

SPACE STATION SCIENCE AND APPLICATIONS ADVISORY SUBCOMMITTEE

**Report
on the
1989 Woods Hole
SSSAAS Summer Workshop**

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**A Presentation to the Space Station Advisory Committee
October 18, 1989**

THE 1989 WOODS HOLE SUMMER WORKSHOP

- Second Annual Summer Study
- NAS Woods Hole Study Center, Woods Hole Massachusetts, June 26-30, 1989
- Focus: Science Accommodations and Operations
- 70 Participants:
 - 12 SSSAAS Members
 - 12 Non-NASA U.S. Scientists
 - 17 Internationals
 - 19 NASA Science and Program Office Personnel
 - 6 Industry
- Chair: Dr. Robert Bayuzick, Vanderbilt University
- Executive Secretary: Mr. Robert Rhome, NASA/HQ
- Charge: Evaluate status of Space Station with respect to physical accommodations, scientist-experiment interactions, and operations regarding Observing Sciences, Life Sciences, and Materials and Fluid Sciences. Identify weaknesses and recommend corrective actions.

Format of Study

- Daily Plenary Sessions, Evening Splinters:
 - Life Sciences
 - Materials Science
 - Observing Sciences (Attached Payloads)
- Subset of IFSUSS members Met to Discuss Upcoming Meeting in Japan and SSSAAS/IFSUSS Mutual Concerns
- "Woods Hole Statement" Formulated —?
- Splinter Reported Formal Findings and Recommendations in Friday Special Session
 - Plenary SSSAAS Received Findings and Recommendations in Joint Session with Space Station Advisory Committee (SSAC)
- Summary Minutes to be Released Later This Month

Recommendations

- **Observing Sciences**

1. Information System Planning and Development Status
 - Operation options for peak data rates must be defined
 - Studies of alternative mass storage devices and TDRSS-Independent direct data downlink are needed
2. Accuracy of Attitude Information Provided to Attached Payloads
 - Impact of change of attitude information provided to attached payloads (from .25° to 1°) is unclear.
 - Technical audit that produced this decision should be put on hold pending immediate OSSA study of impact and report to OSS of same
3. Baseline Monitoring of Station External Ambient Environment
 - A distributed monitoring system at least as capable as PIMS is needed
 - A comprehensive, integrated model of station and platform environment should be developed

4. Distributed Allocation of Levels for Station Contamination Sources
 - Establish a contributed contamination level requirement

5. Availability of Unobstructed Fields of View for Attached Payloads
 - Station designers should perform a detailed analysis of attached payload viewing requirements specifically directed toward optimizing unobstructed viewing opportunities

6. Science Operations
 - Continue discipline-oriented science operations studies. Add the international science element
 - Convene a high-level international workshop aimed at defining international discipline-oriented science operations
 - International partners are encouraged to re-examine their proposed science approach and incorporate a science discipline approach

Recommendations

- **Life Sciences**

1. **Extended Duration Crew Operations**

- EDCO is strongly supported. The resources to support it should come from Space Station common systems.

2. **Tight Building Syndrome/Microbial Buildup**

- The group is concerned about the possibility of a toxic spill or similar mishap
- Spill site and module isolation contingencies must be investigated

3. **Centrifuge Status**

- The group is gratified by the action to relocate the centrifuge in Node 3
- The centrifuge should be as large as the node can accommodate

4. **Biotechnology/Policy**

- The group recommends that NASA review its biotechnology management policy including location and affiliation of the applicable expertise (Responsibility for this policy currently resides in Microgravity Science and Applications at NASA HQ.)

5. On-Board Analysis/Sample Characterization, Automation, Expert Systems, Artificial Intelligence, and Rapid Sample Return
 - Current requirements for crew time are oversubscribed
 - A thorough, multi-case, cost-benefit analysis of on-board characterization must be performed including reliable on-board analytical equipment and rapid sample return

6. Lab Support Equipment/Phasing
 - LSE requirements require refining; high fidelity system for ascertaining user needs is required
 - Group recommends a clear-cut vehicle be devised to enhance investigator/NASA/contractor interaction for LSE

7. Model Experiment Scenarios
 - Model experiment scenarios are important for space station planning
 - The life sciences scenarios currently selected should continue to be refined and evaluated to disclose more specific needs

8. Logistics Supply

- Recommend unmanned logistics resupply be considered
- Group supports recent late and early access changes

9. Crew Time/Skills, Telescience Trades

- Users should have input into crew selection process
- Telescience is essential for crew science operations, and, along with specialized crew training, will maximize crew efficiency

10. Precursor Science and Operations Activities

- Group supports testing operations procedures as Space station precursor activities
- Recommends better connections be established between ground-based activities and flight-selected activities

11. Distribution of Functional User Capabilities - Discipline Operations Centers
 - Completely decentralized operations is recommended. There is overwhelming preference of discipline-oriented operations over national centers

12. Small and Rapid response Payloads in the Pressurized Volume
 - SARR payloads need higher visibility in NASA planning. Group endorses this activity and exhorts NASA to promote the SARR program.

Recommendations

- **Materials and Fluid Sciences**

1. Gravity-Level Characterization and Management

- The changes in the dynamic g-level requirements suggested by the Chief Scientist of Space Station must be immediately examined
- The accelerometer subsystem, providing for determination of magnitude and direction of the g-level distribution, is a non-negotiable prerequisite for meaningful microgravity missions
- Station must assume responsibility for the development and management of a vibroacoustic budget

2. Model Experiment Scenarios

- Model experiment scenarios are essential for the development of high-fidelity requirements and should be the basis for program development
- Model experiment scenarios must be provided immediately for the scientific community (DWG members, SS facility, Project Scientists, MSAD funded PI's, OCP constituency, OAST constituency, international partners, etc)..

3. Laboratory Support Equipment

- The present LSE list must be audited based upon model experiment scenarios. SSFP must organize such an audit among all user Codes
- A study must be carried out that considers the impact in the quantity and quality of science and cost-effectiveness resulting from rapid sample return and/or on-board characterization
- The establishment of Requirements Integration Groups (RIGs) to facilitate communication between designers and the user community is enthusiastically supported. In particular, an LSE RIG should be established as soon as possible

4. Rack and Interface Commonality

- Establishment of commonality is of the highest priority and should be addressed directly to the Administrator.
- Commonality should be accomplished in a spirit of compromise

5. Science Operations-International Commonality and Interoperability

- There must be a full international flavor for operating within the SSF environment
- Operations commonality must be a prime agenda item for the December SSSAAS meeting
- Presentations by OSS and OSSA on arrangements for ensurance of international operatilty must be made

6. Science Operations - Functionality

- OSS and OSSA must examine lessons learned in Material, and Fluids Sciences. Use them as a guide and "sanity check" for proposed SSF operations. Report results of this examination at the December meeting
- NASA must critically examine the possibility of physically combining the POIC and ISOC in order to reduce costs

7. Science Operations - Telescience

- The use of telescience must be aggressively pursued to improve crew effectiveness and to permit direct participation of investigation in their experiments
- Telescience must be a prime agenda item at the December meeting
- A tutorial session on the technical (but user-related) aspects of telescience must be provided at the December meeting
- An outline of NASA plans for incorporating telescience capabilities into the OSSA and OSS Portions of SSF operations system must be presented at the December meeting, including the role of telescience in international operations. Include also any plans to test telescience concepts in advance and to provide a basis of experience for its use by SSF investigators and operators