The NASA STI Program Office...in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program Office plays a key part in helping NASA maintain this important role.

The NASA STI Program Office is operated by Langley Research Center, the lead center for NASA's scientific and technical information. The NASA STI Program Office provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program Office is also NASA's institutional mechanism for disseminating the results of its research and development activities. These results are published by NASA in the NASA STI Report Series, which includes the following report types:

• TECHNICAL PUBLICATION. Reports of completed research or a major significant phase of research that present the results of NASA programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA's counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.

• TECHNICAL MEMORANDUM. Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.

• CONTRACTOR REPORT. Scientific and technical findings by NASA-sponsored contractors and grantees.

• CONFERENCE PUBLICATION. Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or cosponsored by NASA.

• SPECIAL PUBLICATION. Scientific, technical, or historical information from NASA programs, projects, and mission, often concerned with subjects having substantial public interest.

• TECHNICAL TRANSLATION. English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services that complement the STI Program Office's diverse offerings include creating custom thesauri, building customized databases, organizing and publishing research results...even providing videos.

For more information about the NASA STI Program Office, see the following:

• Access the NASA STI Program Home Page at http://www.sti.nasa.gov

• E-mail your question via the Internet to help@sti.nasa.gov

• Fax your question to the NASA Access Help Desk at (301) 621-0134

• Telephone the NASA Access Help Desk at (301) 621-0390

• Write to:
  NASA Access Help Desk
  NASA Center for AeroSpace Information
  7121 Standard Drive
  Hanover, MD 21076-1320
FY 1999 Scientific and Technical Reports, Articles, Papers, and Presentations

Compiled by
J.E. Turner Waits
Marshall Space Flight Center, Marshall Space Flight Center, Alabama

National Aeronautics and
Space Administration

Marshall Space Flight Center • MSFC, Alabama 35812

March 2000
FOREWORD

In accordance with the NASA Space Act of 1958, the MSFC has provided for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

Since July 1, 1960, when the George C. Marshall Space Flight Center was organized, the reporting of scientific and engineering information has been considered a prime responsibility of the Center. Our credo has been that “research and development work is valuable, but only if its results can be communicated and made understandable to others.”

The N number shown for the reports listed is assigned by the Center for AeroSpace Information (CASI), Hanover, MD, indicating that the material is unclassified and unlimited and is available for public use. These publications can be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. The N number should be cited when ordering.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA TECHNICAL MEMORANDA</td>
<td>1</td>
</tr>
<tr>
<td>NASA TECHNICAL PUBLICATIONS</td>
<td>5</td>
</tr>
<tr>
<td>MSFC CONFERENCE PUBLICATIONS</td>
<td>8</td>
</tr>
<tr>
<td>NASA CONTRACTOR REPORTS</td>
<td>11</td>
</tr>
<tr>
<td>MSFC PAPERS CLEARED FOR PRESENTATION</td>
<td>13</td>
</tr>
<tr>
<td>INDEX</td>
<td>59</td>
</tr>
</tbody>
</table>
A new aluminum-silicon alloy has been successfully developed at Marshall Space Flight Center that has a significant improvement in tensile strength at elevated temperatures (550 to 700 °F). For instance, the new alloy shows an average tensile strength of at least 90 percent higher than the current 300 aluminum piston alloy tested at 500 °F. Compared to conventional aluminum alloys, automotive engines using the new piston alloy will have improved gas mileage, and may produce less air pollution in order to meet the future U.S. automotive legislative requirements for low hydrocarbon emissions. The projected cost for this alloy is <$0.95/lb, and it readily allows the automotive components to be cast at a high production volume with a low, fully accounted cost. It is economically produced by pouring molten metal directly into conventional steel molds or die casting.

As a research facility for microgravity science, the International Space Station (ISS) will be used for numerous experiments which require a quiescent acceleration environment across a broad spectrum of frequencies. For many microgravity science experiments, the ambient acceleration environment on ISS will significantly exceed desirable levels. The ubiquity of acceleration disturbance sources and the difficulty in characterization of these sources precludes source isolation, requiring vibration isolation to attenuate the disturbances to an acceptable level at the experiment. To provide a more quiescent acceleration environment, a vibration isolation system named STABLE (Suppression of Transient Accelerations By LEvitation) was developed. STABLE was the first successful flight test of an active isolation device for microgravity science payloads and was flown on STS–73/USML–2 in October 1995. This report documents the development of the high fidelity, nonlinear, multibody simulation developed using TREETOPS which was used to design the control laws and define the expected performance of the STABLE isolation system.
The analytical prediction of stress, strain, and fatigue life at locations experiencing local plasticity is full of uncertainties. Much of this uncertainty arises from the material models and their use in the numerical techniques used to solve plasticity problems. Experimental measurements of actual plastic strains would allow the validity of these models and solutions to be tested. This memorandum describes how experimental plastic residual strain measurements were used to verify the results of a thermally induced plastic fatigue failure analysis of a Space Shuttle main engine fuel pump component.

**TM—1999-209148**

February 1999


The Shuttle Upgrade program is a continuing improvement process to enable the Space Shuttle to be an effective space transportation vehicle for the next few decades. The Solid Rocket Booster (SRB), as a component of that system, is currently undergoing such an improvement. Advanced materials, such as composites, have given us a chance to improve performance and to reduce weight.

The SRB Composite Nose Cap (CNC) program aims to replace the current aluminum nose cap, which is coated with a Thermal Protection System and poses a possible debris hazard, with a lighter, stronger CNC. For the next 2 years, this program will evaluate the design, material selection, properties, and verification of the CNC. This particular process specification cites the methods and techniques for verifying the integrity of such a nose cap with nondestructive evaluation.

**TM—1999-209149**

March 1999


This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY98. It also includes papers of MSFC contractors.

After being announced in STAR, all of the NASA series reports may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

The information in this report may be of value to the scientific and engineering community in determining what information has been published and what is available.

**TM—1999-209201**

March 1999

A Strategy for Integrating a Large Finite Element Model Using MSC NASTRAN/PATRAN: X-33 Lessons Learned. D.S. McGhee. Structures and Dynamics Laboratory. 19990028385N

The X-33 vehicle is an advanced technology demonstrator sponsored by NASA. For the past 3 years the Structural Dynamics and Loads Branch of NASA's Marshall Space Flight Center has had the task of integrating the X-33 vehicle structural finite element model. In that time, five versions of the integrated vehicle model have been produced and a strategy has evolved that would benefit anyone given the task of integrating structural finite element models that have been generated by various modelers and companies. The strategy that has been presented here consists of six decisions that need to be made: purpose of models, units, common materials list, model numbering, interface control, and archive format. This strategy has been proven and expanded from experience on the X-33 vehicle.

**TM—1999-209266**

May 1999

Modified Truncated Cone Target Hyperthermal Atomic Oxygen Test Results. J.A. Vaughn, R.R. Kamenetzky, and M.M. Finckenor. Materials and Processes Laboratory. 19990087364N

The modified truncated cone target is a docking target planned for use on the International Space Station. The current design consists of aluminum treated with a black dye anodize, then crosshairs are laser etched for a silvery color. Samples of the treated aluminum were exposed to laboratory simulation of atomic oxygen and ultraviolet radiation to determine if significant degradation might occur. Durability was evaluated based on the contrast ratio between the black and silvery white areas of the target. Degradation of optical properties appeared to level off after an initial period of exposure to atomic oxygen. The sample that was not alodined according to MIL-C-5541, type 1A, performed better than alodined samples.

**TM—1999-209425**

June 1999

This document lists the significant publications and presentations of the Space Sciences Laboratory during the period January 1–December 31, 1998. Entries in the main part of the document are categorized according to NASA Reports (arranged by report number), Open Literature, and Presentations (arranged alphabetically by title). Most of the articles listed under Open Literature have appeared in refereed professional journals, books, monographs, or conference proceedings. Although many published abstracts are eventually expanded into full papers for publication in scientific and technical journals, they are often sufficiently comprehensive to include the significant results of the research reported. Therefore, published abstracts are listed separately in a subsection under Open Literature. Questions or requests for additional information about the entries in this report should be directed to Gregory S. Wilson (ESO: 544-7579) or to one of the authors. The organizational code of the cognizant SSL branch or office is given at the end of each entry.

**TM—1999–209573 August 1999**


This Technical Memorandum provides a summary of current work accomplished under Technical Task Agreement (TTA) by the Marshall Space Flight Center (MSFC) regarding the *International Space Station (ISS)* Environmental Control and Life Support System (ECLSS). Current activities include ECLSS component design and development, computer model development, subsystem/integrated system testing, life testing, and general test support provided to the ISS program.

Under ECLSS design, MSFC was responsible for the six major ECLSS functions, specifications and standard, component design and development, and was the architectural control agent for the ISS ECLSS. MSFC was responsible for ECLSS analytical model development. In-house subsystem and system level analysis and testing were conducted in support of the design process, including testing air revitalization, water reclamation and management hardware, and certain nonregenerative systems.

The activities described herein were approved in task agreements between MSFC and NASA Headquarters Space Station Program Management Office and their prime contractor for the ISS, Boeing. These MSFC activities are inline to the designing, development, testing, and flights of ECLSS equipment planned by Boeing. MSFC’s unique capabilities for performing integrated systems testing and analyses, and its ability to perform some tasks cheaper and faster to support ISS program needs, are the basis for the TTA activities.

**TM—1999–209575 September 1999**

*Comparison of Observed Beta Cloth Interactions With Simulated and Actual Space Environment.* R.R. Kamenetzky and M.M. Finckenor. Materials Processes and Manufacturing Department. 19990103958N 19990103942N

A common component of multilayer insulation blankets is beta cloth, a woven fiberglass cloth impregnated with Teflon™. It is planned for extensive use on the *International Space Station.* The Environmental Effects Group of the Marshall Space Flight Center Materials, Processing, and Manufacturing Department has investigated the impact of atomic oxygen (AO) and ultraviolet (UV) radiation on the optical properties of plain and aluminized beta cloth, both in the laboratory and as part of long-duration flight experiments. These investigations indicate that beta cloth is susceptible to darkening in the presence of UV radiation, dependent on the additives used. AO interactions resulted in bleaching of the beta cloth.

**TM—1999–209629 May 1999**


Mars Global Reference Atmospheric Model (Mars-GRAM) Version 3.8 is presented and its new features are discussed. Mars-GRAM uses new values of planetary reference ellipsoid radii, gravity term, and rotation rate (consistent with current JPL values) and includes centrifugal effects on gravity. The model now uses NASA Ames Global Circulation Model low resolution topography. Curvature corrections are applied to winds and limits based on speed of sound are applied. Altitude of the F1 ionization peak and density scale height, including effects of change of molecular weight with altitude are computed. A check is performed to disallow temperatures below CO2 sublimation. This memorandum includes instructions on obtaining Mars-GRAM source code and data files and running the program. Sample input and output are provided. An example of
incorporating Mars-GRAM as an atmospheric subroutine in a trajectory code is also given.

**TM—1999–209630 May 1999**


The latest version of Global Reference Atmospheric Model (GRAM–99) is presented and discussed. GRAM–99 uses either (binary) Global Upper Air Climatic Atlas (GUACA) or (ASCII) Global Gridded Upper Air Statistics (GGUAS) CD-ROM data sets, for 0–27 km altitudes. As with earlier versions, GRAM–99 provides complete geographical and altitude coverage for each month of the year. GRAM–99 uses a specially-developed data set, based on Middle Atmosphere Program (MAP) data, for 20–120 km altitudes, and NASA's 1999 version Marshall Engineering Thermosphere (MET–99) model for heights above 90 km. Fairing techniques assure smooth transition in overlap height ranges (20–27 km and 90–120 km). GRAM–99 includes water vapor and 11 other atmospheric constituents (O_3, N_2O, CO, CH_4, CO_2, N_2, O_2, O, A, He, and H). A variable-scale perturbation model provides both large-scale (wave) and small-scale (stochastic) deviations from mean values for thermodynamic variables and horizontal and vertical wind components. The small-scale perturbation model includes improvements in representing intermittency ("patchiness"). A major new feature is an option to substitute Range Reference Atmospheric (RRA) data for conventional GRAM climatology when a trajectory passes sufficiently near any RRA site. A complete user's guide for running the program, plus sample input and output, is provided. An example is provided for how to incorporate GRAM–99 as subroutines in other programs (e.g., trajectory codes).

**TM—1999–209631 September 1999**

Deflections of a Uniformly Loaded Circular Plate With Multiple Support Points. L.D. Craig and J.A.M. Boulet*. Structures, Mechanics, and Thermal Department and *University of Tennessee.

This technical memorandum describes a method for determining the transverse deflections of a uniformly loaded, thin circular plate of constant thickness supported by single or multiple rings of equally spaced discreet points. The rotations are assumed free at each point. This could have application in the design of telescope mirror supports that must minimize structural gravitational deformations. It could also be of general use to the structural analyst.

**TM—1999–209734 May 1999**


This technical memorandum provides lightning protection engineering guidelines and technical procedures used by the George C. Marshall Space Flight Center (MSFC) Electromagnetics and Aerospace Environments Branch for aerospace vehicles. The overviews illustrate the technical support available to project managers, chief engineers, and design engineers to ensure that aerospace vehicles managed by MSFC are adequately protected from direct and indirect effects of lightning. Generic descriptions of the lightning environment and vehicle protection technical processes are presented. More specific aerospace vehicle requirements for lightning protection design, performance, and interface characteristics are available upon request to the MSFC Electromagnetics and Aerospace Environments Branch, mail code EL23.

**TM-1999-209735 September 1999**


The analysis of mechanically fastened composite joints presents a great challenge to structural analysts because of the large number of parameters that influence strength. These parameters include edge distance, width, bolt diameter, laminate thickness, ply orientation, and bolt torque. The research presented in this report investigates the influence of some of these parameters through testing and analysis. A methodology is presented for estimating the strength of the bolt hole based on classical lamination theory using the Tsai-Hill failure criteria and typical bolt hole bearing analytical methods.
During the interval of 1944–1997, 120 intense hurricanes (i.e., those of category 3 or higher on the Saffir-Simpson hurricane damage potential scale) were observed in the Atlantic basin, having an annual frequency of 0–7 events per year, being more active prior to the mid 1960's than thereafter (hence a possible two-state division: more active versus less active), and being preferentially lower during El Niño years as compared to non-El Niño years. Because decadal averages of the frequency of intense hurricanes closely resemble those of average temperature anomalies for northern hemispheric and global standards and of the average temperature at the Armagh Observatory (Northern Ireland), a proxy for climatic change, it is inferred that the long-term trends of the annual frequency of intense hurricanes and temperature may be statistically related. Indeed, on the basis of 4- and 10-yr moving averages, one finds that there exists strong linear associations between the annual frequency of intense hurricanes in the Atlantic basin and temperature (especially, when temperature slightly leads). Because the long-term leading trends of temperature are now decidedly upward, beginning about mid 1980's, it is inferred that the long-term consequentional trends of the annual frequency of intense hurricanes should now also be upward, having begun near 1990, suggesting that a return to the more active state probably has already occurred. However, because of the anomalous El Niño activity of the early to mid 1990's, the switch from the less active to the more active state essentially went unnoticed (a marked increase in the number of intense hurricanes was not observed until the 1995 and 1996 hurricane seasons, following the end of the anomalous El Niño activity.) Presuming that a return to the more active state has, indeed, occurred, one expects the number of seasonal intense hurricanes during the present epoch (continuing through about 2012) to usually be higher than average (i.e., ≥2), except during El Niño-related seasons when the number usually will be less than average.

On the basis of Kevin Trenberth's quantitative definition for marking the occurrence of an El Niño (or La Niña), one can precisely identify by month and year the starts and ends of some 15 El Niño and 10 La Niña events during the interval of 1950–1997, an interval corresponding to the most reliable for cataloging intense hurricane activity in the Atlantic basin (i.e., those of category 3–5 on the Saffir-Simpson hurricane scale). The main purpose of this investigation is primarily two-fold: First, the statistical aspects of these identified extremes and the intervening periods between them (called "interludes") are examined and, second, the statistics of the seasonal frequency of intense hurricanes in comparison to the extremes and interludes are determined.

This study clearly demonstrates that of the last 48 hurricane seasons, 20 (42 percent) can be described as being "El Niño-related" (i.e., an El Niño was in progress during all, or part, of the year hurricane season—June–November), 13 (27 percent) as “La Niña-related” (i.e., a La Niña was in progress during all, or part, of the yearly hurricane season), and 15 (31 percent) as "interlude-related" (i.e., neither an El Niño nor a La Niña was in progress during any portion of the yearly hurricane season.) Combining the latter two subgroups into a single grouping called “non-El Niño-related” seasons, one finds that they have had a mean frequency of intense hurricanes measuring 2.8 events per season, while the El Niño-related seasons have had a mean frequency of intense hurricanes measuring 1.3 events per season, where the observed difference in the means is inferred to be statistically important at the 99.8-percent level of confidence. Therefore, as previously shown by William Gray and colleagues more than a decade ago using a different data set, there undeniably exists an El Niño-Atlantic hurricane activity relationship, one which also extends to the class of intense hurricanes. During the interval of 1950–1997, fewer intense hurricanes occurred during El Niño-related seasons (always ≤3 and usually ≤2, this latter value having been true for 18 of the 20 El Niño-related seasons), while more usually occurred during non-El Niño-related seasons (typically ≥2, having been true for 22 of the 28 non-El Niño-related seasons). Implications for the 1998 and 1999 hurricane seasons are discussed.
Current deterministic structural methods are easily applied to substructures and components, and analysts have built great design insights and confidence in them over the years. However, deterministic methods cannot support systems risk analyses, and it was recently reported that deterministic treatment of statistical data is inconsistent with error propagation laws that can result in unevenly conservative structural predictions. Assuming normal distributions and using statistical data formats throughout prevailing stress deterministic processes lead to a safety factor in statistical format, which integrated into the safety index, provides a safety factor and first order reliability relationship. The embedded safety factor in the safety index expression allows a historically based risk to be determined and verified over a variety of quasi-static metallic substructures consistent with the traditional safety factor methods and NASA Std. 5001 criteria.


Material Selection Guidelines to Limit Atomic Oxygen Effects on Spacecraft Surfaces provides guidelines in selecting materials for satellites and space platforms, designed to operate within the Low-Earth orbit environment, which limit the effects of atomic oxygen interactions with spacecraft surfaces.

This document should be treated as an introduction rather than a comprehensive guide since analytical and flight technologies continue to evolve, flight experiments are conducted as primary or piggyback opportunities arise, and our understanding of materials interactions and protection methods grows. The reader is urged to consult recent literature and current web sites containing information about research and flight results.

Multilayer Insulation Material Guidelines provides data on multilayer insulation materials used by previous spacecraft such as Spacelab and the Long-Duration Exposure Facility and outlines other concerns. The data presented in the document are presented for information only. They can be used as guidelines for multilayer insulation design for future spacecraft provided the thermal requirements of each new design and the environmental effects on these materials are taken into account.


During ground-based assembly and upon exposure to the space environment, optical surfaces accumulate both particles and molecular condensables, inevitably resulting in degradation of optical instrument performance.

Currently, this performance degradation (and the resulting end-of-life instrument performance) cannot be predicted with sufficient accuracy using existing software tools. Optical design codes exist to calculate instrument performance, but these codes generally assume uncontaminated optical surfaces. Contamination models exist which predict approximate end-of-life contamination levels, but the optical effects of these contamination levels can not be quantified without detailed information about the optical constants and scattering properties of the contaminant. The problem is particularly pronounced in the extreme ultraviolet (EUV, 300–1,200 Å) and far (FUV, 1,200–2,000 Å) regimes due to a lack of data and a lack of knowledge of the detailed physical and chemical processes involved. Yet it is in precisely these wavelength regimes that accurate predictions are most important, because EUV/FUV instruments are extremely sensitive to contamination.


This report summarizes the design, analysis, manufacture, and test of a subscale, low-profile composite aerospace dome under internal pressure. A low-profile dome has a radius-to-height ratio greater than the square root of two. This effort demonstrated that a low-profile composite dome with a radius-to-height ratio of three was a feasible design and could adequately withstand the varying stress states resulting from internal pressurization. Test data for strain and displacement versus pressure are provided to validate the design.
The natural space environment is characterized by complex and subtle phenomena hostile to spacecraft. Effects of these phenomena impact spacecraft design, development, and operation. Space systems become increasingly susceptible to the space environment as use of composite materials and smaller, faster electronics increases. This trend makes an understanding of space radiation and its effects on electronic systems essential to accomplish overall mission objectives, especially in the current climate of smaller/better/cheaper faster.

This primer outlines the radiation environments encountered in space, discusses regions and types of radiation, applies the information to effects that these environments have on electronic systems, addresses design guidelines and system reliability, and stresses the importance of early involvement of radiation specialists in mission planning, system design, and design review (part-by-part verification).
This document reports the one year science results for the Third United States Microgravity Payload (USMP–3). The USMP–3 major experiments were on a support structure in the Space Shuttle’s payload bay and operated almost completely by the Principal Investigators through telescience. The mission included a Glovebox where the crew performed additional experiments for the investigators. Together about seven major scientific experiments were performed, advancing the state of knowledge in fields such as low temperature physics, solidification, and combustion. The results demonstrate the range of quality science that can be conducted utilizing orbital laboratories in microgravity and provide a look forward to a highly productive space station era.

This document reports the results and analyses presented at the Microgravity Science Laboratory (MSL–1) One Year Science Review meeting held at Marshall Space Flight Center August 25–26, 1998. The MSL–1 payload first flew on the Space Shuttle Columbia (STS–83) April 4–8, 1997. Due to a fuel cell problem, the mission was cut short, and the payload flew again on Columbia (STS–94) July 1–17, 1997. The MSL–1 investigations were performed in a pressurized Spacelab module and the Shuttle middeck. Twenty-nine experiments were performed and represented disciplines such as fluid physics, combustion, materials science, biotechnology, and plant growth. Four accelerometers were used to record and characterize the microgravity environment. The results demonstrate the range of quality science that can be conducted utilizing orbital laboratories in microgravity.

The Microgravity Materials Science Conference was held July 14–16, 1998 at the Von Braun Center in Huntsville, AL. It was organized by the Microgravity Materials Science Discipline Working Group, sponsored by the Microgravity Research Division at NASA Headquarters, and hosted by the NASA Marshall Space Flight Center and the Alliance for Microgravity Materials Science and Applications. It was the third NASA conference of this type in the microgravity materials science discipline. The microgravity science program sponsored approximately 125 investigations and 100 principal investigators in FY98, almost all of whom made oral or poster presentations at this conference. The
conference’s purpose was to inform the materials science community of research opportunities in reduced gravity in preparation for a NASA Research Announcement scheduled for release in late 1998 by the Microgravity Research Division at NASA Headquarters. The conference was aimed at materials science researchers from academia, industry, and government. A tour of the Marshall Space Flight Center microgravity research facilities was held on July 16, 1998. This volume is comprised of the research reports submitted by the principal investigators after the conference.

CP—1999–209144 February 1999
The 1998 NASA Aerospace Battery Workshop. J.C. Brewer, Compiler. 19990032324N

This document contains the proceedings of the 31st annual NASA Aerospace Battery Workshop, hosted by the Marshall Space Flight Center on October 27–29, 1998. The workshop was attended by scientists and engineers from various agencies of the U.S. Government, aerospace contractors, and battery manufacturers, as well as international participation in like kind from a number of countries around the world.

The subjects covered included nickel-hydrogen, silver-hydrogen, nickel-metal hydride, and lithium-based technologies, as well as results from destructive physical analyses on various cell chemistries.

CP—1999–209146/VOL. 2 February 1999

The Space Transportation Association and NASA conducted a General Public Space Travel study between 1996 and 1998. During the study, a workshop was held at Georgetown University. Participants included representatives from the travel, aerospace, and construction industries. This report is the proceedings from that workshop. Sections include infrastructure needs, travel packages, policy related issues, and potential near-term activities.

CP—1999–209258 April 1999
Third Aerospace Environmental Technology Conference. A.F. Whitaker, D.R. Cross, S.V. Caruso, M. Clark-Ingram, Editors. Materials and Processes Laboratory. 19990075847N

The elimination of CFC’s, Halons, TCA, other ozone depleting chemicals, and specific hazardous materials is well underway. The phaseout of these chemicals has mandated changes and new developments in aerospace materials and processes. We are beyond discovery and initiation of these new developments and are now in the implementation phase. This conference provided a forum for materials and processes engineers, scientists, and managers to describe, review, and critically assess the evolving replacement and clean propulsion technologies from the standpoint of their significance, application, impact on aerospace systems, and utilization by the research and development community. The use of these new technologies, their selection and qualification, their implementation, and the needs and plans for further developments were presented.

CP—1999–209261 June 1999

This document contains the proceedings from the 11th International Conference on Atmospheric Electricity (ICAE 99), held June 7–11, 1999. This conference was attended by scientists and researchers from around the world.

The subjects covered included natural and artificially initiated lightning, lightning in the middle and upper atmosphere (sprites and jets), lightning protection and safety, lightning detection techniques (ground, airborne, and space-based), storm physics, electric fields near and within thunderstorms, storm electrification, atmospheric ions and chemistry, shumann resonances, satellite observations of lightning, global electrical processes, fair weather electricity, and instrumentation.

CP—1999–209628 September 1999

This document reports the one year science results for the Fourth United States Microgravity Payload (USMP–4). The USMP–4 major experiments were on a support structure in the Space Shuttle’s payload bay and operated almost completely by the Principal Investigators through telescience. The mission included a Glovebox where the crew performed additional experiments for the investigators. Together about eight major scientific experiments were performed, advancing the state of
knowledge in fields such as low temperature physics, solidification, and combustion. The results demonstrate the range of quality science that can be conducted utilizing orbital laboratories in microgravity and provide a look forward to a highly productive Space Station era.
19990040178N

19990040422N

19990040421N

19990042214N

19990041442N

19990008476N

CR—1999–209008  January 1999  
Thermal Control Surfaces Experiment. NAS8–38939. AZ Technology, Inc.  
19990021250N

CR—1999–209256  March 1999  
19990050998N

CR—1999–209426  July 1999  
19990064433N

CR—1999–209427  July 1999  
Guidelines for Proof Test Analysis. NAS8–39380. Southwest Research Institute.  
19990064431N

CR—1999–209428  July 1999  
19990063917N

CR—1999–209561  August 1999  
19990116211N

CR—1999–209562  January 1993  
19990066705N

CR—1999–209563  December 1993  

CR—1999–209565  April 1996  
19990071658N

19990064432N
CR—1999–209568 December 1998
19990092480N

19990116348N

CR—1999–209574 September 1999
Specification, Measurement, and Control of Electrical Switching Transients. EMC Compliance.
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Title</th>
<th>Location/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>PALEY, M.S.</td>
<td>USRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRAZIER, D.O.</td>
<td>SD40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADAMS, M.L.</td>
<td>ES82</td>
<td>Solar Flares and Their Prediction. For presentation at Colloquium at the University of Memphis, Memphis, TN, January 27, 1999.</td>
<td></td>
</tr>
<tr>
<td>ADAMS, M.L.</td>
<td>ES82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEVER, T.L.</td>
<td>ES82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADAMS, M.L.</td>
<td>ES82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAGYARD, M.J.</td>
<td>ES82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHOI, J.</td>
<td>Alabama A&amp;M University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WANG, W.S.</td>
<td>Alabama A&amp;M University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHAT, K.</td>
<td>Alabama A&amp;M University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAI, R.B.</td>
<td>Alabama A&amp;M University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHIELDS, A.D.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PENN, B.G.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRAZIER, D.O.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWIFT, W.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHOSH, K.K.</td>
<td>NRC/ES84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAMSEY, B.D.</td>
<td>ES84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALEXANDER, R.A.</td>
<td>PD21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEMAN, H.W.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALEXANDER, R.A.</td>
<td>ES82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANDERSON, R.R.</td>
<td>University of Iowa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GURNETT, D.A.</td>
<td>University of Iowa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRANK, L.A.</td>
<td>University of Iowa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIEGwartH, J.B.</td>
<td>University of Iowa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATSUMOTO, H.</td>
<td>Kyoto University, Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HASHIMOTO, K.</td>
<td>Kyoto University, Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KOJIMA, H.</td>
<td>Kyoto University, Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MURATA, T.</td>
<td>Ehime University, Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTAR, B.N.</td>
<td>University of Tennessee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAXWELL, D.</td>
<td>SD47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCHWANDEN, M.J.</td>
<td>Lockheed-Martin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALEXANDER, D.</td>
<td>Lockheed-Martin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HURLBURT, N.</td>
<td>Lockheed-Martin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEWMARK, J.S.</td>
<td>Space Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEUPERT, W.M.</td>
<td>Hughes SXT Corp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KLIMCHUK, J.A.</td>
<td>Naval Research Lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GARY, G.A.</td>
<td>ES82</td>
<td>3D-Stereoscopic Analysis of Solar Active Region Loops: II. SoHo/EIT Observations at Temperatures of</td>
<td></td>
</tr>
</tbody>
</table>

AUSTIN, R.A. ES82
RAMSEY, B.D. ES82
TSE, C.L.


AUSTIN, R.A. ES82
RAMSEY, B.D. ES82
TSE, C.L.


AUSTIN, R.E. ES84
RISING, J.J. RA20

X–33, Leading the Way to VentureStar™ in the Next Millennium. For presentation at 50th International Astronautical Congress by IAF, Amsterdam, The Netherlands, October 2–9, 1999.

BACHMANN, K.J. North Carolina State
CARDELINO, B.H. Spelman College
MOORE, C.E. SD47
CARDELINO, C.A. Georgia Institute of Technology
SUKIDI, N. North Carolina State
MCCALL, S. North Carolina State


BAILEY, J.C. Raytheon STX
BLAKESLEE, R.J. HR20
DRISCOLL, K.T. UAH

Evidence for the Absence of Conductivity Variations Above Thunderstorms. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BALEPIN, V. MSE Technology
PRICE, J. EP62
FILIPENCO, V. United Technologies

RL10-Based Combined Cycle for a Small Reusable Single-Stage-to-Orbit Launcher. For presentation at 14th International Symposium on Airbreathing Engines, Florence, Italy, September 5–10, 1999.

BANKS, C.E. ES75
ZHU, S. USRA
FRAZIER, D.O. ES75
PENN, B. ES75
ABDELDAYEM, H. USRA
HICKE, R. ES75
SARKISOV, S. Alabama A&M University

Electrical Field Effects in Phthalocyanine Film Growth by Vapor Deposition. For presentation at Conference for Optical Science, Engineering, & Instrumentation (SPIE), Denver, CO, July 18–23, 1999.

BANKSTON, C.D. ES84
CARLSTROM, J.E. University of Chicago


BARRET, C. EP63


BARRET, C. EP63


BARRET, C. TD40


BASKARAN, S. Raytheon ITSS
NOEVER, D. ES76

BATEMAN, M.G. USRA/HR20
BLAKESLEE, R.J. HR20
BAILEY, J.C. Pace and Waite
STEWART, M.F. UAH/HR20
BLAIR, A.K. UAH/HR20

High-Altitude Aircraft-Based Electric-Field Measurements Above Thunderstorms. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7-11, 1999.

BAUGHER, C. SD46
BENNETT, N. USRA/SD48
COCKRELL, D. SD46
JEX, F. SD46
MUSICK, B. SD46
POE, J. SD46
ROARK, W. Mevatec/SD46


BELLOMY-EZELL, J. Sverdrup
FARMER, J. ED25
BREEDING, S. Tec Masters, Inc.
SPIVEY, R. Tec Masters, Inc.


BELLONI, T. University of Amsterdam
VAN DEN ANCKER, M. University of Amsterdam
DIETERS, S. UAH
FENDER, R. University of Amsterdam
FOX, D.W. MIT
KOMMERS, J.M. MIT
LEWIN, W.H.G. MIT
VAN PARADIJS, J. UAH
HARMON, B.A. ES84


BELYAEV, M.Y. RSC-Energia
RULEV, D.N. RSC-Energia
STAZHKOV, V.M. RSC-Energia
MELTON, T.L. FD32

Principles for Payload Operation Integration on the International Space Station. For presentation at Tsiolkovski Conference, Kaluga, Russia, September 14-17, 1999.

BENDER, R.L. Qualis Corp.
D'AGOSTINO, M.G. TD63
ENGEL, B.A. Qualis Corp.
ENGEL, C.D. Qualis Corp.


BEST, S.R. ES01
ROSE, M.F. ES01


BICKLEY, F.P. EE61
SCHWINGHAMER, R.J. DA01


BLAKESLEE, R. SD60


BLAKESLEE, R.J. HR20
KOSHAK, W.J. HR20
BAILEY, J.C. Pace and Waite

Application of Linear Analytic Techniques for Lightning Location Retrieval for Advanced Lightning Direction Finder (ALDF) Networks. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7-11, 1999.

BLANCHARD, G.T. SE LA University
LYONS, L.R. ES83
SPANN, J.F., JR. ES83
REEVES, G.D. ES83

On the Predictability of Substorms Following Sharp Northward Turnings of the IMF. For presentation at Fall American Geophysical Union Meeting, San Francisco, CA, December 6-10, 1998.

BLANCHARD, G.T. Southeastern Louisiana
LYONS, L.R. University of California
SPANN, J.F., JR. SD50

BLYTH, A.M. HR20
CHRISTIAN, H.J., JR. HR20
LATHAM, J. HR20

Determination of Thunderstorm Anvil Ice Contents and Other Cloud Properties from Satellite Observations of Lightning. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BOCCIPPIO, D.J. HR20
CHRISTIAN, H.J. HR20


BOCCIPPIO, D.J. HR20
DRISCOLL, K. HR20
KOSHK, W.J. HR20
BLAKESLEE, R. HR20
BOECK, W. Niagara University
MACH, D. UAH
CHRISTIAN, H.J. HR20
GOODMAN, S.J. HR20


BOCCIPPIO, D.J. HR20
HECKMAN, S. HR20
GOODMAN, S.J. HR20

A Diagnostic Analysis of the Kennedy Space Center LDAR Network. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BOCCIPPIO, D.J. HR20
KOSHK, W.J. HR20
CHRISTIAN, H.J. HR20
GOODMAN, S.J. HR20

Land-Ocean Differences in LIS and OTD Tropical Lightning Observations. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BOECK, W.L. Niagara University
MACH, D.M. HR20

Optical Observations of Lightning in Northern India Himalayan Mountain Countries and Tibet. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BOLOTNIKOV, A. Caltech
RAMSEY, B.D. ES84

Studies of Light and Charge Produced by Alpha-Particles in High-Pressure Xenon. For publication in Nuclear Instruments and Methods in Physics Research A 00, 1999.

BOOKOUT, P.S. ED23
RICKS, E. ED23


BOTTCHER, M. Rice University
PETRY, D. Universitat Autonoma de Barcelona
CONNAUGHTON, V. SDS0
LAHTSA, A. Tuorla Observatory, Finland
PURISMO, T. Tuorla Observatory, Finland
RAITI, C.M. Strada Osservatorio, Italy
SCHRODER, F. Universitat Wuppertal, Germany
SILLANPA, A. Tuorla Observatory
SOBIRIO, G. Strada Osservatorio, Italy
ET AL.


BRADFORD, R.N. EO36

Voice Over the Net (VON) and Its Use in NASA's International Space Station Science Operation. For presentation at VON Fall 99 Conference, Atlanta, GA, September 27–30, 1999.

BRAINERD, J.J. ES84


BRAINERD, J.J. ES84
PENDLETON, G.N. ES84
MALLOZZI, R.S. ES84
BRIGGS, M.S. ES84
PREECE, R.D. ES84

The Role of the BATSE Instrument Response in
Creating the GRB E-Peak Distribution. For publication

BRAINERD, J.J. ES84

A Plasma Instability Theory of Gamma-Ray Burst

BRIGGS, M.S. ES84
BAND, D.L. ES84
PREECE, R.D. ES84
PACIESAS, W.S. ES84
PENDLETON, G.N. ES84

Analysis of Line Candidates in Gamma-Ray Bursts
Observed by BATSE. For publication in Proceedings
of INTEGRAL Conference, Amsterdam, The
Netherlands, Spring 1999.

BRIGGS, M.S. ES84
BAND, D.L.
KIPPEN, R.D.
KOUVELIOTOU, C.
VAN PARADUS, J.
SHARE, G.H.
MURPHY, R.J.
MATZ, S.M.
CONNORS, A.
ET AL.

Observations of GRB 990123 by the Compton Gamma-
Ray Observatory. For publication in Astrophysical

BRITTNACHER, M.J. University of Washington
FILLINGIM, M. University of Washington
CHUA, D. University of Washington
WILBER, M. University of Washington
PARKS, G.K. University of Washington
GERMANY, G.A. UAH/CSPAR
SPANN, J.F., JR. ES83

Global Dynamics of Dayside Auroral Precipitation in
Conjunction With Solar Wind Pressure Pulses. For
presentation at 1999 Spring AGU Meeting, Boston,

BRITTNACHER, M.J. University of Washington
WILBER, M. University of Washington
FILLINGIM, M. University of Washington
CHUA, D. University of Washington
PARKS, G.K. University of Washington
GERMANY, G.A. UAH/CSPAR
SPANN, J.F., JR. ES83

Global Observations of Poleward Moving Aurora on
the Dayside. For presentation at 1999 Fall AGU

BROWN, A.M. ED23
FERRI, A.A. Georgia Institute of Technology

BUECHLER, D. HR20
GOODMAN, S.J. HR20
KNUPP, K. HR20
MCCAUL, E.W., JR. HR20

BUECHLER, D.E. UAH
GOODMAN, S.J. HR20
CHRISTIAN, H.J. HR20
DRISCOLE, K. UAH
Optical Transient Detector (OTD) Observations of a Tornadic Thunderstorm. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

BUNE, A. USRA
GILLIES, D.C. ES75
LEHOCZKY, S. ES75
Effects of Gravity on the Double-Diffusive Convection During Directional Solidification of a Non-Dilute Alloy with Application to the HgCdTe. For presentation at SPIE's 44th Meeting, Denver, CO, July 18–23, 1999.

BUNE, A.V. USRA
SEN, S. USRA
STEFANESCU, D.M. University of Alabama
CURRERI, P.A. ES75
CARRUTH, M.R., JR.  VAUGHN, J.  
Increasing Importance of Material Electrical Interaction with the Space Environment. For presentation at 8th Symposium International on Materials in a Space Environment, Arcachon, France, June 8, 2000.

CARUSO, S.V.  

CATALINA, A.V.  SEN, S.  STEFANESCU, D.M.  CURRENRI, P.A.  KAUSSLER, W.F.  

CHAKRABARTI, S.  SCHMIDT, G.R.  THIO, Y.C.  HURST, C.M.  

CHANDLER, M.O.  CRAVEN, P.D.  MOORE, T.E.  

CHANDLER, M.O.  CRAVEN, P.D.  

CHEN, P.S.  BHAT, B.N.  

CHOU, S.-H.  

CHOWDHURY, D.P.  GARY, G.A.  

CHOWDHURY, D.P.  GARY, G.A.  AMBASTHA, A.K.  
Complex Halpha Loop Activity in a Long Duration Flare. For publication in Proceedings of Sac Peak Workshop/Conference, Sac Peak, AZ, October 20–23, 1998.

CHRISTENSEN, E.  NEMAN, T.E.  

Global Frequency and Distribution of Lightning as Observed by the Optical Transient Detector (OTD). For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.
CHRISTL, M.J. SD50  CISSOM, R.D. EO31
BENSON, C.M. SD50  MELTON, T.L. EO31
BERRY, F.A. SD50  SCHNEIDER, M.P. EO31
FOUNTAIN, W.F. SD50  LAPENTA, C.C. EO31
JOHNSON, J.S. USRA/SD50
MUNROE, R.B. University of Mobile
PARNELL, T.A. UAH
TAKEHASHI, Y. UAH
WATTS, J.W. SD50


CHU, T.P. Southern Illinois  CLARK-INGRAM, M. EH42
DIGREGORIO, A. Southern Illinois

CHUA, D. University of Washington  CLAYTON, J.L. ED63
PARKS, G.K. University of Washington
GERMANY, G.A. UAH/CSPAR
SPANN, J.F., JR. ES83


CHUA, D.H. University of Washington  CLOUD, D. Hamilton Standard
BRITTNACHER, M.J. ES83  BAGDIGIAN, R. FD21
GERMANY, G.A. UAH/CSPAR
SPANN, J.F., JR. ES83


CHUNG, T.J. UAH  COBB, S.D. ES75
SCHUNK, R.G. ED26  LEHOCZKY, S.L. ES75
CANABAL, F. UAH  SZOFRAN, F.R. ES75
HEARD, G. UAH  JONES, K.S. University of Florida


COBB, S.D. ES75  COBB, S.D. ES75
SZOFRAN, F.R. ES75  SZOFRAN, F.R. ES75
JONES, K.S. University of Florida  JONES, K.S. University of Florida
LEHOCZKY, S.L. ES75  LEHOCZKY, S.L. ES75

COBB, S.D. ES75
SZOFRAN, F.R. ES75
SCHAEFER, D.A. ES75


COBB, S.D. ES75
SZOFRAN, F.R. ES75
VOLZ, M.P. ES75


COBB, S.D. SD47
LEHOCZKY, S.L. SD47
SZOFRAN, F.R. SD47
JONES, K.S. University of Florida


COFFEY, V.N. ES83
CHANDLER, M.O. ES83
POLLOCK, C.J. ES83
MOORE, T.E. ES83


COFFEY, V.N. SD50
VAISBERG, O.L. SD50
GALLAGHER, D.L. SD50
CHANDLER, M.O. SD50


COHEN, C. HR20


COHEN, C. HR20


COLE, H. EB52
CHAMBERS, D. UAH


COLE, H.J. EB52
CHAMBERS, D.M. UAH
DIXIT, S.N. Lawrence Livermore
BRITTEN, J.A. Lawrence Livermore
SHORE, R.W. Lawrence Livermore
KAVAYA, M.J. HR20


COLE, J. TD15
SCHMIDT, G.R. TD40


COMFORT, R.H. UAH
RICHARDS, P.G. ES83
LIAO, J.-H. ES83

CROPELL, A. SD47
SCHWEIZER, M. SD47
KAIser, T. SD47
LICHTENSTEIGER, M. SD47
BENZ, K.W. SD47
Measurement of Temperature Fluctuations and Microscopic Growth Rates in a Silicon Floating Zone Under Microgravity. For presentation at American Association for Crystal Growth, Tucson, AZ, August 2, 1999.

CROPELL, A. NRC/SD47
DOLD, P. NRC/SD47
KAIser, T. NRC/SD47
SZOFRAN, F.R. SD47
BENZ, K.W. NRC/SD47

CROPELL, A. NRC/SD47
DOLD, E NRC/SD47
KAIser, T. NRC/SD47
SZOFRAN, E.R. SD47
BENZ, K.W. NRC/SD47

CROPELL, A. NRC/SD47
DOLD, E NRC/SD47
KAIser, T. NRC/SD47
SZOFRAN, E.R. SD47
BENZ, K.W. NRC/SD47

CROPELL, A. NRC/SD47
DOLD, E NRC/SD47
KAIser, T. NRC/SD47
SZOFRAN, E.R. SD47
BENZ, K.W. NRC/SD47

CROPELL, A. NRC/SD47
DOLD, E NRC/SD47
KAIser, T. NRC/SD47
SZOFRAN, E.R. SD47
BENZ, K.W. NRC/SD47
Quench Module Insert (QMI) and the Diffusion Module Insert (DMI) Furnace Development. For presentation at Space Technology and Application International Forum (STAIF-00), Albuquerque, NM, January 30, 2000.

CRUZEN, C.A. ED13
LOMAS, J.J. ED13

CUMNOCK, J.A.
SPANN, J.F., JR.
GERMANY, G.A.
BLOMBERG, L.G.
COLEY, W.R.
BRITTNACHER, M.J.
PARKS, G.K.
CLAUER, C.R.

CURRY, K.
AGGARWAL, M.D.
CHOOI, J.
WANG, W.S.
LAI, R.B.
PENN, B.G.
FRAZIER, D.O.

DAISUKE, N.
SULKANEN, M.E.
EVRARD, A.E.

Daly, M. ES76
SRIDHAR, R. ES76
RICHMOND, R. ES76

DELIBERTY, T. University of Delaware
CALLAHAN, J. University of Delaware
GUILLORY, A.R. SD60
JEDLOVEC, G. SD60

DERRICKSON, J.H. SD50
WU, J. Fayetteville State
CHRISTL, J.J. SD50
FOUNTAIN, W.F. SD50
PARNELL, T.A. UAH

DEXTER, C.E. RA50
KOS, L.D. PD32

DIMMOCK, J.O. UAH
ADAMS, M. ES82
SEVER, T. GHCC
Theories of the Universe: A One Semester Course for Honors Undergraduates. For presentation at Fourth Biennial History of Astronomy Workshop, University of Notre Dame, IL, July 2, 1999.

DING, R.J. EH23
OELOGETZ, P.A. Boeing

DISCHINGER, H.C., JR. ED42
TILGHMAN, N.C. LMCO
HAMMONS, M. TRW
HALE, J.P., II ED42
Duet: A Distributed Usability Lab Supporting Displays Development for Space Station. For presentation at 43rd
Annual Meeting, Human Factors & Ergonomics Society, Houston, TX, September 27–October 1, 1999.

DOBSON, C.C. EP93
SUNG, C.C. UAH

DOBSON, C.C. EP63
Laser-Induced Fluorescence Measurements of Translational Temperature and Relative Cycle Number by Use of Optically Pumped Trace-Sodium Vapor. For publication in Applied Optics, Volume 38, No. 18, Washington, DC, June 20, 1999.

DOLD, P. University of Freiburg
CROLL, A. University of Freiburg
SCHWEIZER, M. University of Freiburg
KAISER, T. University of Freiburg
SZOFRAN, F. ES75
NAKAMURA, S. NEC Fundamental
HIGIYA, T. NEC Fundamental
BENZ, K.W. University of Freiburg
The Role of Marangoni Convection for the FZ-Growth of Silicon. For publication in Proceedings of International Astronautical Federation, Melbourne, Australia, September 28–October 2, 1998.

DOLD, P. University of Freiburg
SCHWEIZER, M. University of Freiburg
SZOFRAN, F. ES75
BENZ, K.W. University of Freiburg

DOLD, P. NRC/SD47
CROLL, A. NRC/SD47
SZOFRAN, F.R. SD47
NAKAMURA, S. NRC/SD47
HIGIYA, T. NRC/SD47
BENZ, K.W. NRC/SD47
The Role of Marangoni Convection for the FZ-Growth of Silicon. For publication in Microgravity Quarterly, 1999.

DORNEY, D.J. Virginia Commonwealth
GRIFFIN, L.W. ED32
GUNDY-BURLET, K.L. Ames Research Center

DRAKE, J.J. ES84
SWARTZ, D.A. ES84
BEIERSDORFER, P. ES84
BROWN, G. ES84
KAHN, S. ES84

DRAKE, J.J. ES84
SWARTZ, D.A. ES84

DRISCOLL, K.T. HR20
CHRISTIAN, H.J. HR20
GOODMAN, S.J. HR20
A Comparison Between Lightning Activity and Passive Microwave Measurements. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

DUNN, M.C. Southern University
HUTCHINSON, S.L. EO66

DUNN, M.C. Southern University
HUTCHINSON, S.L. EO66

EDWARDS, D.L. EH12
EDWARDS, D.L. ED31
FINCKENOR, M.M. ED31


ELLIOITT, H.A. UAH
COMFORT, R.H. UAH
CHANDLER, M.O. ES83
CRAVEN, P.D. ES83
MOORE, T.E. GSFC


EMERSON, C.W. Southwest Missouri
LAM, N.S. Louisiana State
QUATTROCHI, D.A. HR20


FALCONER, D.A. ES82/UAH
MOORE, R.L. ES82
PORTER, J.G. ES82
HATHAWAY, D.H. ES82


ENGEBERG, R. ED73
LASSITER, J. ED73


FALCONER, D.A. ED73
MOORE, R.L. ED73
PORTER, J.G. ED73
HATHAWAY, D.H. ED73


ESTES, M. USRA
QUATTROCHI, D.A. HR20
LUVALL, J. HR20


FEDOSEYEV, A.I. UAH
KANSA, E.J. Embry-Riddle
MARIN, C. UAH
VOLZ, M.P. SD47
OSTROGORSKY, A.G. UAH

FILLINGIM, M. University of Washington  
BRITTNACHER, M. University of Washington  
PARKS, G.K. University of Washington  
GERMANY, G.A. UAH/CSPAR  
SPANN, J.F., JR. ES83


FILLINGIM, M.O. University of Washington  
BRITTNACHER, M. University of Washington  
PARKS, G.K. University of Washington  
GERMANY, G.A. UAH/CSPAR  
SPANN, J.F., JR. ES83  
LIN, R.P. ES83


FISHMAN, G.J. ES01

Observational Review of Gamma-Ray Bursts. For presentation at Results and Perspectives in Particle Physics, La Thuile, Italy, February 28–March 6, 1999.

FISHMAN, G.J. ES01


FISHMAN, G.J. ES01


FISHMAN, G.J. ES01


FLACHBART, R. EP63


FLACHBART, R.H. TD53


FORSYTHE, E.L. USRA

JUDGE, R.A. ES76

PUSEY, M.L. ES76


FRAZIER, D.O. ES01

PALEY, M.S. ES01

PENN, B.G. ES01

ABDELDAYEM, H.A. ES01

SMITH, D.D. ES01

WITHEROW, W.K. ES01

FRAZIER, D.O. ES01
PENN, B.G. ES01
PALEY, M.S. ES01
ABDELDAYEM, H.A. ES01
WITHEROW, W.K. ES01
SMITH, D.D. ES01

FRAZIER, D.O. ES01

FUNG, S.F. GSFC
BENSON, R.F. GSFC
CARPENTER, D.L. Stanford University
REINISCH, B.W. University of Massachusetts
GALLAGHER, D.L. SD50

GAINES, J. ED19
JOHNSTON, N. ED19

GALLAGHER, D.L. ES83
CRAVEN, P.D. ES83
HAJI, G. ES83
Modeling the Plasmasphere. For presentation at Sixth Huntsville Modeling Workshop, Guntersville, AL, October 26–30, 1998.

GALLAGHER, D.L. ES83
Modeling the Plasmasphere. For presentation at Colloquium/Meeting With the Russian Space Research Institute (IKI), Moscow, Russia, January 14, 1998.

GALLAGHER, D.L. ES83
GARCIA, R. TD64
GRIFFIN, L.W. TD64
WANG, T.-S. TD64
Overview of Fluid Dynamics Activities at the Marshall Space Flight Center. For presentation at Tenth Thermal and Fluids Analysis Workshop, Huntsville, AL, September 13–17, 1999.

GALLAGHER, D.L. ES83
GREEN, J.L. GSFC
FUNG, S.F. GSFC
BENSON, R.F. GSFC
GARY, G.A. ES82
ALEXANDER, D.A. ES82

University of Arizona
Stanford University
The Plasmasphere as “Seen” by the IMAGE Mission.
For presentation at International Union of Radio Science, Toronto, Canada, August 14, 1999.

KHAZANOV, G.V. University of Alaska

GALLAGHER, D.L. SD50
CRAVEN, P.D. SD50
COMFORT, R.H. UAH

GALLAGHER, D.L. SD50
CRAVEN, P.D. SD50
COMFORT, R.H. SD50

GALLAGHER, D.L. SD50
VAISBERG, O.L. SD50
COFFEY, V.N. SD50

GEARHART, R.B. ES84
CRAIG, A. ES84
WHEELER, J. ES84
SWARTZ, D.A. ES84


GEERTS, B. SD60
HEYMSFIELD, G.M. SD60
TIAN, L. SD60
HALVERSON, J.B. SD60
GUILLORY, A.R. SD60
MEJIA, M.I. SD60


GERASIMENKO, L.M. Russian Academy of Sciences
HOOVER, R.B. SD50
ROZANOV, A.Y. Russian Academy of Sciences
ZHEGALLO, E.A. Russian Academy of Sciences
ZHMUR, S.I. Russian Academy of Sciences


GERMANY, G.A. UAH/CSPAR
SWIFT, W. UAH
CREUTZBERG, F.
EASTES, R.
RICH, F.
SPANN, J.F., JR. ES83
BRITTNACHER, M. University of Washington
PARKS, G.K. University of Washington


GERMANY, G.A. UAH/CSPAR
RICHARDS, P.G. UAH
SPANN, J.F., JR. ES83
BRITTNACHER, M.J. University of Washington
PARKS, G.K. University of Washington


GERRISH, H.P., JR. TD40


GHOSH, K.K. NSA/NRC
RAMSEY, B.D. ES84
SIVARAM, C. Indian Institute of Technology


GHOSH, K.K. ES84
RAMSEY, B.D. ES84
AUSTIN, R.A. ES84
SOUNDARARAJAPERUMAL, S. Indian Institute of Technology


GHOSH, K.K. NSA/NRC
RAMSEY, B.D. ES82
SOUNDARARAJAPERUMAL, S. Indian Institute of Technology


GHOSH, K.K. NSA/NRC
RAMSEY, B.D. ES84
SOUNDARARAJAPERUMAL, S. Indian Institute of Technology

PUKALENTHI, S. Indian Institute of Technology


GHOSH, K.K. NSA/NRC
RAMSEY, B.D. SD50
SADUN, A.C.
SOUNDARARAJAPERUMAL, S. Indian Institute of Technology


GERMANY, G.A. UAH/CSPAR
RICHARDS, P.G. UAH
SPANN, J.F., JR. ES83
BRITTNACHER, M.J. University of Washington
PARKS, G.K. University of Washington

Total Lightning Activity Associated With Tornadic Storms. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

Pulse Profiles, Accretion Column Dips and a Flare in GX 1+4 During a Faint State. For publication in Astrophysical Journal, 1999.


JOY, M.K. 
RESEE, E.D. 
HOLDER, G.P. 
PATEL, S. 
HOLZAPFEL, W.L. 
COORAY, A.K. 


HAGYARD, M.J. 


HALL, C.E. 


HARMON, B.A. 

HARMON, B.A. ES84
FINGER, M.H. ES84
MCCOLLOUGH, M.L. USRA
ZHANG, S.N. UAH
PACIESAS, W.S. UAH
WILSON, C.A. ES84


HARMON, B.A. ES84
WILSON, C.A. ES84
FISHMAN, G.J. ES84
MCCOLLOUGH, M.L. USRA
ROBINSON, C.R. USRA
SAHI, M. USRA
PACIESAS, W.S. UAH
ZHANG, S.N. UAH


HATHAWAY, D.H. ES82
WILSON, R.M. ES82
REICHMANN, E.J. ES82


HATHAWAY, D.H. SD50


HATHAWAY, D.H. SD50


HENDRIX, T.D. Auburn University
SCHNEIDER, M.P. FD41


HERREN, K.A. EB52
GREGORY, D.A. UAH


HIGGINS, D.B. SD42
JAYROE, R.R. SD42
MCCARLEY, K.S. SD42


HJELLMING, R.M.
RUPEN, M.
MIODUSZEWSKI, A.J.
KUULKERS, E.
MCCOLLOUGH, M.L. USRA
HARMON, B.A.
BUSTON, M.
SOOD, R.
TZIOUMIS, A.


HOLMES, R.R. SD42
ELLIS, D. Glenn Research Center
MCKECHNIE, T. Plasma Processes Inc.
HICKMAN, R. Plasma Processes Inc.


HOLMES, R.R. EJ71
ELLIS, D. LeRC
MCKECHNIE, T. Plasma Processes Inc.


HOLT, J.M. ED25
CLANTON, S.E. Sverdrup

Overview of the Third Convection and Moisture Experiment (CAMEX-3). For presentation at 23rd AMS Conference on Hurricanes & Tropical Meteorology, Dallas, TX, January 9–15, 1999.


JACOBSON, D.N. SD70

JARZEMBSKI, M.A. HR20
SRIVASTAVA, V. USRA
Interference of Backscatter From Two Droplets in a Focused Continuous Wave CO2 Doppler Lidar Beam. For publication in Applied Optics: Lasers, Photonics and Environmental Optics, 1998.

JARZEMBSKI, M.A. HR20
SRIVASTAVA, V. USRA
Aerosol Backscatter From Airborne Continuous Wave CO2 Lidsars Over Western North America and the Pacific Ocean. For presentation at Tenth Biennial Coherent Laser Radar Technology & Applications Conference, Mt. Hood, OR, June 28, 1999.

JARZEMBSKI, M.A. HR20
SRIVASTAVA, V. USRA

JARZEMBSKI, M.A. HR20
PUESCHEL, R.F. Ames
SRIVASTAVA, V. USRA
MCCAUL, E.W., JR. USRA
CUTTEN, D.R. UAH
JEDLOVEC, G.J. HR20
ATKINSON, R.J. Lockheed Martin

JEDLOVEC, G.J. HR20
IWAI, H. UAH

JEDLOVEC, G.J. SD60
HAINES, S.L. UAH

JEKER, D.P. Swiss Federal Institute
PFISTER, L. Ames
BRUNNER, D. Royal Netherlands
BOCCIPPIO, D.J. HR20
PICKERING, K.E. University of Maryland
THOMPSON, A.M. Goddard
WERNLI, H. Swiss Federal Institute
SELKIRK, R.B. Ames
KONDO, Y. Nagoya University
ET AL.


JENKINS, A.A. Ion Corp.
ROMAN, M.C. ED62
Portable Fan Assembly for the International Space Station. For presentation at 29th International...

JOHNSON, C.L. RA10
LEIFER, S. RA10
Interstellar Exploration: Propulsion Options for Precursors and Beyond. For presentation at IAF, Amsterdam, Netherlands, October 4–8, 1999.

JOHNSON, C.L. RA10
ESTES, R.D. Smithsonian
LORENZINI, E. Smithsonian
MARTINEZ-SANCHEZ, M. MIT
SANMARTIN, J. University of Madrid

JOHNSON, C.L. RA10
ESTES, R. Harvard Smithsonian

JOHNSON, D.L. EL23
VAUGHAN, W.W. UAH

JOHNSON, L. TD15
CURTIS, L. TD15
BALLANCE, J. TD15
ESTES, R. Smithsonian
LORENZINI, E. Smithsonian
GILCHRIST, B. University of Michigan

JONES, M.R. University of Arizona
FARMER, J.T. ED25
BREEDING, S.P. Tec-Masters, Inc.
Evaluation of the Use of Optical Fiber Thermometers for Thermal Control of the Quench Module Insert. For presentation at Tenth Thermal & Fluids Analysis Workshop, Huntsville, AL, September 13–17, 1999.

JOY, M.K. SD50

JUDGE, R.A. ES76
SNELL, E.H. ES76

KAISER, N. UAH
CROELL, A. UAH
SZOFRAN, F.R. ES75
COBB, S.D. ES75
DOLD, P. Universitat Freiburg
BENZ, K.W. Universitat Freiburg

KAMENETZKY, R.R. ED31
FINCKENOR, M.M. ED31

KAMENETZKY, R.R. ED31
FINCKENOR, M.M. ED31

KATZ, I. Maxwell Technologies
DAVIS, V.A. Maxwell Technologies
Mandell, M.J. Maxwell Technologies
GARDNER, B.M. Maxwell Technologies
HILTON, J.M. Maxwell Technologies
MINOR, J. ED03
FREDRICKSON, A.R. Jet Propulsion
COOKE, D.L. Air Force Research

KAUFFMAN, W.J. EL23
HARDAGE, D.M. EL23

KAUKLER, W.F. UAH
CURRER, P.A. ES75
In-Situ X-Ray Microscopy of Phase and Composition Distributions in Metal Alloys During Solidification. For presentation at SPIE Conference, Denver, CO, July 18, 1999.

KAVAYA, M.J. HR20

KAVAYA, M.J. HR20

KAVAYA, M.J. HR20
SINGH, U.N. LARC

KETCHUM, A. Boeing
EMANUEL, M. Boeing
CRAMER, J. EP62
Summary of Rocketdyne Engine A5 Rocket Based Combined Cycle Testing. For presentation at Propulsion Engineering Research Center at MSFC, Huntsville, AL, October 26, 1998.

KEYS, A.S. EB52
FORK, R.L. UAH
NELSON, T.R. Air Force Research Lab
LOEHR, J.P. Air Force Research Lab

KHAZANOV, G.V. University of Alaska
KRIVORUTSKY, E.N. University of Alaska
GALLAGHER, D.L. SD50
Whistler Solitons in Plasma with Anisotropic Hot Electron Admixture. For publication in Plasma Physics, 1999.

KOCZOR, R.J. ES01
NOEVER, D.A. ES01
HISER, R. ES01

KOCZOR, R.J. ES01
NOEVER, D.A. ES01
ROBERTSON, G.A. ES01

KOLODZIEJCZAK, J.J. SD50
JOY, M.K. SD50
RUSSELL, C.H. GISON, W.M.

KOMMERS, J.M. MIT
LEWIN, W.H.G. MIT
**KOUVELIOTOU, C.** USRA/ES84  
**HALL, J.M.** Computer Science Corp.  
**SOLAKIEWICZ, R.J.** Chicago State University  
Laboratory Calibration of the Optical Transient Detector (OTD) and the Lightning Imaging Sensor (LIS). For publication in Journal of Atmospheric and Oceanic Technology, 1999.

**KOS, L.D.** PD31  
**KOZYRA, J.U.**  
**SONG, P.**  
**CHANDLER, M.O.** ES83  
**RUSSELL, C.T.**  
**STAHARA, S.S.**  
**SPREITER, J.R.**  
**SHUE, J.-H.**  

**KOSHA K, W.J. HR20**  
**KROES, R.L.** ES76  

**KOSHA K, W.J. HR20**  
**KROES, R.L.** ES76  

**KOSHA K, W.J. HR20**  
**KROME, M.E.** ED44  
**CLARK, T.L.** ED44  

**KOSHA K, W.J. HR20**  
**KRUPP, D.** ED13  
**SHTESSEL, Y.B.** UAH  

**KOSHA K, W.J. HR20**  
**KUNDROT, C.E.** ES76  
NASA's Biological Crystal Growth Program on the International Space Station. For presentation at 18th IUCR General Assembly and Congress, Glasgow, Scotland, August 7, 1999.
HAGYARD, M.J. ES82
HATHAWAY, D.H. ES82

LAK, T. Boeing
FLACHBART, R. EP63
NGUYEN, H. Boeing
MARTIN, J.J. EP63

LEE, J.A. EH23

LEE, J.A. EH23
PALEY, M.S. ES76/USRA

LEYDERMAN, A. University of Puerto Rico
PENN, B.G. ES76

LIGGIN, K. ED13
CLARK, P. ED13

LITCHFORD, F.J. EP63
THOMPSON, B.R. ERC Inc.
LINEBERRY, J.T. ERC Inc.

LITCHFORD, R. TD40
ROBERTSON, T. TD40
HAWK, C. UAH
TURNER, M. UAH
KOELFGEN, S. UAH

LONDON, J.R., III RA30
CREECH, S.D. RA30
LU, H.-I.  
ROBERTSON, F.R.  

LU, H.-I.  
ROBERTSON, F.R.  

LUMMERZHEIM, D. University of Alaska  
SPANN, J.F., JR.  
PARKS, G. University of Washington  
Global Imaging Mission. For presentation at Huntsville 98 Meeting, Guntersville, AL, October 29, 1998.

LUVALL, J.C.  
QUATTROCHI, D.A.  
RICKMAN, D.L.  

LYLES, G.M. RA10  
Technology Maturity Towards Highly Reusable Space Transportation Goals. For presentation at IAF, Amsterdam, Netherlands, October 4–8, 1999.

MACH, D.M.  
BOECK, W.L.  
CHRISTIAN, H.J.  
The Unit of Lightning. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

MACKERRAS, D. University of Queensland  
DARVENIZA, M. University of Queensland  
ORVILLE, R.E. University of Queensland  
WILLIAMS, E.R. University of Queensland  
GOODMAN, S.J. HR20  
Simulation of the Universal-Time Diurnal Variation of the Global Electric Circuit Charging Rate. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

MACLEOD, T.C. ES93  
HO, F.D. UAH  

MALONE, C.C. USRA  
CISZAK, E. USRA  
KARR, L.J. SD48  

MAZURUK, K. ES75  
GILLIES, D.C. ES75  
VOLZ, M.P. ES75  

MCCAUL, E.W., JR. HR20  
BUECHLER, D. HR20  
GOODMAN, S.J. HR20  
Cloud-to-Ground Lightning Characteristics of a Major Tropical Cyclone. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

MCCLURE, J.C. University of Texas, El Paso  
NUNES, A.C. EH23  
EVANS, D.M. University of Texas, El Paso  
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROBINSON, C.R.</td>
<td>USRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZHANG, S.N.</td>
<td>USRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HARMON, B.A.</td>
<td>ES84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACIESAS, W.S.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIETERS, S.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHENGCHAMMAN, S.</td>
<td>National Radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HJELLMING, R.M.</td>
<td>National Radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUPEN, M.</td>
<td>National Radio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET AL.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILLER, T.L.</td>
<td>HR20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANFIMOV, D.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LITVAK, M.L.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SANIN, A.B.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAEVICH, Y.Y.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRIGGS, M.S.</td>
<td>UAH/SD50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACIESAS, W.S.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FISCHMAN, G.J.</td>
<td>SD50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEEGAN, C.A.</td>
<td>SD50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET AL.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEEGAN, C.A.</td>
<td>ES84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PENDLETON, G.N.</td>
<td>ES84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALLOZZI, R.S.</td>
<td>ES84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Institution(s)</th>
<th>Title</th>
<th>Conference/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENDE, S.B.</td>
<td>University of CA-Berkeley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEETDERKS, H.</td>
<td>University of CA-Berkeley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FREY, H.U.</td>
<td>University of CA-Berkeley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOHAMADINEJAD, H.</td>
<td>Boeing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KNOX, J.C.</td>
<td>FD21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMITH, J.E.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

39

MOORE, R.L.  
FALCONER, D.A.  
PORTER, J.G.  
SUESS, S.T.  


MOORE, R.L.  
FALCONER, D.A.  
PORTER, J.G.  


MULLINS, L.D.  
STONE, R.L.  
EVANS, S.W.  


NADARAJAH, A.  
LI, H.  
PUSEY, M.L.  


NADLER, J.  

Inertial-Electrostatic Confinement (IEC) Fusion for Space Propulsion. For presentation at ASE Summer Faculty Fellow Program, The University of Alabama, Huntsville, AL, August 1999.

NAFTEL, J.C.  

X–33, Stepping Stone to Low Cost Access to Space. For presentation at International Space University, Nakhon Ratchasima, Thailand, August 9–14, 1999.

NELSON, T.R., JR.  
LOEHR, J.P.  

Air Force Research Lab

FORK, R.L.  
COLE, S.  
JONES, D.K.  
KEYS, A.S.  


NESMAN, T.E.  
DENNIS, J.  

Fastrac Gas Generator Testing. For presentation at Tenth Thermal & Fluids Analysis Workshop, Huntsville, AL, September 13–17, 1999.

NEWTON, E.K.  
MILLER, J.A.  


NEWTON, E.K.  


NICHOLAS, D.P.  


NIX, M.B.  

ESCHER, W.J.D.  


NOEVER, D.  
PHILLIPS, T.  
HORACK, J.M.  
PORTER, L.  

MYSZKA, E.  

Leonid's Particle Analyses from Stratospheric Balloon Collection on Xerogel Surfaces. For presentation at Leonid's Meteor International Conference, Santa Clara, CA, April 12, 1999.
NOEVER, D. ES76
BREMNER, C.

NOEVER, D. ES76
PHILLIPS, T. ES76
HORACK, J. ES76
MYSZKA, E. CSC Corporation
PORTER, L. ES76
JERMAN, G. ES76

Low-Density Silica Xerogel Capture of Leonids Meteor Storm Dust Candidates by Stratospheric Balloon Return. For presentation at Leonids Meteor International Conference, Santa Clara, CA, April 12, 1999.

NOEVER, D. SD48
BASKARAN, S. Raytheon

NOEVER, D.A. SD48

NOEVER, D.A. SD48

NOEVER, D.A. SD48

NOEVER, D.A. SD48
MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)


OBER, D. ES83
THOMSEN, M.F. ES83
GARY, P. ES83
GALLAGHER, D.L. ES83
MCCOMAS, D.J. ES83


OLUSEYI, H.M. Stanford University
WALKER, A.B.C., II Stanford University
PORTER, J.G. ES82
HOOVER, R.B. ES82
BARBEE, T.W., JR. Lawrence Livermore


PADIN, S. California Institute of Tech.
CARTWRIGHT, J.K. California Institute of Tech.
JOY, M. ES84


PAGE, A.T. ED26


PARKER, D. Hamilton Standard
O'CONNOR, E. Hamilton Standard
BADGIGIAN, R. FD21


PARKS, G.K. University of Washington
REME, H.
LIN, R.P.
SANDERSON, G.
GERMANY, G. UAH/CSPAR
SPANN, J.F., JR. ES83

BRITTNAECHER, M. University of Washington
MCCARTHY, M.
CHEN, L.J.
ET AL.


PEARSON, S.D. ED03
CLIFTON, K.S. ED03


PEROZZO, M.A.
KONNERT, J.H.
LI, H.
NADARAJAH, A.

PUSEY, M.L. ES76


PERRY, J.L. ED62
CARTER, R.N. Precision Combustion, Inc.
ROYCHOUDHURY, S. Precision Combustion, Inc.


POLITES, M.E. EB01
ET AL.


POLITES, M.E. EB01
ET AL.


POLITES, M.E. EB01
ET AL.

MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

PORTER, J.G. ES82
FALCONER, D.A. UAH/ES82
MOORE, R.L. ES82


PREECE, R.D. ES84
BRIGGS, M.S. UAH
MALLOZZI, R.S. UAH
PENDLETON, G.N. UAH
PACIESAS, W.S. UAH
BAND, D.L. University of CA-San Diego


PRICE, M.W. Corning Inc.
SCRIPA, R.N. UAB
LEHOCZKY, S.L. ES75
SZOFRAN, FR. ES75
HANSON, B. Corning Inc.

Determination of the Solid/Liquid Interface Shape and Resultant Radial Homogeneity in Directionally Solidified Hg0.89Mn0.11Te. For presentation at ACCGE–11, Tucson, AZ, July 31–August 1, 1999.

PRIMM, L. JA62
BERGMANN, A. Boeing


PRINCE, F.A. PP03


PRINCE, F.A. PP03


PRUEGER, G. Boeing
WILLIAMS, M. Boeing
CHEN, W. Boeing
PARIS, J. Boeing
STEWARD, E. Boeing
WILLIAMS, R. TD64

Unshrouded Centrifugal Turbopump Impeller. For presentation at Thermal & Fluids Analysis Workshop, Huntsville, AL, September 13–17, 1999.

PRYOR, D. TD15
HYDE, E.H. TD15
ESCHER, W.I.D. SAIC


PUSEY, M.L. ES76
SMITH, L. USRA
FORSYTHE, E. USRA


QIU, H.-L. California State
LAM, N.S. Lousiana State
QUATTROCHI, D.A. HR20
GAMON, J.A. California State


QUATTROCHI, D.A. HR20
LUVALL, J.C. HR20


QUATTROCHI, D.A. HR20
LUVALL, J.C. HR20

Introduction to This Special Issue on Geostatistics and Scaling of Remote Sensing. For publication in Photogrammetric Engineering and Remote Sensing, 1998/1999.

QUATTROCHI, D.A. HR20
JENSEN, J.R. University of South Carolina
MORAIN, S.A. University of New Mexico
WALSH, S.J. University of North Carolina
RIDD, M.K. University of Utah

RAMACHANDRAN, N. USRA/SD47
SU, C.-H. SD47

RAMSEY, B.D. ES84
AUSTIN, R.A. ES84
APPLE, J.A. ES84
DIETZ, K.L. ES84

RAMSEY, B.D. SD50
SHARMA, D.P. SD50
MEISNER, J. SD50
REINISCH, B.W. University of MA
HAINES, D.M. University of MA
BIBL, K. University of MA
CHENNY, G. University of MA
GALKIN, I.A. University of MA
HUANG, X. University of MA
MYERS, S.H. University of MA
SALES, G.S. University of MA
GALLAGHER, D.L. SD50
ET AL.

RAMSEY, B.D. SD50
BUONSANTO, M.J. University of MA
REINISCH, B.W. University of MA
HOLT, J.M. TD64
FENNELLY, J.A. University of MA
SCALI, J.J. University of MA
COMFORT, R.H. UAH/CSPAR
GERMANY, G.A. UAH
SPANN, J.F., JR. SD50
ET AL.

RAMSEY, B.D. SD50
ENGELHAUP, D. SD50
SPEEGLE, C.O. SD50
AUSTIN, R.A. SD50
KOLODZIEJCZAK, J.J. SD50
O’DELL, S.L. SD50
WEISSKOPF, M.C. SD50
RITTER, J. SD71
BRANLY, R. University of Central FL
THEODORAKIS, C. Texas A&M University
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Group</th>
<th>Presentation Title</th>
<th>Conference/Meeting Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICKHAM, J.</td>
<td>Texas A&amp;M University</td>
<td>A Novel Technique for Performing Space Based Radiation Dosimetry Using DNA—Results from GRaDEX-I and the Design of GRaDEX-II. For presentation at SSPPO Conference “Shuttle Small Payloads Project Office,” Annapolis, MD, September 1999.</td>
<td></td>
</tr>
<tr>
<td>SWARTZ, C.</td>
<td>Texas A&amp;M University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRIEDFED, R.</td>
<td>Austin State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACKERMAN, E.</td>
<td>Broward Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARRUTHERS, C.</td>
<td>Broward Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIGIROLAMO, A.</td>
<td>Broward Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET AL.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RITTER, T.M.</td>
<td>University of North Carolina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBB, S.D.</td>
<td>ES75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SZOFRAN, F.R.</td>
<td>ES75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBERTS, B.C.</td>
<td>EL23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBERTSON, F.R.</td>
<td>HR20</td>
<td>Systematic Differences Between Satellite-Based Precipitation Climatologies Over the Tropical Oceans. For presentation at 79th American Meteorological Society Annual Meeting, Dallas, TX, January 10-15, 1999.</td>
<td></td>
</tr>
<tr>
<td>FITZJARRALD, D.</td>
<td>HR20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCCCAUL, E.W.</td>
<td>USRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBINSON, M.B.</td>
<td>ES75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LI, D.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RATHZ, T.J.</td>
<td>UAH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBERTSON, G.A.</td>
<td>SD60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBERTSON, J.R.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBINSON, M.B.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVAGE, L.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOELLNER, W.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUIE, D.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROGER, J.R.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROBINSON, M.B.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVAGE, L.</td>
<td>ES76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROMAN, M.C.</td>
<td>ED62</td>
<td>Hamilton Standard</td>
<td></td>
</tr>
<tr>
<td>STEELE, J.W.</td>
<td>Hamilton Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARSH, R.W.</td>
<td>Hamilton Standard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VONJOUANNE, R.G. Boeing

SAYYAH, T. Sverdrup Corp.
SWANSON, G.R. ED25
SCHONBERG, W.P. UAH

ROTHENBERG, J. HR20
CUTFEN, D.R. HR20
HOWELL, B.F. HR20
HARDESTY, R.M. HR20
TRATT, D.M. HR20
DARBY, L.S. HR20

ROWE, S. ED53
WHITTEN, D. ED53
CLOYD, R. ED53
COPPENS, C. ED53
RODRIGUEZ, P. ED53

SCHAEFER, D.A. SD44
COBB, S.D. SD44
SZOFFRAN, F.R. SD44

RUF, J. TD64
CANABAL, F. TD64
HOLT, J. TD64

SCHMIDT, G.R. EP61
GERRISH, H.P. EP61
MARTIN, J.J. EP61

GUBAREV, M. NRC/SD50
KOLODZIEJCZAK, J. SD50
JOY, M. SD50
MACDONALD, C.A. University of Albany
GIBSON, W.M. University of Albany

RUSSELL, S.S. EH13
WALKER, J.L. EH13

SCHMIDT, G.R. TD40
THIO, Y.C. TD40
CHAKRABARTI, S. Pennsylvania State University

SCHMIDT, G.R. TD40
THIO, Y.C. TD40
CHAKRABARTI, S. Pennsylvania State University

SCHMIDT, G.R. TD40
GERRISH, H.P. TD40
MARTIN, J.J. TD40
SMITH, G.A. Pennsylvania State University
MEYER, K.J. Pennsylvania State University

SCHUNK, R.G. ED26
CHUNG, T.J. UAH
Parallelization of the Flow Field Dependent Variation Scheme for Solving the Triple Shock/Boundary Layer Interaction Problem. For presentation at Tenth Thermal & Fluids Analysis Workshop, Huntsville, AL, September 13–17, 1999.

SEN, S. USRA/SD47
KAUKLER, W. UAH
CATALINA, A. USRA/SD47
STEFANESCU, D.M. University of Alabama
CURRERI, P. ES75

SEN, S. USRA/ES75
JURETZKO, F. University of Alabama
STEFANESCU, D.M. University of Alabama
DHINDAW, B.K. IIT Khargpur, India
CURRERI, P.A. ES75


SEVER, T.L. HR20

SHARP, J.R. ED26

SHAW, E.J. VS20

SHIPLEY, A. University of Colorado
CASH, W. University of Colorado
OSTERMAN, S. University of Colorado
JOY, M.K. SD50
CARTER, J. SD50

SIEBENHAAR, A. Aerojet
BULMAN, M. Aerojet
JOHNSON, R. Aerojet
FAZAH, M. TD51
Demonstrating the Performance Benefits of the Strutjet RBCC for Space Launch Architectures. For presentation at ISABE Conference, Florence, Italy, September 1999.

SINGER, C. MP21

SINGH, A.D. Auburn University
LAKIN, D.R., II EB32
Sinha, G. Auburn University
NIGH, P. IBM
MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

Binning for IC Quality: Experimental Studies on the SEMATECH Data. For presentation at IEEE International Symposium on Defect and Fault VLSI Systems, Austin, TX, November 2–4, 1998.

SKELLEY, S. TD63
ZOLADZ, T. TD63

SLADE, K.N. Duke University
TINKER, M.L. ED23

SLEDD, A.M. FD31

SMITH, D.D. ES76
YOON, Y. University of Rochester
BOYD, R.W. University of Rochester
CROOKS, R.M. Texas A&M University
GEORGE, M. UAH

SODEN, B. NOAA/GFDL
TJEMKES, S. EUMETSAT
SAUNDERS, R. ECMWF
BATES, J. NOAA/CDC
ELLINGSON, B. University of Maryland

ENGLELEN, R. Colorado State
GARAND, L. AES
JACKSON, D. NOAA/CDC
JEDLOVEC, G. SD60
ET AL.

SOLAKIEWICZ, R.J. HR20
KOSHK, W.J. HR20
Time of Arrival Retrievals on an Oblate Spheroidal. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 6–11, 1999.

SPANN, J.F., JR. ES83
VENTURINI, C.C. UAH
COMFORT, R.H. University of Alabama
ABBAS, M.M. ES83

SMITH, D.D. SD50
YOON, Y. University of Rochester
BOYD, R.W. University of Rochester
CROOKS, R.M. Texas A&M University
GEORGE, M. UAH

SPANN, J.F., JR. ES83
SMITH, M. SD50
GERMANY, G.A. UAH/CSPAR
CHUA, D. University of Washington
BRITTNACHER, M.J. University of Washington
PARKS, G.K. University of Washington

SPANN, J.F., JR. ES83
BRITTNACHER, M.J. University of Washington
PARKS, G.K. University of Washington
GERMANY, G.A. UAH/CSPAR
**MSFC PAPERS CLEARED FOR PRESENTATION**

(Available only from authors. Dates are presentation dates.)

**GERMANY, G.A.**
**MENDE, S.**
**FREY, H.**
**CHENETTE, D.**
**SCHULTZ, M.**
**PETRINEC, S.**


**SPENCER, R.W.**
**BRASWELL, W.D.**
**CHRISTY, J.R.**

Localized Upper Tropospheric Warming During Tropical Depression and Storm Formation Revealed by the NOAA-15 AMSU. For presentation at American Meteorological Society, Dallas, TX, January 10–15, 1999.

**SPENCER, R.W.**
**BRASWELL, W.D.**
**CHRISTY, J.R.**

A New Era in Global Temperature Monitoring with the Advanced Microwave Sounding Unit (AMSU). For presentation at American Meteorological Society, Dallas, TX, January 10–15, 1999.

**SPENCER, R.W.**
**BRASWELL, W.D.**


**SPENCER, R.W.**
**PETRENKO, B.**


**SPRINGER, A.M.**


**SPRINGER, A.M.**


**STANLEY, T.T.**


**STEVENSON, B.A.**
**HORWITZ, J.L.**
**GERMANY, G.A.**
**CRAVEN, P.D.**
**CHANDLER, M.O.**
**SU, Y.J.**
**MOORE, T.E.**
**GILES, B.L.**
**PARKS, G.K.**

POLAR/TIDE Observations of Field Aligned 0+ Flows at 5000 km Altitude Over the Auroral Regions in Comparison to UVI Auroral Images. For presentation at AGU Meeting, Boston, MA, June 2, 1999.

STRAKEY, P.A. Air Force Research Lab.
TALLEY, D.G. Air Force Research Lab.
HUTT, J.J. TD61

SU, C.-H. ES75
FETH, S. Raytheon STX Corp.
HIRSCHFELD, D. New Mex. Inst. of Mining and Tech.
SMITH, T.M. New Mex. Inst. of Mining and Tech.
WANG, L.J. University of Tennessee
VOLZ, M.P. ES75
LEHOCZKY, S.L. ES75

SU, C.-H. ES75
GEORGE, M.A. UAH
PALOSZ, W. USRA
FETH, S. Raytheon STX Corp.
LEHOCZKY, S.L. ES75

SU, C.-H. ES75
FETH, S. Raytheon STX Corp.
VOLZ, M.P. ES75
MATYI, R. University of Wisconsin-Madison
GEORGE, M.A. UAH
BURGER, A. Fisk University
LEHOCZKY, S.L. ES75

SU, C.-H. SD47
SHA, Y.-G. USRA
VOLZ, M.P. SD47
CARPENTER, P. USRA
LEHOCZKY, S.L. SD47
SUSS, S.T.  SD50
NERNEY, S.  Ohio University

SUGGS, R.J.  SD60
JEDLOVEC, G.J.  SD60
LAPENTA, W.M.  SD60
HAINES, S.L.  UAH

SUITTS, M.W.  EH13
CLARK, L.  EH13
COX, D.  EH13

SWANSON, G.R.  ED25
ZACHARY, L.W.  Iowa State University
Experimentally Determined Crack Location and Mixed Mode Stress Intensity Factors. For presentation at 1999 SEM Annual Conference & Exposition, Cincinnati, Ohio, June 7–9, 1999.

SZOFRAN, E.R.  ES75

TANTON, G.  Morgan Research Corp.
KESMOBILE, R.  Morgan Research Corp.
BURDEN, J.  Morgan Research Corp.
SU, C.-H.  SD47
COBB, S.D.  SD47
LEHOCHZYK, S.L.  SD47

TAYLOR, E.W.  University of New Mexico
OSINSKI, M.  University of New Mexico
SVIMONISHVILI, T.  University of New Mexico
WATSON, M.  SD72
BUNTON, P.  SD72
PEARSON, S.D.  SD72
BILBro, J.  SD72

THIO, Y.C.F.  TD40
FREEZE, B.  TD40
KIRKPATRICK, R.C.  Los Alamos National Lab.
LANDRUM, B.  UAH
GERRISH, H.P., JR.  TD40
SCHMIDT, G.R.  TD40

THOMAS, R.J.  New Mex. Inst. of Mining and Tech.
KREHBIEL, P.R.  New Mex. Inst. of Mining and Tech.
RISON, W.  New Mex. Inst. of Mining and Tech.
HAMLIN, T.  New Mex. Inst. of Mining and Tech.
BOCCIPPIO, D.  SD60
GOODMAN, S.  SD60
CHRISTIAN, H.  SD60
Comparison of Ground-Based 3-Dimensional Lightning Mapping Observations with Satellite-Based LIS Observations in Oklahoma. For presentation at 11th International Conference on Atmospheric Electricity, Guntersville, AL, June 7–11, 1999.

TIMOFEEVA, T.V.  Spelman College
NESTEROV, V.N.  ANTIPIN, M.Y.
CLARK, R.D.  SD47
SANGHADASA, M.  CARDELINO, B.H.  University of New Mexico
MOORE, C.E. SD47

TOWNSEND, J.S. ED23
SMART, C. Hernandez Eng., Inc.

TRINH, H.P. EP62
CRAMER, J.M. EP62

VAUGHAN, T.P. EH43

VENTURINI, C.C. UAH/SD50
SPANN, J.F., JR. SD50
COMFORT, R.H. UAH/SD50
Preliminary Results from a Laboratory Study of Charging Mechanisms in a Dusty Plasma. For presentation at Colloquium/Physics Department of Auburn University, Auburn, AL, April 8, 1999.
VENTURINI, C.C. UAH/SD50
SPANN, J.F., JR. SD50
COMFORT, R.H. UAH/SD50
A Laboratory Study of the Charging/Discharging Mechanisms of a Dust Particle Exposed to an Electron Beam. For presentation at IPELS '99, Kreuth, Germany, August 11, 1999.

VENTURINI, C.C. UAH/SD50
SPANN, J.F., JR. SD50
COMFORT, R.H. UAH/SD50

VIKRAM, C.S. UAH
WITHEROW, W.K. ES76

VOLZ, M.P. ES75
MAZURUK, K. USRA

VOLZ, M.P.
SZOFRAN, F.R.
COBB, S.D.
RITTER, T.M.
University of North Carolina

WALKER, J.L. UAH
RUSSELL, S.S. EH13

WALLACE, K.S.
WILKERSON, D.

WANG, J.-C. Alabama A&M University
WATRING, D. ES71
LEHOCZKY, S.L. ES71
SU, C.-H. ES71
GILLIES, D.C. ES71
SZOFRAN, F.R. ES71

WANG, J.-C. Alabama A&M University
WATRING, D. ES71
LEHOCZKY, S.L. ES71
SU, C.-H. ES71
GILLIES, D.C. ES71
SZOFRAN, F.R. ES71
SHA, Y.-G. ES71

WANG, J.-C. Alabama A&M University
LEHOCZKY, S.L. ES75
SU, C.-H. ES75
Low Temperature Photoluminescence of PVT Grown ZnSe and ZnSeTe. For presentation at APS Centennial Meeting, Atlanta, GA, March 20–26, 1999.

WANG, T.-S. ED32

WATSON, M.D. EB52
JAYROE, R.R. EB51

WEISSKOPF, M.C. ES01

WEISSKOPF, M.C. ES01
The Study of Neutron Stars with the Chandra X-Ray Observatory. For presentation at The Neutron Star—Black Hole Connection, Crete, Greece, June 10, 1999.

WESTRA, D.G. ED25

WILKerson, G.W. Micro Craft, Inc.
PITALO, S.K. SD70

WILLIAMS, B.E. Ultramet
FORTINI, A.J. Ultramet
Tuffias, R.H. Ultramet
DUFFY, A.J. Ultramet
TUCKER, S.P. EP63

WILKerson, E.
LIN, S.
LABRADA, C.
CHRISTIAN, H.J., JR.
GOODMAN, S.
BOCCIPPIO, D.
DRISCOLL, K.

WILSON, C.A. ES84
FINGER, M.H. USRA

WILSON, C.A. ES84
FINGER, M.H. USRA
SCOTT, D.M. USRA

WILSON, C.A. SD50
FINGER, M.H. USRA
SCOTT, D.M. USRA
GRO J2058+42 Observations with BATSE and RXTE. For presentation at 5th Compton Symposium, Portsmouth, NH, September 15, 1999.

WILSON, R.B. ES84
FINGER, M.H. USRA
SCOTT, D.M. USRA
WILSON, C.A. ES84

WILSON, R.B. ES84
HARMON, B.A. SD50
FISHERMAN, G.J. SD50
ZHANG, S.N. UAH
PACIESAS, W.S. UAH
MCCOLLOUGH, M.L. USRA
The Earth Occultation Technique With the Burst and Transient Source Experiment. For presentation at Astronomical Data Analysis Software & Systems IX Conference, Kauai, HI, October 4, 1999.

WILSON, C.A. SD50
HARMON, B.A. SD50
FISHERMAN, G.J. SD50
ZHANG, S.N. UAH
PACIESAS, W.S. UAH
MCCOLLOUGH, M.L. USRA
WILSON, C.A. ES84

WILSON, R.B. ES84
HARMON, B.A. ES84
FINGER, M.H. USRA
WILSON, R.M. ES82

WILSON, R.M. ES82

WILSON, R.M. ES82

WILSON, R.M. ES82

WILSON, R.M. ES82

WILSON, R.M. SD50

WINGARD, C.D. EH32

WINGARD, C.D. ED34

WOODS, P. ES84
KOUVELIOTOU, C. USRA/ES84
VAN PARADIJS, J. UAH
PETERSON, W.K. Lockheed Martin

WOODS, P. ES84
KOUVELIOTOU, C. USRA/ES84
VAN PARADIJS, J. UAH
THOMPSON, C. USRA

HURLEY, K. University of Texas
KIPPEN, R.M. USRA
FINGER, M.H. UAH
BRIGGS, M.S. UAH
DIETERS, S. UAH
FISHMAN, G.J. ES84


WOODS, P. ES84
KOUVELIOTOU, C. USRA/ES84
VAN PARADIJS, J. UAH
FINGER, M.H. USRA
THOMPSON, C. USRA

WORLIKAR, A. Cape Simulations, Inc.
OVERHOLT, M. Cape Simulations, Inc.
MOTAKEF, S. Cape Simulations, Inc.
SU, C.-H. ES75
RAMACHANDRAN, N. ES75

Simulation of Dynamics of PVT Growth: ZnSe. For presentation at ACCGE–11, Tucson, AZ, August 1–6, 1999.

WRIGHT, M.E. SD43

WU, J. Fayetteville State
DERRICKSON, J.H. SD50
PARNELL, T.A. SD50
STRAYER, M.R. Oak Ridge Nat. Lab.


WUEST, M. Southwest Research
HULLDESTON, M.M. Southwest Research
BURCH, J.L. Southwest Research
DEMPSEY, D.L. Southwest Research
CRAVEN, P.D. ES83
CHANDLER, M.O. ES83
SPANN, J.F., JR. ES83
PETERSON, W.K. Lockheed Martin

ES83
ES83
ES83
ES83

Southwest Research
Southwest Research
Southwest Research
ES83
ES83
ES83

Lockheed Martin
COLLIN, H.L. Lockheed Martin
LENNAERTSSON, W. Lockheed Martin

YESILYURT, S. Cape Simulations, Inc.
VUJISIC, L. Cape Simulations, Inc.
MOTAKEF, S. Cape Simulations, Inc.
SZOFRAN, F.R. ES75
VOLZ, M.P. ES75

YOUNG, R.B. ES76
BRIDGE, K.Y. ES76
VAUGHN, J.R. ES76

YOUNG, R.B. ES76
BRIDGE, K.Y. ES76
VAUGHN, J.R. ES76
Beta-Adrenergic Receptor Expression in Muscle Cells. For presentation at Signal Transduction & Therapeutic Strategies, Houston, TX, February 6, 1999.

YOUNG, R.B. ES76
BRIDGE, K.Y. ES76
Electrical Stimulation Decreases Coupling Efficiency Between Beta-Adrenergic Receptors and Cyclic AMP Production in Cultured Muscle Cells. For presentation at The Congress on In Vitro Biology, New Orleans, Louisiana, June 6, 1999.

YOUNG, R.B. ES76
BRIDGE, K.Y. ES76
STRIETZEL, C.J. UAH
Effect of Electrical Stimulation on Beta-Adrenergic Receptor Population and Coupling Efficiency in Chicken and Rat Skeletal Muscle Cell Cultures. For publication in In Vitro Cellular and Developmental Biology, 1999.

YOUNG, R.B. ES76
BRIDGE, K.Y. ES76
VAUGHN, J.R. ES76

ZHU, S. USRA/ES75
BANKS, C.E. USRA/ES75
FRAZIER, D.O. ES75
PENN, B. ES75
ABDELDAAYEM, H. USRA
HICKS, R. ES75

ZHU, S. USRA/ES75
SU, C.-H. USRA/ES75
LEHOCZKY, S. ES75
GEORGE, M.A. University of Alabama

ZHU, S. USRA/ES75
SU, C.-H. USRA/ES75
LEHOCZKY, S.L. ES75
Morphology and Structure of ZnO Films Synthesized by Off-Axis Sputtering Deposition. For presentation at Conference for Optical Science, Engineering, & Instrumentation (SPIE) SD74, Denver, CO, July 18–23, 1999.

ZHU, S. USRA/SD40
SU, C.-H. USRA/SD40
LEHOCZKY, S.L. SD40
HARRIS, M.T. SD40
GEORGE, M.A. SD40
MCCARTY, P. SD40
Substrate Effects in Growth of Spitaxial ZnO Films. For presentation at International Workshop on ZnO, Dayton, Ohio, October 7–8, 1999.
Growth of Homoepitaxial ZnO Semiconducting Films.

ZHU, S. USRA/SD47
BANKS, C.E. SD47
FRAZIER, D.O. SD47
PENN, B. SD47
ABDELDAYEM, H. USRA/SD47
HICKS, R. SD47
BURNS, H.D. ED01
THOMPSON, G.W. UAH


ZHU, S. USRA/SD47
SU, C.-H. USRA/SD47
LEHOCZKY, S.L. SD47
PETERS, P. SD47
GEORGE, M.A. UAH


ZIMMERMAN, F.R. EH23
GERISH, H.
DAVIS, W.M. Boeing
HISSAM, D.A. TD62


ZIMMERMAN, F.R. EH23
HISSAM, D.A. TD62
GERISH, H.P. TD40
DAVIS, W.M. Boeing


ZISSA, D.E. EB52

INDEX

TECHNICAL MEMORANDA

Boulet, J.A.M .......................................................... 4
C. Wilkerson ............................................................. 1
Craig, L.D .................................................................. 4
Finckenor, M.M ...................................................... 2, 3
Fox, D.E .................................................................... 4
Goodloe, C.C ............................................................. 4
James, B.F .................................................................. 3
Johnson, D.L ............................................................. 4
Justus, C.G ............................................................... 3, 4
Kamenetzky, R.R .................................................. 2, 3
Kim, Y.K .................................................................... 1
Lake, R.E .................................................................... 1
Lee, J.A ...................................................................... 1
Leslie, F ..................................................................... 1
McGhee, D.S ............................................................. 2
Murphy, A.W ............................................................. 1
Nurre, G.S .................................................................. 1
Price, J.M .................................................................... 1
Ramachandran, N ..................................................... 1
Ray, C.D ...................................................................... 3
Salyer, B.H ................................................................. 3
Steeve, B.E ............................................................... 1
Suits, M ...................................................................... 2
Summers, F.G ............................................................. 2
Swaim, K.W ................................................................. 4
Swanson, G.R ............................................................. 1
Vaughn, J.A ............................................................... 2
Waits, Turner, J.E ..................................................... 2
Whorton, M.S ............................................................. 1
Wilkerson, C ............................................................... 1

TECHNICAL PUBLICATIONS

Ahmed, R ................................................................. 6
Borhani, N ................................................................. 7
Dooling, D ................................................................. 6
Finckenor, M.M .......................................................... 6
Goldberg, B ............................................................... 5
Hardage, D.M ............................................................. 7
Hart, J.E ..................................................................... 7
Howard, J.W., Jr ...................................................... 7
Kittelman, S ............................................................... 7
Leslie, F ..................................................................... 7

Miller, T ................................................................. 7
Ohlsen, D ................................................................. 7
Tveekrem, J ............................................................... 6
Verderaime, V ......................................................... 5
Wilson, R.M ............................................................. 5

CONFERENCE PUBLICATIONS

Bekey, I ................................................................. 9
Brewer, J.C ............................................................... 9
Caruso, S.V ............................................................. 9
Christian, H.J ........................................................... 9
Clark-Ingram, M ..................................................... 9
Cross, D.R ............................................................... 9
Curreri, P.A .............................................................. 8, 9
Ethridge, E.C ........................................................... 9
Gillies, D.C .............................................................. 8
Mankins, J ............................................................... 9
McCaulley, D.E ....................................................... 8, 9
O’Neil, D ................................................................. 9
Piland, W ................................................................. 9
Robinson, M.B ........................................................ 8
Rogers, T ................................................................. 9
Smitherman, D.V., Jr ............................................. 8
Stallmer, E ............................................................... 9
Walker, C ................................................................. 8
Whitaker, A.F ........................................................... 9

CONTRACTOR REPORTS

Aeroflex ................................................................. 13
Aerojet ASRM Division .......................................... 11
Auburn University .................................................. 11
AZ Technology, Inc ................................................. 11
Computer Sciences Corporation ............................. 11
Control Dynamics ................................................... 11
EMC Compliance .................................................... 12
Erl Research, Inc ..................................................... 11
Northrop Grumman Corporation ........................... 11
Science Applications International Corp ................. 12
Simpson Weather Associations, Inc .......................... 11
Southwest Research Institute .................................. 11
Teledyne Brown Engineering .................................. 12
University of Alabama in Huntsville ......................... 11
<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbas, M.M.</td>
<td>48</td>
</tr>
<tr>
<td>Abdeldayem, H.</td>
<td>14, 56, 57</td>
</tr>
<tr>
<td>Abdeldayem, H.A.</td>
<td>13, 26, 27</td>
</tr>
<tr>
<td>Abedian, B.</td>
<td>32</td>
</tr>
<tr>
<td>Ackerman, E.</td>
<td>45</td>
</tr>
<tr>
<td>Adams, G.P.</td>
<td>41</td>
</tr>
<tr>
<td>Adams, M.</td>
<td>23</td>
</tr>
<tr>
<td>Adams, M.L.</td>
<td>13, 30</td>
</tr>
<tr>
<td>Aggarwal, M.D.</td>
<td>13, 23</td>
</tr>
<tr>
<td>Akimov, V.V.</td>
<td>36</td>
</tr>
<tr>
<td>Alexander, C.</td>
<td>13</td>
</tr>
<tr>
<td>Alexander, D.</td>
<td>13</td>
</tr>
<tr>
<td>Alexander, D.A.</td>
<td>27</td>
</tr>
<tr>
<td>Alexander, R.</td>
<td>49</td>
</tr>
<tr>
<td>Alexander, R.A.</td>
<td>13</td>
</tr>
<tr>
<td>Alhorn, D.C.</td>
<td>13</td>
</tr>
<tr>
<td>Alves, J.R.</td>
<td>32</td>
</tr>
<tr>
<td>Ambastha, A.K.</td>
<td>19</td>
</tr>
<tr>
<td>Ames, G.H.</td>
<td>30</td>
</tr>
<tr>
<td>Anderson, B.J.</td>
<td>13</td>
</tr>
<tr>
<td>Anderson, R.R.</td>
<td>13</td>
</tr>
<tr>
<td>Anfimov, D.S.</td>
<td>39</td>
</tr>
<tr>
<td>Antar, B.N.</td>
<td>13</td>
</tr>
<tr>
<td>Antipin, M.Y.</td>
<td>51</td>
</tr>
<tr>
<td>Apple, J.A.</td>
<td>44</td>
</tr>
<tr>
<td>Aschwanden, M.J.</td>
<td>13</td>
</tr>
<tr>
<td>Atkinson, R.J.</td>
<td>33</td>
</tr>
<tr>
<td>Austin, R.A.</td>
<td>14, 28, 44</td>
</tr>
<tr>
<td>Austin, R.E.</td>
<td>14</td>
</tr>
<tr>
<td>Ayala, S.</td>
<td>52</td>
</tr>
<tr>
<td>Bachmann, K.J.</td>
<td>14, 18</td>
</tr>
<tr>
<td>Bagdigan, R.</td>
<td>20, 42</td>
</tr>
<tr>
<td>Bailey, J.</td>
<td>52</td>
</tr>
<tr>
<td>Bailey, J.C.</td>
<td>14, 15, 36</td>
</tr>
<tr>
<td>Baker, L.A.</td>
<td>48</td>
</tr>
<tr>
<td>Balepin, V.</td>
<td>14</td>
</tr>
<tr>
<td>Ballance, J.</td>
<td>34</td>
</tr>
<tr>
<td>Baumann, C.</td>
<td>18</td>
</tr>
<tr>
<td>Band, D.L.</td>
<td>17, 43</td>
</tr>
<tr>
<td>Banks, C.E.</td>
<td>14, 56, 57</td>
</tr>
<tr>
<td>Bankston, C.D.</td>
<td>14</td>
</tr>
<tr>
<td>Barbee, T.W., Jr.</td>
<td>42</td>
</tr>
<tr>
<td>Barret, C.</td>
<td>14</td>
</tr>
<tr>
<td>Baskaran, S.</td>
<td>14, 41</td>
</tr>
<tr>
<td>Bateman, M.G.</td>
<td>15</td>
</tr>
<tr>
<td>Bates, J.</td>
<td>48</td>
</tr>
<tr>
<td>Batts, W.</td>
<td>45</td>
</tr>
<tr>
<td>Baugher, C.</td>
<td>15</td>
</tr>
<tr>
<td>Beiersdorfer, P.</td>
<td>24</td>
</tr>
<tr>
<td>Bellomy-Ezell, J.</td>
<td>15</td>
</tr>
<tr>
<td>Belloni, T.</td>
<td>15</td>
</tr>
<tr>
<td>Belyaev, M.Y.</td>
<td>15</td>
</tr>
<tr>
<td>Bender, R.L.</td>
<td>15</td>
</tr>
<tr>
<td>Bennett, N.</td>
<td>15</td>
</tr>
<tr>
<td>Benson, C.M.</td>
<td>20</td>
</tr>
<tr>
<td>Benson, R.F.</td>
<td>27, 29</td>
</tr>
<tr>
<td>Benz, K.W.</td>
<td>22, 24, 34</td>
</tr>
<tr>
<td>Bergmann, A.</td>
<td>43</td>
</tr>
<tr>
<td>Bergstrom, J.W.</td>
<td>36</td>
</tr>
<tr>
<td>Bernstein, E.</td>
<td>41</td>
</tr>
<tr>
<td>Bero, E.</td>
<td>13</td>
</tr>
<tr>
<td>Berry, F.A.</td>
<td>20</td>
</tr>
<tr>
<td>Bertotto, D.</td>
<td>18</td>
</tr>
<tr>
<td>Best, S.R.</td>
<td>15</td>
</tr>
<tr>
<td>Bhat, B.N.</td>
<td>19</td>
</tr>
<tr>
<td>Bhat, K.</td>
<td>13</td>
</tr>
<tr>
<td>Bibi, K.</td>
<td>29, 44</td>
</tr>
<tr>
<td>Bickham, J.</td>
<td>45</td>
</tr>
<tr>
<td>Bickley, F.P.</td>
<td>15</td>
</tr>
<tr>
<td>Biloc, J.</td>
<td>51</td>
</tr>
<tr>
<td>Blair, A.K.</td>
<td>15</td>
</tr>
<tr>
<td>Blakeslee, R.</td>
<td>15, 16</td>
</tr>
<tr>
<td>Blakeslee, R.J.</td>
<td>14, 15, 19, 36</td>
</tr>
<tr>
<td>Blanchard, G.T.</td>
<td>15</td>
</tr>
<tr>
<td>Blomberg, L.G.</td>
<td>23</td>
</tr>
<tr>
<td>Blyth, A.M.</td>
<td>16</td>
</tr>
<tr>
<td>Board, S.A.</td>
<td>29</td>
</tr>
<tr>
<td>Boccioppio, D.J.</td>
<td>16, 19, 33, 51, 54</td>
</tr>
<tr>
<td>Boeck, W.L.</td>
<td>16, 19, 38</td>
</tr>
<tr>
<td>Boldi, B.</td>
<td>29</td>
</tr>
<tr>
<td>Bolotnikov, A.</td>
<td>16</td>
</tr>
<tr>
<td>Book, M.L.</td>
<td>32</td>
</tr>
<tr>
<td>Bookout, P.S.</td>
<td>16</td>
</tr>
<tr>
<td>Bottcher, M.</td>
<td>16</td>
</tr>
<tr>
<td>Boyd, R.W.</td>
<td>48</td>
</tr>
<tr>
<td>Bradford, R.N.</td>
<td>16</td>
</tr>
<tr>
<td>Brainerd, J.J</td>
<td>16, 17</td>
</tr>
<tr>
<td>Branly, R.</td>
<td>44</td>
</tr>
<tr>
<td>Braswell, W.D.</td>
<td>49</td>
</tr>
<tr>
<td>Breeding, S.</td>
<td>15</td>
</tr>
<tr>
<td>Breeding, S.P.</td>
<td>34</td>
</tr>
<tr>
<td>Bremer, C.</td>
<td>41</td>
</tr>
<tr>
<td>Bridge, K.Y.</td>
<td>56</td>
</tr>
<tr>
<td>Briggs, M.S.</td>
<td>17, 39, 43, 55</td>
</tr>
<tr>
<td>Britten, J.A.</td>
<td>21</td>
</tr>
<tr>
<td>Brittnacher, M.J.</td>
<td>17, 20, 23, 26, 28, 42, 48</td>
</tr>
<tr>
<td>Brown, A.M.</td>
<td>18</td>
</tr>
<tr>
<td>Brown, G.</td>
<td>24</td>
</tr>
<tr>
<td>Brunner, D.</td>
<td>33</td>
</tr>
<tr>
<td>Bryan, T.C.</td>
<td>32</td>
</tr>
<tr>
<td>Buechler, D.E.</td>
<td>18, 19, 29, 38</td>
</tr>
<tr>
<td>Bulman, M.</td>
<td>47</td>
</tr>
<tr>
<td>Name</td>
<td>Pages</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
</tr>
<tr>
<td>Hutchinson, S.L</td>
<td>24, 32</td>
</tr>
<tr>
<td>Hutt, J.J.</td>
<td>50</td>
</tr>
<tr>
<td>Hyde, E.H.</td>
<td>43</td>
</tr>
<tr>
<td>Hyers, R.W.</td>
<td>32</td>
</tr>
<tr>
<td>Ivanouchenkov, Y</td>
<td>32</td>
</tr>
<tr>
<td>Ivanov, V.</td>
<td>44</td>
</tr>
<tr>
<td>Iwai, H.</td>
<td>33</td>
</tr>
<tr>
<td>Jackson, D.</td>
<td>48</td>
</tr>
<tr>
<td>Jackson, J.L.</td>
<td>32</td>
</tr>
<tr>
<td>Jacobson, D.N.</td>
<td>33</td>
</tr>
<tr>
<td>Jamar, C.</td>
<td>39</td>
</tr>
<tr>
<td>Jarzembski, M.A</td>
<td>33</td>
</tr>
<tr>
<td>Jayroe, R.R., Jr.</td>
<td>31, 53</td>
</tr>
<tr>
<td>Jedlovec, G.J.</td>
<td>23, 33, 37, 48, 51</td>
</tr>
<tr>
<td>Jeker, D.P.</td>
<td>33</td>
</tr>
<tr>
<td>Jenkins, A.A.</td>
<td>33</td>
</tr>
<tr>
<td>Jensen, J.R.</td>
<td>44</td>
</tr>
<tr>
<td>Jerman, G.A.</td>
<td>41</td>
</tr>
<tr>
<td>Jex, F.</td>
<td>15</td>
</tr>
<tr>
<td>Johnson, C.L.</td>
<td>34</td>
</tr>
<tr>
<td>Johnson, D.L.</td>
<td>34, 52</td>
</tr>
<tr>
<td>Johnson, J.S.</td>
<td>20</td>
</tr>
<tr>
<td>Johnson, L.</td>
<td>34</td>
</tr>
<tr>
<td>Johnson, R.</td>
<td>47</td>
</tr>
<tr>
<td>Johnston, N.</td>
<td>27</td>
</tr>
<tr>
<td>Jones, D.K.</td>
<td>40</td>
</tr>
<tr>
<td>Jones, K.S.</td>
<td>20, 21</td>
</tr>
<tr>
<td>Jones, M.R.</td>
<td>34</td>
</tr>
<tr>
<td>Jones, S.D.</td>
<td>41</td>
</tr>
<tr>
<td>Joy, M.K.</td>
<td>30, 34, 35, 42, 46, 47</td>
</tr>
<tr>
<td>Judge, R.A.</td>
<td>26, 34</td>
</tr>
<tr>
<td>Junen, K.</td>
<td>22</td>
</tr>
<tr>
<td>Juretzko, F</td>
<td>47</td>
</tr>
<tr>
<td>Kahn, S.</td>
<td>24</td>
</tr>
<tr>
<td>Kaiser, N.</td>
<td>34</td>
</tr>
<tr>
<td>Kaiser, T.</td>
<td>22, 24</td>
</tr>
<tr>
<td>Kakar, R.</td>
<td>32</td>
</tr>
<tr>
<td>Kamenetzky, R.R</td>
<td>34, 52</td>
</tr>
<tr>
<td>Kang, J.</td>
<td>17</td>
</tr>
<tr>
<td>Kansa, E.J.</td>
<td>25</td>
</tr>
<tr>
<td>Karr, L.J.</td>
<td>22, 38</td>
</tr>
<tr>
<td>Katz, A.</td>
<td>18</td>
</tr>
<tr>
<td>Katz, I.</td>
<td>34</td>
</tr>
<tr>
<td>Kauffman, B.</td>
<td>39</td>
</tr>
<tr>
<td>Kauffman, W.J.</td>
<td>35</td>
</tr>
<tr>
<td>Kaukler, W.</td>
<td>47</td>
</tr>
<tr>
<td>Kaukler, W.F.</td>
<td>19, 35</td>
</tr>
<tr>
<td>Kavaya, M.J.</td>
<td>21, 35, 39</td>
</tr>
<tr>
<td>Kesmodel, R.</td>
<td>51</td>
</tr>
<tr>
<td>Ketchum, A.</td>
<td>35</td>
</tr>
<tr>
<td>Keys, A.S.</td>
<td>35, 40</td>
</tr>
<tr>
<td>Khazanov, G.V.</td>
<td>27, 35</td>
</tr>
<tr>
<td>Name</td>
<td>Pages</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Li, H.</td>
<td>40, 42</td>
</tr>
<tr>
<td>Liao, J.-H.</td>
<td>21</td>
</tr>
<tr>
<td>Lichtensteiger, M.</td>
<td>22</td>
</tr>
<tr>
<td>Liggin, K.</td>
<td>37</td>
</tr>
<tr>
<td>Lin, R.P.</td>
<td>26, 42</td>
</tr>
<tr>
<td>Lin, S.</td>
<td>54</td>
</tr>
<tr>
<td>Lineberry, J.T.</td>
<td>37</td>
</tr>
<tr>
<td>Litchford, E.J.</td>
<td>37</td>
</tr>
<tr>
<td>Litchford, R.</td>
<td>37</td>
</tr>
<tr>
<td>Litvak, M.L.</td>
<td>39</td>
</tr>
<tr>
<td>Loehr, J.P.</td>
<td>35, 40</td>
</tr>
<tr>
<td>Lomas, J.J.</td>
<td>23</td>
</tr>
<tr>
<td>London, J.R., III</td>
<td>37</td>
</tr>
<tr>
<td>Long, D.A.</td>
<td>32</td>
</tr>
<tr>
<td>Lorenzini, E.</td>
<td>34</td>
</tr>
<tr>
<td>Loupiolov, A.</td>
<td>44</td>
</tr>
<tr>
<td>Lowry, S.</td>
<td>18</td>
</tr>
<tr>
<td>Lu, H.-I.</td>
<td>38</td>
</tr>
<tr>
<td>Lummerzheim, D.</td>
<td>38</td>
</tr>
<tr>
<td>Luvall, J.</td>
<td>25</td>
</tr>
<tr>
<td>Luvall, J.C.</td>
<td>25, 38, 43</td>
</tr>
<tr>
<td>Lyles, G.M.</td>
<td>30, 38</td>
</tr>
<tr>
<td>Lyons, L.R.</td>
<td>15</td>
</tr>
<tr>
<td>Ma, X.</td>
<td>18</td>
</tr>
<tr>
<td>Macdonald, C.A.</td>
<td>46</td>
</tr>
<tr>
<td>Mach, D.M.</td>
<td>16, 38</td>
</tr>
<tr>
<td>Mackerras, D.</td>
<td>38</td>
</tr>
<tr>
<td>Macleod, T.C.</td>
<td>38</td>
</tr>
<tr>
<td>Mading, C.</td>
<td>29</td>
</tr>
<tr>
<td>Majumdar, A.</td>
<td>49, 52</td>
</tr>
<tr>
<td>Mallozzi, R.S.</td>
<td>16, 39, 43</td>
</tr>
<tr>
<td>Malone, C.C.</td>
<td>38</td>
</tr>
<tr>
<td>Mandell, M.J.</td>
<td>34</td>
</tr>
<tr>
<td>Marchol, P.</td>
<td>18</td>
</tr>
<tr>
<td>Marin, C.</td>
<td>25</td>
</tr>
<tr>
<td>Marsh, R.W.</td>
<td>45</td>
</tr>
<tr>
<td>Martin, J.J.</td>
<td>32, 37, 46, 47</td>
</tr>
<tr>
<td>Martinez-Sanchez, M.</td>
<td>34</td>
</tr>
<tr>
<td>Matlin, A.</td>
<td>29</td>
</tr>
<tr>
<td>Matsumoto, H.</td>
<td>13</td>
</tr>
<tr>
<td>Matyi, R.</td>
<td>29, 50</td>
</tr>
<tr>
<td>Matz, S.M.</td>
<td>17</td>
</tr>
<tr>
<td>Maxwell, D.</td>
<td>13</td>
</tr>
<tr>
<td>Mazuruk, K.</td>
<td>38, 53</td>
</tr>
<tr>
<td>McCall, C.</td>
<td>14</td>
</tr>
<tr>
<td>McCarrey, K.S.</td>
<td>31</td>
</tr>
<tr>
<td>McCarthy, M.</td>
<td>42</td>
</tr>
<tr>
<td>McCarty, P.</td>
<td>56</td>
</tr>
<tr>
<td>McCaul, E.W.</td>
<td>29, 45</td>
</tr>
<tr>
<td>McCaul, E.W., Jr.</td>
<td>18, 33, 38</td>
</tr>
<tr>
<td>McClaire, J.C.</td>
<td>38, 41</td>
</tr>
<tr>
<td>McCollough, M.L.</td>
<td>22, 31, 39, 54</td>
</tr>
<tr>
<td>McCollum, M.B.</td>
<td>39</td>
</tr>
<tr>
<td>McComas, D.J.</td>
<td>42</td>
</tr>
<tr>
<td>McKechnie, T.</td>
<td>31</td>
</tr>
<tr>
<td>McNider, R.T.</td>
<td>37</td>
</tr>
<tr>
<td>McPherson, J.W.</td>
<td>39</td>
</tr>
<tr>
<td>Meegan, C.A.</td>
<td>36, 39</td>
</tr>
<tr>
<td>Meisner, J.</td>
<td>44</td>
</tr>
<tr>
<td>Mejia, M.I.</td>
<td>28</td>
</tr>
<tr>
<td>Melton, T.L.</td>
<td>15, 20</td>
</tr>
<tr>
<td>Mende, S.B.</td>
<td>39, 49</td>
</tr>
<tr>
<td>Meyer, K.J.</td>
<td>46, 47</td>
</tr>
<tr>
<td>Miller, J.A.</td>
<td>40</td>
</tr>
<tr>
<td>Miller, T.L.</td>
<td>39</td>
</tr>
<tr>
<td>Minor, J.</td>
<td>35, 39</td>
</tr>
<tr>
<td>Mioduszewski, A.J.</td>
<td>31</td>
</tr>
<tr>
<td>Mitrofanov, I.G.</td>
<td>39</td>
</tr>
<tr>
<td>Mixson, C.D.</td>
<td>31</td>
</tr>
<tr>
<td>Mohamadinejad, H.</td>
<td>39</td>
</tr>
<tr>
<td>Moore, C.E.</td>
<td>14, 18, 52</td>
</tr>
<tr>
<td>Moore, R.L.</td>
<td>25, 40, 43</td>
</tr>
<tr>
<td>Moore, T.E.</td>
<td>19, 21, 22, 25, 49</td>
</tr>
<tr>
<td>Morain, S.A.</td>
<td>44</td>
</tr>
<tr>
<td>Motakef, S.</td>
<td>29, 55, 56</td>
</tr>
<tr>
<td>Mullins, L.D.</td>
<td>40</td>
</tr>
<tr>
<td>Munroe, R.B.</td>
<td>20</td>
</tr>
<tr>
<td>Murata, T.</td>
<td>13</td>
</tr>
<tr>
<td>Murphy, R.J.</td>
<td>17</td>
</tr>
<tr>
<td>Musick, B.</td>
<td>15</td>
</tr>
<tr>
<td>Myers, S.H.</td>
<td>44</td>
</tr>
<tr>
<td>Myszka, E.</td>
<td>40, 41</td>
</tr>
<tr>
<td>Nadarajah, A.</td>
<td>22, 40, 42</td>
</tr>
<tr>
<td>Nadler, J.</td>
<td>40</td>
</tr>
<tr>
<td>Naftel, J.C.</td>
<td>40</td>
</tr>
<tr>
<td>Nakamura, S.</td>
<td>24</td>
</tr>
<tr>
<td>Ndap, J.-O.</td>
<td>18</td>
</tr>
<tr>
<td>Nelson, T.R., Jr.</td>
<td>35, 40</td>
</tr>
<tr>
<td>Nerny, S.F.</td>
<td>50, 51</td>
</tr>
<tr>
<td>Nesman, T.E.</td>
<td>19, 40, 45</td>
</tr>
<tr>
<td>Nesterov, V.N.</td>
<td>51</td>
</tr>
<tr>
<td>Neuert, W.M.</td>
<td>13</td>
</tr>
<tr>
<td>Newmark, J.S.</td>
<td>13</td>
</tr>
<tr>
<td>Newton, E.K.</td>
<td>13, 40</td>
</tr>
<tr>
<td>Nguyen, H.</td>
<td>37</td>
</tr>
<tr>
<td>Nicholas, D.P.</td>
<td>40</td>
</tr>
<tr>
<td>Nigh, P.</td>
<td>47</td>
</tr>
<tr>
<td>Nix, M.B.</td>
<td>40</td>
</tr>
<tr>
<td>Noci, G.</td>
<td>50</td>
</tr>
<tr>
<td>Noever, D.</td>
<td>14, 35, 40, 41</td>
</tr>
<tr>
<td>Nolen, A.</td>
<td>34</td>
</tr>
<tr>
<td>Nunes, A.C., Jr.</td>
<td>38, 41</td>
</tr>
<tr>
<td>Ober, D.</td>
<td>42</td>
</tr>
<tr>
<td>O'Connor, T.E.</td>
<td>42</td>
</tr>
</tbody>
</table>
This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY99. It also includes papers of MSFC contractors.

All of the NASA series reports may be obtained from the NASA Center for AeroSpace Information (CASI), 7121 Standard Drive, Hanover, MD 21076–1320

The information in this report may be of value to the scientific and engineering community in determining what information has been published and what is available.