Murder or Magnetism

New Mexico Adventures in Supercomputing Challenge

Final Report

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Team 051

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Executive Summary

The problem that our team has studied deals with solar flares and crime statistics. What we are investigating is the premise that crime statistics in the United States as a whole, as well as individual states, rise with an increase in solar flare activity, based on the fact that magnetic fields have been proven to be capable of affecting human behavior. We input solar flare data into an Excel program, and created charts and graphs symbolizing this information, which we later transferred into Mat-Lab. The crime data was then put into the Mat-Lab program, and graphs were produced representing these figures. We then compared the graphs to one another, and conducted a statistical analysis of the information found. Next, we derived a conclusion to whether or not a correlation exists between crime rises in selected locations and solar flares.

Our Project

Introduction- Everybody is familiar with the theory that a full moon causes people do things that are considered to be out of the ordinary. In fact, there are numerous stories that deal with these types of old wives tales. Another associated belief is that magnetic fields have a direct impact on human behavior. This is from the understood belief that animals, and bacteria are directly affected by magnetic lines of force. Our team was intrigued and decided to create our own problem of this kind with statistical evidence to support it.

Hypothesis- Is there a correlation between solar flare activity, and an increase in abhorrent social behavior in America nationwide, and/or it's individual states?

Methods Used- Our team used a variety of methods when it came to compiling the data for our project. Originally, the goal of our project was to calculate a percent change in the Earth's magnetic field based on solar flares impacting it. These flares would have caused a magnetic flux to occur at differing latitudes on the Earth's surface. We were then going to try to correlate the percent change in the Earth's magnetic field to a change in criminal statistics in cities we had selected at different latitudes. It turned out that finding an equation for the Earth's magnetic field was extremely difficult. On top of this, monthly

crime statistics for individual cities were virtually unattainable. What monthly statistics we could find were too vague to be worthy of a supercomputing project. Eventually, we revised the details of our project. We decided to use yearly crime statistics for the United States as a whole, and for each of the individual states. We also used yearly data for the solar flares affecting the Earth. Yearly data is less accurate than monthly, but we would still be able to discover a correlation if one existed.

We input the solar flare data into Excel, and created several graphs, which represented the figures. The crime data was put into Mat-Lab, and charts and graphs were created for each state that we selected, as well as for the United States as one entity. In order for all the information to be more precise and accurate, we transferred the Excel information into Mat-Lab.

Results- After thorough analysis of the data, our team finally came up with results for our project. We found the following ratios of solar flare activity compared to state crime statistics by using max-normalized Mat-Lab functions. After a cursory analysis of the ratios, it can be seen that Alaska has the closest to a one to one correlation. We suspect that this is due to the effects of the Earth's magnetic field at the poles. The other states showed a similar variance, but a minute difference between the three.

State	Max-normalized Statistic	Found Ratio
Alaska	2.1%	1:1.62
Hawaii	2.8%	1:2.15
New Mexico	.6%	2.17:1
Washington	.4%	3.25:1

Conclusions- Averaging the ratios between the solar activity from the chosen years, and the state crime figures produces a relation of 1:1.4. This is a close enough correlation to warrant further study into the possibility that there is a direct *causation* between solar flare activity and a rise in criminal behavior.

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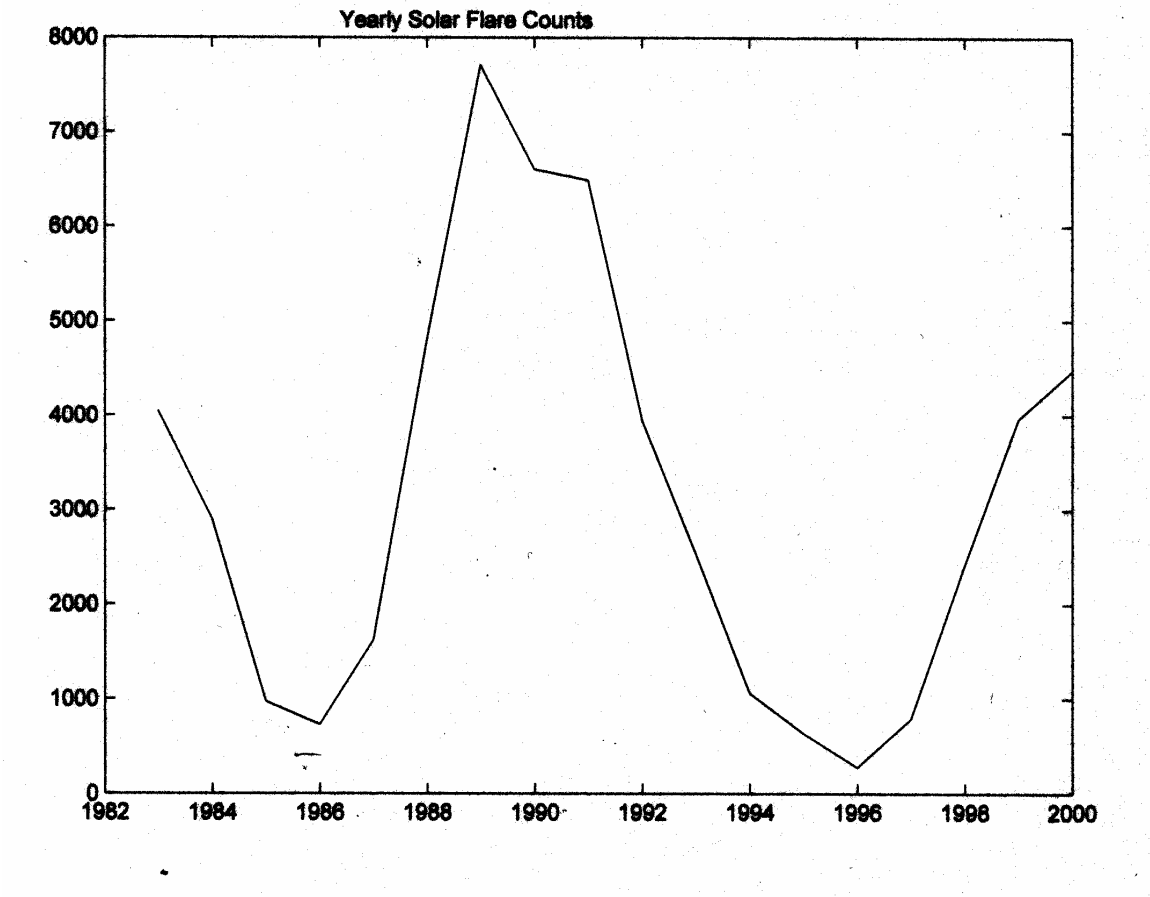
Thank you to Mr. Roger Byrd, Mrs. Ruthie Hefner, Mrs. Helen Coffey, Mr. Mike Fancher, Nikolai Tsyganenko, David Sibeck, Donald Herzog, Richard Wolf, Mr. Miyoko Wolf, Mr. Morris Pongratz, Mr. Reiner Friedel, Mr. Peter Gary, Mr. Stephen Blair, and Mr. William Thompson for keeping in touch with us via e-mail, and helping our project along a little bit at a time.

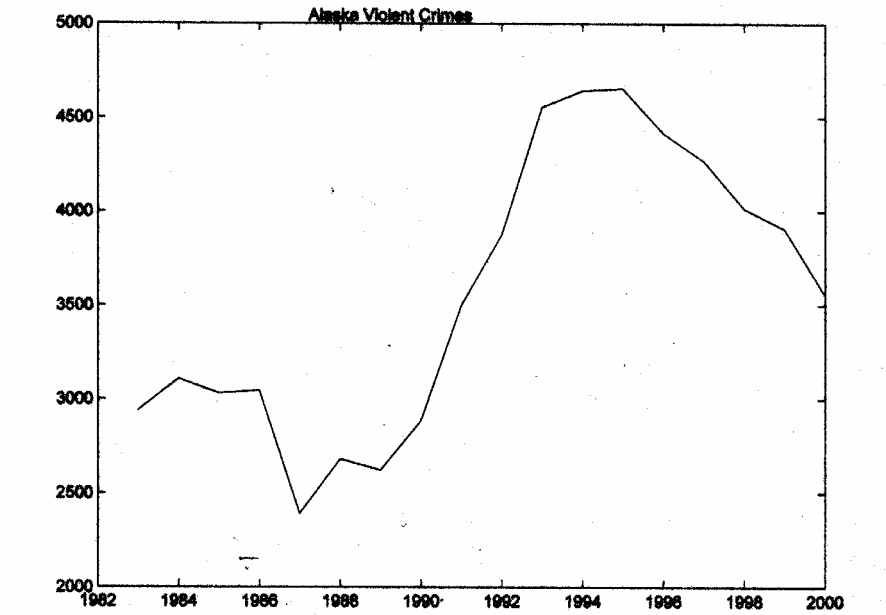
Thank you to the 2004 Adventures in Supercomputing Challenge for enabling our team to have this experience.

Appendix A: Solar Flare Chart

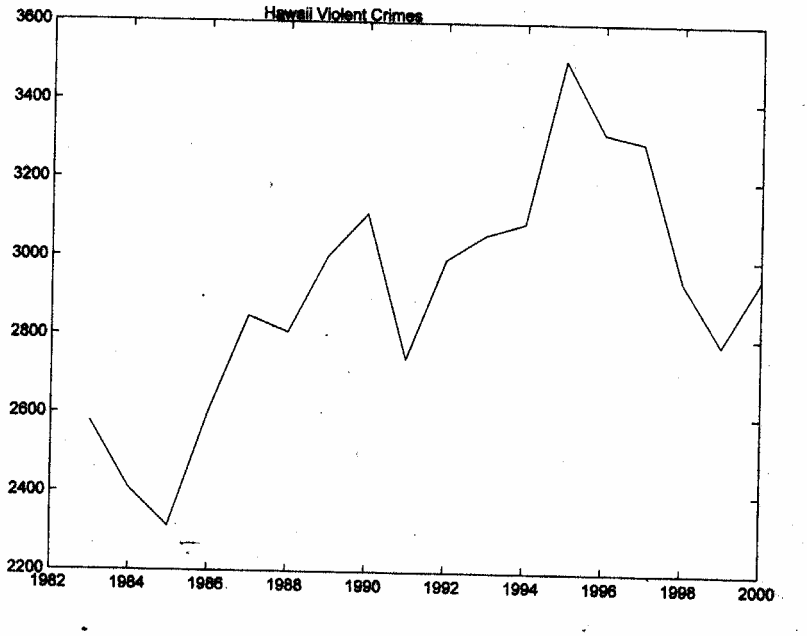


This graph represents the number of solar flares detected yearly from the years 1983-2000.

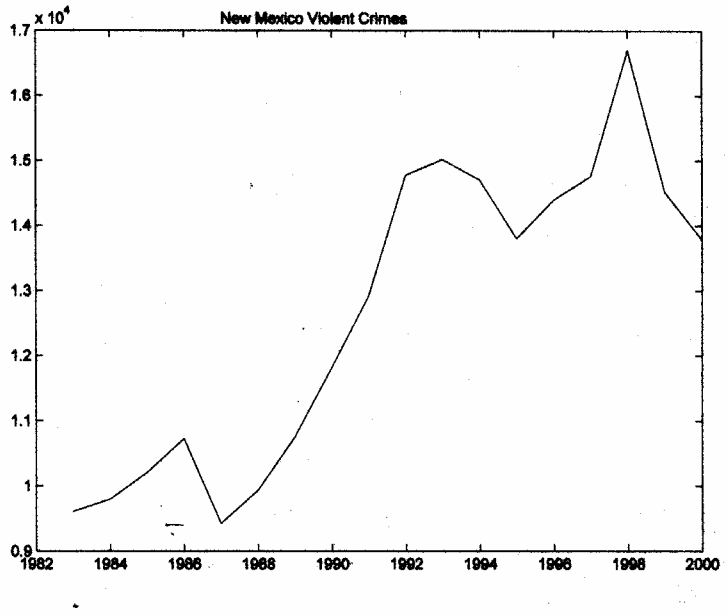
Appendix B: Crime Statistics



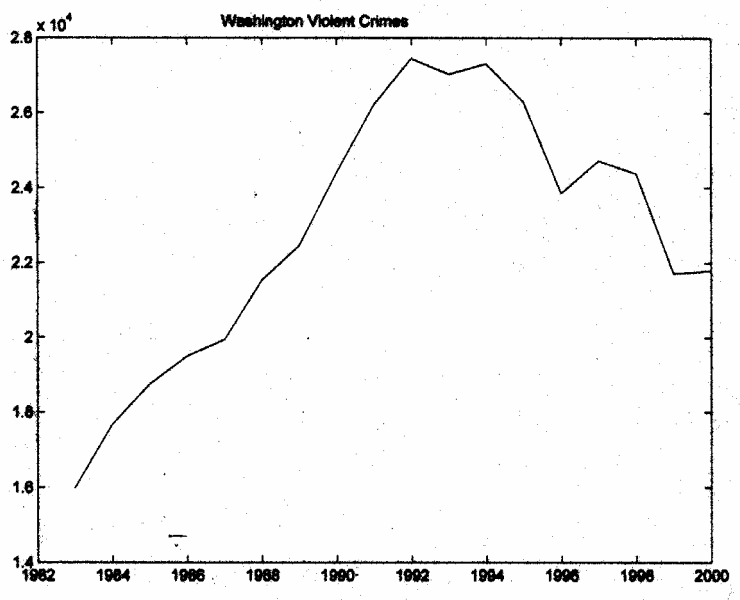
This graph represents Alaska's crime statistics for the years 1983-2000.



This graph represents Hawaii's crime statistics for the years 1983-2000.

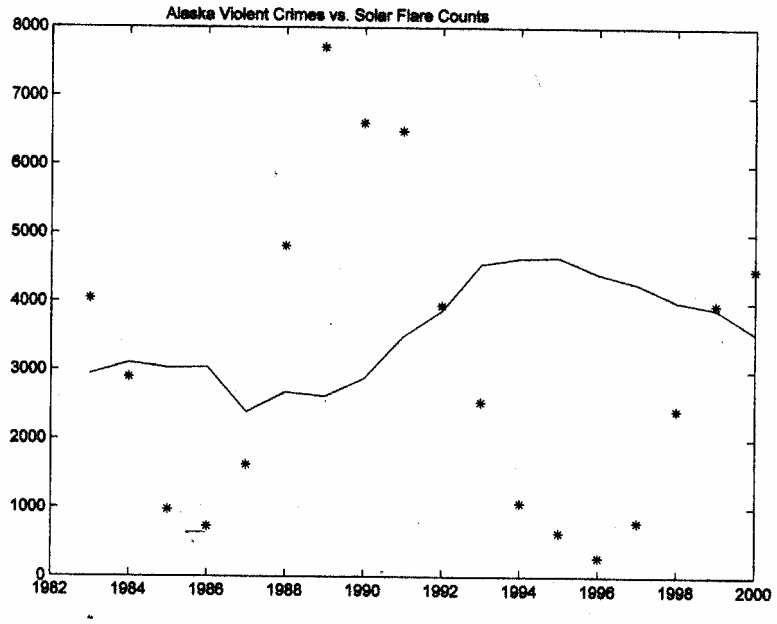


This graph represents New Mexico's crime statistics for the years 1983-2000.

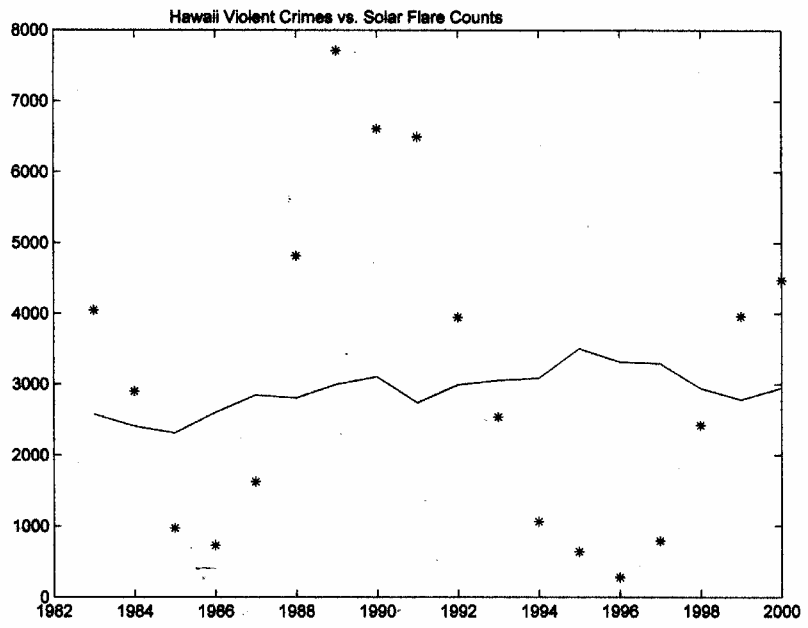


This graph represents Washington's crime statistics for the years 1983-2000.

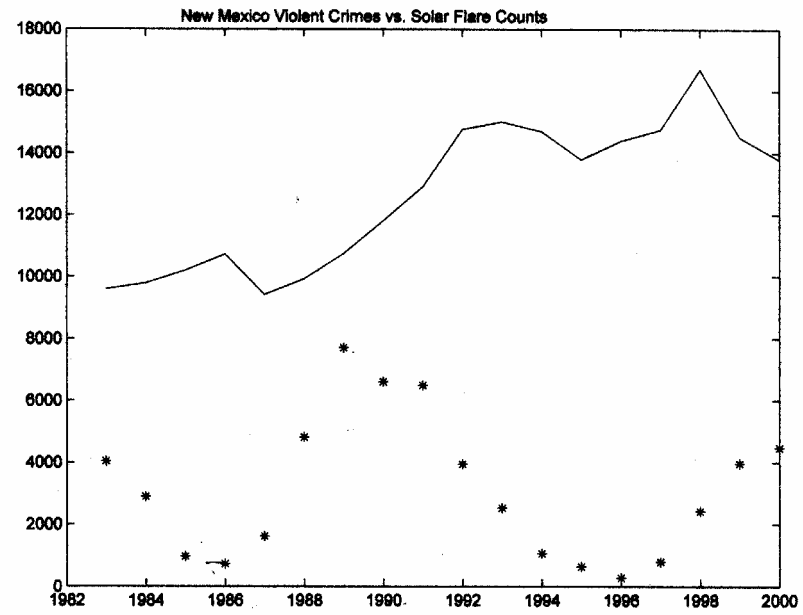
Appendix C: Correlations



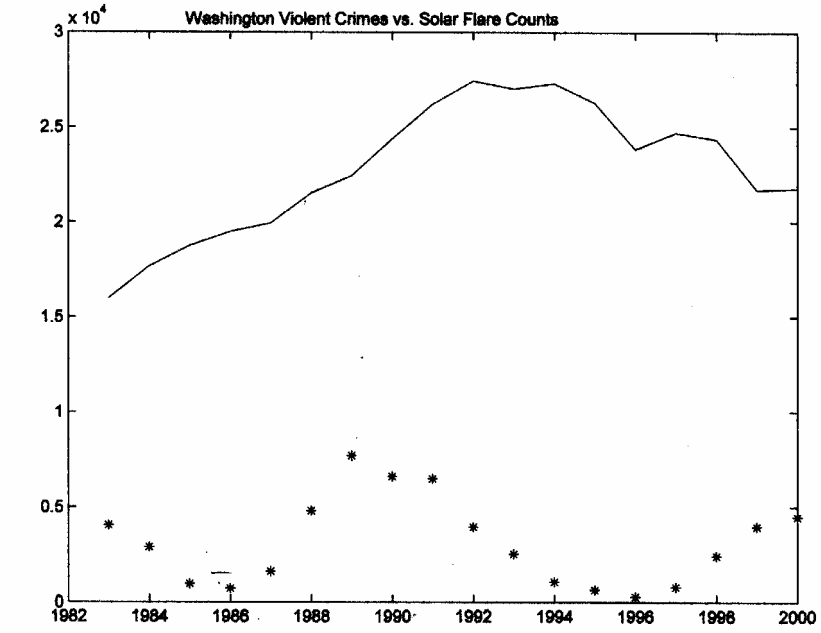
This graph correlates Alaska's yearly crime statistics with yearly solar flares.



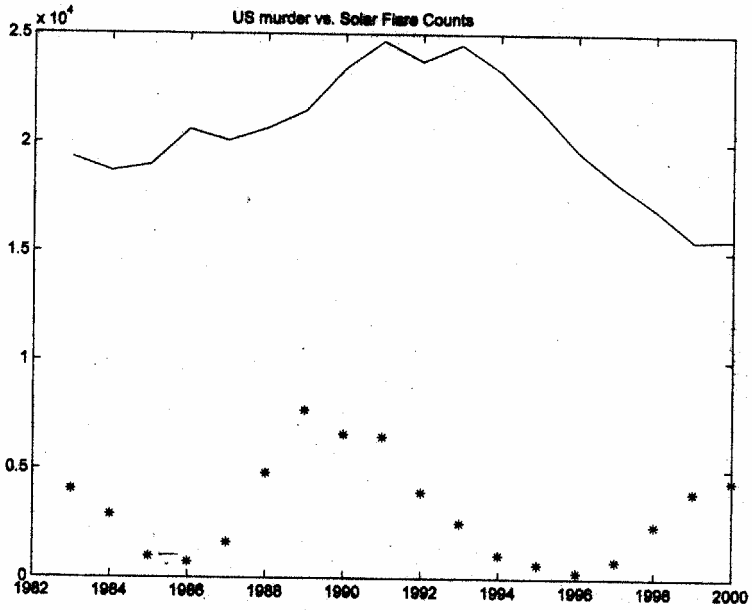
This graph correlates Hawaii's yearly crime statistics with yearly solar flares.



This graph correlates New Mexico's yearly crime statistics with yearly solar flares.



This graph correlates Washington's yearly crime statistics with yearly solar flares.



This graph shows the correlation between yearly U.S. statistics and yearly solar flares.