp=7+
1973/10/29 Ap= 86,  After max: 59. Before min: 29. Peak Kp=7o
1974/03/16 Ap= 42,  After max: 64. Before min: 24. Peak Kp=7o
1974/03/21 Ap= 68,  After max: 64. Before min: 24. Peak Kp=7-
1974/07/05 Ap= 74,  After max: 68. Before min: 20. Peak Kp=7-
1974/07/06 Ap=130,  After max: 68. Before min: 20. Peak Kp=9-
1974/07/23 Ap= 82,  After max: 68. Before min: 20. Peak Kp=7o
1974/09/15 Ap= 73,  After max: 70. Before min: 18. Peak Kp=8-
1974/09/16 Ap= 88,  After max: 70. Before min: 18. Peak Kp=8o
1974/10/13 Ap= 86,  After max: 71. Before min: 17. Peak Kp=7o
1974/10/16 Ap= 68,  After max: 71. Before min: 17. Peak Kp=7o
1974/11/11 Ap= 48,  After max: 72. Before min: 16. Peak Kp=7o
1975/01/07 Ap= 44,  After max: 74. Before min: 14. Peak Kp=8-
1975/03/10 Ap= 80,  After max: 76. Before min: 12. Peak Kp=7o
1975/03/11 Ap= 53,  After max: 76. Before min: 12. Peak Kp=7-
1975/07/09 Ap= 35,  After max: 80. Before min: 08. Peak Kp=7-
1975/10/08 Ap= 45,  After max: 83. Before min: 05. Peak Kp=7-
1975/11/02 Ap= 36,  After max: 84. Before min: 04. Peak Kp=7-
1976/01/10 Ap= 47,  After max: 86. Before min: 02. Peak Kp=7o
1976/01/11 Ap= 41,  After max: 86. Before min: 02. Peak Kp=7+
1976/03/26 Ap=145,  After max: 88. Before min: 00. Peak Kp=8o
1980/02/15 Ap= 33,  After max: 02. Before min: 79. Peak Kp=7o
1980/07/18 Ap= 30,  After max: 07. Before min: 74. Peak Kp=7-
1980/07/25 Ap= 46,  After max: 07. Before min: 74. Peak Kp=7o
1980/12/19 Ap= 79,  After max: 12. Before min: 69. Peak Kp=8-
1981/02/06 Ap= 48,  After max: 14. Before min: 67. Peak Kp=7-
1981/03/05 Ap= 81,  After max: 15. Before min: 66. Peak Kp=7+
1981/04/12 Ap= 96,  After max: 16. Before min: 65. Peak Kp=7o
1981/04/13 Ap=121,  After max: 16. Before min: 65. Peak Kp=8+
1981/04/26 Ap= 62,  After max: 16. Before min: 65. Peak Kp=7+
1981/05/10 Ap= 32,  After max: 17. Before min: 64. Peak Kp=7o
1981/05/11 Ap= 61,  After max: 17. Before min: 64. Peak Kp=7-
1981/05/15 Ap= 54,  After max: 17. Before min: 64. Peak Kp=7o
1981/05/18 Ap= 57,  After max: 17. Before min: 64. Peak Kp=7o
1981/06/07 Ap= 50,  After max: 18. Before min: 63. Peak Kp=7-
1981/07/25 Ap=134,  After max: 19. Before min: 62. Peak Kp=8+
1981/07/26 Ap= 78,  After max: 19. Before min: 62. Peak Kp=8o
1981/10/14 Ap= 73,  After max: 22. Before min: 59. Peak Kp=8o
1981/10/20 Ap= 67,  After max: 22. Before min: 59. Peak Kp=7o
1981/10/22 Ap= 72,  After max: 22. Before min: 59. Peak Kp=7o
1981/11/12 Ap= 39,  After max: 23. Before min: 58. Peak Kp=7-
1982/02/02 Ap= 60,  After max: 26. Before min: 55. Peak Kp=7o
1982/02/22 Ap= 51,  After max: 26. Before min: 55. Peak Kp=7-
1982/03/01 Ap= 68,  After max: 27. Before min: 54. Peak Kp=8o
1982/03/02 Ap=107,  After max: 27. Before min: 54. Peak Kp=8o
1982/04/10 Ap= 61,  After max: 28. Before min: 53. Peak Kp=7o
1982/04/25 Ap= 52,  After max: 28. Before min: 53. Peak Kp=7-
1982/06/12 Ap= 59,  After max: 30. Before min: 51. Peak Kp=7-
1982/06/30 Ap= 39,  After max: 30. Before min: 51. Peak Kp=7-
1982/07/12 Ap= 48,  After max: 31. Before min: 50. Peak Kp=7-
1982/07/13 Ap=144,  After max: 31. Before min: 50. Peak Kp=9o
1982/07/14 Ap=153,  After max: 31. Before min: 50. Peak Kp=9o
1982/07/16 Ap= 50,  After max: 31. Before min: 50. Peak Kp=7o
1982/07/24 Ap= 50,  After max: 31. Before min: 50. Peak Kp=7-
1982/08/07 Ap=107,  After max: 32. Before min: 49. Peak Kp=8-
1982/09/05 Ap= 39,  After max: 33. Before min: 48. Peak Kp=7-
1982/09/06 Ap=199,  After max: 33. Before min: 48. Peak Kp=9-
1982/09/07 Ap= 88,  After max: 33. Before min: 48. Peak Kp=7+
1982/09/09 Ap= 50,  After max: 33. Before min: 48. Peak Kp=7-
1982/09/21 Ap= 76,  After max: 33. Before min: 48. Peak Kp=7+
1982/09/22 Ap=135,  After max: 33. Before min: 48. Peak Kp=8+
1982/09/26 Ap= 84,  After max: 33. Before min: 48. Peak Kp=7+
1982/09/27 Ap= 42,  After max: 33. Before min: 48. Peak Kp=7-
1982/11/24 Ap= 83,  After max: 35. Before min: 46. Peak Kp=7+
1982/11/25 Ap= 54,  After max: 35. Before min: 46. Peak Kp=7-
1982/12/17 Ap= 62,  After max: 36. Before min: 45. Peak Kp=7+
1982/12/22 Ap= 42,  After max: 36. Before min: 45. Peak Kp=7-
1983/01/10 Ap= 78,  After max: 37. Before min: 44. Peak Kp=8+
1983/02/04 Ap= 59,  After max: 38. Before min: 43. Peak Kp=8-
1983/02/05 Ap=143,  After max: 38. Before min: 43. Peak Kp=8o
1983/03/02 Ap= 86,  After max: 39. Before min: 42. Peak Kp=7o
1983/03/12 Ap= 53,  After max: 39. Before min: 42. Peak Kp=7+
1983/04/15 Ap= 59,  After max: 40. Before min: 41. Peak Kp=7-
1983/05/17 Ap= 64,  After max: 41. Before min: 40. Peak Kp=7+
1983/05/24 Ap= 77,  After max: 41. Before min: 40. Peak Kp=8o
1983/06/13 Ap= 70,  After max: 42. Before min: 39. Peak Kp=8-
1983/08/08 Ap= 62,  After max: 44. Before min: 37. Peak Kp=8-
1983/10/04 Ap= 43,  After max: 46. Before min: 35. Peak Kp=7-
1983/11/09 Ap= 43,  After max: 47. Before min: 34. Peak Kp=7o
1984/03/28 Ap= 60,  After max: 51. Before min: 30. Peak Kp=7+
1984/04/04 Ap= 84,  After max: 52. Before min: 29. Peak Kp=8-
1984/04/09 Ap= 37,  After max: 52. Before min: 29. Peak Kp=7+
1984/04/26 Ap=103,  After max: 52. Before min: 29. Peak Kp=8-
1984/06/16 Ap= 42,  After max: 54. Before min: 27. Peak Kp=7-
1984/07/13 Ap= 62,  After max: 55. Before min: 26. Peak Kp=7o
1984/08/01 Ap= 75,  After max: 56. Before min: 25. Peak Kp=7o
1984/09/04 Ap= 59,  After max: 57. Before min: 24. Peak Kp=8-
1984/09/05 Ap= 63,  After max: 57. Before min: 24. Peak Kp=7o
1984/09/23 Ap=112,  After max: 57. Before min: 24. Peak Kp=7o
1984/10/18 Ap= 43,  After max: 58. Before min: 23. Peak Kp=7-
1984/10/19 Ap= 75,  After max: 58. Before min: 23. Peak Kp=7-
1984/10/20 Ap= 63,  After max: 58. Before min: 23. Peak Kp=7-
1984/11/15 Ap= 52,  After max: 59. Before min: 22. Peak Kp=7+
1984/11/16 Ap=112,  After max: 59. Before min: 22. Peak Kp=8o
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1985/02/27 Ap= 19,  After max: 62. Before min: 19. Peak Kp=7-
1985/02/28 Ap= 60,  After max: 62. Before min: 19. Peak Kp=7o
1985/04/20 Ap= 53,  After max: 64. Before min: 17. Peak Kp=7-
1985/04/21 Ap=103,  After max: 64. Before min: 17. Peak Kp=8+
1985/04/28 Ap= 61,  After max: 64. Before min: 17. Peak Kp=7o
1985/04/30 Ap= 42,  After max: 64. Before min: 17. Peak Kp=7+
1985/07/12 Ap= 48,  After max: 67. Before min: 14. Peak Kp=7-
1985/10/05 Ap= 66,  After max: 70. Before min: 11. Peak Kp=7o
1985/11/29 Ap= 37,  After max: 71. Before min: 10. Peak Kp=7-
1985/11/30 Ap= 52,  After max: 71. Before min: 10. Peak Kp=7+
1986/02/07 Ap= 82,  After max: 74. Before min: 07. Peak Kp=8-
1986/02/08 Ap=202,  After max: 74. Before min: 07. Peak Kp=9o
1986/02/09 Ap=100,  After max: 74. Before min: 07. Peak Kp=9-
1986/05/02 Ap= 43,  After max: 77. Before min: 04. Peak Kp=7-
1986/05/03 Ap= 40,  After max: 77. Before min: 04. Peak Kp=7+
1986/05/06 Ap= 67,  After max: 77. Before min: 04. Peak Kp=7-
1986/09/12 Ap= 89,  After max: 81. Before min: 00. Peak Kp=9-
1989/08/14 Ap= 55,  After max: 01. Before min: 81. Peak Kp=7-
1989/08/15 Ap= 77,  After max: 01. Before min: 81. Peak Kp=7-
1989/08/28 Ap= 22,  After max: 01. Before min: 81. Peak Kp=7-
1989/08/29 Ap= 58,  After max: 01. Before min: 81. Peak Kp=7+
1989/09/18 Ap= 52,  After max: 02. Before min: 80. Peak Kp=8-
1989/09/19 Ap= 70,  After max: 02. Before min: 80. Peak Kp=8o
1989/09/26 Ap= 54,  After max: 02. Before min: 80. Peak Kp=7o
1989/10/20 Ap=112,  After max: 03. Before min: 79. Peak Kp=8+
1989/10/21 Ap=146,  After max: 03. Before min: 79. Peak Kp=8+
1989/11/17 Ap=109,  After max: 04. Before min: 78. Peak Kp=8o
1989/11/18 Ap= 45,  After max: 04. Before min: 78. Peak Kp=7o
1989/12/29 Ap= 50,  After max: 05. Before min: 77. Peak Kp=7-
1990/02/15 Ap= 36,  After max: 07. Before min: 75. Peak Kp=7-
1990/02/16 Ap= 50,  After max: 07. Before min: 75. Peak Kp=7-
1990/03/12 Ap= 42,  After max: 08. Before min: 74. Peak Kp=7+
1990/03/20 Ap= 30,  After max: 08. Before min: 74. Peak Kp=7-
1990/03/21 Ap= 76,  After max: 08. Before min: 74. Peak Kp=7+
1990/03/30 Ap= 69,  After max: 08. Before min: 74. Peak Kp=8o
1990/04/10 Ap=124,  After max: 09. Before min: 73. Peak Kp=8o
1990/04/11 Ap= 64,  After max: 09. Before min: 73. Peak Kp=7-
1990/04/12 Ap= 99,  After max: 09. Before min: 73. Peak Kp=8-
1990/05/26 Ap= 47,  After max: 10. Before min: 72. Peak Kp=7+
1990/05/27 Ap= 45,  After max: 10. Before min: 72. Peak Kp=7-
1990/06/12 Ap= 89,  After max: 11. Before min: 71. Peak Kp=8+
1990/06/13 Ap= 70,  After max: 11. Before min: 71. Peak Kp=8-
1990/06/14 Ap= 79,  After max: 11. Before min: 71. Peak Kp=8-
1990/07/28 Ap=102,  After max: 12. Before min: 70. Peak Kp=8-
1990/07/29 Ap= 75,  After max: 12. Before min: 70. Peak Kp=7o
1990/08/23 Ap= 77,  After max: 13. Before min: 69. Peak Kp=7o
1990/08/26 Ap= 63,  After max: 13. Before min: 69. Peak Kp=7-
1990/09/01 Ap= 26,  After max: 14. Before min: 68. Peak Kp=7-
1990/11/27 Ap= 45,  After max: 16. Before min: 66. Peak Kp=7-
1991/03/21 Ap= 26,  After max: 20. Before min: 62. Peak Kp=7-
1991/03/24 Ap=161,  After max: 20. Before min: 62. Peak Kp=9-
1991/03/25 Ap=130,  After max: 20. Before min: 62. Peak Kp=9-
1991/03/26 Ap=114,  After max: 20. Before min: 62. Peak Kp=8o
1991/04/04 Ap= 50,  After max: 21. Before min: 61. Peak Kp=7-
1991/04/29 Ap= 59,  After max: 21. Before min: 61. Peak Kp=7-
1991/05/31 Ap= 52,  After max: 22. Before min: 60. Peak Kp=7-
1991/06/01 Ap= 74,  After max: 23. Before min: 59. Peak Kp=7+
1991/06/02 Ap= 60,  After max: 23. Before min: 59. Peak Kp=7o
1991/06/04 Ap= 58,  After max: 23. Before min: 59. Peak Kp=7+
1991/06/05 Ap=196,  After max: 23. Before min: 59. Peak Kp=9-
1991/06/06 Ap= 49,  After max: 23. Before min: 59. Peak Kp=7-
1991/06/09 Ap= 58,  After max: 23. Before min: 59. Peak Kp=7-
1991/06/10 Ap=119,  After max: 23. Before min: 59. Peak Kp=8-
1991/06/11 Ap= 88,  After max: 23. Before min: 59. Peak Kp=7+
1991/06/12 Ap= 66,  After max: 23. Before min: 59. Peak Kp=7-
1991/06/13 Ap=120,  After max: 23. Before min: 59. Peak Kp=8-
1991/06/17 Ap= 67,  After max: 23. Before min: 59. Peak Kp=7+
1991/07/08 Ap= 68,  After max: 24. Before min: 58. Peak Kp=8o
1991/07/09 Ap=117,  After max: 24. Before min: 58. Peak Kp=8o
1991/07/13 Ap=134,  After max: 24. Before min: 58. Peak Kp=9-
1991/07/14 Ap= 75,  After max: 24. Before min: 58. Peak Kp=7-
1991/08/12 Ap= 64,  After max: 25. Before min: 57. Peak Kp=7+
1991/08/19 Ap= 74,  After max: 25. Before min: 57. Peak Kp=8-
1991/08/20 Ap= 67,  After max: 25. Before min: 57. Peak Kp=8-
1991/08/22 Ap= 48,  After max: 25. Before min: 57. Peak Kp=7o
1991/08/27 Ap= 37,  After max: 25. Before min: 57. Peak Kp=7-
1991/09/09 Ap= 49,  After max: 26. Before min: 56. Peak Kp=7o
1991/10/01 Ap= 54,  After max: 27. Before min: 55. Peak Kp=7+
1991/10/08 Ap= 41,  After max: 27. Before min: 55. Peak Kp=7-
1991/10/28 Ap= 98,  After max: 27. Before min: 55. Peak Kp=8+
1991/10/29 Ap=128,  After max: 27. Before min: 55. Peak Kp=8+
1991/10/31 Ap= 59,  After max: 27. Before min: 55. Peak Kp=7o
1991/11/01 Ap=109,  After max: 28. Before min: 54. Peak Kp=8+
1991/11/02 Ap= 41,  After max: 28. Before min: 54. Peak Kp=7o
1991/11/08 Ap= 98,  After max: 28. Before min: 54. Peak Kp=9-
1991/11/09 Ap=119,  After max: 28. Before min: 54. Peak Kp=8+
1991/11/21 Ap= 65,  After max: 28. Before min: 54. Peak Kp=7-
1992/02/03 Ap= 92,  After max: 31. Before min: 51. Peak Kp=8-
1992/02/08 Ap= 49,  After max: 31. Before min: 51. Peak Kp=7o
1992/02/09 Ap= 79,  After max: 31. Before min: 51. Peak Kp=7o
1992/02/20 Ap= 63,  After max: 31. Before min: 51. Peak Kp=7o
1992/02/21 Ap= 69,  After max: 31. Before min: 51. Peak Kp=7+
1992/02/25 Ap= 55,  After max: 31. Before min: 51. Peak Kp=7-
1992/02/26 Ap= 65,  After max: 31. Before min: 51. Peak Kp=8o
1992/02/29 Ap= 44,  After max: 31. Before min: 51. Peak Kp=7-
1992/05/09 Ap= 39,  After max: 34. Before min: 48. Peak Kp=7-
1992/05/10 Ap=179,  After max: 34. Before min: 48. Peak Kp=9-
1992/05/11 Ap= 70,  After max: 34. Before min: 48. Peak Kp=7+
1992/06/30 Ap= 37,  After max: 35. Before min: 47. Peak Kp=7-
1992/08/22 Ap= 39,  After max: 37. Before min: 45. Peak Kp=7-
1992/08/23 Ap= 73,  After max: 37. Before min: 45. Peak Kp=8o
1992/09/09 Ap= 84,  After max: 38. Before min: 44. Peak Kp=7+
1992/09/10 Ap= 88,  After max: 38. Before min: 44. Peak Kp=7o
1992/09/17 Ap= 93,  After max: 38. Before min: 44. Peak Kp=7+
1992/09/29 Ap= 62,  After max: 38. Before min: 44. Peak Kp=7-
1993/02/17 Ap= 36,  After max: 43. Before min: 39. Peak Kp=7-
1993/03/09 Ap= 64,  After max: 44. Before min: 38. Peak Kp=7-
1993/03/11 Ap= 50,  After max: 44. Before min: 38. Peak Kp=7-
1993/03/24 Ap= 58,  After max: 44. Before min: 38. Peak Kp=7+
1993/04/04 Ap= 58,  After max: 45. Before min: 37. Peak Kp=8-
1993/04/05 Ap= 87,  After max: 45. Before min: 37. Peak Kp=7+
1993/06/10 Ap= 28,  After max: 47. Before min: 35. Peak Kp=7o
1993/08/16 Ap= 78,  After max: 49. Before min: 33. Peak Kp=7o
1993/08/17 Ap= 27,  After max: 49. Before min: 33. Peak Kp=7-
1993/09/13 Ap= 91,  After max: 50. Before min: 32. Peak Kp=8-
1993/10/09 Ap= 48,  After max: 51. Before min: 31. Peak Kp=7-
1993/11/04 Ap= 77,  After max: 52. Before min: 30. Peak Kp=7-
1993/12/02 Ap= 48,  After max: 53. Before min: 29. Peak Kp=7-
1994/02/21 Ap= 95,  After max: 55. Before min: 27. Peak Kp=8-
1994/02/22 Ap= 63,  After max: 55. Before min: 27. Peak Kp=8-
1994/03/07 Ap= 65,  After max: 56. Before min: 26. Peak Kp=7o
1994/04/02 Ap= 53,  After max: 57. Before min: 25. Peak Kp=7o
1994/04/03 Ap= 92,  After max: 57. Before min: 25. Peak Kp=7+
1994/04/04 Ap= 59,  After max: 57. Before min: 25. Peak Kp=7o
1994/04/17 Ap=100,  After max: 57. Before min: 25. Peak Kp=8+
1994/05/01 Ap= 50,  After max: 58. Before min: 24. Peak Kp=7o
1994/05/02 Ap= 49,  After max: 58. Before min: 24. Peak Kp=7-
1994/05/28 Ap= 44,  After max: 58. Before min: 24. Peak Kp=7o
1994/10/03 Ap= 88,  After max: 63. Before min: 19. Peak Kp=7o
1994/10/29 Ap= 53,  After max: 63. Before min: 19. Peak Kp=7o
1994/10/30 Ap= 57,  After max: 63. Before min: 19. Peak Kp=7-
1995/04/07 Ap=100,  After max: 69. Before min: 13. Peak Kp=8o
1995/09/27 Ap= 41,  After max: 74. Before min: 08. Peak Kp=7o
1995/10/04 Ap= 57,  After max: 75. Before min: 07. Peak Kp=7-
1995/10/18 Ap= 32,  After max: 75. Before min: 07. Peak Kp=7-
1995/10/19 Ap= 31,  After max: 75. Before min: 07. Peak Kp=7-
1996/04/14 Ap= 32,  After max: 81. Before min: 01. Peak Kp=7o
2000/04/06 Ap= 82,  After max: 00. Before min: NA. Peak Kp=8+
2000/04/07 Ap= 74,  After max: 00. Before min: NA. Peak Kp=9-
2000/05/23 Ap= 29,  After max: 01. Before min: NA. Peak Kp=7-
2000/05/24 Ap= 93,  After max: 01. Before min: NA. Peak Kp=8o
2000/06/08 Ap= 64,  After max: 02. Before min: NA. Peak Kp=7o
2000/07/13 Ap= 42,  After max: 03. Before min: NA. Peak Kp=7o
2000/07/14 Ap= 51,  After max: 03. Before min: NA. Peak Kp=7+
2000/07/15 Ap=164,  After max: 03. Before min: NA. Peak Kp=9o
2000/07/16 Ap= 50,  After max: 03. Before min: NA. Peak Kp=8-
2000/08/12 Ap=123,  After max: 04. Before min: NA. Peak Kp=8-
2000/09/17 Ap= 56,  After max: 05. Before min: NA. Peak Kp=8+
2000/09/18 Ap= 70,  After max: 05. Before min: NA. Peak Kp=8-
2000/10/04 Ap= 63,  After max: 06. Before min: NA. Peak Kp=7+
2000/10/05 Ap=116,  After max: 06. Before min: NA. Peak Kp=8-
2000/10/13 Ap= 36,  After max: 06. Before min: NA. Peak Kp=7-
2000/11/06 Ap= 55,  After max: 07. Before min: NA. Peak Kp=7o
2000/11/07 Ap= 46,  After max: 07. Before min: NA. Peak Kp=7-
2000/11/29 Ap= 56,  After max: 07. Before min: NA. Peak Kp=7-
2001/03/19 Ap= 37,  After max: 11. Before min: NA. Peak Kp=7-
2001/03/20 Ap= 74,  After max: 11. Before min: NA. Peak Kp=7+
2001/03/31 Ap=192,  After max: 11. Before min: NA. Peak Kp=9-
2001/04/08 Ap= 63,  After max: 12. Before min: NA. Peak Kp=7o
2001/04/11 Ap= 85,  After max: 12. Before min: NA. Peak Kp=8+
2001/04/12 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/04/13 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/04/18 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/08/17 Ap= 42,  After max: 16. Before min: NA. Peak Kp=7o
2001/09/25 Ap= 33,  After max: 17. Before min: NA. Peak Kp=7+
2001/10/02 Ap= 52,  After max: 18. Before min: NA. Peak Kp=7-
2001/10/03 Ap= 69,  After max: 18. Before min: NA. Peak Kp=7o
2001/10/21 Ap= 57,  After max: 18. Before min: NA. Peak Kp=8-
2001/10/22 Ap= 96,  After max: 18. Before min: NA. Peak Kp=7+
2001/10/28 Ap= 44,  After max: 18. Before min: NA. Peak Kp=7-
2001/11/06 Ap=142,  After max: 19. Before min: NA. Peak Kp=9-
2001/11/24 Ap=104,  After max: 19. Before min: NA. Peak Kp=8+
2002/04/17 Ap= 62,  After max: 24. Before min: NA. Peak Kp=7+
2002/04/18 Ap= 63,  After max: 24. Before min: NA. Peak Kp=7o
2002/04/19 Ap= 62,  After max: 24. Before min: NA. Peak Kp=7-
2002/04/20 Ap= 70,  After max: 24. Before min: NA. Peak Kp=7+
2002/05/11 Ap= 49,  After max: 25. Before min: NA. Peak Kp=7-
2002/05/23 Ap= 78,  After max: 25. Before min: NA. Peak Kp=8+
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APPENDIX B

This appendix lists **all** of the geomagnetic storm events having Kp values of 7 or higher during the interval from 1932 to 2002, **including** those years near and prior to the solar maximum. In other words, this dataset is not limited exclusively to the declining phase of the solar cycle.

1932/03/28 Ap= 38, After max: 47. Before min: 18. Peak Kp=7-
1932/05/29 Ap= 75, After max: 49. Before min: 16. Peak Kp=8-
1932/05/30 Ap= 66, After max: 49. Before min: 16. Peak Kp=8o
1932/08/28 Ap= 59, After max: 52. Before min: 13. Peak Kp=7o
1933/05/01 Ap= 82, After max: 61. Before min: 04. Peak Kp=8-
1933/08/05 Ap= 36, After max: 64. Before min: 01. Peak Kp=7-
1933/09/09 Ap= 54, After max: 65. Before min: 00. Peak Kp=7-
1936/04/21 Ap= 45, Before max: 12. After min: 31. Peak Kp=7o
1936/06/19 Ap= 67, Before max: 10. After min: 33. Peak Kp=7+
1936/11/29 Ap= 60, Before max: 05. After min: 38. Peak Kp=7o
1937/02/03 Ap= 56, Before max: 02. After min: 41. Peak Kp=7-
1937/03/31 Ap= 53, Before max: 01. After min: 42. Peak Kp=7+
1937/04/24 Ap= 45, Before max: 00. After min: 43. Peak Kp=8o
1937/04/25 Ap= 72, Before max: 00. After min: 43. Peak Kp=7+
1937/04/26 Ap= 67, Before max: 00. After min: 43. Peak Kp=8+
1937/04/27 Ap= 61, Before max: 00. After min: 43. Peak Kp=7o
1937/04/28 Ap=128, Before max: 00. After min: 43. Peak Kp=8o
1937/05/05 Ap= 65, After max: 01. Before min: 81. Peak Kp=7o
1937/08/22 Ap= 74, After max: 04. Before min: 78. Peak Kp=8o
1937/09/30 Ap= 36, After max: 05. Before min: 77. Peak Kp=7-
1937/10/04 Ap= 71, After max: 06. Before min: 76. Peak Kp=8-
1937/10/08 Ap= 38, After max: 06. Before min: 76. Peak Kp=7-
1937/10/11 Ap= 46, After max: 06. Before min: 76. Peak Kp=7o
1938/01/16 Ap= 34, After max: 09. Before min: 73. Peak Kp=8-
1938/01/17 Ap=120, After max: 09. Before min: 73. Peak Kp=8+
1938/01/22 Ap=128, After max: 09. Before min: 73. Peak Kp=8+
1938/01/25 Ap=107, After max: 09. Before min: 73. Peak Kp=9-
1938/01/26 Ap= 62, After max: 09. Before min: 73. Peak Kp=8+
1938/02/06 Ap= 51, After max: 10. Before min: 72. Peak Kp=7-
1938/04/13 Ap= 36, After max: 12. Before min: 70. Peak Kp=7-
1938/04/14 Ap= 60, After max: 12. Before min: 70. Peak Kp=7o
1938/04/16 Ap=136, After max: 12. Before min: 70. Peak Kp=9o
1938/05/04 Ap= 44, After max: 13. Before min: 69. Peak Kp=7o
1938/05/11 Ap=103, After max: 13. Before min: 69. Peak Kp=9-
1938/05/12 Ap= 76, After max: 13. Before min: 69. Peak Kp=7+
1938/07/15 Ap= 67, After max: 15. Before min: 67. Peak Kp=7o
1938/08/03 Ap= 27, After max: 16. Before min: 66. Peak Kp=7+
1938/08/04 Ap= 50, After max: 16. Before min: 66. Peak Kp=7-
1938/09/15 Ap=100, After max: 17. Before min: 65. Peak Kp=7+
1938/09/27 Ap= 30, After max: 17. Before min: 65. Peak Kp=7o
1938/09/28 Ap= 56, After max: 17. Before min: 65. Peak Kp=8-
1938/09/30 Ap= 32, After max: 17. Before min: 65. Peak Kp=7-
1938/10/01 Ap= 45, After max: 18. Before min: 64. Peak Kp=7+
1938/10/07 Ap= 67, After max: 18. Before min: 64. Peak Kp=7o
1938/10/08 Ap= 58, After max: 18. Before min: 64. Peak Kp=7o
1939/02/24 Ap= 55, After max: 22. Before min: 60. Peak Kp=7+
1939/02/25 Ap= 73, After max: 22. Before min: 60. Peak Kp=7+
1939/03/28 Ap= 56, After max: 23. Before min: 59. Peak Kp=7-
1939/04/17 Ap=135, After max: 24. Before min: 58. Peak Kp=8o
1939/04/19 Ap= 45, After max: 24. Before min: 58. Peak Kp=7-
1939/04/23 Ap= 92, After max: 24. Before min: 58. Peak Kp=8-
1939/04/24 Ap= 79, After max: 24. Before min: 58. Peak Kp=9-
1939/04/25 Ap= 61, After max: 24. Before min: 58. Peak Kp=7+
1939/05/01 Ap= 56, After max: 25. Before min: 57. Peak Kp=7-
1939/05/07 Ap= 51, After max: 25. Before min: 57. Peak Kp=7-
1939/06/14 Ap= 61, After max: 26. Before min: 56. Peak Kp=7o
1939/06/16 Ap= 35, After max: 26. Before min: 56. Peak Kp=7-
1939/07/03 Ap= 45, After max: 27. Before min: 55. Peak Kp=7-
1939/07/04 Ap= 43, After max: 27. Before min: 55. Peak Kp=7-
1939/07/05 Ap= 94, After max: 27. Before min: 55. Peak Kp=7+
1939/07/21 Ap= 36, After max: 27. Before min: 55. Peak Kp=7+
1939/08/12 Ap= 88, After max: 28. Before min: 54. Peak Kp=8-
1939/08/16 Ap= 62, After max: 28. Before min: 54. Peak Kp=8-
1939/08/22 Ap=133, After max: 28. Before min: 54. Peak Kp=8-
1939/08/23 Ap= 89, After max: 28. Before min: 54. Peak Kp=8-
1939/09/17 Ap= 55, After max: 29. Before min: 53. Peak Kp=7o
1939/10/04 Ap= 51, After max: 30. Before min: 52. Peak Kp=7+
1939/10/09 Ap= 32, After max: 30. Before min: 52. Peak Kp=7-
1939/10/13 Ap= 89, After max: 30. Before min: 52. Peak Kp=8o
1939/10/14 Ap= 74, After max: 30. Before min: 52. Peak Kp=7-
1939/10/15 Ap= 68, After max: 30. Before min: 52. Peak Kp=8o
1940/01/03 Ap= 47, After max: 33. Before min: 49. Peak Kp=8-
1940/01/18 Ap= 38, After max: 33. Before min: 49. Peak Kp=7-
1940/03/23 Ap= 51, After max: 35. Before min: 47. Peak Kp=7+
1940/03/24 Ap=187, After max: 35. Before min: 47. Peak Kp=9o
1940/03/25 Ap=184, After max: 35. Before min: 47. Peak Kp=9-
1940/03/26 Ap= 53, After max: 35. Before min: 47. Peak Kp=7+
1940/03/29 Ap=100, After max: 35. Before min: 47. Peak Kp=8+
1940/03/30 Ap=189, After max: 35. Before min: 47. Peak Kp=9-
1940/03/31 Ap=128, After max: 35. Before min: 47. Peak Kp=8+
1940/04/01 Ap= 66, After max: 36. Before min: 46. Peak Kp=7-
1940/04/02 Ap= 34, After max: 36. Before min: 46. Peak Kp=7o
1940/04/03 Ap= 98, After max: 36. Before min: 46. Peak Kp=8o
1940/04/25 Ap= 70, After max: 36. Before min: 46. Peak Kp=8o
1940/04/26 Ap= 43, After max: 36. Before min: 46. Peak Kp=7o
1940/05/24 Ap= 78, After max: 37. Before min: 45. Peak Kp=8-
1940/06/25 Ap=126, After max: 38. Before min: 44. Peak Kp=8+
1940/07/13 Ap= 58, After max: 39. Before min: 43. Peak Kp=8-
1940/09/26 Ap= 44, After max: 41. Before min: 41. Peak Kp=8-
1940/09/27 Ap= 45, After max: 41. Before min: 41. Peak Kp=7-
1940/10/01 Ap= 40, After max: 42. Before min: 40. Peak Kp=7o
1940/10/07 Ap= 61, After max: 42. Before min: 40. Peak Kp=7o
1940/10/08 Ap= 49, After max: 42. Before min: 40. Peak Kp=7-
1940/11/13 Ap= 49, After max: 43. Before min: 39. Peak Kp=7-
1941/03/01 Ap=207, After max: 47. Before min: 35. Peak Kp=9o
1941/03/14 Ap= 79, After max: 47. Before min: 35. Peak Kp=7o
1941/03/30 Ap= 85, After max: 47. Before min: 35. Peak Kp=8-
1941/03/31 Ap= 76, After max: 47. Before min: 35. Peak Kp=8-
1941/04/24 Ap= 63, After max: 48. Before min: 34. Peak Kp=7-
1941/07/05 Ap=222, After max: 51. Before min: 31. Peak Kp=9o
1941/07/07 Ap= 54, After max: 51. Before min: 31. Peak Kp=7o
1941/08/04 Ap=110, After max: 52. Before min: 30. Peak Kp=8+
1941/09/18 Ap=232, After max: 53. Before min: 29. Peak Kp=9-
1941/09/19 Ap=176, After max: 53. Before min: 29. Peak Kp=9o
1941/10/11 Ap= 42, After max: 54. Before min: 28. Peak Kp=7-
1941/10/31 Ap= 47, After max: 54. Before min: 28. Peak Kp=7-
1941/11/01 Ap= 79, After max: 55. Before min: 27. Peak Kp=8-
1941/12/01 Ap= 83, After max: 56. Before min: 26. Peak Kp=8-
1942/03/01 Ap=111, After max: 59. Before min: 23. Peak Kp=8o
1942/03/02 Ap= 45, After max: 59. Before min: 23. Peak Kp=7+
1942/03/05 Ap= 52, After max: 59. Before min: 23. Peak Kp=7o
1942/04/04 Ap= 70, After max: 60. Before min: 22. Peak Kp=7+
1942/08/16 Ap= 35, After max: 64. Before min: 18. Peak Kp=7-
1942/09/12 Ap= 54, After max: 65. Before min: 17. Peak Kp=7-
1942/10/02 Ap= 48, After max: 66. Before min: 16. Peak Kp=7-
1942/10/28 Ap= 56, After max: 66. Before min: 16. Peak Kp=7o
1942/10/29 Ap= 80, After max: 66. Before min: 16. Peak Kp=7+
1942/11/24 Ap= 62, After max: 67. Before min: 15. Peak Kp=7-
1943/01/20 Ap= 40, After max: 69. Before min: 13. Peak Kp=7-
1943/02/17 Ap= 41, After max: 70. Before min: 12. Peak Kp=7-
1943/03/29 Ap= 38, After max: 71. Before min: 11. Peak Kp=7o
1943/08/08 Ap= 79, After max: 76. Before min: 06. Peak Kp=7+
1943/08/09 Ap= 48, After max: 76. Before min: 06. Peak Kp=8-
1943/08/28 Ap= 43, After max: 76. Before min: 06. Peak Kp=7o
1943/08/30 Ap= 90, After max: 76. Before min: 06. Peak Kp=7o
1943/08/31 Ap=140, After max: 76. Before min: 06. Peak Kp=8+
1943/09/29 Ap= 61, After max: 77. Before min: 05. Peak Kp=7-
1943/09/30 Ap= 66, After max: 77. Before min: 05. Peak Kp=7o
1943/10/24 Ap= 42, After max: 78. Before min: 04. Peak Kp=7-
1943/11/19 Ap= 57, After max: 79. Before min: 03. Peak Kp=7-
1944/02/14 Ap= 49, After max: 82. Before min: 00. Peak Kp=7-
1944/03/27 Ap= 60, Before max: 55. After min: 01. Peak Kp=7+
1944/04/02 Ap= 88, Before max: 54. After min: 02. Peak Kp=8+
1944/12/16 Ap= 83, Before max: 46. After min: 10. Peak Kp=8+
1945/01/29 Ap= 50, Before max: 45. After min: 11. Peak Kp=7o
1945/03/15 Ap= 57, Before max: 43. After min: 13. Peak Kp=7-
1945/03/28 Ap= 53, Before max: 43. After min: 13. Peak Kp=7+
1945/04/01 Ap= 54, Before max: 42. After min: 14. Peak Kp=7o
1945/12/14 Ap= 70, Before max: 34. After min: 22. Peak Kp=7-
1946/01/03 Ap= 70, Before max: 33. After min: 23. Peak Kp=7o
1946/02/07 Ap=127, Before max: 32. After min: 24. Peak Kp=8+
1946/02/08 Ap=118, Before max: 32. After min: 24. Peak Kp=9-
1946/03/24 Ap=117, Before max: 31. After min: 25. Peak Kp=8o
1946/03/25 Ap=195, Before max: 31. After min: 25. Peak Kp=9-
1946/03/28 Ap=213, Before max: 31. After min: 25. Peak Kp=9-
1946/04/15 Ap= 61, Before max: 30. After min: 26. Peak Kp=7-
1946/04/23 Ap=117, Before max: 30. After min: 26. Peak Kp=9-
1946/04/24 Ap= 99, Before max: 30. After min: 26. Peak Kp=8+
1946/05/06 Ap= 41, Before max: 29. After min: 27. Peak Kp=7-
1946/05/07 Ap= 37, Before max: 29. After min: 27. Peak Kp=7-
1946/05/11 Ap= 41, Before max: 29. After min: 27. Peak Kp=7-
1946/06/07 Ap= 47, Before max: 28. After min: 28. Peak Kp=7+
1946/06/29 Ap= 46, Before max: 28. After min: 28. Peak Kp=7-
1946/07/26 Ap= 79, Before max: 27. After min: 29. Peak Kp=9-
1946/07/27 Ap=152, Before max: 27. After min: 29. Peak Kp=9o
1946/07/29 Ap= 60, Before max: 27. After min: 29. Peak Kp=7o
1946/08/31 Ap= 52, Before max: 26. After min: 30. Peak Kp=8-
1946/09/16 Ap= 34, Before max: 25. After min: 31. Peak Kp=7o
1946/09/18 Ap=136, Before max: 25. After min: 31. Peak Kp=8-
1946/09/19 Ap= 58, Before max: 25. After min: 31. Peak Kp=7-
1946/09/22 Ap=198, Before max: 25. After min: 31. Peak Kp=9o
1946/09/23 Ap=146, Before max: 25. After min: 31. Peak Kp=8o
1946/09/28 Ap= 91, Before max: 25. After min: 31. Peak Kp=7+
1946/09/29 Ap= 36, Before max: 25. After min: 31. Peak Kp=7-
1946/10/27 Ap= 56, Before max: 24. After min: 32. Peak Kp=7-
1947/03/02 Ap= 81, Before max: 19. After min: 37. Peak Kp=7o

1947/03/03 Ap=128, Before max: 19. After min: 37. Peak Kp=8+
1947/03/04 Ap= 82, Before max: 19. After min: 37. Peak Kp=7+
1947/03/08 Ap= 90, Before max: 19. After min: 37. Peak Kp=8-
1947/03/09 Ap= 46, Before max: 19. After min: 37. Peak Kp=7-
1947/03/15 Ap= 74, Before max: 19. After min: 37. Peak Kp=7+
1947/03/28 Ap= 75, Before max: 19. After min: 37. Peak Kp=7-
1947/04/17 Ap=100, Before max: 18. After min: 38. Peak Kp=9-
1947/05/24 Ap= 52, Before max: 17. After min: 39. Peak Kp=8-
1947/06/14 Ap= 62, Before max: 16. After min: 40. Peak Kp=7o
1947/07/17 Ap= 68, Before max: 15. After min: 41. Peak Kp=8o
1947/07/18 Ap= 80, Before max: 15. After min: 41. Peak Kp=7-
1947/08/15 Ap= 55, Before max: 14. After min: 42. Peak Kp=7+
1947/08/16 Ap= 54, Before max: 14. After min: 42. Peak Kp=7+
1947/08/22 Ap= 71, Before max: 14. After min: 42. Peak Kp=8+
1947/08/23 Ap= 55, Before max: 14. After min: 42. Peak Kp=7o
1947/09/03 Ap= 84, Before max: 13. After min: 43. Peak Kp=7+
1947/09/07 Ap= 45, Before max: 13. After min: 43. Peak Kp=7-
1947/09/24 Ap= 90, Before max: 13. After min: 43. Peak Kp=7+
1947/09/25 Ap=100, Before max: 13. After min: 43. Peak Kp=8-
1947/10/02 Ap= 61, Before max: 12. After min: 44. Peak Kp=7-
1947/10/03 Ap= 45, Before max: 12. After min: 44. Peak Kp=7-
1947/11/09 Ap= 62, Before max: 11. After min: 45. Peak Kp=7o
1947/11/10 Ap= 48, Before max: 11. After min: 45. Peak Kp=7-
1947/11/11 Ap= 53, Before max: 11. After min: 45. Peak Kp=7-
1948/03/15 Ap=140, Before max: 07. After min: 49. Peak Kp=8+
1948/04/21 Ap= 24, Before max: 06. After min: 50. Peak Kp=7-
1948/04/22 Ap= 50, Before max: 06. After min: 50. Peak Kp=7o
1948/05/16 Ap= 72, Before max: 05. After min: 51. Peak Kp=7o
1948/08/08 Ap=146, Before max: 02. After min: 54. Peak Kp=8-
1948/08/10 Ap= 74, Before max: 02. After min: 54. Peak Kp=7o
1948/10/14 Ap= 35, Before max: 00. After min: 56. Peak Kp=7o
1948/10/17 Ap= 35, Before max: 00. After min: 56. Peak Kp=8+
1948/10/18 Ap= 86, Before max: 00. After min: 56. Peak Kp=8+
1948/10/19 Ap= 94, Before max: 00. After min: 56. Peak Kp=8-
1948/10/21 Ap= 67, Before max: 00. After min: 56. Peak Kp=7-
1949/01/02 Ap= 45, After max: 03. Before min: 63. Peak Kp=7-
1949/01/24 Ap= 38, After max: 03. Before min: 63. Peak Kp=7+
1949/01/25 Ap=156, After max: 03. Before min: 63. Peak Kp=9-
1949/01/26 Ap=100, After max: 03. Before min: 63. Peak Kp=8+
1949/03/16 Ap= 36, After max: 05. Before min: 61. Peak Kp=7+
1949/03/18 Ap= 37, After max: 05. Before min: 61. Peak Kp=7-
1949/03/22 Ap= 90, After max: 05. Before min: 61. Peak Kp=8-
1949/03/23 Ap= 47, After max: 05. Before min: 61. Peak Kp=7o
1949/04/07 Ap= 32, After max: 06. Before min: 60. Peak Kp=7+
1949/04/08 Ap= 83, After max: 06. Before min: 60. Peak Kp=7o
1949/05/03 Ap= 26, After max: 07. Before min: 59. Peak Kp=7o
1949/05/12 Ap=153, After max: 07. Before min: 59. Peak Kp=9-
1949/05/13 Ap= 59, After max: 07. Before min: 59. Peak Kp=8o
1949/05/30 Ap= 36, After max: 07. Before min: 59. Peak Kp=7-
1949/06/04 Ap= 58, After max: 08. Before min: 58. Peak Kp=7-
1949/08/03 Ap= 58, After max: 10. Before min: 56. Peak Kp=7o
1949/08/04 Ap= 64, After max: 10. Before min: 56. Peak Kp=7-
1949/08/08 Ap= 34, After max: 10. Before min: 56. Peak Kp=7-
1949/10/07 Ap= 65, After max: 12. Before min: 54. Peak Kp=7+
1949/10/08 Ap= 38, After max: 12. Before min: 54. Peak Kp=7-
1949/10/14 Ap= 91, After max: 12. Before min: 54. Peak Kp=8-
1949/10/15 Ap=156, After max: 12. Before min: 54. Peak Kp=8+
1949/10/16 Ap= 62, After max: 12. Before min: 54. Peak Kp=7o
1950/01/24 Ap= 42, After max: 15. Before min: 51. Peak Kp=7-
1950/02/20 Ap= 79, After max: 16. Before min: 50. Peak Kp=9-
1950/02/21 Ap= 79, After max: 16. Before min: 50. Peak Kp=8-
1950/02/24 Ap= 46, After max: 16. Before min: 50. Peak Kp=7o
1950/03/19 Ap= 84, After max: 17. Before min: 49. Peak Kp=7+
1950/04/05 Ap= 53, After max: 18. Before min: 48. Peak Kp=7-
1950/05/27 Ap= 40, After max: 19. Before min: 47. Peak Kp=7o
1950/05/28 Ap= 63, After max: 19. Before min: 47. Peak Kp=7o
1950/06/30 Ap= 39, After max: 20. Before min: 46. Peak Kp=7-
1950/07/12 Ap= 47, After max: 21. Before min: 45. Peak Kp=7o
1950/08/07 Ap= 42, After max: 22. Before min: 44. Peak Kp=8-
1950/08/08 Ap= 71, After max: 22. Before min: 44. Peak Kp=8-
1950/08/19 Ap=136, After max: 22. Before min: 44. Peak Kp=8+
1950/08/20 Ap=108, After max: 22. Before min: 44. Peak Kp=8+
1950/09/03 Ap= 56, After max: 23. Before min: 43. Peak Kp=7o
1950/10/02 Ap= 79, After max: 24. Before min: 42. Peak Kp=7-
1950/10/03 Ap= 52, After max: 24. Before min: 42. Peak Kp=7-
1950/10/28 Ap= 90, After max: 24. Before min: 42. Peak Kp=7+
1950/11/26 Ap= 64, After max: 25. Before min: 41. Peak Kp=7-
1951/01/31 Ap= 49, After max: 27. Before min: 39. Peak Kp=7-
1951/02/27 Ap= 48, After max: 28. Before min: 38. Peak Kp=7o
1951/02/28 Ap= 55, After max: 28. Before min: 38. Peak Kp=7o
1951/03/13 Ap= 51, After max: 29. Before min: 37. Peak Kp=7-
1951/04/18 Ap= 66, After max: 30. Before min: 36. Peak Kp=8-
1951/05/01 Ap= 63, After max: 31. Before min: 35. Peak Kp=7+
1951/05/02 Ap= 68, After max: 31. Before min: 35. Peak Kp=7+
1951/05/09 Ap= 35, After max: 31. Before min: 35. Peak Kp=7+
1951/05/10 Ap= 47, After max: 31. Before min: 35. Peak Kp=7-
1951/05/26 Ap= 42, After max: 31. Before min: 35. Peak Kp=7o
1951/06/17 Ap= 38, After max: 32. Before min: 34. Peak Kp=8o
1951/06/18 Ap= 54, After max: 32. Before min: 34. Peak Kp=7+
1951/07/01 Ap= 31, After max: 33. Before min: 33. Peak Kp=7o
1951/07/02 Ap= 82, After max: 33. Before min: 33. Peak Kp=8-
1951/09/11 Ap= 40, After max: 35. Before min: 31. Peak Kp=7o
1951/09/16 Ap= 82, After max: 35. Before min: 31. Peak Kp=7-
1951/09/19 Ap= 59, After max: 35. Before min: 31. Peak Kp=8-
1951/09/20 Ap=106, After max: 35. Before min: 31. Peak Kp=7+
1951/09/21 Ap= 88, After max: 35. Before min: 31. Peak Kp=7o
1951/09/22 Ap= 85, After max: 35. Before min: 31. Peak Kp=7o
1951/09/25 Ap=116, After max: 35. Before min: 31. Peak Kp=8+
1951/09/26 Ap= 73, After max: 35. Before min: 31. Peak Kp=9-
1951/10/07 Ap= 37, After max: 36. Before min: 30. Peak Kp=7-
1951/10/17 Ap= 91, After max: 36. Before min: 30. Peak Kp=7o
1951/10/28 Ap= 98, After max: 36. Before min: 30. Peak Kp=9-
1951/12/28 Ap= 68, After max: 38. Before min: 28. Peak Kp=7o
1952/02/10 Ap= 35, After max: 40. Before min: 26. Peak Kp=7-
1952/02/24 Ap= 72, After max: 40. Before min: 26. Peak Kp=7o
1952/03/03 Ap= 42, After max: 41. Before min: 25. Peak Kp=7-
1952/03/05 Ap= 94, After max: 41. Before min: 25. Peak Kp=7+
1952/03/06 Ap= 82, After max: 41. Before min: 25. Peak Kp=8o
1952/03/07 Ap= 58, After max: 41. Before min: 25. Peak Kp=7-
1952/03/23 Ap= 48, After max: 41. Before min: 25. Peak Kp=7o
1952/03/30 Ap= 45, After max: 41. Before min: 25. Peak Kp=7-
1952/03/31 Ap= 80, After max: 41. Before min: 25. Peak Kp=8-
1952/04/02 Ap= 77, After max: 42. Before min: 24. Peak Kp=7o
1952/04/03 Ap= 82, After max: 42. Before min: 24. Peak Kp=7-
1952/04/10 Ap= 33, After max: 42. Before min: 24. Peak Kp=7-
1952/04/21 Ap= 94, After max: 42. Before min: 24. Peak Kp=8+
1952/04/29 Ap= 87, After max: 42. Before min: 24. Peak Kp=7+
1952/04/30 Ap= 66, After max: 42. Before min: 24. Peak Kp=7-
1952/05/03 Ap= 56, After max: 43. Before min: 23. Peak Kp=7o
1952/05/04 Ap= 47, After max: 43. Before min: 23. Peak Kp=7-
1952/05/07 Ap= 74, After max: 43. Before min: 23. Peak Kp=7o
1952/05/26 Ap= 52, After max: 43. Before min: 23. Peak Kp=8-
1952/05/27 Ap= 72, After max: 43. Before min: 23. Peak Kp=8o
1952/06/30 Ap= 78, After max: 44. Before min: 22. Peak Kp=8o
1952/09/29 Ap= 71, After max: 47. Before min: 19. Peak Kp=7o
1952/09/30 Ap= 48, After max: 47. Before min: 19. Peak Kp=7+
1952/10/04 Ap= 69, After max: 48. Before min: 18. Peak Kp=7-
1952/10/05 Ap= 68, After max: 48. Before min: 18. Peak Kp=7-
1952/12/04 Ap= 38, After max: 50. Before min: 16. Peak Kp=7-
1952/12/27 Ap= 23, After max: 50. Before min: 16. Peak Kp=7-
1953/01/05 Ap= 51, After max: 51. Before min: 15. Peak Kp=7-
1953/03/08 Ap= 30, After max: 53. Before min: 13. Peak Kp=7-
1953/03/09 Ap= 39, After max: 53. Before min: 13. Peak Kp=7-
1953/03/24 Ap= 63, After max: 53. Before min: 13. Peak Kp=7-
1953/05/15 Ap= 55, After max: 55. Before min: 11. Peak Kp=8-
1953/05/16 Ap= 85, After max: 55. Before min: 11. Peak Kp=7+
1953/05/17 Ap= 28, After max: 55. Before min: 11. Peak Kp=7-
1953/08/24 Ap= 58, After max: 58. Before min: 08. Peak Kp=7-
1953/09/03 Ap= 40, After max: 59. Before min: 07. Peak Kp=7+
1953/09/04 Ap= 61, After max: 59. Before min: 07. Peak Kp=7+
1953/09/19 Ap= 80, After max: 59. Before min: 07. Peak Kp=7-
1953/10/15 Ap= 46, After max: 60. Before min: 06. Peak Kp=7+
1954/04/11 Ap= 35, After max: 66. Before min: 00. Peak Kp=7+
1954/04/12 Ap= 56, After max: 66. Before min: 00. Peak Kp=7+
1954/09/20 Ap= 45, Before max: 42. After min: 05. Peak Kp=7-
1955/01/17 Ap= 43, Before max: 38. After min: 09. Peak Kp=7-
1955/01/18 Ap= 59, Before max: 38. After min: 09. Peak Kp=8-
1955/04/27 Ap= 54, Before max: 35. After min: 12. Peak Kp=8-
1955/04/28 Ap= 44, Before max: 35. After min: 12. Peak Kp=7o
1955/05/25 Ap= 34, Before max: 34. After min: 13. Peak Kp=7-
1955/09/30 Ap= 54, Before max: 30. After min: 17. Peak Kp=7-
1955/11/19 Ap= 65, Before max: 28. After min: 19. Peak Kp=8-
1956/02/25 Ap=103, Before max: 25. After min: 22. Peak Kp=8+
1956/03/03 Ap=102, Before max: 24. After min: 23. Peak Kp=7+
1956/03/22 Ap= 60, Before max: 24. After min: 23. Peak Kp=7o
1956/04/21 Ap= 59, Before max: 23. After min: 24. Peak Kp=7o
1956/04/22 Ap= 80, Before max: 23. After min: 24. Peak Kp=7+
1956/04/26 Ap= 40, Before max: 23. After min: 24. Peak Kp=8-
1956/04/27 Ap=172, Before max: 23. After min: 24. Peak Kp=9-
1956/04/28 Ap= 64, Before max: 23. After min: 24. Peak Kp=7o
1956/04/29 Ap= 58, Before max: 23. After min: 24. Peak Kp=8-
1956/05/13 Ap= 34, Before max: 22. After min: 25. Peak Kp=7-
1956/05/16 Ap=156, Before max: 22. After min: 25. Peak Kp=8+
1956/05/17 Ap= 52, Before max: 22. After min: 25. Peak Kp=7o
1956/05/23 Ap= 28, Before max: 22. After min: 25. Peak Kp=7-
1956/05/24 Ap= 95, Before max: 22. After min: 25. Peak Kp=7o
1956/05/25 Ap= 69, Before max: 22. After min: 25. Peak Kp=7o
1956/06/25 Ap= 52, Before max: 21. After min: 26. Peak Kp=7-
1956/08/24 Ap= 84, Before max: 19. After min: 28. Peak Kp=8-
1956/09/02 Ap= 82, Before max: 18. After min: 29. Peak Kp=8o
1956/09/08 Ap= 78, Before max: 18. After min: 29. Peak Kp=8+
1956/10/26 Ap= 41, Before max: 17. After min: 30. Peak Kp=7-
1956/11/11 Ap= 72, Before max: 16. After min: 31. Peak Kp=7-
1956/11/14 Ap= 59, Before max: 16. After min: 31. Peak Kp=7o
1956/11/15 Ap= 86, Before max: 16. After min: 31. Peak Kp=8-
1956/11/16 Ap= 48, Before max: 16. After min: 31. Peak Kp=7-
1956/11/25 Ap= 29, Before max: 16. After min: 31. Peak Kp=7o
1957/01/21 Ap= 82, Before max: 14. After min: 33. Peak Kp=9-
1957/01/22 Ap= 70, Before max: 14. After min: 33. Peak Kp=8+
1957/02/24 Ap= 62, Before max: 13. After min: 34. Peak Kp=7o
1957/03/02 Ap=132, Before max: 12. After min: 35. Peak Kp=8+
1957/03/10 Ap= 73, Before max: 12. After min: 35. Peak Kp=7o
1957/03/27 Ap= 44, Before max: 12. After min: 35. Peak Kp=7o
1957/03/28 Ap= 58, Before max: 12. After min: 35. Peak Kp=7o
1957/03/29 Ap= 77, Before max: 12. After min: 35. Peak Kp=8-
1957/04/10 Ap= 58, Before max: 11. After min: 36. Peak Kp=7-
1957/04/17 Ap= 55, Before max: 11. After min: 36. Peak Kp=8-
1957/04/19 Ap= 60, Before max: 11. After min: 36. Peak Kp=7-
1957/06/26 Ap= 84, Before max: 09. After min: 38. Peak Kp=7o
1957/06/30 Ap=150, Before max: 09. After min: 38. Peak Kp=8+

1957/07/01 Ap= 83, Before max: 08. After min: 39. Peak Kp=7+
1957/07/02 Ap= 55, Before max: 08. After min: 39. Peak Kp=8o
1957/07/05 Ap= 56, Before max: 08. After min: 39. Peak Kp=7+
1957/08/29 Ap= 28, Before max: 07. After min: 40. Peak Kp=7-
1957/08/30 Ap= 38, Before max: 07. After min: 40. Peak Kp=7-
1957/08/31 Ap= 36, Before max: 07. After min: 40. Peak Kp=7o
1957/09/02 Ap=102, Before max: 06. After min: 41. Peak Kp=8-
1957/09/03 Ap=135, Before max: 06. After min: 41. Peak Kp=9-
1957/09/04 Ap=145, Before max: 06. After min: 41. Peak Kp=9o
1957/09/05 Ap=112, Before max: 06. After min: 41. Peak Kp=9-
1957/09/13 Ap=160, Before max: 06. After min: 41. Peak Kp=9-
1957/09/21 Ap= 74, Before max: 06. After min: 41. Peak Kp=7+
1957/09/22 Ap=104, Before max: 06. After min: 41. Peak Kp=8+
1957/09/23 Ap=164, Before max: 06. After min: 41. Peak Kp=9-
1957/09/29 Ap=139, Before max: 06. After min: 41. Peak Kp=9-
1957/10/21 Ap= 28, Before max: 05. After min: 42. Peak Kp=7-
1957/11/07 Ap= 31, Before max: 04. After min: 43. Peak Kp=7o
1957/11/26 Ap= 64, Before max: 04. After min: 43. Peak Kp=7-
1958/01/21 Ap= 33, Before max: 02. After min: 45. Peak Kp=7-
1958/02/11 Ap=199, Before max: 01. After min: 46. Peak Kp=9o
1958/03/05 Ap= 39, Before max: 00. After min: 47. Peak Kp=7-
1958/03/12 Ap= 64, Before max: 00. After min: 47. Peak Kp=7o
1958/05/26 Ap= 39, After max: 02. Before min: 77. Peak Kp=7-
1958/05/31 Ap= 72, After max: 02. Before min: 77. Peak Kp=8o
1958/06/01 Ap= 60, After max: 03. Before min: 76. Peak Kp=8-
1958/06/07 Ap= 77, After max: 03. Before min: 76. Peak Kp=8-
1958/06/28 Ap= 55, After max: 03. Before min: 76. Peak Kp=8-
1958/06/29 Ap=103, After max: 03. Before min: 76. Peak Kp=8o
1958/07/08 Ap=200, After max: 04. Before min: 75. Peak Kp=9o
1958/07/09 Ap= 75, After max: 04. Before min: 75. Peak Kp=7o
1958/07/21 Ap= 53, After max: 04. Before min: 75. Peak Kp=7+
1958/08/17 Ap= 82, After max: 05. Before min: 74. Peak Kp=7+
1958/08/24 Ap= 85, After max: 05. Before min: 74. Peak Kp=8-
1958/08/27 Ap= 64, After max: 05. Before min: 74. Peak Kp=7-
1958/09/03 Ap= 64, After max: 06. Before min: 73. Peak Kp=7-
1958/09/04 Ap=131, After max: 06. Before min: 73. Peak Kp=9-
1958/09/05 Ap= 71, After max: 06. Before min: 73. Peak Kp=8o
1958/09/25 Ap= 82, After max: 06. Before min: 73. Peak Kp=7o
1958/10/24 Ap= 89, After max: 07. Before min: 72. Peak Kp=7o
1958/12/04 Ap= 54, After max: 09. Before min: 70. Peak Kp=7-
1958/12/05 Ap= 28, After max: 09. Before min: 70. Peak Kp=7o
1958/12/18 Ap= 33, After max: 09. Before min: 70. Peak Kp=7o
1959/02/25 Ap= 69, After max: 11. Before min: 68. Peak Kp=7+
1959/03/26 Ap= 81, After max: 12. Before min: 67. Peak Kp=8o
1959/03/27 Ap=178, After max: 12. Before min: 67. Peak Kp=8+
1959/03/28 Ap= 87, After max: 12. Before min: 67. Peak Kp=7+
1959/03/29 Ap= 73, After max: 12. Before min: 67. Peak Kp=7-
1959/04/10 Ap= 98, After max: 13. Before min: 66. Peak Kp=8-
1959/04/23 Ap= 40, After max: 13. Before min: 66. Peak Kp=7-
1959/05/12 Ap=108, After max: 14. Before min: 65. Peak Kp=8+
1959/05/24 Ap= 52, After max: 14. Before min: 65. Peak Kp=7+
1959/07/11 Ap= 44, After max: 16. Before min: 63. Peak Kp=7-
1959/07/15 Ap=236, After max: 16. Before min: 63. Peak Kp=9o
1959/07/16 Ap= 47, After max: 16. Before min: 63. Peak Kp=7+
1959/07/17 Ap=110, After max: 16. Before min: 63. Peak Kp=9-
1959/07/18 Ap=119, After max: 16. Before min: 63. Peak Kp=8o
1959/08/16 Ap=130, After max: 17. Before min: 62. Peak Kp=8+
1959/08/17 Ap=114, After max: 17. Before min: 62. Peak Kp=8+
1959/09/03 Ap= 39, After max: 18. Before min: 61. Peak Kp=8-
1959/09/04 Ap=103, After max: 18. Before min: 61. Peak Kp=7+
1959/09/21 Ap= 86, After max: 18. Before min: 61. Peak Kp=7o
1959/09/22 Ap= 73, After max: 18. Before min: 61. Peak Kp=7o
1959/10/03 Ap= 46, After max: 19. Before min: 60. Peak Kp=7-
1959/10/04 Ap= 51, After max: 19. Before min: 60. Peak Kp=7o
1959/11/28 Ap= 82, After max: 20. Before min: 59. Peak Kp=8o
1959/12/05 Ap= 68, After max: 21. Before min: 58. Peak Kp=8-
1960/03/16 Ap= 52, After max: 24. Before min: 55. Peak Kp=7-
1960/03/31 Ap=129, After max: 24. Before min: 55. Peak Kp=8+
1960/04/01 Ap=241, After max: 25. Before min: 54. Peak Kp=9-
1960/04/02 Ap= 62, After max: 25. Before min: 54. Peak Kp=7o
1960/04/03 Ap= 68, After max: 25. Before min: 54. Peak Kp=7+
1960/04/10 Ap= 33, After max: 25. Before min: 54. Peak Kp=7-
1960/04/24 Ap= 66, After max: 25. Before min: 54. Peak Kp=7-
1960/04/25 Ap= 57, After max: 25. Before min: 54. Peak Kp=7-
1960/04/27 Ap= 31, After max: 25. Before min: 54. Peak Kp=7o
1960/04/28 Ap= 84, After max: 25. Before min: 54. Peak Kp=7o
1960/04/30 Ap=174, After max: 25. Before min: 54. Peak Kp=9o
1960/05/01 Ap= 49, After max: 26. Before min: 53. Peak Kp=7-
1960/05/06 Ap= 60, After max: 26. Before min: 53. Peak Kp=7+
1960/05/08 Ap=128, After max: 26. Before min: 53. Peak Kp=8+
1960/05/11 Ap= 42, After max: 26. Before min: 53. Peak Kp=7-
1960/05/29 Ap= 54, After max: 26. Before min: 53. Peak Kp=8-
1960/06/27 Ap= 65, After max: 27. Before min: 52. Peak Kp=7-
1960/06/29 Ap= 36, After max: 27. Before min: 52. Peak Kp=7-
1960/06/30 Ap= 55, After max: 27. Before min: 52. Peak Kp=7o
1960/07/15 Ap= 93, After max: 28. Before min: 51. Peak Kp=8o
1960/07/16 Ap= 77, After max: 28. Before min: 51. Peak Kp=8+
1960/08/16 Ap= 52, After max: 29. Before min: 50. Peak Kp=7o
1960/08/17 Ap=106, After max: 29. Before min: 50. Peak Kp=8-
1960/08/29 Ap= 45, After max: 29. Before min: 50. Peak Kp=7-
1960/08/30 Ap= 58, After max: 29. Before min: 50. Peak Kp=7o
1960/09/03 Ap= 35, After max: 30. Before min: 49. Peak Kp=7-
1960/09/04 Ap= 95, After max: 30. Before min: 49. Peak Kp=8o
1960/09/05 Ap=118, After max: 30. Before min: 49. Peak Kp=8-
1960/10/04 Ap= 36, After max: 31. Before min: 48. Peak Kp=7-
1960/10/06 Ap=203, After max: 31. Before min: 48. Peak Kp=9-
1960/10/07 Ap=186, After max: 31. Before min: 48. Peak Kp=9o
1960/10/25 Ap= 76, After max: 31. Before min: 48. Peak Kp=8-
1960/10/26 Ap= 63, After max: 31. Before min: 48. Peak Kp=7-
1960/11/12 Ap= 67, After max: 32. Before min: 47. Peak Kp=8o
1960/11/13 Ap=280, After max: 32. Before min: 47. Peak Kp=9o
1960/11/14 Ap= 49, After max: 32. Before min: 47. Peak Kp=7+
1960/11/15 Ap= 69, After max: 32. Before min: 47. Peak Kp=8-
1960/11/16 Ap= 94, After max: 32. Before min: 47. Peak Kp=8+
1960/12/01 Ap= 93, After max: 33. Before min: 46. Peak Kp=8o
1961/02/04 Ap= 43, After max: 35. Before min: 44. Peak Kp=7o
1961/02/18 Ap= 51, After max: 35. Before min: 44. Peak Kp=7-
1961/03/06 Ap= 37, After max: 36. Before min: 43. Peak Kp=7-
1961/03/10 Ap= 46, After max: 36. Before min: 43. Peak Kp=7o
1961/04/14 Ap= 54, After max: 37. Before min: 42. Peak Kp=7+
1961/04/15 Ap= 61, After max: 37. Before min: 42. Peak Kp=8-
1961/06/21 Ap= 58, After max: 39. Before min: 40. Peak Kp=7o
1961/06/22 Ap= 58, After max: 39. Before min: 40. Peak Kp=7o
1961/07/13 Ap=102, After max: 40. Before min: 39. Peak Kp=8+
1961/07/14 Ap= 98, After max: 40. Before min: 39. Peak Kp=8+
1961/07/18 Ap= 93, After max: 40. Before min: 39. Peak Kp=8-
1961/07/27 Ap=114, After max: 40. Before min: 39. Peak Kp=8+
1961/09/30 Ap= 36, After max: 42. Before min: 37. Peak Kp=8o
1961/10/01 Ap=114, After max: 43. Before min: 36. Peak Kp=9-
1961/10/28 Ap=128, After max: 43. Before min: 36. Peak Kp=9-
1961/12/01 Ap= 54, After max: 45. Before min: 34. Peak Kp=8-
1961/12/03 Ap= 55, After max: 45. Before min: 34. Peak Kp=7-
1962/09/12 Ap= 58, After max: 54. Before min: 25. Peak Kp=7+
1962/12/17 Ap= 36, After max: 57. Before min: 22. Peak Kp=7-
1963/06/07 Ap= 43, After max: 63. Before min: 16. Peak Kp=7o
1963/08/20 Ap= 58, After max: 65. Before min: 14. Peak Kp=7o
1963/09/14 Ap= 82, After max: 66. Before min: 13. Peak Kp=7o
1963/09/21 Ap= 44, After max: 66. Before min: 13. Peak Kp=7o
1963/09/22 Ap=126, After max: 66. Before min: 13. Peak Kp=9-
1963/09/23 Ap= 78, After max: 66. Before min: 13. Peak Kp=9-
1963/09/25 Ap= 60, After max: 66. Before min: 13. Peak Kp=7+
1963/10/24 Ap= 63, After max: 67. Before min: 12. Peak Kp=7+
1963/10/29 Ap= 74, After max: 67. Before min: 12. Peak Kp=8o
1963/10/30 Ap= 35, After max: 67. Before min: 12. Peak Kp=8-
1964/01/02 Ap= 53, After max: 70. Before min: 09. Peak Kp=7-
1964/04/01 Ap= 46, After max: 73. Before min: 06. Peak Kp=7+
1964/06/10 Ap= 49, After max: 75. Before min: 04. Peak Kp=7-
1964/09/22 Ap= 44, After max: 78. Before min: 01. Peak Kp=8-
1965/04/18 Ap= 68, Before max: 43. After min: 06. Peak Kp=8-
1965/06/16 Ap= 73, Before max: 41. After min: 08. Peak Kp=7o
1966/03/14 Ap= 64, Before max: 32. After min: 17. Peak Kp=7+
1966/03/23 Ap= 67, Before max: 32. After min: 17. Peak Kp=7o
1966/03/28 Ap= 42, Before max: 32. After min: 17. Peak Kp=7o
1966/05/26 Ap= 78, Before max: 30. After min: 19. Peak Kp=7o
1966/08/30 Ap= 82, Before max: 27. After min: 22. Peak Kp=7+
1966/09/03 Ap= 92, Before max: 26. After min: 23. Peak Kp=9-
1966/09/04 Ap=112, Before max: 26. After min: 23. Peak Kp=9-
1966/12/14 Ap= 48, Before max: 23. After min: 26. Peak Kp=7o
1967/01/08 Ap= 60, Before max: 22. After min: 27. Peak Kp=7-
1967/01/14 Ap= 61, Before max: 22. After min: 27. Peak Kp=8-
1967/02/16 Ap= 64, Before max: 21. After min: 28. Peak Kp=8o
1967/05/03 Ap= 87, Before max: 18. After min: 31. Peak Kp=7o
1967/05/25 Ap=130, Before max: 18. After min: 31. Peak Kp=9o
1967/05/26 Ap=146, Before max: 18. After min: 31. Peak Kp=9o
1967/05/28 Ap= 55, Before max: 18. After min: 31. Peak Kp=7-
1967/05/29 Ap= 45, Before max: 18. After min: 31. Peak Kp=7-
1967/05/31 Ap= 43, Before max: 18. After min: 31. Peak Kp=7o
1967/06/05 Ap= 36, Before max: 17. After min: 32. Peak Kp=7o
1967/06/06 Ap= 46, Before max: 17. After min: 32. Peak Kp=8o
1967/06/07 Ap= 22, Before max: 17. After min: 32. Peak Kp=7-
1967/09/21 Ap= 85, Before max: 14. After min: 35. Peak Kp=7+
1968/04/05 Ap= 34, Before max: 07. After min: 42. Peak Kp=7o
1968/05/07 Ap= 53, Before max: 06. After min: 43. Peak Kp=7-
1968/06/11 Ap=103, Before max: 05. After min: 44. Peak Kp=8o
1968/10/31 Ap=112, Before max: 01. After min: 48. Peak Kp=8o
1968/11/01 Ap=122, Before max: 00. After min: 49. Peak Kp=8+
1968/11/02 Ap= 82, Before max: 00. After min: 49. Peak Kp=8-
1968/11/03 Ap= 35, Before max: 00. After min: 49. Peak Kp=7-
1969/02/02 Ap= 47, After max: 03. Before min: 85. Peak Kp=8o
1969/03/23 Ap= 47, After max: 04. Before min: 84. Peak Kp=8o
1969/03/24 Ap= 79, After max: 04. Before min: 84. Peak Kp=8o
1969/04/28 Ap= 60, After max: 05. Before min: 83. Peak Kp=7+
1969/05/14 Ap= 50, After max: 06. Before min: 82. Peak Kp=7-
1969/05/15 Ap=131, After max: 06. Before min: 82. Peak Kp=8-
1969/07/27 Ap= 45, After max: 08. Before min: 80. Peak Kp=7o
1969/09/28 Ap= 47, After max: 10. Before min: 78. Peak Kp=7o
1969/09/29 Ap= 71, After max: 10. Before min: 78. Peak Kp=7o
1969/09/30 Ap= 90, After max: 10. Before min: 78. Peak Kp=8o
1970/03/08 Ap=149, After max: 16. Before min: 72. Peak Kp=9o
1970/04/21 Ap= 90, After max: 17. Before min: 71. Peak Kp=8+
1970/04/22 Ap= 41, After max: 17. Before min: 71. Peak Kp=7o
1970/05/28 Ap= 45, After max: 18. Before min: 70. Peak Kp=7o
1970/07/09 Ap= 87, After max: 20. Before min: 68. Peak Kp=7+
1970/07/10 Ap= 34, After max: 20. Before min: 68. Peak Kp=7-
1970/07/25 Ap= 92, After max: 20. Before min: 68. Peak Kp=8-
1970/08/16 Ap= 21, After max: 21. Before min: 67. Peak Kp=7o
1970/08/17 Ap=115, After max: 21. Before min: 67. Peak Kp=9-
1970/10/18 Ap= 39, After max: 23. Before min: 65. Peak Kp=7-
1970/11/07 Ap= 58, After max: 24. Before min: 64. Peak Kp=7-
1970/12/14 Ap= 65, After max: 25. Before min: 63. Peak Kp=8+

1971/04/14 Ap= 39, After max: 29. Before min: 59. Peak Kp=8-
1971/04/15 Ap= 36, After max: 29. Before min: 59. Peak Kp=7-
1971/05/17 Ap= 73, After max: 30. Before min: 58. Peak Kp=7-
1971/09/18 Ap= 47, After max: 34. Before min: 54. Peak Kp=7-
1971/12/17 Ap= 67, After max: 37. Before min: 51. Peak Kp=7+
1972/03/06 Ap= 26, After max: 40. Before min: 48. Peak Kp=7+
1972/05/15 Ap= 38, After max: 42. Before min: 46. Peak Kp=8-
1972/06/17 Ap= 62, After max: 43. Before min: 45. Peak Kp=7+
1972/06/18 Ap=126, After max: 43. Before min: 45. Peak Kp=8+
1972/08/04 Ap=132, After max: 45. Before min: 43. Peak Kp=9o
1972/08/05 Ap=182, After max: 45. Before min: 43. Peak Kp=9-
1972/08/06 Ap= 87, After max: 45. Before min: 43. Peak Kp=7+
1972/08/09 Ap= 74, After max: 45. Before min: 43. Peak Kp=8+
1972/09/13 Ap= 53, After max: 46. Before min: 42. Peak Kp=7+
1972/09/14 Ap= 54, After max: 46. Before min: 42. Peak Kp=8o
1972/10/31 Ap= 29, After max: 47. Before min: 41. Peak Kp=7-
1972/11/01 Ap= 98, After max: 48. Before min: 40. Peak Kp=8o
1972/12/15 Ap= 29, After max: 49. Before min: 39. Peak Kp=7-
1973/02/21 Ap= 49, After max: 51. Before min: 37. Peak Kp=7+
1973/03/19 Ap= 82, After max: 52. Before min: 36. Peak Kp=7o
1973/03/20 Ap= 80, After max: 52. Before min: 36. Peak Kp=7-
1973/04/01 Ap= 91, After max: 53. Before min: 35. Peak Kp=8+
1973/04/02 Ap= 54, After max: 53. Before min: 35. Peak Kp=7o
1973/04/13 Ap= 46, After max: 53. Before min: 35. Peak Kp=7+
1973/04/14 Ap= 57, After max: 53. Before min: 35. Peak Kp=8-
1973/05/14 Ap= 80, After max: 54. Before min: 34. Peak Kp=8-
1973/05/21 Ap= 48, After max: 54. Before min: 34. Peak Kp=7o
1973/09/09 Ap= 44, After max: 58. Before min: 30. Peak Kp=8-
1973/09/23 Ap= 63, After max: 58. Before min: 30. Peak Kp=7o
1973/10/03 Ap= 48, After max: 59. Before min: 29. Peak Kp=7+
1973/10/29 Ap= 86, After max: 59. Before min: 29. Peak Kp=7o
1974/03/16 Ap= 42, After max: 64. Before min: 24. Peak Kp=7o
1974/03/21 Ap= 68, After max: 64. Before min: 24. Peak Kp=7-
1974/07/05 Ap= 74, After max: 68. Before min: 20. Peak Kp=7-
1974/07/06 Ap=130, After max: 68. Before min: 20. Peak Kp=9-
1974/07/23 Ap= 82, After max: 68. Before min: 20. Peak Kp=7o
1974/09/15 Ap= 73, After max: 70. Before min: 18. Peak Kp=8-
1974/09/16 Ap= 88, After max: 70. Before min: 18. Peak Kp=8o
1974/10/13 Ap= 86, After max: 71. Before min: 17. Peak Kp=7o
1974/10/16 Ap= 68, After max: 71. Before min: 17. Peak Kp=7o
1974/11/11 Ap= 48, After max: 72. Before min: 16. Peak Kp=7o
1975/01/07 Ap= 44, After max: 74. Before min: 14. Peak Kp=8-
1975/03/10 Ap= 80, After max: 76. Before min: 12. Peak Kp=7o
1975/03/11 Ap= 53, After max: 76. Before min: 12. Peak Kp=7-
1975/07/09 Ap= 35, After max: 80. Before min: 08. Peak Kp=7-
1975/10/08 Ap= 45, After max: 83. Before min: 05. Peak Kp=7-
1975/11/02 Ap= 36, After max: 84. Before min: 04. Peak Kp=7-
1976/01/10 Ap= 47, After max: 86. Before min: 02. Peak Kp=7o
1976/01/11 Ap= 41, After max: 86. Before min: 02. Peak Kp=7+
1976/03/26 Ap=145, After max: 88. Before min: 00. Peak Kp=8o
1976/04/01 Ap=118, Before max: 44. After min: 01. Peak Kp=8+
1976/05/02 Ap= 60, Before max: 43. After min: 02. Peak Kp=8-
1976/05/03 Ap= 97, Before max: 43. After min: 02. Peak Kp=8+
1976/06/30 Ap= 29, Before max: 42. After min: 03. Peak Kp=7-
1977/04/06 Ap= 49, Before max: 32. After min: 13. Peak Kp=7o
1977/04/07 Ap= 48, Before max: 32. After min: 13. Peak Kp=7-
1977/07/29 Ap= 61, Before max: 29. After min: 16. Peak Kp=7-
1977/09/21 Ap= 64, Before max: 27. After min: 18. Peak Kp=7+
1977/09/22 Ap= 63, Before max: 27. After min: 18. Peak Kp=7-
1977/10/27 Ap= 62, Before max: 26. After min: 19. Peak Kp=7-
1977/10/28 Ap= 47, Before max: 26. After min: 19. Peak Kp=7+
1977/12/02 Ap= 69, Before max: 24. After min: 21. Peak Kp=7o
1978/01/04 Ap= 89, Before max: 23. After min: 22. Peak Kp=7+
1978/02/15 Ap= 48, Before max: 22. After min: 23. Peak Kp=7+
1978/03/26 Ap= 49, Before max: 21. After min: 24. Peak Kp=7-
1978/03/27 Ap= 70, Before max: 21. After min: 24. Peak Kp=7-
1978/04/04 Ap= 55, Before max: 20. After min: 25. Peak Kp=7o
1978/04/10 Ap= 36, Before max: 20. After min: 25. Peak Kp=7+
1978/04/11 Ap= 64, Before max: 20. After min: 25. Peak Kp=8-
1978/04/12 Ap= 29, Before max: 20. After min: 25. Peak Kp=7-
1978/04/30 Ap= 58, Before max: 20. After min: 25. Peak Kp=8o
1978/05/01 Ap= 88, Before max: 19. After min: 26. Peak Kp=8+
1978/05/02 Ap= 94, Before max: 19. After min: 26. Peak Kp=7+
1978/05/03 Ap= 83, Before max: 19. After min: 26. Peak Kp=7o
1978/05/04 Ap= 96, Before max: 19. After min: 26. Peak Kp=8-
1978/05/09 Ap= 85, Before max: 19. After min: 26. Peak Kp=8-
1978/06/02 Ap= 82, Before max: 18. After min: 27. Peak Kp=7+
1978/06/29 Ap= 32, Before max: 18. After min: 27. Peak Kp=8-
1978/07/04 Ap= 80, Before max: 17. After min: 28. Peak Kp=8o
1978/07/05 Ap= 53, Before max: 17. After min: 28. Peak Kp=7o
1978/08/28 Ap=124, Before max: 16. After min: 29. Peak Kp=8+
1978/09/29 Ap=109, Before max: 15. After min: 30. Peak Kp=8o
1978/11/25 Ap= 60, Before max: 13. After min: 32. Peak Kp=7o
1979/02/21 Ap= 59, Before max: 10. After min: 35. Peak Kp=7-
1979/03/10 Ap= 54, Before max: 09. After min: 36. Peak Kp=7o
1979/03/22 Ap= 45, Before max: 09. After min: 36. Peak Kp=7-
1979/03/29 Ap= 68, Before max: 09. After min: 36. Peak Kp=7-
1979/04/03 Ap= 54, Before max: 08. After min: 37. Peak Kp=8o
1979/04/04 Ap= 47, Before max: 08. After min: 37. Peak Kp=7-
1979/04/05 Ap= 52, Before max: 08. After min: 37. Peak Kp=7-
1979/04/25 Ap=126, Before max: 08. After min: 37. Peak Kp=8o
1979/05/29 Ap= 30, Before max: 07. After min: 38. Peak Kp=7o
1979/06/06 Ap= 34, Before max: 06. After min: 39. Peak Kp=7o
1979/08/13 Ap= 76, Before max: 04. After min: 41. Peak Kp=7+
1979/08/20 Ap= 42, Before max: 04. After min: 41. Peak Kp=7o
1979/08/29 Ap= 77, Before max: 04. After min: 41. Peak Kp=8-
1979/09/18 Ap= 64, Before max: 03. After min: 42. Peak Kp=7o
1980/02/15 Ap= 33, After max: 02. Before min: 79. Peak Kp=7o
1980/07/18 Ap= 30, After max: 07. Before min: 74. Peak Kp=7-
1980/07/25 Ap= 46, After max: 07. Before min: 74. Peak Kp=7o
1980/12/19 Ap= 79, After max: 12. Before min: 69. Peak Kp=8-
1981/02/06 Ap= 48, After max: 14. Before min: 67. Peak Kp=7-
1981/03/05 Ap= 81, After max: 15. Before min: 66. Peak Kp=7+
1981/04/12 Ap= 96, After max: 16. Before min: 65. Peak Kp=7o
1981/04/13 Ap=121, After max: 16. Before min: 65. Peak Kp=8+
1981/04/26 Ap= 62, After max: 16. Before min: 65. Peak Kp=7+
1981/05/10 Ap= 32, After max: 17. Before min: 64. Peak Kp=7o
1981/05/11 Ap= 61, After max: 17. Before min: 64. Peak Kp=7-
1981/05/15 Ap= 54, After max: 17. Before min: 64. Peak Kp=7o
1981/05/18 Ap= 57, After max: 17. Before min: 64. Peak Kp=7o
1981/06/07 Ap= 50, After max: 18. Before min: 63. Peak Kp=7-
1981/07/25 Ap=134, After max: 19. Before min: 62. Peak Kp=8+
1981/07/26 Ap= 78, After max: 19. Before min: 62. Peak Kp=8o
1981/10/14 Ap= 73, After max: 22. Before min: 59. Peak Kp=8o
1981/10/20 Ap= 67, After max: 22. Before min: 59. Peak Kp=7o
1981/10/22 Ap= 72, After max: 22. Before min: 59. Peak Kp=7o
1981/11/12 Ap= 39, After max: 23. Before min: 58. Peak Kp=7-
1982/02/02 Ap= 60, After max: 26. Before min: 55. Peak Kp=7o
1982/02/22 Ap= 51, After max: 26. Before min: 55. Peak Kp=7-
1982/03/01 Ap= 68, After max: 27. Before min: 54. Peak Kp=8o
1982/03/02 Ap=107, After max: 27. Before min: 54. Peak Kp=8o
1982/04/10 Ap= 61, After max: 28. Before min: 53. Peak Kp=7o
1982/04/25 Ap= 52, After max: 28. Before min: 53. Peak Kp=7-
1982/06/12 Ap= 59, After max: 30. Before min: 51. Peak Kp=7-
1982/06/30 Ap= 39, After max: 30. Before min: 51. Peak Kp=7-
1982/07/12 Ap= 48, After max: 31. Before min: 50. Peak Kp=7-
1982/07/13 Ap=144, After max: 31. Before min: 50. Peak Kp=9o
1982/07/14 Ap=153, After max: 31. Before min: 50. Peak Kp=9o
1982/07/16 Ap= 50, After max: 31. Before min: 50. Peak Kp=7o
1982/07/24 Ap= 50, After max: 31. Before min: 50. Peak Kp=7-
1982/08/07 Ap=107, After max: 32. Before min: 49. Peak Kp=8-
1982/09/05 Ap= 39, After max: 33. Before min: 48. Peak Kp=7-
1982/09/06 Ap=199, After max: 33. Before min: 48. Peak Kp=9-
1982/09/07 Ap= 88, After max: 33. Before min: 48. Peak Kp=7+
1982/09/09 Ap= 50, After max: 33. Before min: 48. Peak Kp=7-
1982/09/21 Ap= 76, After max: 33. Before min: 48. Peak Kp=7+
1982/09/22 Ap=135, After max: 33. Before min: 48. Peak Kp=8+
1982/09/26 Ap= 84, After max: 33. Before min: 48. Peak Kp=7+
1982/09/27 Ap= 42, After max: 33. Before min: 48. Peak Kp=7-
1982/11/24 Ap= 83, After max: 35. Before min: 46. Peak Kp=7+
1982/11/25 Ap= 54, After max: 35. Before min: 46. Peak Kp=7-
1982/12/17 Ap= 62, After max: 36. Before min: 45. Peak Kp=7+
1982/12/22 Ap= 42, After max: 36. Before min: 45. Peak Kp=7-
1983/01/10 Ap= 78, After max: 37. Before min: 44. Peak Kp=8+
1983/02/04 Ap= 59, After max: 38. Before min: 43. Peak Kp=8-
1983/02/05 Ap=143, After max: 38. Before min: 43. Peak Kp=8o
1983/03/02 Ap= 86, After max: 39. Before min: 42. Peak Kp=7o
1983/03/12 Ap= 53, After max: 39. Before min: 42. Peak Kp=7+
1983/04/15 Ap= 59, After max: 40. Before min: 41. Peak Kp=7-
1983/05/17 Ap= 64, After max: 41. Before min: 40. Peak Kp=7+
1983/05/24 Ap= 77, After max: 41. Before min: 40. Peak Kp=8o
1983/06/13 Ap= 70, After max: 42. Before min: 39. Peak Kp=8-
1983/08/08 Ap= 62, After max: 44. Before min: 37. Peak Kp=8-
1983/10/04 Ap= 43, After max: 46. Before min: 35. Peak Kp=7-
1983/11/09 Ap= 43, After max: 47. Before min: 34. Peak Kp=7o
1984/03/28 Ap= 60, After max: 51. Before min: 30. Peak Kp=7+
1984/04/04 Ap= 84, After max: 52. Before min: 29. Peak Kp=8-
1984/04/09 Ap= 37, After max: 52. Before min: 29. Peak Kp=7+
1984/04/26 Ap=103, After max: 52. Before min: 29. Peak Kp=8-
1984/06/16 Ap= 42, After max: 54. Before min: 27. Peak Kp=7-
1984/07/13 Ap= 62, After max: 55. Before min: 26. Peak Kp=7o
1984/08/01 Ap= 75, After max: 56. Before min: 25. Peak Kp=7o
1984/09/04 Ap= 59, After max: 57. Before min: 24. Peak Kp=8-
1984/09/05 Ap= 63, After max: 57. Before min: 24. Peak Kp=7o
1984/09/23 Ap=112, After max: 57. Before min: 24. Peak Kp=7o
1984/10/18 Ap= 43, After max: 58. Before min: 23. Peak Kp=7-
1984/10/19 Ap= 75, After max: 58. Before min: 23. Peak Kp=7-
1984/10/20 Ap= 63, After max: 58. Before min: 23. Peak Kp=7-
1984/11/15 Ap= 52, After max: 59. Before min: 22. Peak Kp=7+
1984/11/16 Ap=112, After max: 59. Before min: 22. Peak Kp=8o
1985/02/27 Ap= 19, After max: 62. Before min: 19. Peak Kp=7-
1985/02/28 Ap= 60, After max: 62. Before min: 19. Peak Kp=7o
1985/04/20 Ap= 53, After max: 64. Before min: 17. Peak Kp=7-
1985/04/21 Ap=103, After max: 64. Before min: 17. Peak Kp=8+
1985/04/28 Ap= 61, After max: 64. Before min: 17. Peak Kp=7o
1985/04/30 Ap= 42, After max: 64. Before min: 17. Peak Kp=7+
1985/07/12 Ap= 48, After max: 67. Before min: 14. Peak Kp=7-
1985/10/05 Ap= 66, After max: 70. Before min: 11. Peak Kp=7o
1985/11/29 Ap= 37, After max: 71. Before min: 10. Peak Kp=7-
1985/11/30 Ap= 52, After max: 71. Before min: 10. Peak Kp=7+
1986/02/07 Ap= 82, After max: 74. Before min: 07. Peak Kp=8-
1986/02/08 Ap=202, After max: 74. Before min: 07. Peak Kp=9o
1986/02/09 Ap=100, After max: 74. Before min: 07. Peak Kp=9-
1986/05/02 Ap= 43, After max: 77. Before min: 04. Peak Kp=7-
1986/05/03 Ap= 40, After max: 77. Before min: 04. Peak Kp=7+
1986/05/06 Ap= 67, After max: 77. Before min: 04. Peak Kp=7-
1986/09/12 Ap= 89, After max: 81. Before min: 00. Peak Kp=9-
1986/10/13 Ap= 28, Before max: 33. After min: 01. Peak Kp=7-
1986/11/25 Ap= 49, Before max: 32. After min: 02. Peak Kp=7-
1987/07/29 Ap= 52, Before max: 24. After min: 10. Peak Kp=7o

1988/01/14 Ap= 48, Before max: 18. After min: 16. Peak Kp=7o
1988/01/15 Ap= 63, Before max: 18. After min: 16. Peak Kp=7+
1988/02/22 Ap= 97, Before max: 17. After min: 17. Peak Kp=7+
1988/03/26 Ap= 49, Before max: 16. After min: 18. Peak Kp=7o
1988/04/03 Ap= 48, Before max: 15. After min: 19. Peak Kp=8o
1988/04/04 Ap= 78, Before max: 15. After min: 19. Peak Kp=7+
1988/05/06 Ap=106, Before max: 14. After min: 20. Peak Kp=7+
1988/10/10 Ap= 85, Before max: 09. After min: 25. Peak Kp=8-
1989/01/20 Ap= 45, Before max: 06. After min: 28. Peak Kp=7-
1989/03/13 Ap=246, Before max: 04. After min: 30. Peak Kp=9o
1989/03/14 Ap=158, Before max: 04. After min: 30. Peak Kp=9o
1989/03/15 Ap= 49, Before max: 04. After min: 30. Peak Kp=7-
1989/03/16 Ap= 50, Before max: 04. After min: 30. Peak Kp=7-
1989/03/19 Ap= 55, Before max: 04. After min: 30. Peak Kp=7-
1989/03/29 Ap= 71, Before max: 04. After min: 30. Peak Kp=7o
1989/03/30 Ap= 47, Before max: 04. After min: 30. Peak Kp=7-
1989/04/26 Ap= 76, Before max: 03. After min: 31. Peak Kp=7-
1989/05/05 Ap= 44, Before max: 02. After min: 32. Peak Kp=7-
1989/05/23 Ap= 47, Before max: 02. After min: 32. Peak Kp=7+
1989/06/10 Ap= 78, Before max: 01. After min: 33. Peak Kp=7o
1989/08/14 Ap= 55, After max: 01. Before min: 81. Peak Kp=7-
1989/08/15 Ap= 77, After max: 01. Before min: 81. Peak Kp=7-
1989/08/28 Ap= 22, After max: 01. Before min: 81. Peak Kp=7-
1989/08/29 Ap= 58, After max: 01. Before min: 81. Peak Kp=7+
1989/09/18 Ap= 52, After max: 02. Before min: 80. Peak Kp=8-
1989/09/19 Ap= 70, After max: 02. Before min: 80. Peak Kp=8o
1989/09/26 Ap= 54, After max: 02. Before min: 80. Peak Kp=7o
1989/10/20 Ap=112, After max: 03. Before min: 79. Peak Kp=8+
1989/10/21 Ap=146, After max: 03. Before min: 79. Peak Kp=8+
1989/11/17 Ap=109, After max: 04. Before min: 78. Peak Kp=8o
1989/11/18 Ap= 45, After max: 04. Before min: 78. Peak Kp=7o
1989/12/29 Ap= 50, After max: 05. Before min: 77. Peak Kp=7-
1990/02/15 Ap= 36, After max: 07. Before min: 75. Peak Kp=7-
1990/02/16 Ap= 50, After max: 07. Before min: 75. Peak Kp=7-
1990/03/12 Ap= 42, After max: 08. Before min: 74. Peak Kp=7+
1990/03/20 Ap= 30, After max: 08. Before min: 74. Peak Kp=7-
1990/03/21 Ap= 76, After max: 08. Before min: 74. Peak Kp=7+
1990/03/30 Ap= 69, After max: 08. Before min: 74. Peak Kp=8o
1990/04/10 Ap=124, After max: 09. Before min: 73. Peak Kp=8o
1990/04/11 Ap= 64, After max: 09. Before min: 73. Peak Kp=7-
1990/04/12 Ap= 99, After max: 09. Before min: 73. Peak Kp=8-
1990/05/26 Ap= 47, After max: 10. Before min: 72. Peak Kp=7+
1990/05/27 Ap= 45, After max: 10. Before min: 72. Peak Kp=7-
1990/06/12 Ap= 89, After max: 11. Before min: 71. Peak Kp=8+
1990/06/13 Ap= 70, After max: 11. Before min: 71. Peak Kp=8-
1990/06/14 Ap= 79, After max: 11. Before min: 71. Peak Kp=8-
1990/07/28 Ap=102, After max: 12. Before min: 70. Peak Kp=8-
1990/07/29 Ap= 75, After max: 12. Before min: 70. Peak Kp=7o
1990/08/23 Ap= 77, After max: 13. Before min: 69. Peak Kp=7o
1990/08/26 Ap= 63, After max: 13. Before min: 69. Peak Kp=7-
1990/09/01 Ap= 26, After max: 14. Before min: 68. Peak Kp=7-
1990/11/27 Ap= 45, After max: 16. Before min: 66. Peak Kp=7-
1991/03/21 Ap= 26, After max: 20. Before min: 62. Peak Kp=7-
1991/03/24 Ap=161, After max: 20. Before min: 62. Peak Kp=9-
1991/03/25 Ap=130, After max: 20. Before min: 62. Peak Kp=9-
1991/03/26 Ap=114, After max: 20. Before min: 62. Peak Kp=8o
1991/04/04 Ap= 50, After max: 21. Before min: 61. Peak Kp=7-
1991/04/29 Ap= 59, After max: 21. Before min: 61. Peak Kp=7-
1991/05/31 Ap= 52, After max: 22. Before min: 60. Peak Kp=7-
1991/06/01 Ap= 74, After max: 23. Before min: 59. Peak Kp=7+
1991/06/02 Ap= 60, After max: 23. Before min: 59. Peak Kp=7o
1991/06/04 Ap= 58, After max: 23. Before min: 59. Peak Kp=7+
1991/06/05 Ap=196, After max: 23. Before min: 59. Peak Kp=9-
1991/06/06 Ap= 49, After max: 23. Before min: 59. Peak Kp=7-
1991/06/09 Ap= 58, After max: 23. Before min: 59. Peak Kp=7-
1991/06/10 Ap=119, After max: 23. Before min: 59. Peak Kp=8-
1991/06/11 Ap= 88, After max: 23. Before min: 59. Peak Kp=7+
1991/06/12 Ap= 66, After max: 23. Before min: 59. Peak Kp=7-
1991/06/13 Ap=120, After max: 23. Before min: 59. Peak Kp=8-
1991/06/17 Ap= 67, After max: 23. Before min: 59. Peak Kp=7+
1991/07/08 Ap= 68, After max: 24. Before min: 58. Peak Kp=8o
1991/07/09 Ap=117, After max: 24. Before min: 58. Peak Kp=8o
1991/07/13 Ap=134, After max: 24. Before min: 58. Peak Kp=9-
1991/07/14 Ap= 75, After max: 24. Before min: 58. Peak Kp=7-
1991/08/12 Ap= 64, After max: 25. Before min: 57. Peak Kp=7+
1991/08/19 Ap= 74, After max: 25. Before min: 57. Peak Kp=8-
1991/08/20 Ap= 67, After max: 25. Before min: 57. Peak Kp=8-
1991/08/22 Ap= 48, After max: 25. Before min: 57. Peak Kp=7o
1991/08/27 Ap= 37, After max: 25. Before min: 57. Peak Kp=7-
1991/09/09 Ap= 49, After max: 26. Before min: 56. Peak Kp=7o
1991/10/01 Ap= 54, After max: 27. Before min: 55. Peak Kp=7+
1991/10/08 Ap= 41, After max: 27. Before min: 55. Peak Kp=7-
1991/10/28 Ap= 98, After max: 27. Before min: 55. Peak Kp=8+
1991/10/29 Ap=128, After max: 27. Before min: 55. Peak Kp=8+
1991/10/31 Ap= 59, After max: 27. Before min: 55. Peak Kp=7o
1991/11/01 Ap=109, After max: 28. Before min: 54. Peak Kp=8+
1991/11/02 Ap= 41, After max: 28. Before min: 54. Peak Kp=7o
1991/11/08 Ap= 98, After max: 28. Before min: 54. Peak Kp=9-
1991/11/09 Ap=119, After max: 28. Before min: 54. Peak Kp=8+
1991/11/21 Ap= 65, After max: 28. Before min: 54. Peak Kp=7-
1992/02/03 Ap= 92, After max: 31. Before min: 51. Peak Kp=8-
1992/02/08 Ap= 49, After max: 31. Before min: 51. Peak Kp=7o
1992/02/09 Ap= 79, After max: 31. Before min: 51. Peak Kp=7o
1992/02/20 Ap= 63, After max: 31. Before min: 51. Peak Kp=7o
1992/02/21 Ap= 69, After max: 31. Before min: 51. Peak Kp=7+
1992/02/25 Ap= 55, After max: 31. Before min: 51. Peak Kp=7-
1992/02/26 Ap= 65, After max: 31. Before min: 51. Peak Kp=8o
1992/02/29 Ap= 44, After max: 31. Before min: 51. Peak Kp=7-
1992/05/09 Ap= 39, After max: 34. Before min: 48. Peak Kp=7-
1992/05/10 Ap=179, After max: 34. Before min: 48. Peak Kp=9-
1992/05/11 Ap= 70, After max: 34. Before min: 48. Peak Kp=7+
1992/06/30 Ap= 37, After max: 35. Before min: 47. Peak Kp=7-
1992/08/22 Ap= 39, After max: 37. Before min: 45. Peak Kp=7-
1992/08/23 Ap= 73, After max: 37. Before min: 45. Peak Kp=8o
1992/09/09 Ap= 84, After max: 38. Before min: 44. Peak Kp=7+
1992/09/10 Ap= 88, After max: 38. Before min: 44. Peak Kp=7o
1992/09/17 Ap= 93, After max: 38. Before min: 44. Peak Kp=7+
1992/09/29 Ap= 62, After max: 38. Before min: 44. Peak Kp=7-
1993/02/17 Ap= 36, After max: 43. Before min: 39. Peak Kp=7-
1993/03/09 Ap= 64, After max: 44. Before min: 38. Peak Kp=7-
1993/03/11 Ap= 50, After max: 44. Before min: 38. Peak Kp=7-
1993/03/24 Ap= 58, After max: 44. Before min: 38. Peak Kp=7+
1993/04/04 Ap= 58, After max: 45. Before min: 37. Peak Kp=8-
1993/04/05 Ap= 87, After max: 45. Before min: 37. Peak Kp=7+
1993/06/10 Ap= 28, After max: 47. Before min: 35. Peak Kp=7o
1993/08/16 Ap= 78, After max: 49. Before min: 33. Peak Kp=7o
1993/08/17 Ap= 27, After max: 49. Before min: 33. Peak Kp=7-
1993/09/13 Ap= 91, After max: 50. Before min: 32. Peak Kp=8-
1993/10/09 Ap= 48, After max: 51. Before min: 31. Peak Kp=7-
1993/11/04 Ap= 77, After max: 52. Before min: 30. Peak Kp=7-
1993/12/02 Ap= 48, After max: 53. Before min: 29. Peak Kp=7-
1994/02/21 Ap= 95, After max: 55. Before min: 27. Peak Kp=8-
1994/02/22 Ap= 63, After max: 55. Before min: 27. Peak Kp=8-
1994/03/07 Ap= 65, After max: 56. Before min: 26. Peak Kp=7o
1994/04/02 Ap= 53, After max: 57. Before min: 25. Peak Kp=7o
1994/04/03 Ap= 92, After max: 57. Before min: 25. Peak Kp=7+
1994/04/04 Ap= 59, After max: 57. Before min: 25. Peak Kp=7o
1994/04/17 Ap=100, After max: 57. Before min: 25. Peak Kp=8+
1994/05/01 Ap= 50, After max: 58. Before min: 24. Peak Kp=7o
1994/05/02 Ap= 49, After max: 58. Before min: 24. Peak Kp=7-
1994/05/28 Ap= 44, After max: 58. Before min: 24. Peak Kp=7o
1994/10/03 Ap= 88, After max: 63. Before min: 19. Peak Kp=7o
1994/10/29 Ap= 53, After max: 63. Before min: 19. Peak Kp=7o
1994/10/30 Ap= 57, After max: 63. Before min: 19. Peak Kp=7-
1995/04/07 Ap=100, After max: 69. Before min: 13. Peak Kp=8o
1995/09/27 Ap= 41, After max: 74. Before min: 08. Peak Kp=7o
1995/10/04 Ap= 57, After max: 75. Before min: 07. Peak Kp=7-
1995/10/18 Ap= 32, After max: 75. Before min: 07. Peak Kp=7-
1995/10/19 Ap= 31, After max: 75. Before min: 07. Peak Kp=7-
1996/04/14 Ap= 32, After max: 81. Before min: 01. Peak Kp=7o
1996/10/22 Ap= 38, Before max: 42. After min: 05. Peak Kp=7-
1996/10/23 Ap= 37, Before max: 42. After min: 05. Peak Kp=7+
1997/02/27 Ap= 30, Before max: 38. After min: 09. Peak Kp=7o
1997/04/11 Ap= 37, Before max: 36. After min: 11. Peak Kp=7-
1997/05/15 Ap= 56, Before max: 35. After min: 12. Peak Kp=7-
1997/10/01 Ap= 46, Before max: 30. After min: 17. Peak Kp=7o
1997/11/07 Ap= 44, Before max: 29. After min: 18. Peak Kp=7o
1997/11/23 Ap= 59, Before max: 29. After min: 18. Peak Kp=7+
1998/02/18 Ap= 36, Before max: 26. After min: 21. Peak Kp=7-
1998/03/10 Ap= 53, Before max: 25. After min: 22. Peak Kp=7+
1998/05/02 Ap= 63, Before max: 23. After min: 24. Peak Kp=7-
1998/05/04 Ap=101, Before max: 23. After min: 24. Peak Kp=9-
1998/05/05 Ap= 42, Before max: 23. After min: 24. Peak Kp=7-
1998/05/29 Ap= 26, Before max: 23. After min: 24. Peak Kp=7-
1998/08/06 Ap= 64, Before max: 20. After min: 27. Peak Kp=7+
1998/08/27 Ap=144, Before max: 20. After min: 27. Peak Kp=8o
1998/09/25 Ap=117, Before max: 19. After min: 28. Peak Kp=8+
1998/10/19 Ap= 62, Before max: 18. After min: 29. Peak Kp=7-
1998/11/08 Ap= 66, Before max: 17. After min: 30. Peak Kp=8-
1998/11/09 Ap= 75, Before max: 17. After min: 30. Peak Kp=7-
1999/01/13 Ap= 40, Before max: 15. After min: 32. Peak Kp=7o
1999/02/18 Ap= 80, Before max: 14. After min: 33. Peak Kp=7-
1999/04/17 Ap= 47, Before max: 12. After min: 35. Peak Kp=7+
1999/07/30 Ap= 53, Before max: 09. After min: 38. Peak Kp=8-
1999/09/22 Ap= 50, Before max: 07. After min: 40. Peak Kp=8o
1999/10/22 Ap= 91, Before max: 06. After min: 41. Peak Kp=8o
2000/02/12 Ap= 60, Before max: 02. After min: 45. Peak Kp=7-
2000/04/06 Ap= 82, After max: 00. Before min: NA. Peak Kp=8+
2000/04/07 Ap= 74, After max: 00. Before min: NA. Peak Kp=9-
2000/05/23 Ap= 29, After max: 01. Before min: NA. Peak Kp=7-
2000/05/24 Ap= 93, After max: 01. Before min: NA. Peak Kp=8o
2000/06/08 Ap= 64, After max: 02. Before min: NA. Peak Kp=7o
2000/07/13 Ap= 42, After max: 03. Before min: NA. Peak Kp=7o
2000/07/14 Ap= 51, After max: 03. Before min: NA. Peak Kp=7+
2000/07/15 Ap=164, After max: 03. Before min: NA. Peak Kp=9o
2000/07/16 Ap= 50, After max: 03. Before min: NA. Peak Kp=8-
2000/08/12 Ap=123, After max: 04. Before min: NA. Peak Kp=8-
2000/09/17 Ap= 56, After max: 05. Before min: NA. Peak Kp=8+
2000/09/18 Ap= 70, After max: 05. Before min: NA. Peak Kp=8-
2000/10/04 Ap= 63, After max: 06. Before min: NA. Peak Kp=7+
2000/10/05 Ap=116, After max: 06. Before min: NA. Peak Kp=8-
2000/10/13 Ap= 36, After max: 06. Before min: NA. Peak Kp=7-
2000/11/06 Ap= 55, After max: 07. Before min: NA. Peak Kp=7o
2000/11/07 Ap= 46, After max: 07. Before min: NA. Peak Kp=7-
2000/11/29 Ap= 56, After max: 07. Before min: NA. Peak Kp=7-
2001/03/19 Ap= 37, After max: 11. Before min: NA. Peak Kp=7-
2001/03/20 Ap= 74, After max: 11. Before min: NA. Peak Kp=7+
2001/03/31 Ap=192, After max: 11. Before min: NA. Peak Kp=9-
2001/04/08 Ap= 63, After max: 12. Before min: NA. Peak Kp=7o
2001/04/11 Ap= 85, After max: 12. Before min: NA. Peak Kp=8+

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2001/04/12 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/04/13 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/04/18 Ap= 50,  After max: 12. Before min: NA. Peak Kp=7+
2001/08/17 Ap= 42,  After max: 16. Before min: NA. Peak Kp=7o
2001/09/25 Ap= 33,  After max: 17. Before min: NA. Peak Kp=7+
2001/10/02 Ap= 52,  After max: 18. Before min: NA. Peak Kp=7-
2001/10/03 Ap= 69,  After max: 18. Before min: NA. Peak Kp=7o
2001/10/21 Ap= 57,  After max: 18. Before min: NA. Peak Kp=8-
2001/10/22 Ap= 96,  After max: 18. Before min: NA. Peak Kp=7+
2001/10/28 Ap= 44,  After max: 18. Before min: NA. Peak Kp=7-
2001/11/06 Ap=142,  After max: 19. Before min: NA. Peak Kp=9-
2001/11/24 Ap=104,  After max: 19. Before min: NA. Peak Kp=8+
2002/04/17 Ap= 62,  After max: 24. Before min: NA. Peak Kp=7+
2002/04/18 Ap= 63,  After max: 24. Before min: NA. Peak Kp=7o
2002/04/19 Ap= 62,  After max: 24. Before min: NA. Peak Kp=7-
2002/04/20 Ap= 70,  After max: 24. Before min: NA. Peak Kp=7+
2002/05/11 Ap= 49,  After max: 25. Before min: NA. Peak Kp=7-
2002/05/23 Ap= 78,  After max: 25. Before min: NA. Peak Kp=8+
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