Mission

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STEREO Objectives

- Understand the origin and consequences of coronal mass ejections (CMEs)
- Determine the processes that control CME evolution in the heliosphere
- Discover the mechanism and sites of polar energetic particle acceleration
- Determine the 3-D structure and dynamics of coronal and interplanetary plasmas and magnetic fields
- Probe the solar dynamo through its effects on the corona and heliosphere

Implementation Responsibilities

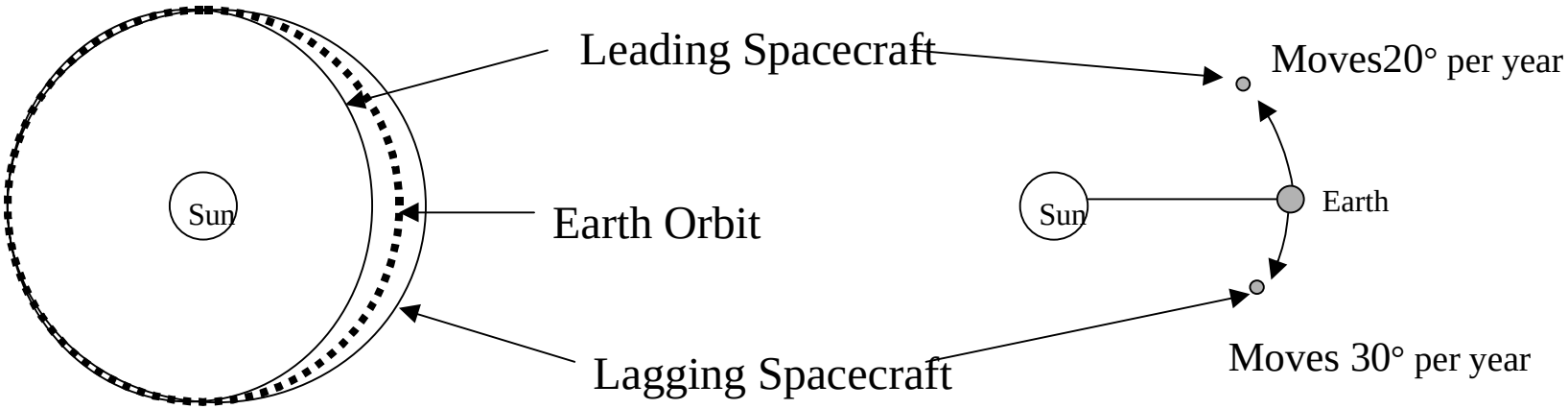
- JHU/APL
  - Provide spacecraft bus, instrument integration, mission design, mission operations, and navigation
  - Manage DSN interfaces
  - Manage spacecraft to instrument interfaces
- GSFC
  - Provide and operate instruments
  - Provide and operate Science Operations Center
  - Launch vehicle procurement

Space Weather Monitoring

- Whenever not in contact with 34-m DSN assets, transmit a low-rate (≈500 bps) science stream that is available to space weather enthusiasts
- All on-board science data processing to be provided by the instruments
- No knowledge of the data content is required by the spacecraft
- A description of the intended ground assets and required downlink rate will be provided by GSFC
- Space weather downlink is not to drive telecommunication design

Mission Design Overview

- One spacecraft orbit less than 1 AU; other orbit greater than 1 AU
- As viewed in a fixed Sun–Earth frame; each spacecraft slowly moves away from Earth



Spacecraft Overview

- Both spacecraft are identical
- 3-axis controlled
- Propulsion for momentum management, no orbit-maintenance requirement
- Single-string with two year primary mission
- Parts/components designed for two year mission duration
- Consumables for five year mission duration
- Design should not preclude extended mission

Operations Overview

- Decoupled spacecraft/ instrument operations
- Daily contacts (seven per week) using 34-m DSN antennas, with the beam-waveguide (BWG) antennas as prime
- Single Mission Operations Center (MOC) to control both spacecraft at JHU/APL
- All operations planning, spacecraft status, and navigation information to be posted on the internet

Spacecraft Operations Concept

- Spacecraft has one operational mode: point at Sun and antennas at Earth
- Thruster firings, used for momentum management, occur at ≈4–10 day intervals
- Most spacecraft operations are autonomous
  - High-gain antenna pointing control
  - Momentum management
  - Power management
  - Thermal management
- On-board recorder management is ground controlled

Instrument Operations Concept

- Instrument operation including health monitoring is a GSFC responsibility, spacecraft operations is a JHU/APL responsibility
- Science team (GSFC) should not need to know any of the details of spacecraft *operation* to plan instrument activity
  - Small time windows budgeted for HGA movement and propulsive events
  - Instrument activity independent of downlink schedule
  - Stored-command memory budgeted for instrument operations
- Spacecraft has resources (power, data bandwidth) to support all instrument activity simultaneously with the only limitation being data volume

Mission Design

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