Investigating a Relationship between Coronal Mass Ejections and the Solar Sun Spot Cycle

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The aim of this project was to explore the relationship between Coronal Mass Ejections (CME's) and the Solar Sun Spot Cycle. CME's and the Solar Sunspot Cycle are both caused by intense activity in the sun's magnetic field and therefore a strong correlation between the two can be expected. Understanding this relationship will assist with predicting future Solar CME activity which is important because of the potential damage CME's can cause to modern day technology on Earth and in Space. The method used included gathering historical data on the past Solar Sunspot cycles and CME's from 1996 to date. The Correlation between the two variables was calculated and a weak positive correlation (r=0.505) was found. This was disappointing as a weak correlation cannot be used to make future predictions. The analysis was extended to consider the 'fit' during the "onset" and "decay" periods of the cycle. (A student's t-test revealed a p value of 0.0059 which showed that there is a significant difference between these times.) Results revealed a strong positive correlation of 0.98 and 0.99 for the onset times and a moderate positive correlation during the decay times. It would be interesting to extend this project to consider the strength of the CME's and see if there is a stronger correlation between the cycle and the strength of the CME's because it is actually only the strong "halo" CME's that can potentially have an impact on Earth.

Awards Won: