Flexibility of Mission Planning Procedures to Changing Spacecraft and Mission Requirements for MSTI-3 Operations

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The third Miniature Sensor Technology Sensor Technology Integration Satellite (MSTI-3) is scheduled to collect over 1.5 million infrared background images of the earth and earthlimb. These images will improve and validate existing predictive infrared radiance models. In addition, the images will expand the statistical information for background scenes ranging from benign (little to no cloud cover) to stressing (multi-layer cloud cover) over a period of seasonal variations. Images used for model improvement and validation are given higher priority over images collected for statistical analysis and constitute the bulk of the first month of spacecraft operations. Geographic regions affecting global climate changes, such as subtropical jet streams, and mountain ranges are of particular interest for images used in model assessment. In addition, mission requirements were expanded to encompass an independent validation process during the first month on orbit. The new plan includes collecting images over existing LIDAR sites in the United States and stations around the world as well as joint operations with aircraft-borne sensor measurements.

The varying mission requirements for the spacecraft in the first month of operations pose interesting challenges for mission planning. Coordination by mission planners with LIDAR facilities and flight operations personnel is crucial to maximizing camera operation time. Additional planning ensures collection of first month model assessment images over specific, and often irregularly shaped geographic regions, while statistical analysis images are collected whenever camera operations and solar geometry allow. To adapt quickly to any scheduling changes, mission planning has automated a significant portion of the planning process. The interlocking nature of the computer programs is designed to calculate the solar geometry and configure sensor position for any combination of geometry requirements. The resulting MSTI-3 mission planning processes is both flexible and responsive, accommodating scheduling changes as well as any replanning efforts necessitated by spacecraft anomalies or post-operation data analysis.

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