

The MMS Science Data Center: Operations, Capabilities, and Data Availability

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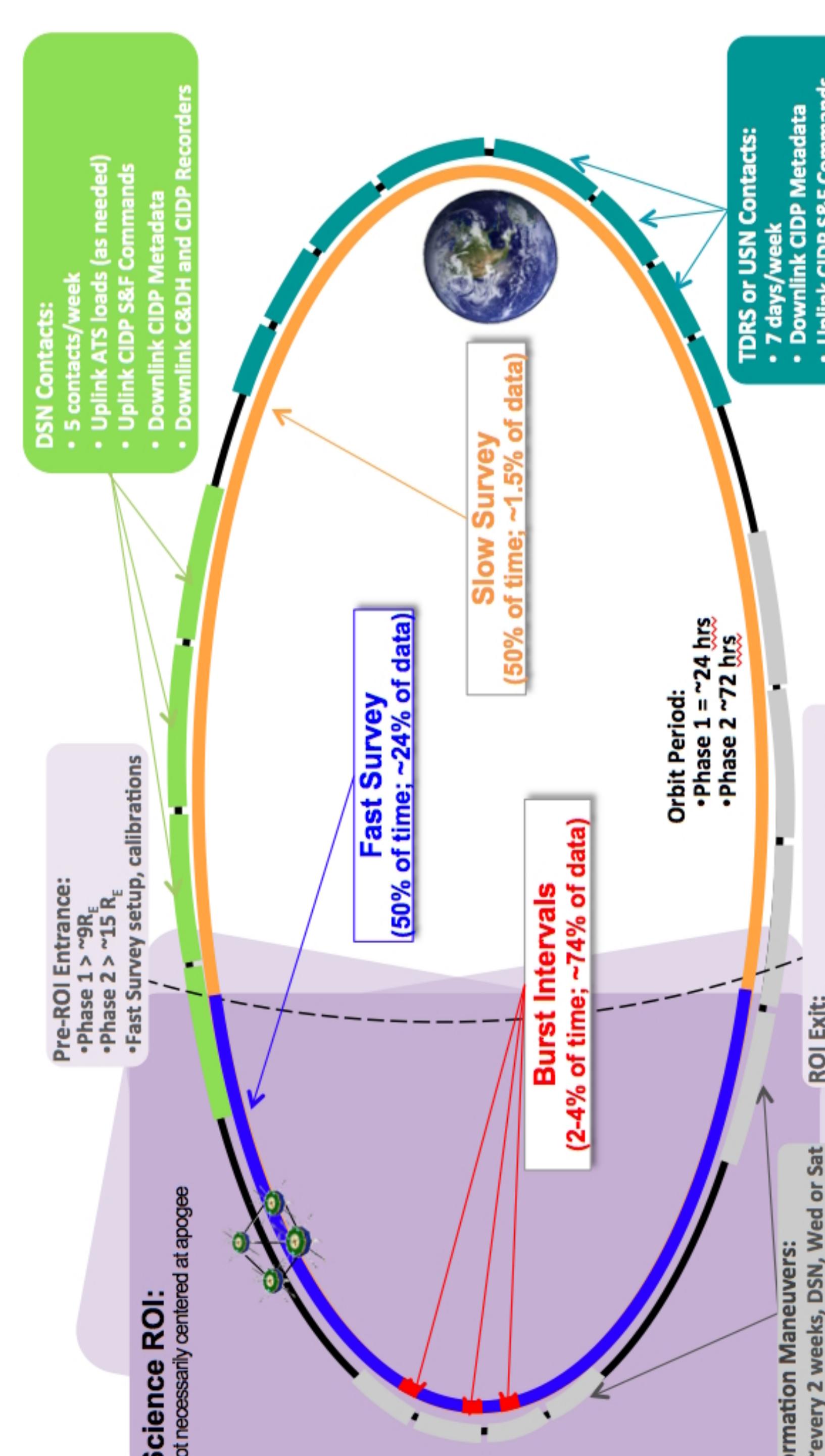
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Introduction

The MMS constellation of four spacecraft launched from Cape Canaveral on March 12, 2015. After six months of commissioning operations, MMS entered into nominal science operations on September 1st. Combined, the four spacecraft collect ~100 gigabits of data daily, twenty-five times more than can be downlinked.

As part of the Science Operations Center (SOC) at the Laboratory for Atmospheric and Space Physics, the Science Data Center (SDC) manages the processing and distribution of the science data, including the unique burst data management and selection system. The Scientist-in-the-Loop (SITL) process is a critical part of determining which of the highest resolution data will be downloaded. The SDC has developed the software and systems to support the daily operations by the mission science team as well as the distribution of higher level data products to the magnetospheric science community.

MMS Operations and Data Modes



MMS data is collected in three different modes available to scientists. Each mode is selected to maximize observations within the reconnection regions of interest (ROI) while balancing the limited data storage and downlink capabilities of the spacecraft. Selection of the highest value data within the Burst Intervals is performed by an automated Burst Data Management (BDM) system and, interactively, by the SITL on duty.

MMS Data Modes and rates. Reduced sampling rates to reserve memory storage for higher value observations.

Fast Survey: ~24 Kbps. Sampling rates equivalent to previous investigations over the ROI near apogee.

Burst: ~2800 Kbps. Highest temporal resolution data selected by SITL process and downlinked in discrete segments.

MMS Data Products

Data Level	Description	Latency
Quicklook	Scientific data products generated using simplified science processing algorithms and/or provisional calibrations and intended to provide only basic scientific insight. Available at the SDC in an interactive browser.	24 Hours
Level-2	Data processed to physical units and/or derived geophysical parameters by combining calibration, ancillary, and other data. These represent the lowest level of research grade scientific data.	30 Days
Level-3	Mission Level Data Products (MLDP). These have been resampled spatially and/or temporally and may be measurements from multiple instruments to produce a merged data set.	Event Based Anticipated later in the mission

Data Products and Access

Data products from the MMS instrument suite are available via a variety of methods from the MMS SDC website. For convenience, the SDC has been designed to serve data in a variety of methods according to the users needs and preference. They are:

- Direct HTTP file access to allow browsing of the SDC file system and individual file access.
- RESTful URL web services that provide the ability to script searches and downloads from the command line or analysis software.
- A user-friendly web-based search and download interface to find the exact MMS data needed (see screenshot below).

New Level-2 data is made available to the community once a week. As of April 2016,

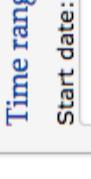
there was approximately 8 TB of processed science data available for download from the five MMS instrument suites. Each instrument has provided a Data Products Guide, also available through the SDC website, with detailed descriptions of the contents of each data file, the calibrations, and algorithms used to generate the data.



[Index of /mms/sdc/public/data](http://mms.sdc/public/data)



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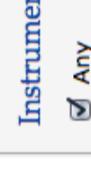
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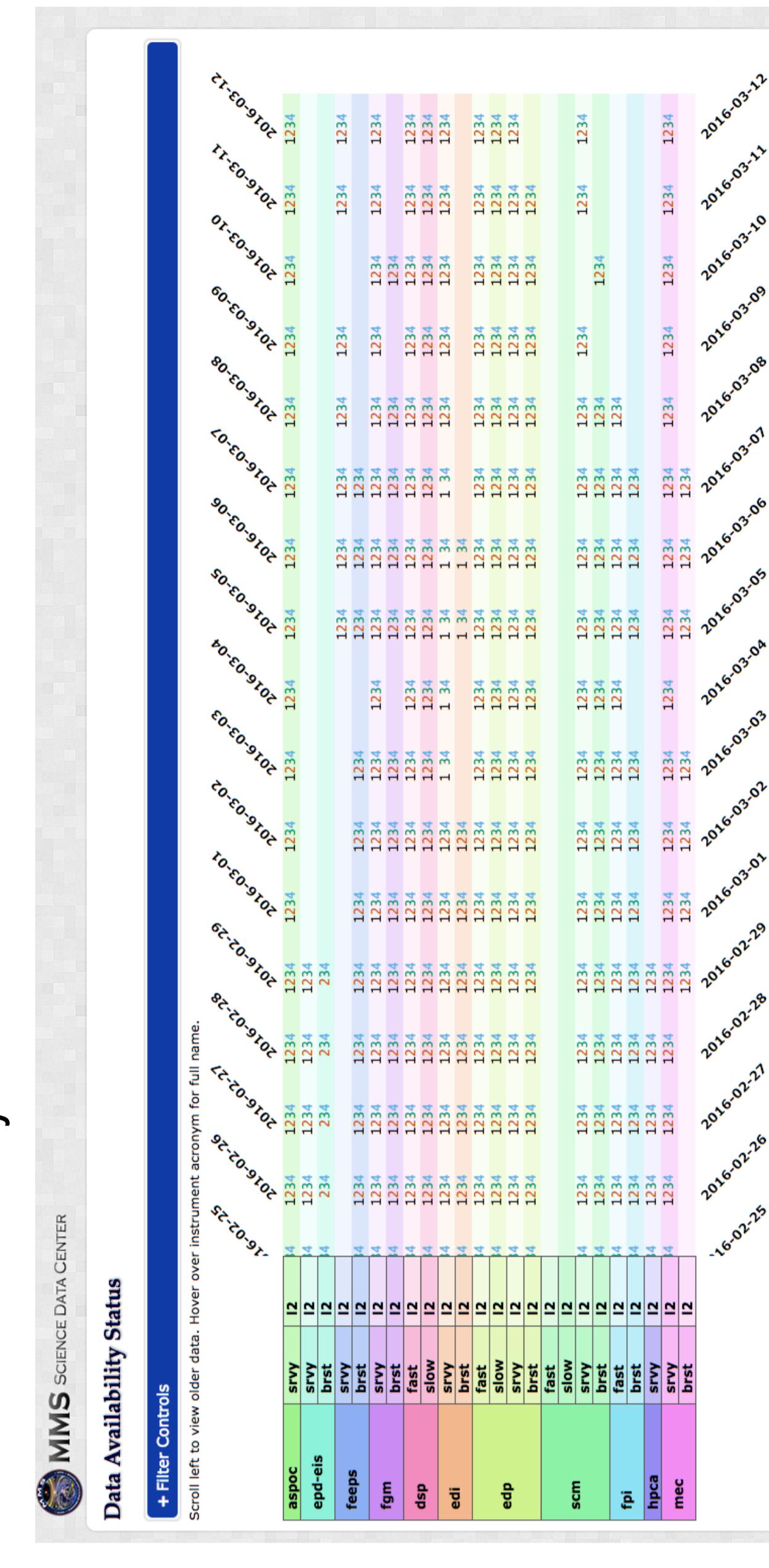
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SDC Website

The SDC website serves as the primary source for data access and ancillary tools for the MMS science team and wider scientific community. The site is under continual development to provide new tools to facilitate MMS science operations. Currently available, and soon to be released, features include:

- Data access (science, ephemeris, ancillary).
- Mission Events Browser.
- MMS orbit and formation visualizations.
- Quicklook data browser.
- Documentation and reference material.
- Data Availability Chart.



The Science Data Center website is your best source for the most up-to-date data from the Magnetospheric MultiScale Mission. We are committed to providing the heliospheric community with the tools and data it needs to understand the complex physics of the interface between the solar wind and Earth's magnetic field.

<https://asp.colorado.edu/mms/sdc/>