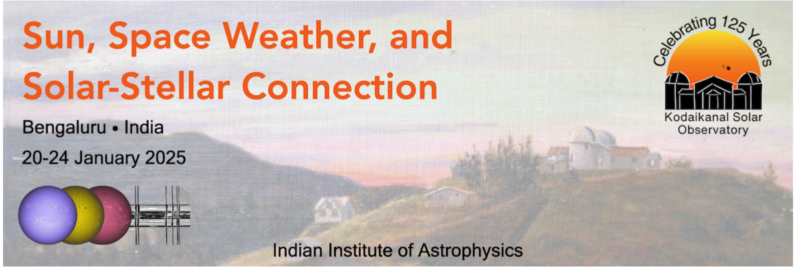


Contribution ID: **19** Type: **Poster**

# Coronal Mass Ejections: Propagation Time Delay due to Magnetospheric Interactions

For my MSc thesis, I focused on investigating the timescales of interactions between Earth's magnetosphere and solar transients, with an emphasis on **Coronal mass ejections (CMEs)** as they traveled through space and passed Earth. CMEs, which are massive expulsions of plasma and magnetic fields from the Sun, can have significant effects on Earth's magnetic environment. My goal was to better understand the timing of these interactions, which is crucial for predicting space weather events and assessing their potential impacts on satellite operations, communication systems, and power grids.

In the course of my research, I analyzed data from a network of spacecraft positioned at various Lagrange points, including L1 (the point between the Earth and the Sun), as well as satellites operating within Earth's magnetosphere. These Lagrange points provided stable observation platforms for capturing solar and geomagnetic activity. By incorporating data from multiple sources, I was able to create a more complete picture of how CMEs propagated through space and interacted with Earth's magnetic field.

A key part of my thesis involved monitoring the magnetic field components and calculating the total magnetic field strength. This method helped standardize the magnetic field measurements across different instruments, allowing for reliable comparisons. The approach minimized inconsistencies that could arise due to varying spacecraft positions and angles.

To determine the true propagation times of CMEs, I cross-referenced the arrival times recorded by instruments at Lagrange points with those observed by satellites within Earth's magnetosphere. This enabled me to accurately measure the timing of CME interactions with Earth's magnetic field, shedding light on how long it took for solar disturbances to travel from Lagrange points to Earth. The timing data I gathered offered valuable insights into the dynamics of CME propagation.

By focusing on the timescales of these interactions, my thesis contributed to a deeper understanding of the relationship between solar phenomena and Earth's magnetosphere. The results from my research helped refine space weather prediction models, providing more accurate tools for forecasting geomagnetic storms and mitigating the risks posed by solar activity to critical infrastructure. My findings are especially important for improving the resilience of technological systems, such as satellites and power grids, against the effects of space weather.

This project has inspired me to continue working in this field. I plan to further investigate the mechanisms behind CME propagation and their interaction with Earth's magnetosphere, with the goal of enhancing space weather forecasting models and developing strategies to better protect technological infrastructure from solar disturbances.

## Contribution Type

Poster

## Theme

Energetic Phenomena

**Primary author:** SHANBHAG, AJITH (Student (Pursuing Masters))

**Presenter:** SHANBHAG, AJITH (Student (Pursuing Masters))