# Magnetospheric Multiscale Interaction with Bifurcated Current Sheets

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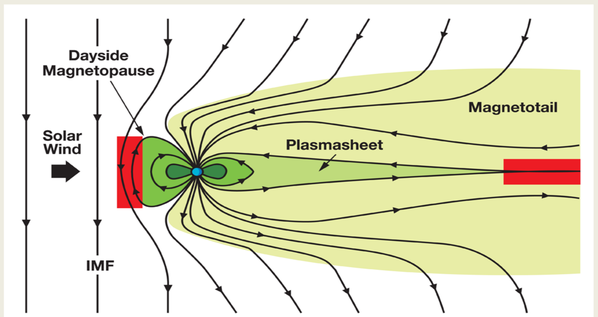
## Introduction

The Magnetospheric Multiscale (MMS) mission was designed to answer questions about the magnetohydrodynamics of magnetic reconnection within the magnetopause. Using the high time resolution data from these four spacecraft, I have attempted to observe Bifurcated Current Sheets (BCS) within the magnetopause.

## Magnetic Reconnection

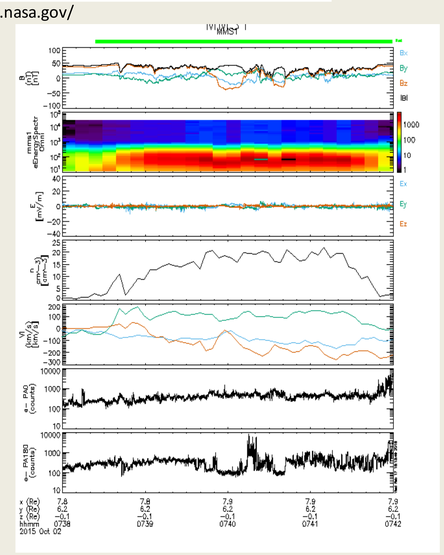
- Phenomena that converts magnetic energy to kinetic and thermal energy
- Occurs within diffusion regions
- Accelerates plasma away from the reconnection site
- Field lines from the southward solar wind connect to those in the northward magnetosphere
- A current sheet forms where the field reverses sign




http://mms.gsfc.nasa.gov/

## SPEDAS

- Space Physics Environment Data Analysis Software
- Capability to plot all 4 spacecraft
- Magnetic Field
- Energy Spectra
- Electric Field
- Spacecraft Potential
- Ion Velocities
- EDI PA 0 and 180's



## Electron Drift Instrument

- Electrons coming in at certain pitch angles
- Use the electron flux to determine location
- Either North of South of reconnection

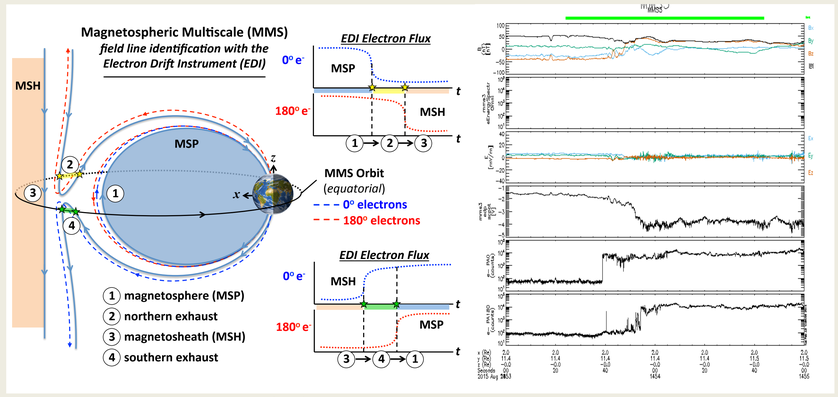



Diagram curtesy of J. Shuster

## Magnetopause Mapping

-Over 60 crossings of the separatrix

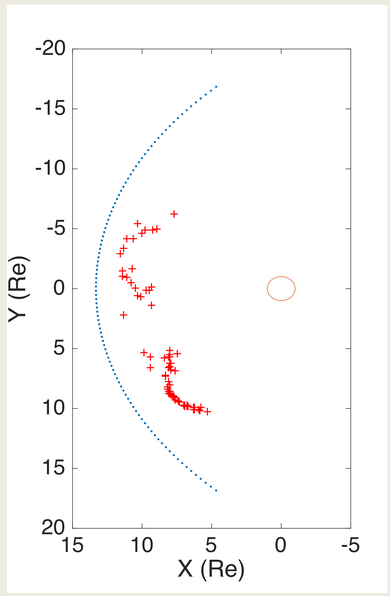
-October 1st through December 25th

-Attempting to compare the crossings with the Shue Model for the magnetopause

$$R = R_o * \left(\frac{2}{1+\cos(\theta)}\right)^{\alpha}$$

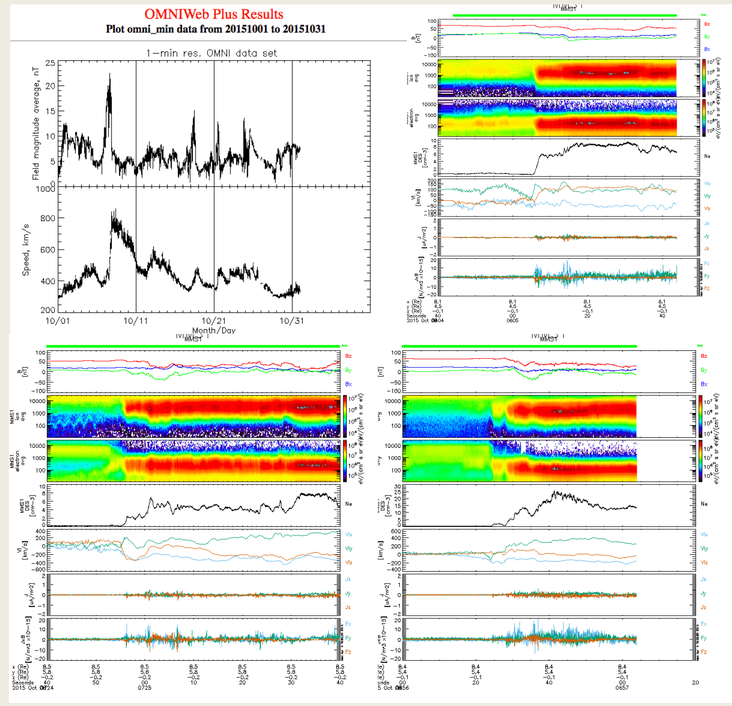
$$R_o = 1.146 + 0.131 * Bz$$

$$\alpha + 0.590 \ - 0.011 * Bz$$




## Bifurcated Current Sheets

- Hasn't been studied with high time resolution until now
- Correlation between high velocity solar wind and BCS
- Step function in Bz
- Anti-correlation between B and V
- Proposed balancing could cause this bifurcation
- All happening on the magnetosphere side




## Future Works

- Combine all 4 space craft data for one event
- Analyze the EDI data for BCS events
- Calculate Magnetic Shear for these events
- Continue to look for the cause of BCS