Lucas Liuzzo

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Education

Georgia Institute of Technology, August 2014–December 2018
School of Earth and Atmospheric Sciences
Ph.D. in Planetary and Space Physics
Dissertation: *Callisto: Signatures of plasma interaction, induction, and energetic particle dynamics at the Galilean moon*

University of Michigan, September 2010–May 2014
Department of Atmospheric, Oceanic, and Space Sciences
B.S.E. Earth System Science and Engineering, magna cum laude
Area of Concentration: Space Weather
Academic Minors: Mathematics, Physics

Research

Experience

Postdoctoral Researcher, Georgia Institute of Technology, January 2019–Present
Applied numerical simulations and data analysis techniques to investigate energetic plasma dynamics near Callisto and compared results to magnetic field and energetic particle data from Galileo. Used hybrid models to study wave generation activity at Saturn and compared to magnetometer data from Cassini.

Graduate Research Assistant, Georgia Institute of Technology, August 2014–December 2018
Modeled and investigated the plasma interaction of Jupiter's moon Callisto through the use of the Adaptive Ion-Kinetic Electron Fluid (AIKEF) hybrid simulation model and data analysis techniques. Results were compared to data from the Galileo mission, and applied to the future JUICE mission to Jupiter.

Undergraduate Research Assistant, University of Michigan, January 2013–August 2014
Modeled and analyzed ionospheric disturbances and effects on atmospheric conditions using the Global Ionosphere-Thermosphere Model and compared with multiple data sets of the high-latitude ionosphere.

Peer-reviewed Publications

Hannes Arnold, **Lucas Liuzzo**, and Sven Simon (2019), Magnetic Signatures of a Plume at Europa during the Galileo E26 Flyby, *Geophys. Res. Lett.*, in press, doi:10.1029/2018GL081544.

Lucas Liuzzo, Sven Simon, and Leonardo Regoli (2019), Energetic ion dynamics near Callisto, *Planet. Space Sci., 166*, 23–53, doi:10.1016/j.pss.2018.07.014.

Lucas Liuzzo, Sven Simon and Moritz Feyerabend (2018), Observability of Callisto's inductive signature during the JUpiter ICy moons Explorer mission, *J. Geophys. Res. (Space Physics), 123*, 9045–9054, doi:10.1029/2018JA025951.

Willi Exner, Daniel Heyner, **Lucas Liuzzo**, Uwe Motschmann, Daikou Shiota, Kanya Kusano, and Takyua Shibayama (2018), Coronal mass ejection hits Mercury: A.I.K.E.F. hybrid-code results compared to MESSENGER data, *Planet. Space Sci., 153*, 89–99, doi:10.1016/j.pss.2017.12.016.

Moritz Feyerabend, **Lucas Liuzzo**, Sven Simon, Uwe Motschmann (2017), A three-dimensional model of Pluto's interaction with the solar wind during the New Horizons encounter, *J. Geophys. Res. (Space Physics), 122*, 10,356–10,368, doi:10.1002/2017JA024456.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann (2017), Magnetic signatures of plasma interaction and induction at Callisto: The Galileo C21, C22, C23, and C30 flybys, *J. Geophys. Res. (Space Physics), 122*, 7364–7386, doi:10.1002/2017JA024303.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann (2016), Disentangling plasma interaction and induction at Callisto: The Galileo C10 flyby, *J. Geophys. Res. (Space Physics), 121*, 8677–8694, doi:10.1002/2016JA023236.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann (2015), The impact of Callisto's atmosphere on its plasma interaction with the Jovian magnetosphere, *J. Geophys. Res. (Space Physics), 120*, 9401–9427, doi:10.1002/2015JA021792.

Moritz Feyerabend, Sven Simon, Uwe Motschmann, and **Lucas Liuzzo** (2015), Filamented ion tail structures at Titan: A hybrid simulation study, *Planet. Space Sci., 117*, 362–376, doi:10.1016/j.pss.2015.07.008.

Lucas Liuzzo, Aaron Ridley, Nicholas Perlongo, Elizabeth Mitchell, Mark Conde, Donald Hampton, William Bristow, and Michael Nicolls (2015), High-latitude ionospheric drivers and their effects on wind patterns in the thermosphere, *J. Geophys. Res. (Space Physics), 120*, 715–735, doi:10.1002/2014JA020553.

Submitted Publications

George McDonald, Paul Corlies, Alexander Hayes, James Wray, Máté Ádámkovics, Michael Malaska, Morgan Cable, Jason Hofgartner, Sarah Hörst, **Lucas Liuzzo**, Jacob Buffo, Ralph Lorenz, and Elizabeth Turtle (submitted), Modeling transmission windows in Titan's lower troposphere: Implications for infrared spectrometers aboard future aerial and surface missions, *Icarus*.

Invited Talks

Lucas Liuzzo. *Callisto: Signatures of plasma interaction, induction, and energetic particle dynamics*. Johns Hopkins University, Applied Physics Laboratory, January 2019.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *A comprehensive picture of Callisto's magnetic and cold plasma environment during the Galileo era: Implications for JUICE*. American Geophysical Union Fall Meeting, New Orleans, LA, USA, December 2017.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *Callisto's magnetic environment during the Galileo era*. University of Braunschweig Institute for Theoretical Physics Seminar, Braunschweig, Germany, June 2017.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *Modeling Callisto's interaction with the Jovian Magnetosphere*. German Aerospace Center, Berlin, Germany. May 2016.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *Modeling Callisto's interaction with the Jovian Magnetosphere*. University of Braunschweig Institute of Geophysics and Extraterrestrial Physics Seminar Series, Braunschweig, Germany. April 2016.

Lucas Liuzzo, Moritz Feyerabend, and Sven Simon. *The interaction of Callisto's atmosphere with the Jovian magnetosphere*. International Symposium for Space Simulations, Prague, Czech Republic, July 2015.

First-Authored Contributed Presentations

Lucas Liuzzo, Sven Simon and Leonardo Regoli. *Energetic ion dynamics near Callisto* (poster). American Geophysical Union Fall Meeting, Washington, D.C., December 2018.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *Understanding Callisto's interaction with the Jovian magnetosphere: A case study of the Galileo C10 flyby* (talk). Committee on Space Research Proceedings, Pasadena, CA, USA, July 2018.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *The impact of Callisto's atmosphere on its plasma interaction with the Jovian magnetosphere* (poster). Committee on Space Research Proceedings, Pasadena, CA, USA, July 2018.

Lucas Liuzzo, Sven Simon, and Moritz Feyerabend. *A comprehensive picture of Callisto's magnetic environment during the Galileo era: Implications for JUICE* (poster). Committee on Space Research Proceedings, Pasadena, CA, USA, July 2018.

Lucas Liuzzo and Sven Simon. *Energetic ion dynamics near Callisto* (poster). Committee on Space Research Proceedings, Pasadena, CA, USA, July 2018.

Lucas Liuzzo and Sven Simon. *Energetic ion dynamics near Callisto* (talk). Magnetospheres of the Outer Planets Meeting, Boulder, CO, USA, July 2018.

Lucas Liuzzo and Sven Simon. *Energetic ion dynamics near Callisto* (poster). Magnetospheres of the Outer Planets Meeting, Boulder, CO, USA, July 2018.

Lucas Liuzzo, Sven Simon, and Moritz Feyerabend. *A comprehensive picture of Callisto's magnetic environment during the Galileo era: Implications for JUICE* (poster). Magnetospheres of the Outer Planets Meeting, Boulder, CO, USA, July 2018.

Lucas Liuzzo and Sven Simon. *Energetic ion dynamics near Callisto* (talk). Asia Oceania Geosciences Society Meeting, Honolulu, HI, USA, June 2018.

Lucas Liuzzo and Sven Simon. *A comprehensive picture of Callisto's magnetic environment during the Galileo era* (poster). Asia Oceania Geosciences Society Meeting, Honolulu, HI, USA, June 2018.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *Plasma interaction and energetic particle dynamics near Callisto* (poster). American Geophysical Union Fall Meeting, New Orleans, LA, USA, December 2017.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *A comprehensive picture of Callisto's magnetic environment during the Galileo era: Implications for JUICE* (talk), JUpiter ICy moons Explorer Radio and Plasma Wave Instrument Team Meeting, September, 2017.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *A comprehensive picture of Callisto's magnetic environment during the Galileo era* (talk). Magnetospheres of the Outer Planets Meeting, Uppsala, Sweden, June 2017.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *Plasma interaction and energetic particle dynamics near Callisto: A case study of the Galileo C10, C21, and C23 flybys* (poster). Magnetospheres of the Outer Planets Meeting, Uppsala, Sweden, June 2017.

Lucas Liuzzo, Sven Simon, Moritz Feyerabend, and Uwe Motschmann. *Plasma interaction and induction at Callisto: Hybrid simulation study of the Galileo C10 flyby* (talk). American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2016.

Lucas Liuzzo, Moritz Feyerabend, and Sven Simon. *Plasma interaction and induction at Callisto: Case studies of Galileo magnetic field data* (poster). American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2016.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *Plasma interaction and induction signatures at Callisto: Preparations for JUICE* (talk). European Geophysical Union General Assembly, Vienna, Austria, April 2016.

Lucas Liuzzo, Moritz Feyerabend, Sven Simon, and Uwe Motschmann. *Modeling Callisto's interaction with the Jovian magnetospheric environment* (poster). American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2015.

Lucas Liuzzo, Moritz Feyerabend, and Sven Simon. *Studying the effect of atmospheric configuration on plasma interaction at Callisto* (poster). International Symposium for Space Simulations, Prague, Czech Republic, July 2015.

Lucas Liuzzo, Moritz Feyerabend, and Sven Simon. *Studying moon-magnetosphere interactions at Callisto and Titan* (poster). International Symposium for Space Simulations, Prague, Czech Republic, July 2015.

Lucas Liuzzo, Moritz Feyerabend, and Sven Simon. *Studying the effect of atmospheric configuration on*

plasma interaction at Callisto (poster). Magnetospheres of Outer Planets Meeting, Atlanta, GA, USA, June 2015.

Lucas Liuzzo. *A statistical comparison of coupled thermosphere-ionosphere models* (talk). American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2014.

Lucas Liuzzo, Aaron Ridley, Nicholas Perlongo, Elizabeth Mitchell, Mark Conde, Donald Hampton, William Bristow, and Michael Nicolls. *High-latitude ionospheric drivers and their effects on wind patterns in the thermosphere* (poster). Coupling, Energetics and Dynamics of Atmospheric Regions Annual Conference, Seattle, WA, USA, June 2014.

Lucas Liuzzo *A statistical comparison of thermosphere-ionosphere models* (poster). Coupling, Energetics and Dynamics of Atmospheric Regions Annual Conference, Seattle, WA, USA, June 2014.

Lucas Liuzzo, Aaron Ridley, Mark Conde, Donald Hampton, William Bristow, Michael Nicolls, and Elizabeth Mitchell. *High-latitude ionospheric drivers and their effects on wind patterns in the thermosphere* (poster). American Geophysical Union Fall Meeting, San Francisco, CA, USA, December 2013.

Lucas Liuzzo and Aaron Ridley, *High-latitude ionospheric drivers and their effects on wind patterns in the thermosphere* (talk). Joint Geospace Environment Modeling and Coupling, Energetics, and Dynamics of Atmospheric Regions (GEM-CEDAR) Workshop, San Francisco, CA, USA, December 2013.

Awards and Recognition

Asia Oceania Geosciences Society Annual Conference: *Best Poster Contest*, 1st prize, 2018.

Georgia Tech School of Earth and Atmospheric Sciences: *Best Paper Award*, 2018.
Awarded to the single graduate student with the most outstanding paper or series of papers published while at Georgia Tech.

Georgia Tech School of Earth and Atmospheric Sciences: *Research Excellence Award*, 2017.
Awarded to the single graduate student with the most outstanding, high-impact research published within the preceding year.

Georgia Tech School of Earth and Atmospheric Sciences: *Student of the Month*, December 2015.

International School/Symposium for Space Simulations: *Best Poster Contest*, 1st prize, 2015.

Community Coordinated Modeling Center: *Student Research Contest*, 1st prize ionospheric category, 2014.
A nationwide contest awarded to a student with an exceptional research study who uses NASA's CCMC to solve a scientific question.

Teaching Experience

Co-Instructor: *Advanced Space Plasma Physics*, Spring 2018.
Lectured students, held office hours, and designed weekly homework sets.

Teaching Assistant: *Earth System Modeling*, Spring 2017, Fall 2017, Fall 2018.
A course focused on solving ordinary and partial differential equations through numerical techniques.

Teaching Assistant: *Advanced Space Plasma Physics*, Fall 2016.
A course studying non-linear processes in plasma physics, such as plasma waves, instabilities, shocks, and discontinuities.

Teaching Assistant: *Introduction to Space Plasma Physics*, Fall 2015.
A course focused on introducing students to concepts in space plasmas including particle dynamics in electromagnetic fields, planetary magnetospheres, and solar physics.

Teaching Assistant: *Habitable Planets*, Spring 2015.
A course introducing students to the concept of habitability in the solar system and beyond.

Professional Involvement

Convener: *Moon-Plasma Interactions Throughout the Solar System* session.
American Geophysical Union Fall Meeting: 2017, 2018.

Science Team Member: JUpiter ICy moons Explorer Radio and Plasma Wave Instrument.
Provide modeling support and will analyze data output from the future mission, 2015–present.

Reviewer: President's Undergraduate Research Award (PURA) Proposals.
Georgia Institute of Technology, 2018, 2019.

Student Member: The Planetary Society.
Georgia Institute of Technology Chapter, 2014–2018.

Student Member: Geophysics Faculty Search Committee.
School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Spring 2017.

Graduates in Earth and Atmospheric Sciences Committee (GEAS) at Georgia Tech:
Social Committee Chair: 2016–2017.
President: 2015–2016.
Treasurer: 2014–2015.
Planetary Science Student Representative: 2014–2015.

Local Organizing Committee: Magnetospheres of the Outer Planets Conference.
Atlanta, Georgia, June 2015.

Student Representative: Undergraduate Curriculum Committee.
Department of Atmospheric, Oceanic, and Space Sciences, University of Michigan, 2013–2014.

Member: American Geophysical Union, 2013–present.

Professional References

Sven Simon, Associate Professor
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Chris Paranicas, Supervisor, Outer Planetary Science
Applied Physics Laboratory
Johns Hopkins University, Laurel, Maryland
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James Wray, Associate Professor
School of Earth and Atmospheric Sciences
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Aaron Ridley, Professor
Department of Climate and Space Sciences and Engineering
University of Michigan, Ann Arbor, Michigan
Undergraduate research advisor
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Uwe Motschmann, Professor
Institute for Theoretical Physics
University of Braunschweig, Braunschweig, Germany
German Aerospace Center, Berlin-Adlershof, Germany
Collaborator and host during a two-month stay abroad
Email: u.motschmann@tu-braunschweig.de

Elias Roussos, Research Scientist
Max Planck Institute for Solar System Research
Göttingen, Germany
Collaborator on modeling energetic particle dynamics
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