Laboratory for Atmospheric and Space Physics

Activity Report
2004
University of Colorado at Boulder
TABLE OF CONTENTS

Introduction ...........................................................................................................-3
A Message from the Director ..................................................................................-3
LASP: A Brief History ............................................................................................-3
LASP Appropriated Funding ....................................................................................-5
Research Support ....................................................................................................-5
LASP Faculty .............................................................................................................-6
Visiting Scholars ....................................................................................................-6
Research/Technical/Administrative Support Staff .................................................-7
2004 Graduates ........................................................................................................-8
Graduate Students ...................................................................................................-8
Undergraduate Students .........................................................................................-9
Faculty Research Interests ......................................................................................-9
Faculty Activities ....................................................................................................-14
Faculty Honors/Awards ..........................................................................................-18
Courses Taught by LASP Faculty ...........................................................................-18
Colloquia and Informal Talks ..................................................................................-19
Publications .............................................................................................................-22
Papers Presented at Scientific Meetings .................................................................-26
Sponsored Programs ...............................................................................................-33
Introduction

Please visit LASP’s Website: http://lasp.colorado.edu for the latest developments at LASP plus many other interesting links.

A Message from the Director

LASP continues to grow and evolve. New scientific programs have been added and new staff members have joined the Lab. We can point with pride to the successful designing, building, and testing of new spacecraft instruments (as reported in these pages) and we can also report on scientific results from many ongoing projects. The combination of experiments, data analysis, and theoretical investigations provides for a remarkably complete scientific approach here at LASP. Based on our widely recognized engineering, mission operations, and information systems work and our science leadership, we believe that LASP is nearly unique in its abilities as a space research enterprise.

In order to carry out the wide range of work undertaken by the Laboratory, it has been clear for some time that more office and laboratory space has been (and certainly will be) necessary. We have been supported by the University administration to help meet space needs. I am very pleased to report that the Chancellor and the Provost have helped to move aggressively toward meeting our office and laboratory space needs. We are now nearing completion of a new building adjacent to the present LASP Space Technology Building in the Research Park. This new facility, which will be ready for occupancy on 30 November 2005, will provide new space comparable in area to the present LSTR building and should allow us to move smoothly to the next level of engineering, operations, and science that we have been striving for.

There are many challenges that must be confronted as an organization grows. Adding new people and facilities while maintaining the traditional LASP culture is a top concern for all of us. I have appreciated the strong support and thoughtful advice in these matters both by the University administration and by our External Advisory Committee (chaired by Prof. L.A. Fisk). I have particularly appreciated the patience and good spirit of our tireless staff here at LASP.

We express our appreciation to the University, to the local Boulder community, and to the national agencies for the continuing support that we receive. We look forward to working actively with the broad space research community in many new endeavors. Thank you to the students, staff, and faculty of LASP for all their hard work. Special thanks go to Ann Alfaro for her thorough and careful efforts in preparing this report.

Daniel N. Baker

LASP: A Brief History

In 1946-47, a handful of American universities joined with the military and with industry to initiate the era of space exploration. The University of Colorado was one of those pioneering universities. The first experiments to be performed in space were lofted by sub-orbital rockets. A key obstacle to these first rocket flights was providing a stabilized platform for cameras and other experiments. With support from the Naval Research Center and the Air Force Cambridge Research Laboratory (now the Phillips Laboratory), the University of Colorado formed a research group called the Upper Air Laboratory (UAL) to solve this problem. Their solution — called the biaxial pointing platform — cleared the way for some of the first major scientific discoveries made in space. Researchers and engineers from the UAL flew experiments into space on over 50 rocket flights before Sputnik. By 1965, the UAL had grown substantially. Along with this growth came a new building on campus and a new name: the Laboratory for Atmospheric and Space Physics. The public is invited to tour our facility and to observe the work that LASP does today.
LASP SPACE RESEARCH CYCLE

Scientists study data, publish discoveries and formulate new questions.

100 students

1.50 professionals

Engineers design and build flight hardware.

Mission operations manages spacecraft and collects data.
**LASP Appropriated Funding**

During the period 1/1/2004 to 12/31/2004 LASP appropriated funding totaled $44M for support of 144 grants and contracts.

**Research Support: 2004 Fiscal Year**

<table>
<thead>
<tr>
<th>Source of Funding</th>
<th>Total Grant Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal Agencies:</strong></td>
<td></td>
</tr>
<tr>
<td>Department of Energy</td>
<td>$2,706</td>
</tr>
<tr>
<td>Naval Research Laboratory</td>
<td>$15,600</td>
</tr>
<tr>
<td>National Aeronautics and Space Administration</td>
<td>$12,431,868</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>$324,364</td>
</tr>
<tr>
<td><strong>Non-Federal Agencies:</strong></td>
<td></td>
</tr>
<tr>
<td>Arizona State University</td>
<td>$110,828</td>
</tr>
<tr>
<td>Ball Aerospace Systems Division</td>
<td>$641,588</td>
</tr>
<tr>
<td>Boston University</td>
<td>$812,000</td>
</tr>
<tr>
<td>Hampton University</td>
<td>$26,715,238</td>
</tr>
<tr>
<td>Jet Propulsion Laboratory</td>
<td>$1,239,966</td>
</tr>
<tr>
<td>Johns Hopkins University</td>
<td>$215,000</td>
</tr>
<tr>
<td>Northrop Grumman</td>
<td>$567,000</td>
</tr>
<tr>
<td>Science Systems and Applications, Inc.</td>
<td>$19,396</td>
</tr>
<tr>
<td>Southwest Research Institute</td>
<td>$185,000</td>
</tr>
<tr>
<td>Universities Space Research Association</td>
<td>$75,000</td>
</tr>
<tr>
<td>University of California at Berkeley</td>
<td>$688,927</td>
</tr>
<tr>
<td>University of Arizona</td>
<td>$36,278</td>
</tr>
<tr>
<td>Washington University</td>
<td>$241,113</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td>$44,321,872</td>
</tr>
</tbody>
</table>
Daniel N. Baker
Director

LASP Faculty

Laila Anderssen  Mihály Horányi  Peter Pilewskie
Linnea M. Avallone  Brian Hynek  Cora E. Randall
Frances Bagenal  Bruce M. Jakosky  Erik C. Richard
Charles A. Barth  Shri Kanekal  E. Joshua Rigler
Yi-Jin Su Caton  Greg Kopp  Gary J. Rottman (Ret.)
Emily CoBabe-Ammann  Kristopher Larsen  David W. Rusch
Joshua E. Colwell  George M. Lawrence (Ret.)  Theodore Sarris
Peter Delamere  Steven W. Lee  Nicholas M. Schneider
Erica Ellingson  Xinlin Li  Byron Smiley
Scot Elkingston  William E. McClintock  Jamison Smith
Francis G. Eparvier  Tom McCollom  Martin Snow
Robert Ergun  Sara Martinez-Alonzo  Miodrag Sremcevic
Stefan Eriksson  Michael Mellon  A. Ian F. Stewart
Larry W. Esposito  Michael Mills  Glen R. Stewart
Janet C. Green  Keiji Ohtsuki  Gary E. Thomas (Ret.)
Jerald W. Harder  Robert T. Pappalardo  Owen B. Toon
Lynn Harvey  Alexander Pavlov  Robert Weigel
Noel Hinners  William Peterson  Thomas N. Woods
Mihály Horányi

Visiting Scholars

Dr. Joseph Ajello, Jet Propulsion Laboratory, Pasadena, California
Dr. Antal Juhasz, Research Inst. for Particle and Nuclear Physics, Hungary
Dr. Mark Lewis, Trinity University, San Antonio, Texas
Dr. Dolores Maravilla, Instituto de Geofisica, UNAM, Mexico
Professor Kap-Soo Oh, Chungnam National Univ., Daejeon, South Korea
Dr. Wayne Pryor, Central Arizona College, Arizona
Camilla Saetre, University of Bergen, Norway
Research/Technical/Administrative Support Staff

Ann Alfaro
Gregg Allison
Michael D. Anfinson
Judy Antman
Richard Arnold
Dennis L. Baker
Susan Batiste
Helmut P. Bay
Christopher Belting
Timothy Bendel
Robert P. Biro
Laura Bloom
Bryce Bolton
Mary Bolton
James S. Bowers
Brian D. Boyle
Shelley Bramer
Catherine Brant
Vanessa Briggs
Nancy Brooks
Jeff Brown
Patrick Brown
Chelsea Bryant
Michael T. Callan
Zachary G. Castleman
Tinapan Chanthawanich
Steve Chappell
Matthew Chojnacki
Wesley Cole
Lillian Connelly
Christopher Converse
Pamela Crandall
David Crotser
John Daspit
Randal L. Davis
Kip W. Denhalter
John Donnelly
Sharon Dooley
Michael Dorey
Virginia Drake
Kathryn Eason
Peter Elespuru
Steve Erickson
Brian Evans
Phillip L. Evans
Jack Faber
Tawnya Ferbiak
Tim Flaherty
John Fontenla
Rodney Freeman
David Gathright
Michael Gehmeyr
Vanessa George
Judith (Dede) Gleason
Jeff Graw
Ken Greist
Elizabeth Grogan
Bonnie Kae Grover
Roger Gunderson
Scott Gurst
Christine Hathaway
Karl Heuerman
Caroline Himes
Rose A. Hoag
Timothy Holden
Bonnie W. Hotard
Vaughn Hoxie
Andrew Hunt
Curtis Iscaro
Christian Jeppeson
Edgar Johansson
James Johnson
Alain J. Jouchoux
David E. Judd
Michelle Kelley
Marjorie K. Klamp
Barry Knapp
Richard Kohnert
Jay Kominek
Bret Lamprecht
Mark R. Lankton
Sally Lasater
Ryan Lewis
Jennifer Loper
Debra McCabe
Beth McGilvray
Sherry McGlochlin
Michael McGrath
James Mack
Melanie McKinney
Jack Marshall
Patrick Meagher
Willie Mein
Russell Meinzer
Hannah Meyer
Nathaniel Miller
Jerel Moffatt
Steve P. Monk
Aref Nammar
Brian Nuel
Sara Ohrman
John M. Padgett
Chris Pankratz
Norman C. Perish
Nicole Ramos
Thomas Reese
Dwight Reinhardt
Randy Reukauf
Pat Ringrose
Hans Rohner
Marissa Rusinek
Timothy Ruske
Cynthia Russell
Jill Ryan
Sean Ryan
Judith A. Salazar
Patti Sicken
Karen Simmons
John D. Smith
Thomas Sparn
Stephen Steg
Kenneth Stevens
Gail Tate
Trenton Taylor
Brian Templeman
Jane Thompson
Wayne Tighe
Susan Tower
Janet Tracy
Matt Triplett
Dale Troyer
Scott A. Tucker
Karen B. Turk
Gregory Ucker
Douglas Vincent
Tracy Vincent
Pamela J. Wagner
Paul Weidmann
Heather Weisacosky
James Westfall
Neil White
Kenneth Wiehe
Ann Williams
Ann Windnagel
Heather Reed Withnell
Peter Withnell
Donald Woodraska
Maria Woody
Ed Wullschleger
Alan Yehle
Jason Young
Jennifer Young
Torsten Zorn
2004 Graduates

Amy Barr, Ph.D., Astrophysical and Planetary Sciences
December 2004
"Convection in Ice I with non-Newtonian Rheology: Application to the Icy Galilean Satellites"
Thesis Advisor: Frances Bagenal

Erika Barth, Ph.D., Astrophysical and Planetary Sciences
December 2004
"Microphysical Modeling of Clouds in Titan’s Atmosphere"
Thesis Advisor: Larry W. Esposito

Corinne Krauss, Ph.D., Astrophysical and Planetary Sciences
December 2004
"Electrical Discharges near the Surface of Mars: Laboratory Experiments and Numerical Modeling"
Thesis Advisor: Mihaly Horanyi

Erin Joshua Rigler, Ph.D., Aerospace Engineering Sciences
December 2004
"Predicting Radiation Belt Electron Flux with Adaptive Multi-Input Linear Filters"
Thesis Advisor: Daniel N. Baker

Graduate Students

Austin Barker  Anna Haugsjaa  Katherine Nauert
Charles Bardeen  Gregory Holsclaw  Tania Nowell
Amy Barr  David Hume  Heather Passe
Erika Barth  David James  Radu Popescu
Todd Bradley  Christian Jeppesen  Manny Presicci
Chelsey Bryant  Amy Jordan  Than Putzig
Jeremy Carnahan  Lars Kalnajs  Licia Ray
Phillip Chamberlin  Bruce Kindel  Erica Raine
Steve Chappell  Corinne Krauss  Lonnie Riesberg
Zane Crawford  Nantawadee Kungsakawin  Eric Schleicher
Christopher Cully  Lindsey Link  Karen Schmidt
Sean Davis  Timothy Lloyd  Sara Sheffler
Nathan Farr  Kevin McGouldrick  Karie Michelle Shipley
Anselm Fernandez  Kevin McWilliams  Cynthia Shaw Singleton
Tiffany Finley  Brian Madge  Hanna Sizemore
Brandi Gamblin  Lansing Madry  Andrew Steffl
Jennifer Gannon  Daniel Main  Heather Tollerud
Brennan Gantner  Rebecca Matichuk  Jennifer Uchida
Damhnait Gleeson  Patrick Meagher  John Weiss
Tyler J. Goudie  Colin Mitchell  Kaj Williams
Alexa Halford  Nate Murphy

8
Undergraduate Students

Keegan Amyx  Jessica Harano  Andrew Poppe
Allyson Bieryla  Aaron Hayden  Emily Kramer Quinty
Jerry Brown  Andrew Jenkins  Kathryn Rash
Lottie Brown  Matthew Kelly  Tyler Redick
Nicholas Bunch  Ervin Krauss  Zachary Rickert
Jeremy Carnahan  Otto Krauss  Lauren Roemer
Anthony Carosa  Davis Lawry  Alex Romanov
Rhain Carpenter  Kurt Lorhammer  Matthew Route
Scott L. Chamberlin  Jennifer Lowell  Patricia Rubi
Marcus Choi  Sharon Lutz  Joshua Rubin
Matthew Chojnack  Kevin McWilliams  Paul Ryan
Patrick Clary  Ben Marsh  Molly Selting
Matthew Colgan  Danielle Massey  Laura Shaner
Pamme Crandall  Patrick Meagher  Patrick Smith
Zane Crawford  McCall Mullen  Jordan Spatz
Jane Crayton  Michael Neelard  Michelle Stempel
Kimdoo Dang  John Neice  Linda Te
Janice Denard  Jonathan Nikkel  Edward Thiemann
Nathan Doyle  Kostas Pagratis  Jane Thompson
Jason Durrie  Heather Passe  Mark Trafton
Loren Eason  Curtis Paxton  Dustin Trail
Attila Elteto  Brian Payne  Thu Yen Tran
Neal Evans  Kolt Peightal  Kelsey Urban
Nathan Farber  Giordin Perlman  Cody Vaudrin
Elizabeth Grogan  Amy Pham  Veronica Vertucci
Jenny Guo  Michael Phan  Marcus Wojtkowiak
Rachel Guryn  William Pisano  Radu Popescu
Andrew Hahn

Faculty Research Interests

Linnea Avallone
Experimental and theoretical studies of tropospheric and stratospheric chemistry, particularly of halogens and related species. Analyzing measurements of chemical species to understand dynamical processes in the stratosphere and troposphere. Development of instrumentation for autonomous in situ measurements of trace species related to understanding the lifetimes of anthropogenic pollutants.
Linnea.Aqwallone@lasp.colorado.edu (303) 492-5913

Frances Bagenal
Magnetic fields and plasma environments of solar system objects—mainly Jupiter and the Sun, but more recently, other planets, comets and asteroids.
Fran.Bagenal@lasp.colorado.edu (303) 492-2598

Daniel N. Baker
Research in space instrument design and calibration, space physics data analysis, and magnetospheric modeling. Study of plasma physical and energetic particle phenomena in the magnetospheres of Jupiter and Mercury, along with the plasma sheet and magnetopause boundary regions of the Earth’s magnetosphere. Analysis of large data sets from spacecraft; involvement in missions to Earth’s deep magnetotail and comets; the study of solar wind-magnetospheric energy coupling; theoretical modeling of magnetotail instabilities. Study of magnetosphere-atmosphere coupling; applying space plasma physics to study of astrophysical systems. Research to understand space weather and effects on human technology. Teaching of space physics.
and public policy, as well as public outreach to space technology community and general public.  
daniel.baker@lasp.colorado.edu (303) 492-4509

Charles A. Barth  
Planetary ultraviolet spectroscopy; observation and theory of nitric oxide in the Earth's upper atmosphere; research on planetary atmospheres.  
charles.barth@lasp.colorado.edu (303) 492-7502

Joshua E. Colwell  
Origin and evolution of planetary rings, observational and theoretical studies of planetary rings, comets, and satellites including Earth's moon. Impact processes on asteroids, satellites, and ring particles. Dynamics of dust in ring-satellite systems. Dusty plasma dynamics. Thermal models of airless bodies.  
josh.colwell@lasp.colorado.edu (303) 492-6805

Scot Elkington  
Space physics theory and modeling, primarily understanding energetic particle dynamics in the inner magnetosphere in the context of radial diffusion and adiabatic transport processes within the radiation belts. Also working on models of plasma sheet access of energetic particles to the inner magnetosphere through convection/substorm injection, development of physical space weather radiation belt models, and magnetohydrodynamic/particle simulations.  
Scot.Elkington@lasp.colorado.edu (303) 735-0810

Erica Ellingson  
The study of the evolution of galaxies, galaxy clusters, and quasars. Investigation of dark matter in distant galaxy clusters, the evolution of the galaxies in these clusters, and the properties of the intra-cluster gas. Observations with ground-based telescopes and use of several orbiting space observatories, extensive computer analysis and modeling.  
erica.ellingson@lasp.colorado.edu (303) 492-6610

Francis G. Eparvier  
Research interests include the aeronomy of the upper atmosphere, the effects of solar irradiance and particle flux variability on the upper atmosphere, and the sources of that solar variability. Approaches include rocket and satellite measurements of the solar outputs and of the atmosphere, and data analysis and theoretical modeling. Currently Co-Investigator on the Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics (TIMED) satellite Solar EUV Experiment (SEE).  
Frank.Eparvier@lasp.colorado.edu, (303) 492-4546, http://stripe.colorado.edu/~eparvier

Larry W. Esposito  
Observational and theoretical studies of planetary atmospheres and rings; chemistry and dynamics of the Venus clouds; waves in Saturn's rings; numerical methods for radiation transfer.  
Larry.Esposito@lasp.colorado.edu (303) 492-7325

Jerald Harder  
Measurement and interpretation of solar spectral irradiance; Development of space-borne prism spectrometers.  
Jerry.harder@lasp.colorado.edu (303) 492-1891

Mihaly Horanyi  
Dusty space and laboratory plasmas. Electrodynamic processes and their role in the origin and evolution of the solar system. Comets, planetary rings, plasma surface interactions at moons and asteroids. Aerosol charging, in situ and remote observations of dust.  
mihaly.horanyi@lasp.colorado.edu (303) 492-6903

Bruce M. Jakosky  
Teaching and research activities focus on understanding the nature of planetary surfaces and atmospheres and the possibility for the existence of life in the universe. Specific activities include teaching undergraduate and graduate courses, training graduate students, research and grant activity pertaining to planetary science and exobiology, leading the campus effort in astrobiology, exploring the nature of the interactions between science and society, and outreach to the public.  
bruce.jakosky@lasp.colorado.edu (303) 492-8004

Greg Kopp  
Greg.Kopp@lasp.colorado.edu, 303-735-0934

George M. Lawrence  
Physical chemistry, laboratory spectroscopy, experiment design and analysis, signal condition-
ing, vacuum technology, IR detectors, UV detectors, imaging detectors, microchannel plates.
george.lawrence@lasp.colorado.edu (303) 492-5389

**Steven W. Lee**

Development of computer techniques for analysis and correlative study of multiple remote-sensing data sets; Digital image processing techniques; Physics of atmosphere/surface interactions; Mechanisms and rates of eolian sediment transport; Effects of topography on regional atmospheric circulation; Educational outreach: incorporating planetary science into K-12 curricula.
steve.lee@lasp.colorado.edu (303) 492-5348

**Xinlin Li**

Space physics, data analysis and modeling. Especially interested in understanding the dynamics of relativistic electrons in the magnetosphere: the source, loss, and transportation of these MeV electrons; also interested in charged particle injections into inner magnetosphere during magnetic storms and substorms, and magnetosphere-atmosphere coupling due to energetic particle precipitations.
Xinlin.Li@lasp.colorado.edu (303) 492-3514

**William E. McClintock**

Observational Astrophysics - Ultraviolet observations of the outer atmospheres of cool stars and the very local (d<20pc) interstellar medium. Ultraviolet Observations of Planetary Atmospheres. Development of state-of-the-art instrumentation for high resolution spectroscopy for the 900-2500/ wavelength range.
bill.mcclintock@lasp.colorado.edu (303) 492-8407

**Michael Mellon**

The history of water on Mars, the martian permafrost, surface-atmosphere interactions and the martian climate. Periglacial geology and geophysics on Earth and Mars. Use of ice-related geomorphic features as an indicating of the distribution of subsurface ice. Antarctic analogs to martian geomorphology. Laboratory research in transport processes in frozen soils, including gas diffusion and solute migration and the effects of water vapor, ice, and adsorbate on transport physics. Remote sensing and thermophysical properties of planetary regoliths, with specific emphasis on martian surface material. Planetary surface temperature behavior and geothermal heat flow.
Mike.mellon@lasp.colorado.edu (303) 492-1711

**Michael Mills**

Research has focused on stratospheric sulfate aerosol. The current research tool is a 2D microphysical model of the troposphere, stratosphere, and mesosphere. A primary goal has been to assess the sources of the nonvolcanic stratospheric sulfate layer, and understand anthropogenic contributions. Because of the role of aerosol in stratospheric chemistry and radiative balance, this knowledge of its sources is critical to understanding global change. Recent efforts have attempted to understand discrepancies between observed and calculated aerosol mass at the top of the layer. Other work has examined the causes of observed particle nucleation in polar winter, the implications for aerosol of recently measured photolysis rates for H2SO4 and SO3, and volcanic aerosol as a potential source for polar mesospheric clouds.
Mike.mills@colorado.edu (303) 492-7767

**Keiji Ohtsuki**

Theoretical studies of planet formation; origin and dynamical evolution of ring-satellite systems.
Keiji.Otsuki@lasp.colorado.edu (303) 492-0260

**Cora E. Randall**

Primary interests include atmospheric chemistry and dynamics, mainly of the stratosphere, and secondarily of the mesosphere and troposphere. Work is experimental in nature, relying on data from remote sensing satellites. The emphasis is on ozone, NO2, and aerosol data from the Polar Ozone and Aerosol Measurement (POAM) instrument as well as from the Stratosphere Aerosol and Gas Experiment (SAGE). Measurements from instruments on the Upper Atmosphere Research Satellite (UARS) and the Solar Mesosphere Explorer (SME) are also used. Other interests include the spectroscopy of comets and laboratory polarization measurements.
cora.randall@lasp.colorado.edu (303) 492-8208

**Gary J. Rottman**

Accurately measure the solar spectral irradiance (Principal Investigator on sounding rockets, UARS, EOS, SORCE, TSIM, and GLORY and Co-Investigator on SME, TIMED, and SDO). Special emphasis is given to solar variability on all time scales and to comparisons of the solar irradiance with the output of other late type stars. Past work has concentrated on the ultraviolet (λ<300) irradi-
The general fields of spectroscopy and aeronomy, emphasizing the measurements of minor constituents and aerosols in planetary atmospheres such as nitric oxide and ozone and the physical and chemical phenomena which determine their densities and temporal variations. Research in the atmospheric sciences including stratospheric, mesospheric, and thermospheric data analysis and modeling. Application of the principles of molecular and atomic spectroscopy in the measurement of ultraviolet, visible, and near-infrared emission and absorption features to obtain understanding of atmospheric phenomena. Current research involves the determination of atmospheric processes affecting ozone and the reevaluation of ozone trends from long-term satellite measurements.

David W. Rusch

Gary.rottman@lasp.colorado.edu (303) 492-8324

A. Ian F. Stewart

The investigation by ultraviolet emissions of the aeronomy of planetary and satellite atmospheres, cometary comae, and Io's plasma torus.

Glen R. Stewart

Origin and evolution of the solar system, with an emphasis on modeling the solid-body accretion of the terrestrial planets and the solid cores of the giant planets. Accretion of the Moon after a giant impact on the Earth. Modeling of satellite wakes and spiral density waves in planetary rings. Nonlinear dynamics of the three-body problem as applied to problems in solar system dynamics.

Gary E. Thomas

Research concerning the middle atmosphere of Earth, in particular the mesosphere (50-100 km). Of interest are noctilucent clouds which occur in the high-latitude summertime mesopause region, around 83 km. These clouds were observed for five years by a CU LASP ultraviolet experiment onboard the LASP SME satellite, and more recently by instruments onboard the POAM II and UARS (Upper Atmosphere Research Satellite) spacecraft. In the last decade, interest involves global change in this region, possibly caused by anthropogenic emissions and by climate changes in the troposphere. Critical parameters studied are solar UV flux, water vapor, temperature and ozone which are being monitored by instruments onboard the UARS.

Nicholas M. Schneider

The physics of planetary magnetospheres, particularly the interactions between planetary plasmas and the satellites of the outer planets. Extensive ground-based observations of the Jupiter/Io system, especially imaging and spectroscopy of the Io atmosphere and plasma torus. Program has been expanded to include Hubble Space Telescope observations. Designing and building of a spacecraft to study the Jupiter/Io system.

Martin Snow

Primary research interests include ultraviolet spectroscopy of stars and the sun and the interaction of comets with the solar wind. The SOLSTICE instruments on UARS and SORCE provide a wealth of information about solar activity in the 115-300 nm range on a variety of timescales, ranging from minutes (solar flares) to decades (solar cycle). Understanding the variation in the solar output will lead to understanding its influence on the Earth. The interaction of comets with the solar wind is best studied using wide-field photography. Both amateur and professional astronomers contribute to this effort, and one research activity has been to help coordinate the interaction of the two groups.

Marty. snow@lasp.colorado.edu 303-735-2143

Owen B. Toon

Theoretical studies of stratospheric aerosols; investigations of volcanic aerosols and studies of polar stratospheric clouds; theoretical studies of tropospheric clouds, aerosols and radiative transfer; experimental investigations of stratospheric and tropospheric phenomena; theoretical investigations of planetary atmospheres.
Robert Weigel

Robert.Weigel@lasp.colorado.edu (303-492-2159)

Thomas N. Woods
Observational studies of the solar ultraviolet (UV) radiation, its variability, and its interaction with Earth's atmosphere. Principal investigator of NASA suborbital program to study the solar irradiance and thermospheric airglow. Principal investigator of the Solar EUV Experiment (SEE) on the TIMED mission. Co-investigator of the Solar Stellar Irradiance Comparison (SOLSTICE) experiment currently making solar UV irradiance measurements on the Upper Atmosphere Research Satellite (UARS) and planned for the Earth Observing System (EOS) missions.
tom.woods@lasp.colorado.edu (303) 492-4224

FACULTY ACTIVITIES

Air Force Technical Applications Center (AFTAC) Satellite Review Panel
Baker, Daniel (Chair)

American Association for the Advancement of Science (AAAS)
Jakosky, Bruce (Member, Program on Dialogue on Science, Ethics, and Religion Advisory Committee)

American Geophysical Union (AGU)
Avalone, Linnea (Member Atmospheric Chemistry Section, Atmospheric Chemistry Technical Committee)
Avalone, Linnea (Member Sullivan Award Committee)
Baker, Daniel (Chair, Nominations Committee)
Baker, Daniel (Convenor, Special Sessions)
Baker, Daniel (Chair, Electronic Publications Review Panel)
Baker, Daniel (President, Space Physics and Aeronomy Section)
Ergun, Robert (Member, Press and Public Affairs Committee)
Ergun, Robert (Chair, Session “Polar Magnetospheres of Jupiter and Earth, Fall AGU meeting”)
Esposito, Larry (Main organizer and Chair of Organizing Committee, Chapman Conference on Venus Exploration)
Li, Xinlin (Member, Student paper evaluation committee)

Association of American Universities (AAU)
Esposito, Larry (Member, Science Working Group)

Astrobiology Science and Technology in Exploration Program (ASTEP)
Jakosky, Bruce (Co-Convenor, Principal Investigator’s Workshop)

Astrophysical and Planetary Sciences Department (APS)
Ergun, Robert (Member of Executive Committee)
Ergun, Robert (Peer Teaching Evaluator)
Ergun, Robert (Member, Faculty Search Committee)
Ergun, Robert (Member, Undergraduate Committee)
Pappalardo, Robert (Department Representative, CU Geophysics Ph.D. Program)
Pappalardo, Robert (Member, Admissions committee)
Pappalardo, Robert (Member, Fiske Planetarium hiring Committee)
Pappalardo, Robert (Member, Course fees committee)

**Boulder Matrix Space Advisory Group**
Baker, Daniel (Chair)

**CLUSTER Science Working Team**
Baker, Daniel (Member)

**Committee on Space Research (COSPAR)**
Esposito, Larry (Main Scientific Organizer, COSPAR 34 : Planetary Atmospheres)

**Conference on Space Weather**
Baker, Daniel (Member, Organizing Committee)

**Department of Energy Programs in Atmospheric Science**
Toon, Owen B. (Member)

**Dissertation/Thesis Advisor/Committee Member**
Avallone, Linnea
Baker, Daniel
Ergun, Robert
Li, Xinlin
Pappalardo, Robert
Toon, Owen B.

**Editorial Board Member**
Avallone, Linnea (Associate Editor, Journal of Geophysical Research – Atmospheres)
Baker, Daniel (Associate Editor – Journal of Space Weather)
Jakosky, Bruce (Astrobiology)
Jakosky, Bruce (International Journal of Astrobiology)
Pappalardo, Robert (Associate Editor, Geophysical Research Letters)
Pappalardo, Robert (Guest Co-Editor, Special Issue of Journal of Structural Geology)

**Education and Public Outreach**
Woods, Thomas (Boulder Valley School District; Math in Science Lecture)
Woods, Tom (Assisted with LSTB tours)
Woods, Tom (Science Fair Judge)

**Electronic Geophysical Year Steering Committee**
Baker, Daniel (Chair)

**International Assoc. for Geomagnetism and Aeronomy (IAGA)**
Baker, Daniel (U.S. National Delegate)
Baker, Daniel (Chair, IGY+ 50 Task Force)

**International Union of Geodesy and Geophysics (IUGG)**
Baker, Daniel (Member, IGY+50 Advisory Committee)
Baker, Daniel (U.S. Representative)

**International Heliophysical Year Planning Group**
Baker, Daniel (Co-Chair)

**International Space Science Institute Working Group**
Baker, Daniel (Member)

**International Space Weather Conference**
Baker, Daniel (Member, Organizing Committee)

**Laboratory for Atmospheric and Space Physics (LASP)**
Avallone, Linnea (Member, Education and Public Outreach Committee)
Baker, Daniel (Chair, Business Committee)
Baker, Daniel (Chair, Executive Committee)
CoBabe-Ammann, Emily (Member, Executive Committee)
Colwell, Josh (Member, Executive Committee)
Davis, Randal (Member, Executive Committee)
Esposito, Larry (Member, Executive Committee)
Esposito, Larry (Member, Merit Evaluation Committee)
Himes, Caroline (Member, Executive Committee)
Horanyi, Mihaly (Member, Executive Committee)
Horanyi, Mihaly (Member, Library Committee)
Jakosky, Bruce (Member, Executive Committee)
Li, Xinlin (Member, Executive Committee)
Li, Xinlin (Member, Graduate Student Curriculum Committee)
Li, Xinlin (Member, Education and Public Outreach Committee)
Li, Xinlin (Member, Weigel Promotion Committee)
Li, Xinlin (Member, Ericksson Promotion Committee)
McClintock, William (Member, Executive Committee)
McGrath, Michael (Member, Executive Committee)
Randall, Cora (Member, Executive Committee)
Rottman, Gary (Member, Executive Committee)
Rottman, Gary (Chair, Project Steering Committee)
Stewart, Ian (Member, Executive Committee)
Woods, Tom (Member, Project Steering Committee)
Woods, Tom (Member, Executive Committee)
Woods, Tom (Editor, SORCE book published as special issue of Solar Physics)
Woods, Tom (Science Supervisor LASP Solar Group)

Mars Astrobiology Science and Technology Workshop
Jakosky, Bruce (Convenor)

Mars Global Surveyor Project Science Group
Jakosky, Bruce (Member)

Mars Odyssey Project Science Group
Jakosky, Bruce (Member)

Mars Sample Return Science Steering Group
Jakosky, Bruce (Member)

MESSENGER/Mercury Orbiter Science Working Team
Baker, Daniel

National Academy of Science (NSF)
Baker, Daniel (Chair, NAS/NC Committee on Solar and Space Physics (CSSP))
Baker, Daniel (Member, Space Studies Board)

National Aeronautics and Space Administration (NASA)
Baker, Daniel (Chair, Living With a Star MOWG)
Baker, Daniel (Advisor, Sun-Earth Connections Roadmap Committee)
Baker, Daniel (Member, Magnetospheric Multiscale Mission Study Team)
Esposito, Larry (Member, NASA Nuclear Systems Initiative Science Definition Team)
Horanyi, Mihaly (Member, Micro-Gravity Fluids Science Review Panel)
Jakosky, Bruce (Chair Astrobiology Institute Lunar Astrobiology Working Group)
Jakosky, Bruce (Chair, Mars Aeronomy Working Group)
Jakosky, Bruce (Chair, Mars Exploration Program Analysis Group)
Jakosky, Bruce (Member, Mars Science Laboratory Planetary Protection Working Group)
Jakosky, Bruce (Convenor and Session Chair, Astrobiology Institute Workshop on Subsurface Life)
Li, Xinlin (Team Member, Science and Technology Study and Definition Team)
Pappalardo, Robert (Member, Science Definition Team)
Pappalardo, Robert (Member, Solar System Exploration Subcommittee)
Pappalardo, Robert (Member, Local Organizing Committee, NASA Astrobiology institute)
Toon, Owen B. (Member, Aura Validation Activities Organizing Committee)
Toon, Owen B. (Member, Tropical clouds Mission Organizing Committee)
Woods, Tom (Member, LWS Climate Review Panel)
Woods, Tom (Member UARS, TIMED, SORCE, and SCO science working groups)
Woods, Tom (Chair/Main organizer for Solar XUV Irradiance and FUV Airglow Validation Workshop)

National Center for Atmospheric Research (NCAR)
Avallone, Linnea (Member: Upper Troposphere/Lower Stratosphere Initiative Progressive Science Campaign Committee)

National Oceanic and Atmospheric Administration (NOAA)
Baker, Daniel (Member, Strategic Planning Group)

National Science Foundation
Baker, Daniel (Member, Advisory Panel on Faculty Development)

Panel on Nonlinear Modeling in Geophysics
Baker, Daniel (Member)

Physics Department Comps Committee
Horanyi, Mihaly (Chair)

Physics Department Undergraduate Committee
Horanyi, Mihaly (Member)

Planetary Society Advisory Board
Jakosky, Bruce, (Member)

Polar Science Working Team
Baker, Daniel (Member)

Program in Atmospheric and Oceanic Science (PAOS)
Toon, Owen B. (Director)

Reviewer of Manuscripts, Grants, or Creative Work
Avallone, Linnea (External expert reviewer: Big Bend Regional Aerosol and Visibility Observational Study (BRAVO))
Avallone, Linnea (Review panelist: National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT) program)
Avallone, Linnea (Reviewer of proposals for creation of research centers (Helmholtz (Germany) Association of National Research Centers)
Avallone, Linnea (Proposals: National Science Foundation Office of Polar Programs)
Ergun, Robert (Manuscripts: Journal of Geophysical Research, Physics of Plasmas, Geophysical Research Letters)
Ergun, Robert (Proposals: NASA, NSF)
Esposito, Larry (Manuscripts: Journal of Geophysical Research and Icarus)
Horanyi, Mihaly (Proposals: NSF, DOE, and NASA)
Jakosky, Bruce (Manuscripts: Icarus, Science)
Jakosky, Bruce (Proposals: NASA Institute for Advanced Concepts)
Jakosky, Bruce (Proposals: NASA Mars Fundamental Research Program)
Jakosky, Bruce (Proposals: NASA Planetary Geology and Geophysics Program)
Li, Xinlin (Proposals: NASA and NSF)
Li, Xinlin (Manuscripts: Journal of Geophysical Research, Geophysical Research Letters, Advanced Plasma Physics, and Earth, Planets, and Space)
Pappalardo, Robert (Manuscripts: Icarus and Journal of Geophysical Research – Planets)
Pappalardo, Robert (Proposals: NASA)
Pilewskie, Peter (Proposals: NASA Earth Science Enterprise, and NSF)
Woods, Tom (Proposals: NASA, NOAA)

SAMPEX Science Working Team
Daniel Baker (Member)

Space Physics Research Lab (U. of Michigan)
Baker, Daniel (Member, Review Committee)

Universities Space Research Association (USRA)
Baker, Daniel (Member, Astronomy and Space Physics Council)
Baker, Daniel (Member, Council of Institutes)
Baker, Daniel (Representative, Council of Institutes)
Jakosky, Bruce (Member, Lunar and Planetary Institute Science Council)
Jakosky, Bruce (Member, NASA Institute for Advanced Concepts Science Council)

University of Colorado Aerospace Engineering Sciences (AES) Department
Baker, Daniel (Member, External Advisory Board)
Li, Xinlin (Member, Graduate Committee on Curriculum)
Li, Xinlin (Member, AES/LASP Cooperation Committee)

University of Colorado
Baker, Daniel (Deputy Director, Center for Limb Atmospheric Sounding)
Baker, Daniel (Member, Chancellor’s Federal Relations Advisory Committee)
Baker, Daniel (Member, Graduate School/Institute Directors Group)
Baker, Daniel (Member, Vision 2010: University without Walls Committee)
Toon, Owen B. (Core Faculty Member, Environmental Studies Program)

FACULTY HONORS/AWARDS

National Academy of Science (NAS)
Baker, Daniel (Chosen National Associate)

Courses Taught by LASP Faculty
Spring 2004

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linnea Avallone</td>
<td>ATOC 4800-5000</td>
<td>Critical issues in climate and policy</td>
</tr>
<tr>
<td>Linnea Avallone</td>
<td>ATOC 6020</td>
<td>Group meeting/Journal Club</td>
</tr>
<tr>
<td>Daniel N. Baker</td>
<td>ASTR 5300</td>
<td>Intro to Magnetospheres</td>
</tr>
<tr>
<td>Robert Ergun</td>
<td>ASTR 1110</td>
<td>Intro to Astronomy: Solar System</td>
</tr>
<tr>
<td>Larry Esposito</td>
<td>ASTR/ATOC 3720</td>
<td>Planets and their atmospheres</td>
</tr>
<tr>
<td>Xinlin Li</td>
<td>ASEN 4010</td>
<td>Intro to Space Dynamics</td>
</tr>
</tbody>
</table>
Robert Pappalardo  ASTR 1010-001  Intro to the Solar System
Owen B. Toon  ATOC 6020  Seminar on aerosols

Fall 2004

Robert Ergun  ASTR 1030  Accelerated general astronomy: Solar system
Mihaly Horanyi  PHYS 3310  Principles of Electricity and Magnetism I
Mihaly Horanyi  PHYS 3320  Principles of Electricity and Magnetism II
Bruce M. Jakosky  GEOL 5830/ASTR 5830/PAOS 5830  Astrobiology
Xinlin Li  ASEN 2002  Thermal Dynamics / Aerodynamics
Robert Pappalardo  ASTR 1110-002  Intro to the Solar System
Robert Pappalardo  ASTR 5835  Planetary Science Seminar: Saturn System
Peter Pilewskie  ATOC/ASTR 5560  Radiative Processes in Planetary Atmospheres
Owen B. Toon  ATOC 6020  Seminar on aerosols
Owen B. Toon  ATOC 5810  Planetary Atmospheres

Colloquia and Informal Talks*
Spring 2004

Sandra Baldauf, Univ. of York, UK, The tree of life; new discoveries about relationships among eukaryotes
Amy C. Barr, CU/LASP, Convective Instability in Ice I: Application to Callisto and Ganymede
Corey Cohn, Stony Brook University, Pyrite-generated radicals and the destruction of nucleic acids
Peter Colarco, U. MD/NASA Goddard Space Flight Center, A Combined Use of Satellite Data and Transport Models to Understand the Composition and Distribution of Climatically Important Aerosols
Matthew DeLand, Science Systems and Applications, Inc. (SSAI), SBUV/2 Observations of Solar Variability and Atmospheric Response
David DesMarais, NASA/AMES, The Mars Exploration Rovers unveil new horizons for astrobiology
Charles Delwiche, U. of Maryland, Key events in the evolution of eukaryotic phototrophs
Andrea Ghez, UCLA, Unveiling a supermassive black hole at the center of our galaxy.

Juan Fontenla, CU/LASP, Modeling the Solar Atmosphere
James Garvin, NASA/HQ, Discovering the new Mars with SPIRIT and OPPORTUNITY
Janet Green, CU/LASP, The Earth's Radiation Belts: Scientific Questions and Societal Impacts
Kevin Hand, Stanford Univ., The surface radiation chemistry of Europa and implications for a habitable ocean
Jerry Harder, CU/LASP, Solar Spectral Variability as Measured by the SORCE SIM Instrument
Noel Hinners, CU/LASP, Humans to the Moon and Mars: The dream revived
Bryan Hynek, CU/LASP, Martian water on the brain
Diego Janches, CU/CIRES, Micrometeors in the Upper Atmosphere Studied Using Big Radars
Bruce Jakosky, LASP/Astrobiology/Geo-logical Sciences, Life Elsewhere, Science and Religion
David Johnson, NASA Langley Research Center, Dehydration of the upper troposphere: What can we learn from isotope ratios?

Dave Johnston, University of Maryland, Isotopic fingerprints of sulfur metabolisms: using the minor isotopes to distinguish between process

Nicole King, Univ. of California/Berkeley, Animal origins: our unicellular ancestry

Doug Kinnison, NCAR, Introduction to the Whole Atmosphere Community Climate Model (WACCM)

Alex Klimas, NASA/GSFC, Mean-Field Self-Organized Criticality in a Driven Current Sheet Model

Greg Kopp, CU / LASP, The Total Irradiance Monitor: What's in a Part Per Million?

Gentry Lee, NASA/JPL, The exploration of Mars: past and present

Xinlin Li, CU/LASP, The predictability of the magnetosphere and space weather.

Ken Mankoff, Honeybee Robotics, Rock Abrasion Tool (RAT) onboard the MER rovers

Victoria Meadows, JPL/Caltech, Exploring the living cosmos: The Spitzer Space Telescope

Terry Onsager, NOAA/SEC, Radiation Belt Electrons - Where do They Come From and Where do They go?

Peter Pilewskie, NASA Ames Research Center, Solar Radiation, Clouds, and Climate: A Multi-Spectral View from Airborne and Satellite Observations

Cora Randall, CU/LASP, Occultation Science: A Rising Star?

Erik C. Richard, NOAA Aeronomy Laboratory/CIRES, The Development and Use of Aircraft In-situ Diode Laser Instruments for Atmospheric Research: From Trace Gases to Aerosols

Theodore Sarris, CU / LASP, Energetic Particle Injections in the Earth's Magnetosphere

Roger Summons, MIT, Organic biosignatures: Earthly biomarkers, analytical approaches, old rocks and meteorites

Mark Tyra, Univ. of Maryland, Terrestrial alteration of CM chondritic carbonate

Joe Vellinga, Lockheed Martin Space Systems, Stardust - Close Encounter with a Comet

Benjamin Weiss, MIT, Records of ancient Martian magnetic fields, climate and life in ALH84001.

John Wise, GE-Panemetrics, Calibration of the GOES solar EUV detector at the Brookhaven NSLS

**Fall 2004**


John Bally, Dept. of Astrophysical & Planetary Sciences, Center for Astrophysics & Space Astronomy, & Center for Astrobiology, Small is Beautiful: Survival of Protoplanetary Disks in Hazardous Star Forming Environments

Phillip B. Chilson, CIRES / CU, Atmospheric Radar Imaging: Theory and Applications

Carol Cleland, CU/Philosophy/Astrobiology, Searching for extraterrestrial life without a definition of 'life'

Joshua Colwell, CU/LASP, Cassini UVIS Observations of Saturn's Rings

Geoffrey A. Dorn, BP Center for Visualization, University of Colorado, Applications of Visualization and Virtual Reality in Research and Engineering

Larry Esposito, CU/LASP, Cassini UVIS Observations Show an Active Saturn System

Bruce Jakosky, CU/LASP, Geological Sciences, and Center for Astrobiology, Liquid water and the biological potential of Mars

Brian R. Johnson, Ball Aerospace, New Sensor Technologies for Measuring CO and CO2 from Space

Bill Kurth, U. of Iowa, Physics/Astronomy Dept., Results from the Radio and Plasma Wave Science experiment on Cassini - Radio emissions from Saturn

Charles Lineweaver, Australian National University, The Galactic Habitable Zone and the Age Distribution of Complex Life in the Milky Way

Jerry Lumpe, Computational Physics, Inc., Remote Sensing of Earth's Atmosphere by Absorptive Occultation
Thomas McCollom, Center for Astrobiology, Laboratory for Atmospheric and Space Physics, Iron-oxidizing bacteria: Inhabitants of the deep subsurface biosphere, early Earth, and Mars?

Stephen J. Mojzsis, CU/Geological Sciences, Center for Astrobiology, Renaming the Hadean: A progress report from the Mission to Really Early Earth

Alexander Pavlov, CU/LASP, Mass-Extinctions and Severe Glaciations due to Changes in the Galactic Environment

Pilewskie, P.A., Measuring aerosol, cloud, and surface radiative properties and effects during the NEAQS-ITCT 2004 field campaign

Cora Randall, CU/LASP, Stratospheric Effects of Energetic Particle Precipitation in 2003-2004

Ralf Srama, MPIK Heidelberg, Germany, Dust Measurements With Cassini

**Publications**


Eriksson, S., M. Øieroset, D.N. Baker, C. Mouikis, A. Vaivads, M.W. Dunlop, H. Rème, R.E. Ergun, and A. Balogh, Walén and Slow-Mode Shock Analyses in the Near-Earth Magnetotail in Connection with a Substorm Onset on 27...


Pelkey, S.M., B.M. Jakosky, and P.R. Christensen, Surficial properties in Gale Crater, Mars, from Mars Odyssey THEMIS data, Icarus, 167, 244-270, 2004.


Sarris, T., and X. Li, Test-particle simulation of the injection region of energetic particles associated with substorms, Proc. 7th International Conference on Substorms, ISSN 0782-6079, 228-231, 2004.


Papers Presented at Scientific Meetings


Baker, D.N., Comparative magnetosphere studies using the JMEX program, NASA Headquarters presentation, 2 November 2004.


Baker, D.N., Space weather: Space environmental threats to human technology, Director’s Colloquium, Los Alamos National Laboratory, Los Alamos, NM, 2 December 2004.


Baker, D.N., The Science Operation Center (SOC) for the MMS mission, MMS Site Visit Briefing, Southwest Research Institute, San Antonio, TX, 30 November 2004.


Barton, Charles, D.N. Baker, and V. Papitashvili, IGY + 50, the IPY, and the electronic Geophysical Year (eGY), Fall AGU Meeting, San Francisco, CA, 13-17 December 2004.


Ergun, R.E., Double layers, electron holes, and VLF saucers, Ringberg Workshop on Waves and Radiation in Geospace, Max Plank Institute, Germany, 2004.


Horanyi, Mihaly, Dusty Plasma Effects on the surfaces of the Moon and Mars, Fall AGU Meet-


Li, X., Magnetospheric responses to extreme solar wind conditions and Dst prediction for October-November, Spring AGU Meeting, Montreal, Canada, 17-21 May 2004.


Li, X., Predicting radiation belt electron fluxes and space weather implications, Spring AGU Meeting, Montreal, Canada, 17-21 May 2004.

Li, X., Prediction of the Dst index using solar wind a the only input and the implication, Yosemite Workshop on Inner Magnetosphere Interactions, Yosemite National Park, CA, 3-6 February 2004.

Li, X., The evolution of dispersionless injection boundary during substorms and its association with sawtooth events, Geospace Environment


Woods, T., Variability of the Solar XUV Irradiance from the SORCE XPS, SORCE Workshop:


**SPONSORED PROGRAMS**

Andersson, Laila  
Micro Physics of the downward current region of the aurora

Avallone, Linnea  
In Situ measurements of halogen oxides in the troposphere and enhancement of graduate education in atmospheric sciences

Bagenal, Frances  
Mass and energy flow through the Io plasma torus

Bagenal, Frances  
New Horizon Pluto-Kuiper belt mission

Bagenal, Frances  
Pluto’s escaping atmosphere

Bagenal, Frances  
Solar wind interaction with comet Borrelly

Baker, Daniel  
SAMPEX data center and WWW user interface for the SEC community

Baker, Daniel  
Radiation belt specification and forecasting with data assimilation

Baker, Daniel  
Space weather forecasting: Predicting radiation belt electrons using adaptive ARMA filters and data assimilation

Baker, Daniel  
The Center for Integrated Space Weather Modeling (CISM)

Colwell, Joshua  
Collisional and electrostatic transport of dust in the regolith of Eros

Colwell, Joshua  
Dynamics of charged dust near surfaces in space

Davis, Randal  
ICES mission operations

Davis, Randal  
ICESAT mission operations

Davis, Randal  
Mission operations of the NASA Quikscat satellite

Elkington, Scot  
GEM: Transport and trapping of energetic plasma sheet electrons in the outer zone radiation belts

Emery, William  
Ocean wind and land surface student satellite

Ergun, Robert  
FAST satellite operations and data analysis

Ergun, Robert  
GEM: Self-consistent characterization of parallel electric fields in the lower magnetosphere

Ergun, Robert  
MMS fields

Ergun, Robert  
Modeling of parallel electric fields in the aurora

Ergun, Robert  
Origins of nonlinear wave structures and particle heating in current driven plasmas

Eriksson, Stefan  
Flank magnetopause reconnection, the sash, and lobe convection

Esposito, Larry  
Cassini mission operations and data analysis

Green, Janet  
Relativistic electrons: Understanding losses

Hinners, Noel  
Center for program/Project management research

Horanyi, Mihaly  
Cassini CDA investigations

Horanyi, Mihaly  
Dusty plasmas in planetary magnetospheres: Earth, Jupiter and Saturn

Horanyi, Mihaly  
Mesospheric aerosol particle spectrometer
Horanyi, Mihaly   New horizons mission student dust counter (SDC)
Hyneck, Brian   Evolution of enigmatic Arabia Terra, Mars and the global consequences
Jakosky, Bruce   NASA Astrobiology Institute
Jakosky, Bruce   Participation in Mars Odyssey project science group
Jakosky, Bruce   Physical properties of potential Mars landing site
Jakosky, Bruce   Remote sensing and geochemistry of planetary surfaces
Jakosky, Bruce   Thermal imaging system
Jakosky, Bruce   Thermal inertia of the MER landing sites
Jakosky, Bruce   University of Colorado Center for Astrobiology
Jakosky, Bruce   Workshop on Mars Astrobiology Science and technology support
Kanekal, Shri   Comprehensive survey of relativistic electron dynamics during geomagnetic storms over a complete solar cycle
Kanekal, Shri   Stud of proton cutoffs during SEP events from 1992 to 2002
Lee, Steven   MGS MOC global mapping of Martian albedo
Lee, Steven   Ozone, condensates and dust in the Martian atmosphere
Li, Xinlin   Dynamics of radiation belt electrons associated with solar wind variations
Li, Xinlin   Solar wind fluctuations and their consequences on the magnetosphere
Li, Xinlin   Source of radiation belt electrons
McClintock, William   Electron impact cross sections of oxygen-bearing species
McCollom, Thomas   Experimental investigation of organic synthesis in submarine hydrothermal systems
McCollum, Thomas   Experimental study of geochemical processing of prebiotic organic compounds on the early Earth, Mars and meteorites
McGrath, Michael   Mechanics of Granular Materials Microgravity experiment (GEM)
McGrath, Michael   Study dust counter (SDC) New Horizons Mission
Mellon, Michael   Geophysics of Martian periglacial processes
Mellon, Michael   HiRISE: High Resolution Imaging Science Experiment
Mellon, Michael   Phoenix Mars scout mission
Mellon, Michael   Shallow ground ice on Mars
Mellon, Michael   High-Resolution Thermal inertia of the Martian surface
Ohtsuki, Keiji   Collisional and rotational evolution of small asteroids
Ohtsuki, Keiji   Formation and dynamical evolution of planets
Ohtsuki, Keiji   Origin and evolution of irregular satellites
Pappalardo, Robert   Astrobiological and geological implications of convective transport in icy outer planet satellites
Pappalardo, Robert   Causes and consequences of faulting on Europa and other icy satellites
Pappalardo, Robert   Characteristics and consequences of faulting on Ganymede and Europa
<table>
<thead>
<tr>
<th>Name</th>
<th>Research Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavlov, Alexander</td>
<td>Hazy archean atmosphere</td>
</tr>
<tr>
<td>Randall, Cora</td>
<td>Assimilation of ozone data sets</td>
</tr>
<tr>
<td>Randall, Cora</td>
<td>Fellowship: Derivation of ozone photochemical loss by combining satellite data and a 3-dimensional chemical transport model</td>
</tr>
<tr>
<td>Randall, Cora</td>
<td>Occultation data intercomparison and evaluation</td>
</tr>
<tr>
<td>Randall, Cora</td>
<td>SAGE III science and validation focused on the UTLS</td>
</tr>
<tr>
<td>Rottman, Gary</td>
<td>EOS SOLSTICE</td>
</tr>
<tr>
<td>Rottman, Gary</td>
<td>SORCE Sciences discovery</td>
</tr>
<tr>
<td>Rottman, Gary</td>
<td>SORCE/EOS SOLSTICE</td>
</tr>
<tr>
<td>Rottman, Gary</td>
<td>Total solar irradiance sensor (TSIS)</td>
</tr>
<tr>
<td>Rottman, Gary</td>
<td>UARS SOLSTICE continued operations</td>
</tr>
<tr>
<td>Rusch, David</td>
<td>Aeronomy of ice in the mesosphere (AIM)</td>
</tr>
<tr>
<td>Rusch, David</td>
<td>An investigation of the effect of solar variability and particle ionization on the Earth’s middle atmosphere</td>
</tr>
<tr>
<td>Rusch, David</td>
<td>Stellar occultation measurements: A new application of spatial heterodyne spectroscopy for determining atmospheric composition</td>
</tr>
<tr>
<td>Schneider, Nicholas</td>
<td>From Io's atmosphere to the plasma torus</td>
</tr>
<tr>
<td>Schneider, Nicholas</td>
<td>JMEX – The Jupiter magnetospheric explorer: Comparative magnetospheres from Earth orbit</td>
</tr>
<tr>
<td>Smith, Jamison</td>
<td>Simulation of the aging of smoke from African biomass burning plumes and implications for remote sensing of aerosols.</td>
</tr>
<tr>
<td>Sternovsky, Zoltan</td>
<td>Design, fabrication and calibration of the large area mass analyzer (LAMA) prototype</td>
</tr>
<tr>
<td>Stewart, Glen</td>
<td>Dynamical models of solar system formation and evolution</td>
</tr>
<tr>
<td>Stewart, Glen</td>
<td>Evolution of protoplanetary disks near the snowline</td>
</tr>
<tr>
<td>Stewart, Glen</td>
<td>The physics of structures in self-gravitating, collisional rings</td>
</tr>
<tr>
<td>Su, Yi-Juin</td>
<td>Cusp dynamics – particle acceleration by Alfvén waves</td>
</tr>
<tr>
<td>Thomas, Gary</td>
<td>Polar mesospheric cloud properties determined from SBUV and SBUV/2 measurements</td>
</tr>
<tr>
<td>Thomas, Gary</td>
<td>Solar-induced variations in polar mesospheric clouds</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Application of an aerosol model to simulate smoke and marine aerosols</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Improving the NASA Ames Mars GCM simulation of global dust storms using MGS TES data</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Investigation of clouds on Venus, Mars and Titan</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Investigation of desert dust and smoke in the North Atlantic in support of the TOMS instrument</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Modeling the environmental effects of large impacts on Mars</td>
</tr>
<tr>
<td>Toon, Owen B.</td>
<td>Models for water isotopes constrained with data from Crystal-Face</td>
</tr>
<tr>
<td>Woods, Thomas</td>
<td>Extreme ultraviolet variability experiment (EVE)</td>
</tr>
<tr>
<td>Woods, Thomas</td>
<td>Geostationary operation environmental satellite</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Woods, Thomas</td>
<td>TIMED phase SEE experiment</td>
</tr>
</tbody>
</table>