H.6 Activation and Flight Operations

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Activation and Flight Operations Outline

- **Mission Operations Concept**
- **Initial Operations**

SPACE PHYSICS RESEARCH LABORATORY

TIDI

Mission Operations Concept

- Overview
- Uplink Activities
- Downlink Activities
- Data Processing

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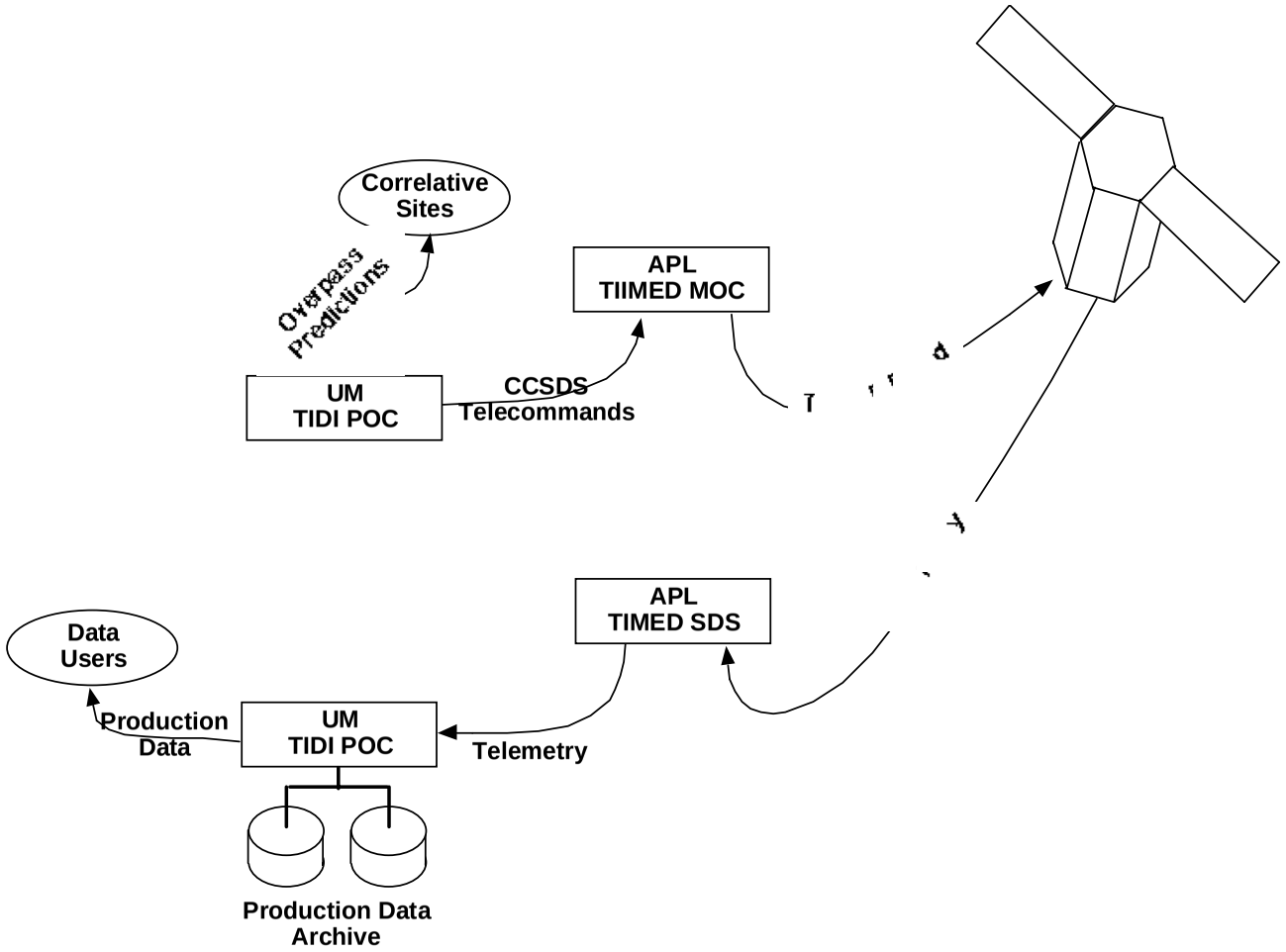
Mission Operations Concept Overview

- **Mission Operations Consists of**
  - Uplink Operations
    - Command Planning
    - Command Generation
    - Command Transmission
  - Downlink Operations
    - Instrument Health and Safety Monitoring
    - Operations Monitoring
    - Data Logging
  - Anomaly Resolution
  - Data Processing and Distribution
    - Data Generation
    - Archive Maintenance

Mission Operations Concept
Data Flow Diagram, General



Mission Operations Concept
Uplink

- **Mission Planning**
  - Develop TIDI observation plan, implementing TIMED science goals
  - Coordinate Special Campaigns
- **Command Planning**
  - Develop detailed observation program
  - Specify, Code and Test instrument control programs
  - Coordinate with correlative measurement sites, particularly rocket measurements
- **Command Execution**
  - Transfer command loads to spacecraft control center
  - Verify receipt and execution

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Mission Operations Concept
Uplink Operations Timeline

Time	Operation
D – 8 weeks D – 4 weeks	Receive predicted orbital ephemerides
D – 4 weeks	Produce viewing geometry predictions Specify measurements
D – 4 weeks	Determine correlative measurement opportunities Transmit overpass predictions to correlative sites
D – 3 weeks	Complete specification of instrument control program
D – 2 weeks	Complete coding and simulator verification of control program
D – 1 week	Transfer control program to TIMED control center for upload
D – 1 day	MOCC uploads TIDI control program at any time during the day
0	Operational Day, execute command program currently in instrument

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Mission Operations Concept Downlink

- **Monitors the instrument health**
  - **Uses automated procedures**
  - **reports limits violations**
  - **maintains trends of important parameters**
- **Monitors instrument operation**
  - **confirms receipt of command loads at TIMED MOCC**
  - **confirms receipt of command loads at the instrument**
  - **confirms measurements are as planned**
- **Anomalies are recognized and resolution activities begun**

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Mission Operations Concept
Downlink Operations Timeline

Time	Operation
	Receive near real time (NRT) data Receive previous day's playback (PB)
Data Receipt + 1 hour	Complete automated limit checking completed on NRT data
Data Receipt + 1 hour	Confirm receipt of uploads in NRT data
Data Receipt + 2 hours	Complete automated production of quicklook plots and review
Data Receipt + 12 hours	Complete limit checking on PB data
Data Receipt + 24 hours	Complete routine processing of PB data
Data Receipt + 24 hours	Examine diagnostic plots: mechanism state plots — sample spectra engineering trend data — daily wind maps
Once each week	Review calibration results Review summary science products

Mission Operations Concept
Quicklook Analysis

- **Provides tools for instrument health and safety monitor**
- **Examines a short data sequence from each contact**
- **Reports**
  - **limit violations**
  - **instrument configuration**
- **Extracts**
  - **engineering trend data**
  - **state sequence information**
- **Produces plots**

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Mission Operations Concept
Data Processing

- **Produces routine data products**
- **Archives routine products**
- **Satisfies data requests**
- **Produces summary products used for operational monitoring of the instrument**

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Mission Operations Concept
Data Processing Software

- Transforms TM data to geophysical quantities
- Archives data
- Analyzes instrument performance (calibrations)
- Provides input data for scientific analysis
- Provides catalog and data distribution services
- Data stored in self-documenting files (netCDF)

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Activation
Initial Operations

- **Goals**
  - **Confirm that the instrument has not been affected by launch**
  - **Configure instrument for initial operations**
- **Phases**
  - **Outgasing**
  - **Initial Turn on and Checkout**
  - **Initial Data Collection**
  - **Routine Operations**

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Initial Operations Outgasing

- **Outgasing is required**
  - **to maintain optical cleanliness**
  - **to avoid corona discharge in the gas discharge calibration lamp power supply**
- **14 days is desired duration**
- **Instrument is off, survival heaters active**
- **Instrument health monitored with passive temperature monitors**

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Initial Operations
Turn On & Checkout

- **Timeline depends on frequency of communications during initial operations period**
- **Steps include**
  - **Aliveness Test**
  - **Computer Self Test**
  - **Detector Map**
  - **Mechanism Functional Test**
  - **Optical Calibration**
  - **Release Telescope Covers**
  - **Optical Continuity Test**
- **Normal TM contains enough information to evaluate each step**
- **Each step is evaluated prior to advancing to the next**

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Initial Operations
Initial Data Collection

- **Provides first “real” data to data processing system**
- **Results examined to confirm validity of assumptions in data collection**
  - **Signal level**
  - **Altitude distribution**
  - **Geographic distribution**
- **Each data collection program defined at launch exercised**
  - **Confirm the operation of the data processing with actual data**
- **Routine Operations continue with data collection**