

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., $v \times B$) 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



Air Force Research Laboratory

The AE9/AP9 Radiation and Plasma Environment Models

15 May 2017

Paul O'Brien
The Aerospace Corporation
on behalf of the AE9/AP9 team



Comparison of Energetic Particle Radiation Environments In the Inner Heliosphere

C. Zeitlin, R. Rios, M. Leitgab, Leidos, NASA JSC, H
D. Hassler, B. Ehresmann, Southwest Research Institut
N. Schwadron, H. Spence, University of New Ha
R. Wimmer-Schweingruber, J. Guo, CAU Kiel, G

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

<http://spacewx.com>

NEW APPROACH TO TOTAL DOSE SPECIFICATION FOR SPACECRAFT ELECTRONICS

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

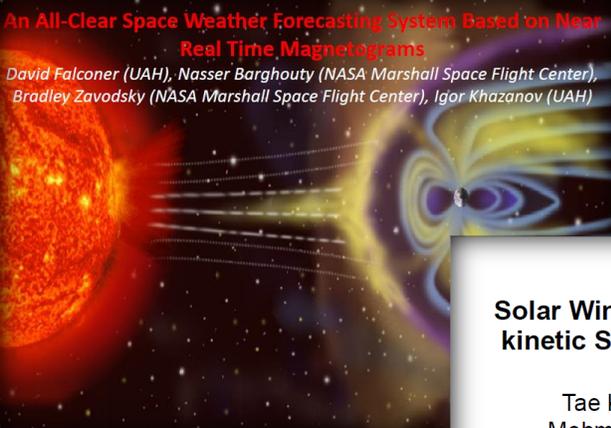


Jet Propulsion Laboratory
California Institute of Technology

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

An All-Clear Space Weather Forecasting System Based on Near Real Time Magnetograms
David Falconer (UAH), Nasser Barghouty (NASA Marshall Space Flight Center), Bradley Zavodsky (NASA Marshall Space Flight Center), Igor Khazanov (UAH)



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
Xinwei Jiang, CSPAR and Harbin Institute of Technology, China
Yan-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}



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

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



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

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

Timothy Guild, Paul O'Brien and Joseph Mazur
The Aerospace Corporation
Physical Sciences Laboratory
Space Sciences Department
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19 May 2017

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

May 18, 2017

John Alred
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Materials & Processes Branch
NASA Lyndon B. Johnson Space Center
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john.w.alred@nasa.gov

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

NASA Jet Propulsion Laboratory
California Institute of Technology

Long-term Neutron Background Environment Measured by the Dynamic Albedo of Neutrons (DAN) Instrument onboard Mars Science Laboratory (MSL)

Presented by Insoo Jun
MSL DAN Science Team

Applied Space Environments Group
California Institute of Technology

17, 2017

Technology. Government sponsorship acknowledged.

MIT

Using the Galileo Solid-State Imaging (SSI) Instrument as a Sensor of Jovian Energetic Electrons

Ashley Carlton¹, Maria de Soria-Santacruz Pich², Insoo Jun², Wousik Kim², and Kerri Cahoy¹

Applied Space Environments Conference

¹Massachusetts Institute of Technology
²Jet Propulsion Laboratory

NASA

GOES-16 Space Environment In-Situ Suite: Sensors, Performance, and Early Orbital Data

Applied Space Environments Conference 2017

G.E. Galica, B. K. Dichter, C. Tsui, M. J. Golightly
Assurance Technology Corp.

C. Lopate, J.J. Connell
University of New Hampshire

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Measurements, Models, Testing, and Tools
15-19 May 2017
Huntsville, AL USA

Flowing Plasma Interaction with an Electric Sail Tether Element

Todd A. Schneider and Jason A. Vaughn
NASA/Marshall Space Flight Center

Kenneth H. Wright, Jr.
Universities Space Research Association (USRA)

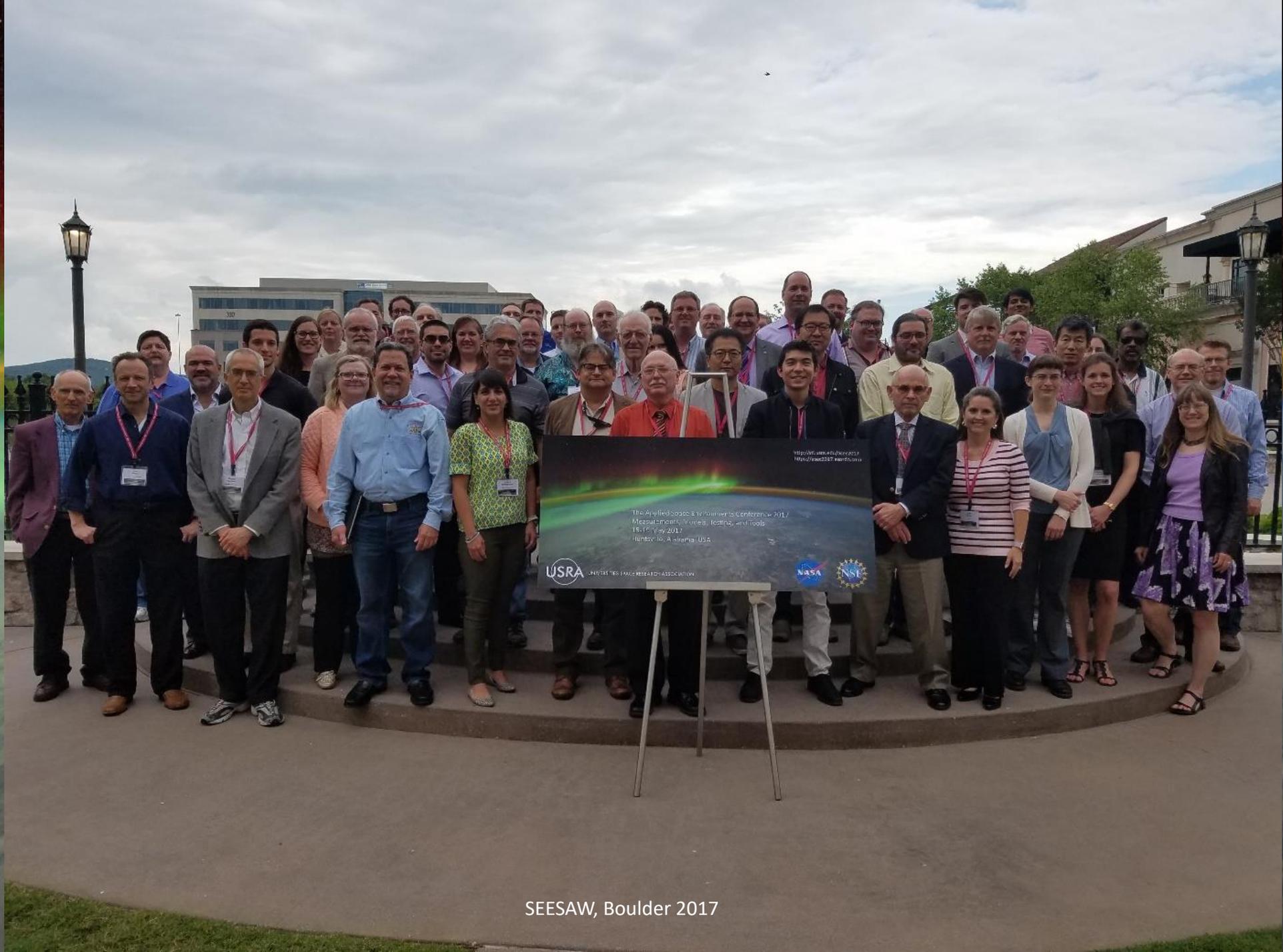
Allen J. Andersen
Utah State University

Nobie H. Stone
Nexolve Corp.

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