Space Experiment Module

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http://www.wff.nasa.gov/~sspp/sem/sem.html

Agenda: SEM Status

- Program Definition
- History
- Experiments
- Current Mission SEM-06
- Future

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SEM Program

- Education Outreach, Free to Participants
- Focus on Educational Aspects of Creating Space Flight Experiment
- Open to Educational Organizations, K-12 & University Level
- Stems from GAS, Reducing Cost & Complexity
- Standard SSPP Hardware & SEM Carrier

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Program Purpose

- Provide Space Flight Opportunity
- Easy Access to Space Environment
- Promote Interest in Science, Technology, and Engineering
- Provide Excellent “Hands On” Learning
- Optimal Use of Orbiter Cargo, Replace Ballast with Experiments

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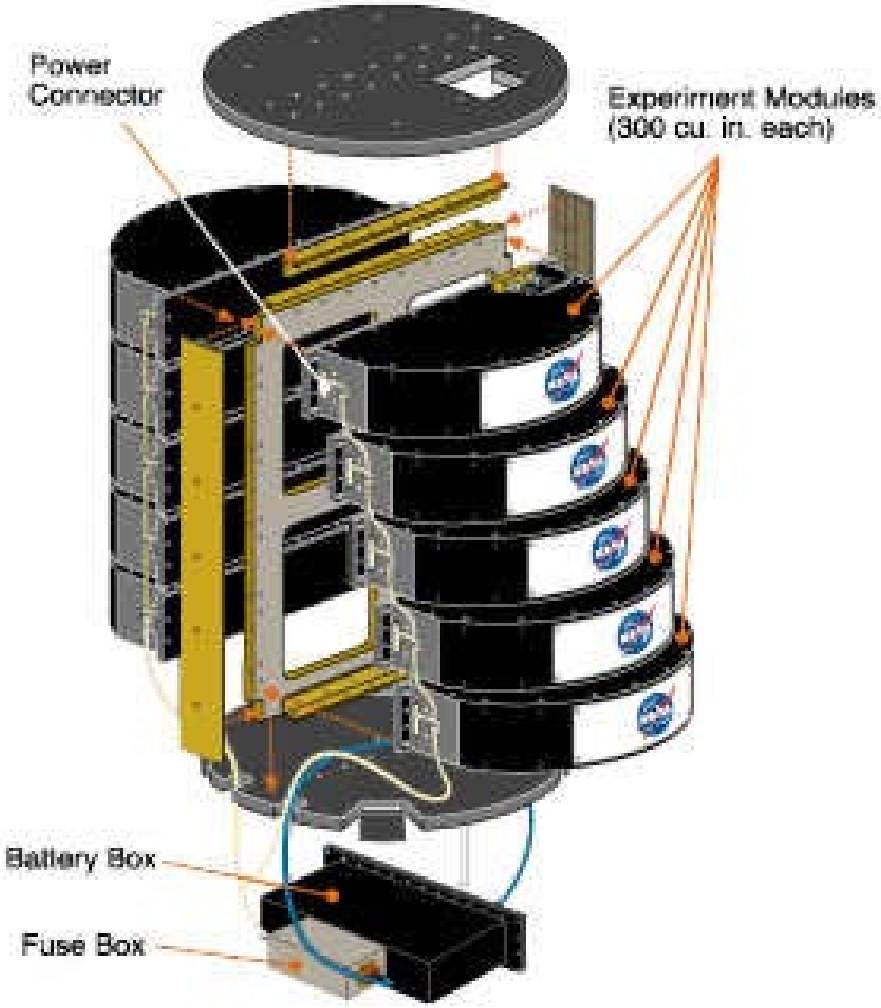
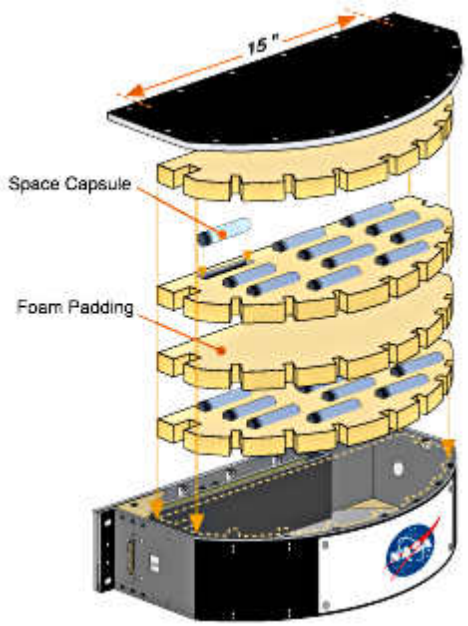
SEM Canister & Carrier

SSPP Canister

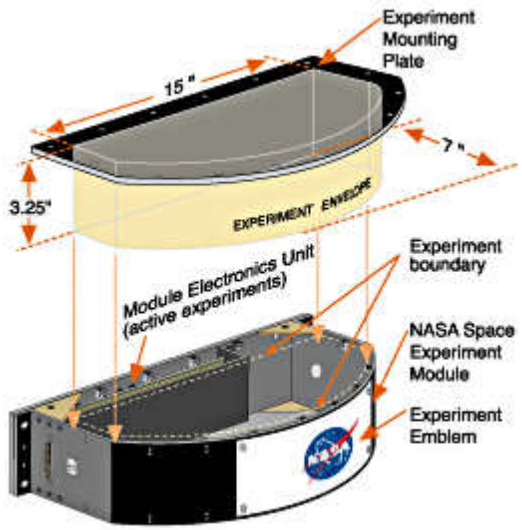


SEM Carrier

SEM Module Types



Passive



Active

Passive Experiment Vials, 22 per Module

Active Experiments

- Module Electronics Unit (MEU) Control Board
- 12 Volt Power
- Data Collection
- Power Switching
- Experiment Provided Timeline

GMEU

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Experiment Comparison

Passive

- Simple
- Inexpensive
- Experiment Concept Easily Understood
- Large Number of People Involved

Active

- More Complex
- High Technical Value
- More Expensive
- Less People Involved at a High Level

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Experiment Group Involvement

- Proposal Preparation
- Experiment Development
- Emblem Graphics
- Integration
- Launch Viewing
- De-Integration
- Post Flight Analysis

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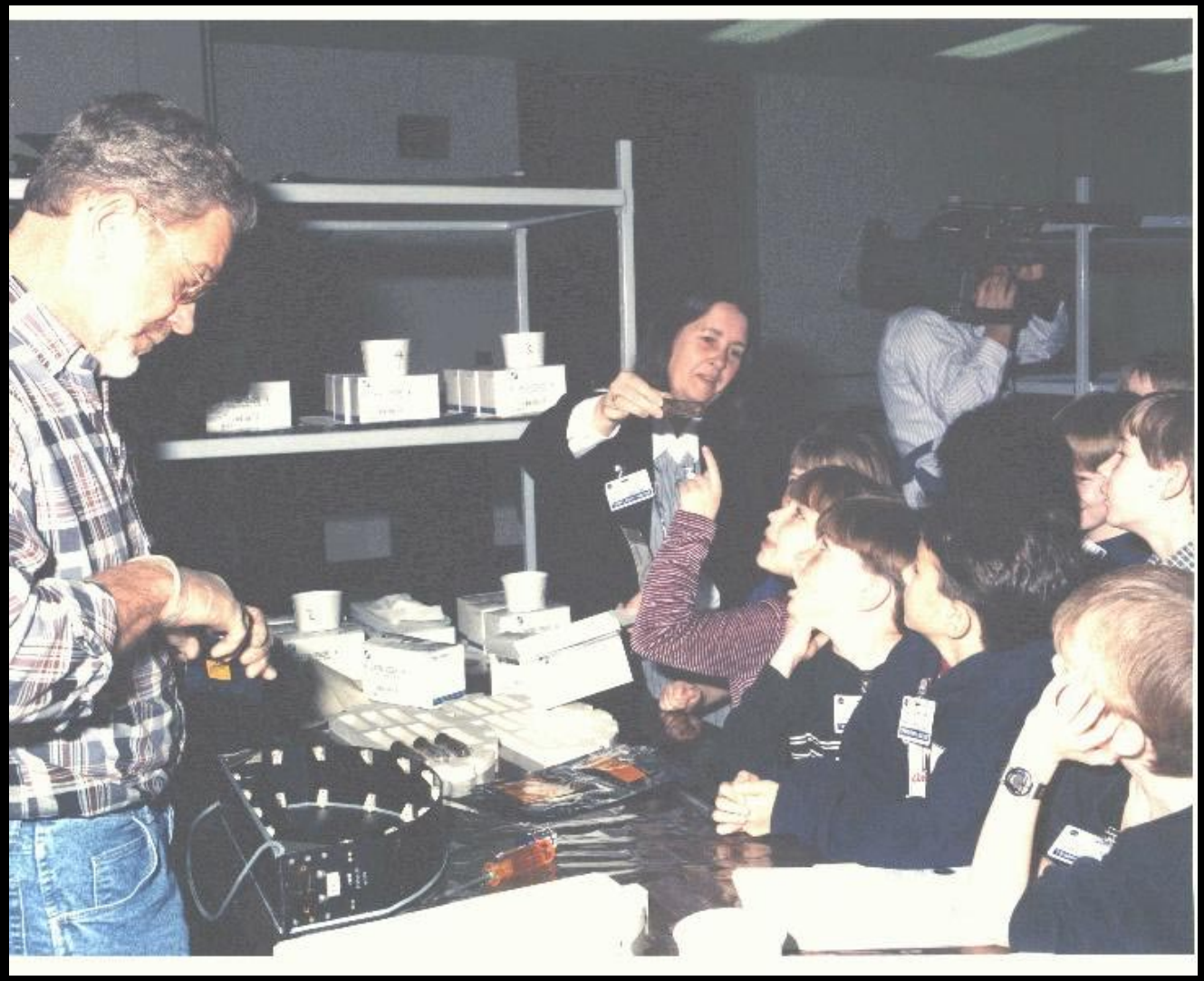
Experiment Development, Taking Soil Samples

Integration at WFF

T-0
Launch!

De-Integration, Experiment Removal/Return



Experiment Selection

- Geographical Location
- Diversity
- Number of Students Involved
- Technical Content
- Selection By NASA Panel
- NASA Student Involvement Program (NSIP) Grades 9-12

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SEM Program History

- Initiated 1994
- Proposed at 1995 Symposium
- SEM-01 Flight, November 1996
- Managed from GSFC Greenbelt
- Transfer to WFF Began in 1998

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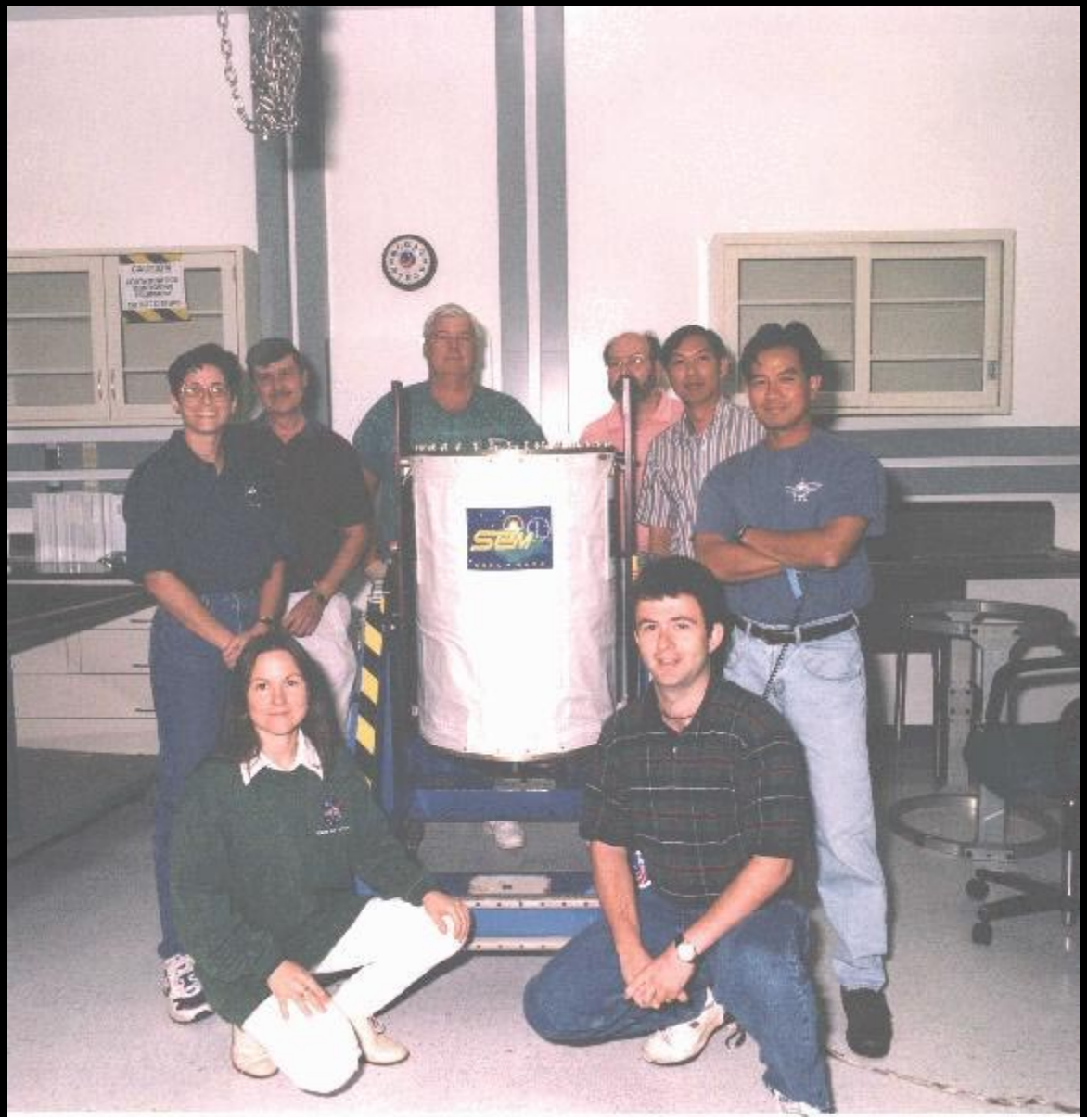
SEM-01 Project Team



Orbiter Installation SEM-01 STS-80

SEM Flight History

- SEM-01 STS-80 Space Shuttle Columbia
  November 19, 1996
- SEM-02 STS-85 Space Shuttle Discovery
  August 7, 1997
- SEM-03 STS-91 Space Shuttle Discovery
  June 2, 1998
- SEM-05 STS-91 Space Shuttle Discovery
  June 2, 1998
- SEM-04 STS-95 Space Shuttle Discovery
  October 29, 1998
- SEM-07 STS-88 Space Shuttle Endeavor
  December 4, 1998
- SEM-06 STS-101 Space Shuttle Atlantis
  Scheduled January 22, 2000

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Experiment Examples

Passive

- Seeds
- Floppy Discs
- Film
- Phone Cards
- Popcorn
- Peanut Butter
- Mosquito Eggs
- Oil/water Solutions
- Soil Samples
- Yeast
- Brine Shrimp
- Silly Putty

Active

- Paint Splatter
- Ratchet Mechanism
- Plant Revival
- Sound in Space
- Surface Tension
- Crystal Growth
- Mixing
- Acceleration Measurement
- Bacteria Growth
- Heat Transfer
- Fluid Separation
- Bacteria Inoculation

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Geographical Areas Reached

- Madison, Alabama
- Rosemead, California
- San Francisco, California
- Marietta, Georgia
- Fort Hall, Idaho
- Noble, Illinois
- Northbrook, Illinois
- West Lafayette, Indiana
- Anne Arundel County, Maryland
- Beltsville, Maryland
- College Park, Maryland
- Gambrills, Maryland
- Mitchellville, Maryland
- Salisbury, Maryland
- Shoreham, New York
- Albuquerque, New Mexico
- Strongsville, Ohio
- Upper St. Clair, Pennsylvania
- Charleston, South Carolina
- Floyd, Virginia
- Norfolk, Virginia
- Grand Coulee, Washington
- Madison, Wisconsin
- Montello, Wisconsin
- **Montello, Italy**
- **Argentina**

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Current Mission, SEM-06
STS-101

- Proposals Selected 12/98
- All Passive, as of 3/99, Thermal Issues
- Experiment Integrations at WFF
- Five Argentina Modules
- Integration Complete KSC Turnover 11/99
- Launch 1/22/00

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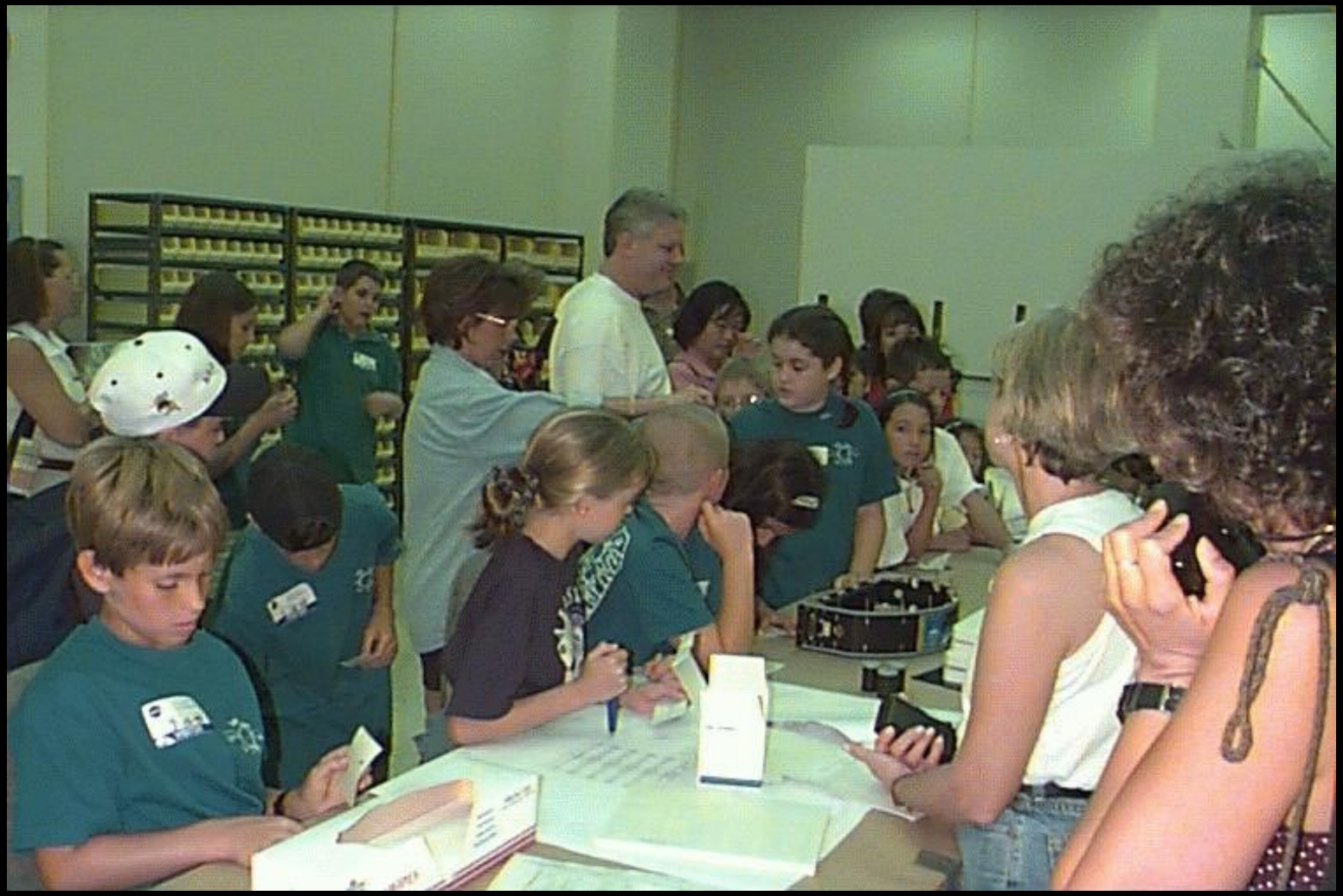
SEM-06 Experiment Integration



Post Integration Video Conference
Students from Argentina

SEM Future

- Mission Support
- Broaden Geographic and Cultural Involvement
- NSIP Involvement
- Virtual Integration Activities
- Software Update
- Increase Available Power
- Update Data Capability
- SEM Video

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Questions

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SEM Presentations

September 13,1999

- Analysis of Three-Dimensional Roller Performance in a Micro-g Environment
  Brian Roberts, University of MD
- The Effects of Microgravity and Extreme Temperature on Mold
  Wiletha Davis, West Richland Elementary School
- GADGET Student Experiments on SEM, A Retrospective Look at the Experiments of Flights STS-080, STS-85, and STS-95
  Lyne Zielinski, Glenbrook North High School
- The Mosquito Growth and Development Experiment on SEM
  Lyne Zielinski, Glenbrook North High School

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SEM Presentations

September 14,1999

- Surface Tension: The Art of Science
  Lyne Zielinski, Glenbrook North High School
- B.L.A.S.T. and S.P.L.A.T
  Norma Boakes, Oakcrest High School
- RAD: The Space Shuttle Radiation Environment and its Effect on High Sensitivity Film (STS-85/STS-91 SEM Experiment)
  Margaret Spigner, Middleton High School
- POLY: Resurection in Space (STS-85 SEM Experiment)
  Ruth Truluck, Wando High School
- NORSTAR SEM, Flown Aboard STS-91 June 2, 1998
  Joy Young, Norfolk Public Schools

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