

Applied Space Environments Conference (ASEC) 2017 Summary

Dr. Linda Neergaard Parker, USRA

Dr. Joseph I. Minow, NASA



Overview

The Applied Space Environments Conference is a forum for the space environment engineering and applied space science community to discuss the discipline's ability to support current space programs and to identify gaps in knowledge and technology needs required for future exploration goals

- Theme: Measurements, Modeling, Testing, and Tools
- The Westin Hotel in Huntsville, Alabama on May 15-19, 2017
- ~110 conference participants
 - NASA (multiple Centers, JPL, HQ), AFRL, NRL, industry, LANL, universities
- 60 Contributed Talks
- 4 Tutorials
- 13 Invited Talks

Presentation Topics

- Overview

- Modeling
- Testing

- Environment

- Ionosphere
- MOD
- Plasma
- Radiation

- Interactions

- Atmospheric 9
- Contamination 1
- Hypervelocity 4
- Induced (e.g., $\mathbf{v} \times \mathbf{B}$) 1
- Radiation Effects 14
- Solar Array Interaction 3
- Space Weather 20
- Spacecraft Charging 12
- Other 7

Overview Presentations

- William Hill, Deputy AA for Exploration System Development, NASA HEOMD
- Jeffrey Newmark, Deputy AA for Research, NASA SMD
- Irfan Azeem, Program Director for Space Weather, NSF
- William Murtagh, Program Coordinator, Space Weather Prediction Center, NOAA
- Michael Mastaler, NASA Space Environments Testing Management Office
- Steven Clarke, Director, Heliophysics Division, NASA SMD

Tutorials

- Atomic Oxygen Effects and Contamination
 - Sharon Miller, NASA
- Radiation Effects in Electronic Systems
 - Jonny Pellish, NASA
- Spacecraft Charging
 - Henry Garrett, JPL
- Orbital Debris and Meteoroid Environments
 - Mark Matney, NASA

Radiation

- The AE9/AP9 Radiation and Plasma Environment Models – Paul O'Brien
- Comparison of Energetic Particle Radiation Environments – Cary Zeitlin
- Europa Lander Radiation Environment Definition and Initial Shielding Design – Luz Maria Martinez Sierra
- Applied Atmospheric, Ionospheric, and Radiation Tools Specify Space Environment Effects for End-user Systems – W. Kent Tobiska
- New Approach to Total Dose Specification for Spacecraft Electronics – Mike Xapsos
- Mapping the 3D Dose Distribution from Space Radiation – Zi-Wei Lin

Mapping 3-Dimensional Dose Distribution from Space Radiation

Zi-Wei Lin
Department of Physics
East Carolina University
Greenville NC

 EAST CAROLINA



Air Force Research Laboratory



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TECHNOLOGY

The AE9/AP9 Radiation and Plasma Environment Models

15 May 2017

Paul O'Brien

The Aerospace Corporation

on behalf of the AE9/AP9 team

Excellence

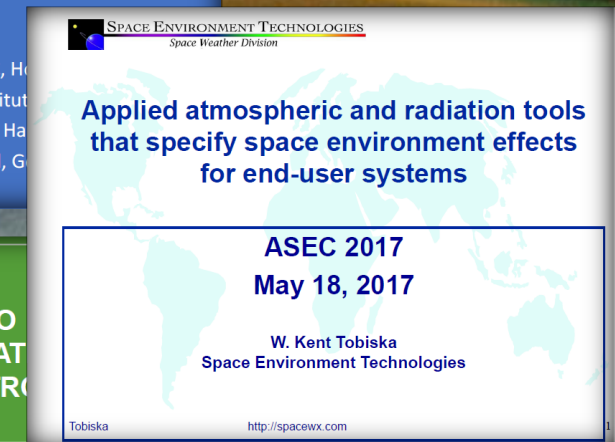
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Comparison of Energetic Particle Radiation Environments In the Inner Heliosphere

C. Zeitlin, R. Rios, M. Leitgab, Leidos, NASA JSC, Houston, TX
D. Hassler, B. Ehresmann, Southwest Research Institute, San Antonio, TX
N. Schwadron, H. Spence, University of New Hampshire
R. Wimmer-Schweingruber, J. Guo, CAU Kiel, Germany

SPACE ENVIRONMENTAL
Space

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that spec



SPACE ENVIRONMENT TECHNOLOGIES
Space Weather Division

**Applied atmospheric and radiation tools
that specify space environment effects
for end-user systems**

ASEC 2017
May 18, 2017

W. Kent Tobiska
Space Environment Technologies

Tobiska <http://spacewx.com>

NEW APPROACH TO TOTAL DOSE SPECIFICATION FOR SPACECRAFT ELECTRONICS

Tobiska

M.A. Xapsos¹, C. Stauffer², A. Phan², S.S. McClure³,
R.L. Ladbury¹, J.A. Pellish¹, M.J. Campola¹ and K.A. LaBel¹

¹NASA Goddard Space Flight Center, Greenbelt, MD
²AS&D, Inc., Greenbelt, MD
³Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

Supported by the NASA Living With a Star Space Environment Testbed Program

To be presented by Mike Xapsos at the 2017 Applied Space Environment Conference (ASEC), Huntsville, Alabama, May 15-19, 2017

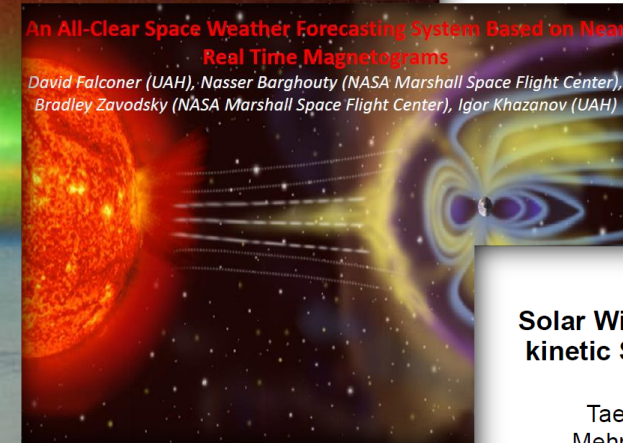
Europa Lander Mission Concept - Radiation Environment Definition and Initial Shielding Design

Luz Maria Martinez Sierra, William Mcalpine, Martin Ratliff, Insoo Jun, Michael Cherng

 Jet Propulsion Laboratory
California Institute of Technology

Space Weather

- An All-Clear Space Weather Forecasting System Based on Near Real Time Magnetograms – David Falconer
- A Data-Driven 3D MHD Simulation Model for the Initiation of a Coronal Mass Ejection CME and SEP Event – ST Wu
- Solar Wind Models of Multi-Scale Fluid-kinetic Simulation Suite (MS-FLUKSS) – Tae Kim
- Coronal Mass Ejections in a Data-Driven Global MHD Model – Mehmet Yalim
- Magnetic Flux Ropes in the Sun-Earth Environment – Qiang Hu



A Data-Driven Three-Dimensional Magnetohydrodynamic (MHD) Simulation Model for the Initiation of a Coronal Mass Ejection (CME) and Solar Energetic Particle (SEP) Event

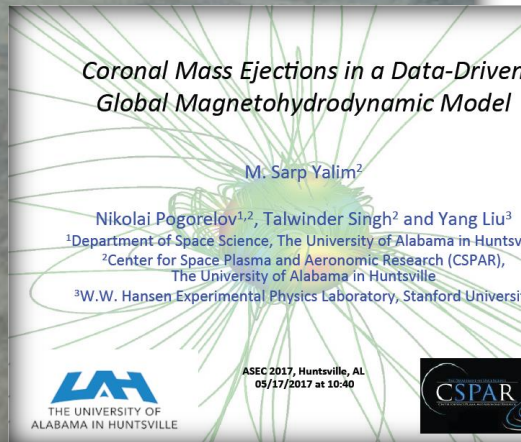
S. T. Wu
Center for Space Plasma & Aeronomic Research (CSPAR) and Department of Mechanical & Aerospace Engineering (MAE), The University of Alabama in Huntsville (UAH), Huntsville, AL 35899 USA

Qiang Hu, Department of Space Science (DSS) and CSPAR, UAH
Tao Jiang, CSPAR and Harbin Institute of Technology, China
Chun-Chun Wu, Naval Research Laboratory, Washington, DC
Sheng Feng and Yufen Zhou, SIGMA Weather Group, State Key Laboratory for Space Weather, National Space Science Center, Chinese Academy of Sciences, Beijing

Measurement Conference (ASEC), Measurements, Models, Testing, and Tools

Solar Wind Models of Multi-scale Fluid-kinetic Simulation Suite (MS-FLUKSS)

Tae K. Kim¹, Nikolai V. Pogorelov^{1,2},
Mehmet S. Yalim¹, and Gary P. Zank^{1,2}



Coronal Mass Ejections in a Data-Driven Global Magnetohydrodynamic Model

M. Sarp Yalim²

Nikolai Pogorelov^{1,2}, Talwinder Singh² and Yang Liu³

¹Department of Space Science, The University of Alabama in Huntsville

²Center for Space Plasma and Aeronomic Research (CSPAR),
The University of Alabama in Huntsville

³W.W. Hansen Experimental Physics Laboratory, Stanford University

THE UNIVERSITY OF
ALABAMA IN HUNTSVILLE

ASEC 2017, Huntsville, AL
05/17/2017 at 10:40

CSPAR

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CSPAR
CENTER FOR SPACE PLASMA AND AERONOMIC RESEARCH

Space Plasma and Aeronomic Research, University of Alabama in Huntsville, Huntsville, AL, USA
Space Science, University of Alabama in Huntsville, Huntsville, AL, USA

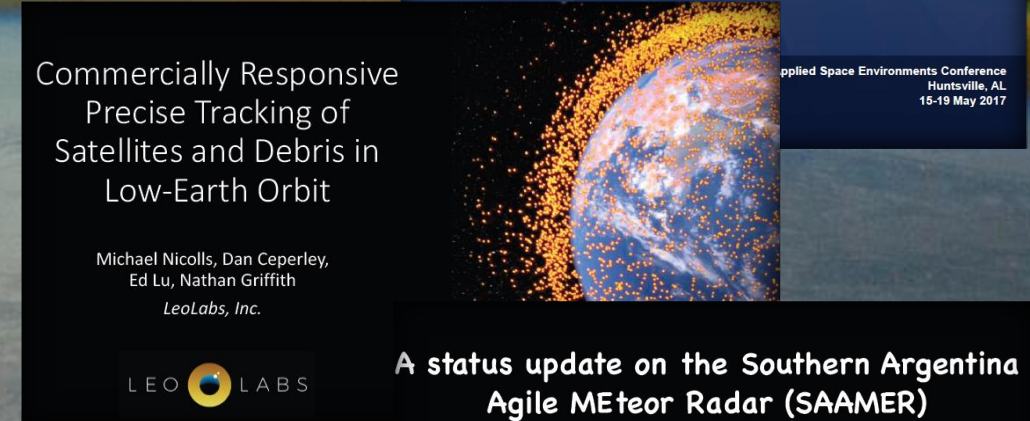
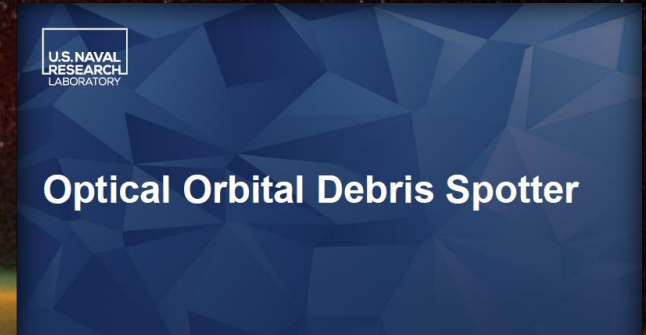
Magnetic Flux Ropes in the Sun-Earth Environment

Qiang Hu
Dept. of Space Science and CSPAR
University of Alabama in Huntsville

qh0001@uah.edu

Meteoroids and Orbital Debris

- A Status Update on the Southern Argentina Agile Meteor Radar (SAAMER) – Diego Janches
- Commercially Responsive Precise Tracking of Satellites and Debris in Low-Earth Orbit – Michael Nicolls
- Optical Orbital Debris Spotter – Christoph Englert



A status update on the Southern Argentina Agile METeor Radar (SAAMER)



Atomic Oxygen

- The Art of Knowing the Surface Potential in an Ionosphere and the Effect of Atomic Oxygen – Laila Andersson
- Fundamental Studies of Material Response in Atmospheric Entry Environments – Timothy Minton
- Atomic Oxygen Erosion of EVA-stranded Soft-goods on the ISS – John Alred
- A Method of Statistically Estimating the Atomic Oxygen Fluence on LEO Spacecraft – Timothy Guild
- Monte Carlo Computational Modeling of Atomic Oxygen Interactions – Bruce Banks

Fundamental Studies of Material Response in Atmospheric Entry Environments
Timothy K. Minton



MONTANA STATE UNIVERSITY
Mountains and Minds

Department of Chemistry and Biochemistry
COWORKERS: Vanessa Murray, *Brody Bessire, Brooks I
Montana State University
COLLABORATORS: Savio Poovathingal, Tom Schwartz, Graham Candler, University of Minne
FUNDING: U.S. Air Force Office of Scientific Research
 NASA ESI-14 *NDSEG Fellow

National Aeronautics and Space Administration

Monte Carlo Computational Modeling of Atomic Oxygen Interactions

Bruce A. Banks¹
 Thomas J. Stueber²
 Sharon K. Miller²
 Kim K. de Groh²

¹AIC at NASA Glenn Research Center
²NASA Glenn Research Center

AEROSPACE
 Assuring Space Mission Success

A Method for Statistically Estimating the Atomic Oxygen Fluence on LEO Spacecraft

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 The Aerospace Corporation
 Physical Sciences Laboratory
 Space Sciences Department
 timothy.guild@aero.org
 571-304-7707

19 May 2017

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Atomic Oxygen Erosion of EVA-stranded Soft-goods on the ISS

May 18, 2017

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 NASA Lyndon B. Johnson Space Center
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The art of Knowing the Surface Potential in an Ionosphere and the Effect of Atomic Oxygen

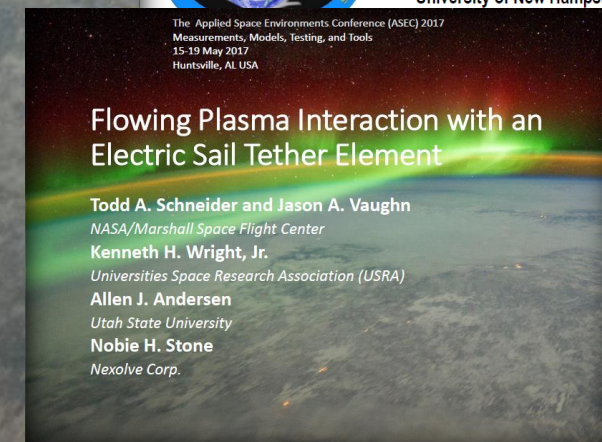
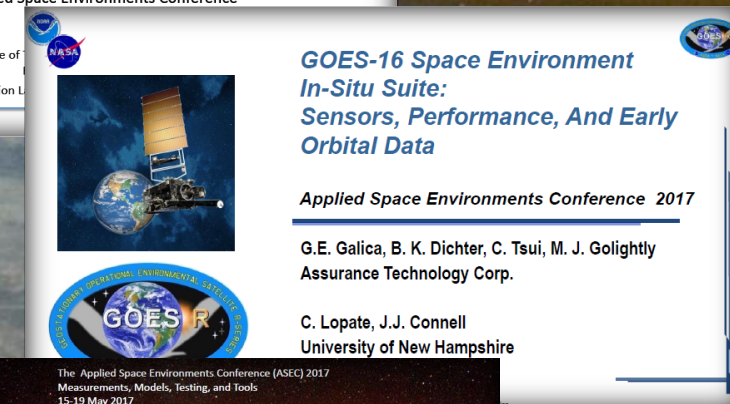
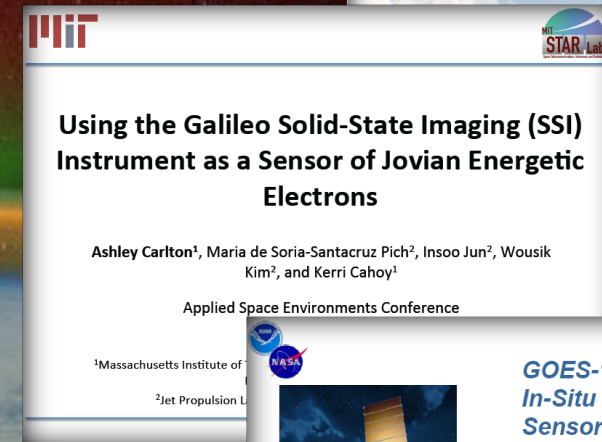
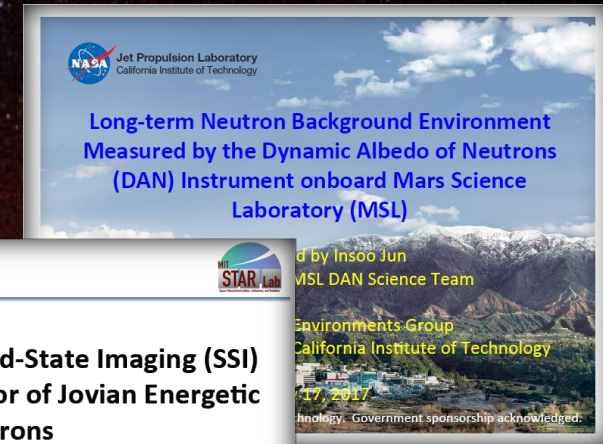
L. Andersson, R. E. Ergun,
 C. Fowler, J. McFadden,
 and D. Mitchell

LASP, University of Colorado, Boulder
 SSL, University of California, Berkeley

ASEC meeting, Huntsville, May 2017

Observations/Testing

- Long-term Neutron Background Environment Measured by the Dynamic Albedo of Neutrons (DAN) Instrument Onboard Mars Science Laboratory – Insoo Jun
- Using the Galileo Solid State Imager as a Sensor of Jovian Energetic Electrons – Ashley Carlton
- GOES-16 Space Environment In-Situ Suite: Sensors, Performance, and Early Orbital Data – Gary Galica – Bronislaw Dichter
- Flowing Plasma Interaction with an Electric Sail Tether Element – Todd Schneider
- Test facilities and internal/surface charging test results



Future Plans

- Presentations on-line: <http://sti.usra.edu/asec2017/>
- Extended abstracts will be published as NASA Technical Memorandum

Next ASEC in 2019



SEESAW, Boulder 2017