

# The study of factors affecting CME

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## Abstract

This project is the study on the relationship between the intensity of Coronal Mass Ejection (CME) and various factors such as the speed of solar wind, the number of sunspots, the size of sunspots and the Interplanetary Magnetic Field (IMF) in 2014. The author found that when all the factors increase, the intensity of Coronal Mass Ejection (CME) will also increase. Then the author found the simple linear regression that shows the relationship between CME and all the factors. The author also use this linear regression to predict the intensity of CME in another year.

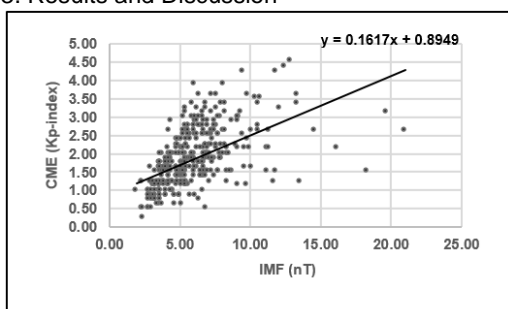
## 1. Introduction

Coronal Mass Ejection (CME) is a significant release of plasma along with magnetic field from the solar corona. They often follow solar flares and are normally present during a solar prominence eruption. The plasma is released into the solar wind. CMEs are often associated with other forms of solar activity and most of them originate from active regions on the solar surface, such as groupings of sunspots associated with frequent flares.

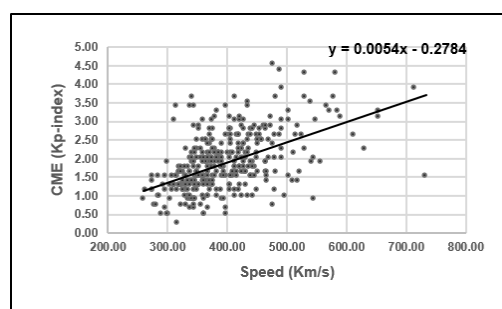
## 2. Methods

- Collect data on Kp-index, speed of solar wind, number of sunspots, size of sunspots and IMF.
- Create a graph showing the Kp-index value with various factors that relate to time.
- Correlate each quantity by analyzing the correlation coefficient.
- Calculate the simple linear regression to show the relationship model of each data set.

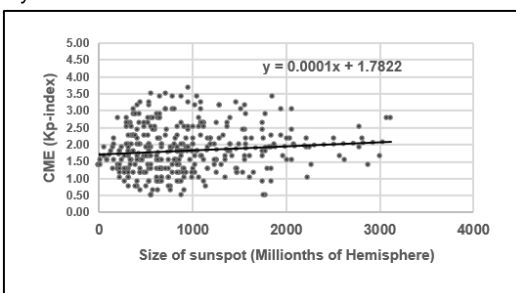
## 3. Results and Discussion



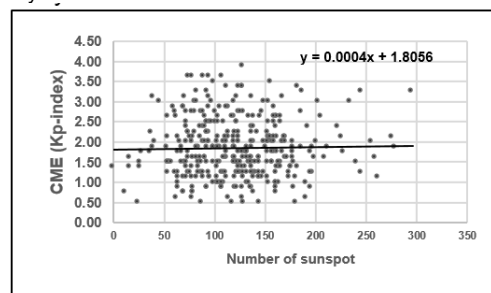
Graph 1 :The graph shows the Linear Regression between Kp-index and IMF in 2014 is  $y = 0.1617x + 0.8949$ .



Graph 2 :The graph shows the Linear Regression between Kp-index and speed of solar wind in 2014 is  $y = 0.0054x - 0.2784$ .



Graph 3 :The graph shows the Linear Regression between Kp-index delaying 4 days and Size of sunspots in 2014 is  $y = 0.0001x + 1.7822$ .



Graph 4 :The graph shows the Linear Regression between Kp-index delaying 4 days and Number of sunspots in 2014 is  $y = 0.0003x + 1.8393$ .

## 4. Conclusions

The intensity of CME (Kp-index) and various factors in 2014 have been related in the form of direct variation. For the correlation model, the author calculated the simple linear regression between the Kp-index and 4 various factors. These are as follows:

- 1) The Kp-index and the speed of solar wind :  $y = 0.0054x - 0.2784$
- 2) The Kp-index and IMF :  $y = 0.1617x + 0.8949$
- 3) The Kp-index and the number of sunspots :  $y = 0.0003x + 1.8393$
- 4) The Kp-index and the size of sunspots is  $y = 0.001x + 1.7822$

## 5. Acknowledgment

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## 6. Reference

Matipon Tangmatitap, (2013). The Handbook of Astronomic Workshop, Chiang Mai: Educational Astronomic Information Service Center.