

Space Operations and Support Overview

The upcoming conference seeks high-quality submissions across various critical sub-topics in space operations and support. Submissions should be well-researched, clearly presented, and provide valuable insights into advancing the field. This document outlines the expectations for each category and the required rigor for submission. Please note that example subject list is NOT exhaustive, but instead are examples of the types of content that could exist in each sub-topic.

Submission Sub-Topics and Example Subjects

Automation, Autonomy, and AI in Mission Operations

Description

This category explores the integration of artificial intelligence and autonomous systems into mission operations, improving efficiency and reducing human intervention.

Example Subjects

- AI-driven anomaly detection in spacecraft operations
- Machine learning applications for autonomous satellite maneuvers
- Human-AI collaboration in mission control centers

Commercial and International Standards for Space Operations

Description:

Focuses on the evolving landscape of commercial space operations and the development of commercial and international standards to ensure consistency and safety.

Example Subjects:

- Standardization of space communication protocols
- Interoperability between commercial and government space assets
- Challenges in aligning international spaceflight regulations

Legal and Regulatory Challenges in Space Operations

Description:

Addresses the legal frameworks and regulatory considerations for operating in space, ensuring compliance and responsible conduct. Discusses licensing and compliance considerations for new space missions, policy implications of space traffic management and evolving frameworks for liability and jurisdiction.

Example Subjects:

- Licensing and compliance for new space missions
- Regulations governing private spaceflight ventures
- The role of the Outer Space Treaty in modern operations

On-Orbit Servicing, Assembly, and Manufacturing (OSAM)

Description:

Covers technologies and methodologies for servicing, assembling, and manufacturing components in orbit to extend mission lifetimes, reduce costs, and/or ensure mission objectives.

Example Subjects:

- In-space robotic assembly of modular spacecraft
- 3D printing applications for space manufacturing
- Challenges in refueling and repairing satellites
- In-space orbital relocation

Orbital Collision Risk Management and Debris Mitigation

Description:

Discusses strategies and technologies to minimize the risk of orbital collisions and mitigate space debris.

Example Subjects:

- Space mission on-orbit collision avoidance novel screening methods
- Launch collision avoidance with satellites, debris novel screening methods to reduce orbital debris.
- AI-driven collision prediction models
- Space debris removal technologies and policies

- Cooperative strategies for orbital traffic management

Reusability and Cost Reduction in Spacecraft and Launch Vehicles

Description:

Examines advances in making space systems more cost-effective and sustainable through reusability and efficiency improvements.

Example Subjects:

- Advances in reusable launch vehicle technology
- Economic benefits of space hardware refurbishment
- Cost analysis of in-orbit servicing vs. new spacecraft deployment

Flight Dynamics, Trajectory Optimization, and Navigation

Description:

Explores innovations in mission trajectory planning, spacecraft navigation, and flight dynamics modeling.

Example Subjects:

- Machine learning for optimal trajectory planning
- High-precision deep-space navigation techniques
- Lunar and Mars landing trajectory simulations

Deep Space, Lunar, and Human Spaceflight Operations

Description:

Covers mission planning and operations for human and robotic exploration beyond Earth's orbit.

Example Subjects:

- Sustainable lunar exploration strategies
- Human factors in deep-space missions
- Logistics and resupply for long-duration space missions

Cybersecurity and Data Protection in Space Operations

Description:

Addresses the critical importance of securing space assets from cyber threats and ensuring data integrity.

Example Subjects:

- Encryption techniques for secure space communications
- Cyber threat detection for spacecraft systems
- Protecting satellite networks from hacking attempts

Simplified and Resilient Mission Planning & Communications

Description:

Examines methods to streamline mission planning processes and improve communication reliability.

Example Subjects:

- AI-driven mission scheduling systems
- Enhancing resilience in deep-space communications
- Standardized frameworks for mission planning

Submission Expectations and Rigor

Technical Paper Requirements

- Submit a well-structured abstract and paper.
- Papers should include a clear methodology, analysis, and discussion of results.
- Ensure adherence to academic and professional standards for citations and references.
- All abstracts will be evaluated by qualified individuals from industry, academia, or government.

Oral Presentations and Panel Discussions

- Presenters should provide a detailed outline or slide deck summarizing key discussion points.
- Panels should include a diverse set of viewpoints to enrich the discussion.

Demonstrations and Case Studies

- Include practical applications and real-world implementations.
- Provide sufficient technical detail to showcase feasibility and impact.

All submissions should demonstrate intellectual rigor, clarity, and relevance to the evolving field of space operations. We encourage collaboration between academia, industry, and government agencies to drive innovation and progress.

For any further inquiries regarding submission guidelines, please contact the space operations and support session chair for SciTech 2026.