# Ryan McGranaghan

**Aerospace Engineer**

November 29, 1988

909 T Street NW, Unit B

Washington, D.C. 20001 USA

ryan.mcgranaghan@jpl.nasa.gov

rymc1012@ucar.edu

https://www.linkedin.com/in/ryanmcgranaghan/

http://ryanmcgranaghan.com/

## EDUCATION

**NASA Jack Eddy Postdoctoral Research Fellow**                                2017

   Jet Propulsion Laboratory

**National Science Foundation Graduate Research Fellow**                       2013-2016

**University of Colorado Boulder**                                             Boulder, CO

  PhD, in Astrodynamics and Satellite Navigation                        2011-2016

  Graduated May 2016

- Graduate Research Associate in Colorado Center for Astrodynamics Research, Remote Sensing and Atmospheric Research, and Space Environment and Data Analysis groups

- 3.755/4.00 GPA

  MS in Astrodynamics and Satellite Navigation                          2011-2013

- Graduated with Honors Magna Cum Laude

- 3.733/4.00 GPA; Dean's List 2012-2013

**University of Tennessee**                                                    Knoxville, TN

  BS in Aerospace Engineering                                          2007 - 2011

- Graduated with Honors Magna Cum Laude

- 3.73/4.00 GPA; Dean's List Fall 2007, Spring 2009, 2010-2011

## SCIENCE AND ENGINEERING EXPERIENCE

**University Corporation for Atmospheric Research**           Jet Propulsion Laboratory

*Jack Eddy Postdoctoral Research Fellow*                       *January 2017 - Present*

- Applying state-of-the-art statistical inference tools and machine learning techniques to improve the understanding and prediction of space weather phenomena

- Principal Investigator for the JPL Data Science Working Group pilot project 'Stretching Global Navigation Satellite Systems (GNSS) signals for Space Weather Discovery'

- Coordinating international collaborations for advanced analyses of the Sun-Earth system

**New Hampshire NASA Space Grant Visiting Young Scientist**           Dartmouth College

*Visiting Research Professor*                                  *July 2016 - January 2017*

- Teaching

    Designed and instructed a graduate-level course on Data Assimilation Techniques at the Thayer School of Engineering

- Interdisciplinary Research

    Coordinated and conducted space science research with the Thayer School of Engineering, Astronomy and Physics Department, and Applied Math Department

**Frontier Development Laboratory**                    NASA Ames/SETI Institute
*Top technical expert, advisor, and consultant for space weather team*          *Summer 2018*
  - Coordinate, advise, and lead a radically interdisciplinary team of data scientists and space
    physicists to develop cutting-edge technologies and models for ionospheric prediction as part of the
    NASA Frontier Development Laboratory (FDL).

**Remote Sensing and Atmospheric Research Department**  University of Colorado Boulder
*Research Assistant*                    *September 2012 - May 2016*
  - Used satellite data surrounding solar events to accurately describe the local and global
    high-latitude ionospheric electrodynamics in Earth's atmosphere

**Colorado Center for Astrodynamics Research**          University of Colorado Boulder
*Research Assistant*                    *October 2011 - May 2016*
  - Linked, Autonomous, Interplanetary Satellite Orbit Navigation (LiAISON)
        Characterized the performance of autonomous orbit determination architecture in
        precise tracking of geosynchronous, lunar-orbiting, interplanetary departure, and noisy
        manned spacecraft

**Los Alamos National Laboratory - Space Weather Summer School**    Los Alamos, NM
                    *Summer 2014*
  - Recipient of Vela Fellowship to conduct data assimilative research focused on characterization of
    fine spatio-temporal features of the ionosphere-thermosphere system

**NCAR Advanced Scholars Program Summer Colloquium**            Boulder, CO
                    *July 2015*

**Jet Propulsion Laboratory Visiting Engineer**            Pasadena, CA
                    *May 2015*

**Jet Propulsion Laboratory Planetary Sciences Summer School**     Pasadena, CA
                    *June 2013 - August 2013*
  - Lead systems engineer

  - Principal investigator for magnetospheric science

**High Altitude Observatory Space Weather Summer School**          Boulder, CO
                    *July 2013*

**Aerospace Concepts Pty Ltd**              Canberra Captal Territory, Australia
                    *June 2012 - August 2012*

**NASA Marshall Space Flight Center**                  Huntsville, AL
                    *June 2009 - August 2009*

**University of Tennessee - Senior Design**                Knoxville, TN
                    *August 2010 - August 2011*

## TEACHING EXPERIENCE

**Dartmouth College**                          Hanover, NH
*ENGG-199: Introduction to Data Assimilation*          *July 2016 - January 2017*
  - Crafted and taught a graduate-level course focused on a survey of data assimilation methods
    applicable across engineering, science, and applied mathematics disciplines

  - Offered through the Thayer School of Engineering

**Aerospace Engineering Sciences Department**          University of Colorado Boulder
*Teaching Assistant*                            *Spring 2016*
  - Teaching assistant and lecturer for Aerospace Environments and Space Weather course (Course
    number: ASEN 5335, *link*)

# Publications

## Peer Reviewed

[1] **Ryan M. McGranaghan**. *Determining global ionospheric conductivity in the satellite and data assimilation age and assessing its influence on the Magnetosphere-Ionosphere-Thermosphere system.* PhD thesis, University of Colorado Boulder, Boulder, CO, May 2016.

[2] **McGranaghan, Ryan M.**, Anthony J. Mannucci, Brian Wilson, Chris A. Mattmann, and Richard Chadwick. New capabilities for prediction of high-latitude ionospheric scintillation: A novel approach with machine learning. *Space Weather*, 2018.

[3] Yiqun Yu, Vania K. Jordanova, **McGranaghan, Ryan M.**, and Stanley C. Solomon. Self-consistent modeling of electron precipitation and responses in the ionosphere: Application to low-altitude energization during substorms. *Geophysical Research Letters*, 0(0), 2018.

[4] E. Camporeale, S. Wing, J. Johnson, C. M. Jackman, and **McGranaghan, Ryan M.** Space Weather in the Machine Learning era: A multi-disciplinary approach. *Space Weather*, 2018.

[5] **McGranaghan, Ryan M.**, Asti Bhatt, Tomoko Matsuo, Anthony J. Mannucci, Joshua L. Semeter, and Seebany Datta-Barua. Ushering in a new frontier in geospace through data science. *Journal of Geophysical Research: Space Physics*, 2017.

[6] **McGranaghan, Ryan M.**, Anthony J. Mannucci, and Colin Forsyth. A comprehensive analysis of multiscale field-aligned currents: Characteristics, controlling parameters, and relationships. *Journal of Geophysical Research: Space Physics*, 2017.

[7] A. J. Mannucci, O. P. Verkhoglyadova, X. Meng, and **Ryan M. McGranaghan**. On the role of neutral flow in field-aligned currents. *Annales Geophysicae*, 36(1):53–57, 2018.

[8] **McGranaghan, Ryan M.**, Anthony J. Mannucci, Olga Verkhoglyadova, and Nishant Malik. Finding multiscale connectivity in our geospace observational system: Network analysis of total electron content. *Journal of Geophysical Research: Space Physics*, 2017.

[9] **Ryan M. McGranaghan**, Delores J. Knipp, and Tomoko Matsuo. High-latitude ionospheric conductivity variability in three dimensions. *Geophysical Research Letters*, 43(15):7867–7877, 2016.

[10] Ryan McGranaghan, Delores J. Knipp, Tomoko Matsuo, and Ellen Cousins. Optimal interpolation analysis of high-latitude ionospheric Hall and Pedersen conductivities: Application to assimilative ionospheric electrodynamics reconstruction. *Journal of Geophysical Research: Space Physics*, 2016.

[11] **Ryan M. McGranaghan**, Delores J. Knipp, Stanley C. Solomon, and Xiaohua Fang. A fast, parameterized model of upper atmospheric ionization rates, chemistry, and conductivity. *Journal of Geophysical Research: Space Physics*, 120(6):4936–4949, 2015.

[12] **Ryan M. McGranaghan**, Delores J. Knipp, Tomoko Matsuo, Humberto Godinez, Robert J. Redmon, Stanley C. Solomon, and Steven K. Morley. Modes of high-latitude auroral conductance variability derived from DMSP energetic electron precipitation observations: Empirical orthogonal function analysis. *Journal of Geophysical Research: Space Physics*, 2015.

[13] Siamak Hesar, Jeffrey S. Parker, Jason M. Leonard, **Ryan M. McGranaghan**, and George H. Born. Lunar far side surface navigation using linked autonomous interplanetary satellite orbit navigation (LiAISON). *Acta Astronautica*, (AA-D-14-00679R1), 2015.

[14] Farah Alibay, Philip Fernandes, **Ryan M. McGranaghan**, Jason Leonard, and JPL PSSS team. Design of a high-value, low-cost mission to the Neptunian system. In *In Proceedings of the 2014 IEEE Aerospace Conference*, Big Sky, Montana, Mar. 2014. Jet Propulsion Laboratory.

[15] **Ryan M. McGranaghan**, Delores Knipp, Robert McPherron, and Linda A. Hunt. Impact of equinoctial high-speed stream structures on thermospheric responses. *Journal of Geophysical Research: Space Weather*, 12(001045), 2014.

[16] **Ryan M. McGranaghan**, Brent Sagan, Gemma Dove, Aaron Tullos, James Evans Lyne, and J.P. Emery. A survey of mission opportunities to trans-neptunian objects. *Advances in the Astrodynamical Sciences Series*, 142(CP11-615), 2012.

[17] **Ryan M. McGranaghan**, Brent Sagan, Gemma Dove, Aaron Tullos, James Evans Lyne, and J.P. Emery. A survey of mission opportunities to trans-neptunian objects. *Journal of the British Interplanetary Society*, 64(296M), 2011.

## Non-Peer Reviewed

[1] **Ryan M. McGranaghan**, H. Godinez, S. Morley, D. Knipp, and T. Matsuo. Global high-latitude conductivity modeling: New data and improved methods. *Los Alamos Space Weather Summer School Research Reports, http://www.lanl.gov/projects/national-security-education-center/space-earth-center/space-weather-school/_assets/docs/swx-report-2014.pdf,*2014.

[2] **Ryan M. McGranaghan**, Jason M. Leonard, Jeffrey S. Parker, George H. Born, Ann Dietrich, and Siamak Hesar. LiAISON tracking for a lunar far-side sample return mission. In *In Proceedings of the 24th Annual AIAA/AAS Spaceflight Mechanics Meeting*, number 14-432, Santa Fe, NM, Jan. 2014. University of Colorado at Boulder.

[3] Siamak Hesar, **Ryan M. McGranaghan**, Jeffrey S. Parker, Jason M. Leonard, Kohei Fujimoto, and George H. Born. Application of LiAISON orbit determination architecture in navigating a rover on the lunar surface. In *In Proceedings of the AAS Astrodynamics Specialist Conference*, number AAS 13-738, Hilton Head, SC, Aug. 2013. University of Colorado at Boulder.

[4] Jason M. Leonard, Jeffrey S. Parker, Rodney L. Anderson, **Ryan M. McGranaghan**, Kohei Fujimoto, and George H. Born. Supporting crewed lunar exploration with LiAISON navigation. In *In Proceedings of the 35th AAS Guidance and Control Conference*, number AAS 13-053, Breckenridge, Colorado, February 2013. University of Colorado at Boulder and Jet Propulsion Laboratory.

[5] **Ryan M. McGranaghan**, Jason Leonard, Jeffrey Parker, George Born, Kohei Fujimoto, and Rodney Anderson. Interplanetary departure stage navigation by means of LiAISON orbit determination architecture. In *Proceedings of the 23rd Annual AIAA/AAS Spaceflight Mechanics Meeting*, number 13-207. American Astronautical Society, 2013/02/11 2013.

[6] Jeffrey Parker, **Ryan M. McGranaghan**, Jason Leonard, George Born, Kohei Fujimoto, and Rodney Anderson. Navigating a crewed lunar vehicle using LiAISON. In *Proceedings of the 23rd Annual AIAA/AAS Spaceflight Mechanics Meeting*, number 13-330. American Astronautical Society, 2013/02/11 2013.

[7] Jeffrey Parker, Rodney Anderson, George Born, Kohei Fujimoto, Jason Leonard, and **Ryan M. McGranaghan**. Navigation between geosynchronous and lunar L1 orbiters. In *Proceedings of the AIAA/AAS Astrodynamics Specialist Conference*. American Institute of Aeronautics and Astronautics, 2012/10/11 2012.

[8] Jason Leonard, **Ryan M. McGranaghan**, Jeffrey Parker, George Born, Kohei Fujimoto, and Rodney Anderson. LiAISON-supplemented navigation for geosynchronous and lunar L1 orbiters. In *Proceedings of the AIAA/AAS Astrodynamics Specialist Conference*. American Institute of Aeronautics and Astronautics, 2012/10/11 2012.

[9] Kohei Fujimoto, Jason Leonard, **Ryan M. McGranaghan**, Jeffrey Parker, Rodney Anderson, and George Born. Simulating the LiAISON navigation concept in a GEO + Earth-Moon halo constellation. In *Proceedings of the 23rd International Symposium on Space Flight Dynamics*, Pasadena, CA, Oct - Nov 2012. Jet Propulsion Laboratory.

[10] **Ryan M. McGranaghan**, Brent Sagan, Gemma Dove, Aaron Tullos, J. E. Lyne, and Joshua P. Emery. A survey of mission opportunities to trans-neptunian objects. In *Proceedings of the AAS/AIAA Astrodynamics Specialists Conference*, number AAS 11-615. American Institute of Aeronautics and Astronautics, August 2011.

## Awards, Grants & Honours

University Center for Atmospheric Research/NASA Living
 With a Star Jack Eddy Postdoctoral Fellow . . . . . . . . . . . . . . . . . . . . . . . . . 2017
Research Spotlight Article Eos.org - Tracing Electric Currents That
 Flow Along Earth's Magnetic Field . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2018
$32^{nd}$ Union of Radio Science General Assembly and
 Scientific Symposium Young Scientist Award . . . . . . . . . . . . . . . . . . . . . . 2017
Selected as New Leader in Space Science
 *National Academy of Sciences and Chinese Academy of Sciences* . . . . . . . . . . . . . 2018
Lorentz Workshop *Space Weather: A multi-disciplinary approach* Invited participant . . . . . 2017
New Hampshire NASA Space Grant Visiting Young Scientist . . . . . . . . . . . . . . . . 2016
Dartmouth College Plasma Physics Seminar Coordinator . . . . . . . . . . . . . . . . . . 2016
1st place: Coupling Energetics and Atmospheric Dynamics Student Poster Competition . . . 2016
Outstanding Student Paper Award (top 3-5%) - AGU Fall Meeting San Francisco, CA . . . . 2015
Selected Speaker - Technology, Entertainment, and Design (TEDx) Boulder . . . . . . . . . 2015
Most Outstanding Student Presentation - NASA Living With a Star Meeting . . . . . . . . 2014
3rd International Conference on GPS Radio Occultation - Taipei, Taiwan . . . . . . . . . . 2016
  1. Selected Student Representative
  2. Outstanding Student Award
National Science Foundation Graduate Research Fellow . . . . . . . . . . . . . . . 2013 - Present
Los Alamos National Laboratory Space Weather Summer School Vela Fellow . . . . Summer 2014
Best Presentation: Los Alamos National Laboratory Space Weather Summer School  Summer 2014
Top 5/100: Coupling Energetics and Atmospheric Dynamics Student Poster Competition . . 2014
Selected Speaker - Smead Symposium . . . . . . . . . . . . . . . . . . . . . . . . . May 2014
Engineer in Training . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Passed FE in 2011
Tau Beta Pi (national engineering honor society) . . . . . . . . . . . . . . . . 2010 - Present
Best Group Presentation: NASA MSFC Internship Program . . . . . . . . . . . . Summer 2009
National Society of Collegiate Scholars . . . . . . . . . . . . . . . . . . . . . . . 2010 - 2011

## Selected Professional Communication

**Public Lectures**
TEDx University of Colorado Boulder (TEDxCU) - Boulder, CO                                   April 11, 2015
 McGranaghan, R., *Living with a star*

Ignite Boulder - Boulder, CO                                                                     May 19, 2016
    McGranaghan, R., *Our space is a place with weather*
High Altitude Observatory (HAO) 75th Anniversary - Boulder, CO                    September, 2015
    McGranaghan, R., *Living with a star*
NASA in Silicon Valley Podcast                                                                     May 25, 2018
  Mountain View, CA - NASA Ames Research Center
    McGranaghan, R., *Lika Guhathakurta and Ryan McGranaghan Talk About Space Weather*
NASA Headquarters Seminar                                                                          May 16, 2018
  Washington, D.C.
    McGranaghan, R., *The importance of weather in space and how data science will help us understand it*
National Academy of Sciences: Committee on Solar and Space Physics (CSSP)          October 6, 2016
  Fall Meeting - Washington, D.C.
    McGranaghan, R., *Ionospheric Data Assimilation*

**Selected Conferences/Workshops**
$8^{th}$ New Leaders in Space Science Forum - Pasadena, CA                                              2018
    McGranaghan, R. Selected Participant: *Ushering in a new frontier in Space Weather: New capabilities through Data Science*
$7^{th}$ New Leaders in Space Science Forum - Guangzhou, China                                          2018
    McGranaghan, R. Selected Participant: *Space weather as a complex system: Improving conductivity modeling for the satellite and assimilation age*
Lorentz Workshop, Space Weather: A multi-disciplinary approach - Leiden, Netherlands           2017
    McGranaghan, R. Session Convener: *Machine Learning for Space Weather*
Union of Radio Science (URSI) General Assembly & Scientific Symposium - Montreal, Canada       2017
    McGranaghan, R., et al. *Gaining the most utility from our geospace observational system: Network analysis of total electron content as a means to understand space weather to the point of prediction*
4th Swarm Science Meeting and Geodetic Missions Workshop - Banff, AB, Canada                   2017
    McGranaghan, R., et al.: *Utilizing data-driven approaches in geospace: Network Analysis of total electron content data and extension with Swarm*
Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Summer
  Meeting - Keystone, CO                                                                                2017
    McGranaghan, R. Session Convener: *Next Generation Systems Science*
American Geophysical Union (AGU) Fall Meeting - San Francisco, CA                   December, 2016
    McGranaghan, R. et al., *New understanding of three-dimensional ionospheric conductivities and application to global analysis of magnetosphere-ionosphere-thermosphere coupling*
    (Co-author) *Making sense of high-latitude geospace observations through Bayesian state estimation for Gaussian processes*
    (Co-author) *Empirical orthogonal function (EOF) analysis of short-term GPS total electron content variations*
Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Summer
  Meeting - Santa Fe, NM                                                                                2016
    McGranaghan, R. et al., *Conductivity: Enabling system science*
    McGranaghan, R. et al., *Data fusion in conductivity specification*
Geospace Environment Modeling (GEM) Summer Meeting - Santa Fe, NM                               2016
    McGranaghan, R., *State of ionospheric conductivity research and what's coming next (or should)*
3rd International Conference on GPS Radio Occultation - Taipei, Taiwan                  March, 2016
    McGranaghan, R. et al., *Reconstruction of three-dimensional auroral ionospheric conductivities via an assimilative technique and extension using COSMIC data*
Space Weather Workshop - Broomfield, CO                                                     April, 2016
    McGranaghan, R. et al., *Determining Global Ionospheric Conductivity in the Satellite and*

*Assimilation Age and Assessing its Influence on the Magnetosphere-Ionosphere-Thermosphere System*

European Geophysical Union (EGU) General Assembly - Vienna, Austria April, 2016

    (Co-author) *Conductance Distributions for Empirical Orthogonal Function Analysis and Optimal Interpolation*

American Geophysical Union (AGU) Fall Meeting - San Francisco, CA December, 2015

    1. (Co-author) *Assimilative Mapping of Interhemispheric Polar Ionospheric Electrodynamics*

    2. (Co-author) *Which Solar and Geomagnetic Drivers Control Earth's Upper Atmosphere Thermostat?*

Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Summer
  Meeting - Seattle, WA 2015

    McGranaghan, R. et al., *Primary modes of high-latitude conductance variability: Improved modeling and Empirical Orthogonal Function (EOF) analysis*

Triennial Earth-Sun Summit (TESS) - Indianapolis, IN 2015

    McGranaghan, R. et al., *Modes of high-latitude conductance variability derived from DMSP F6-F8 and F16-F18 energetic electron precipitation observations: Empirical Orthogonal Function (EOF) analysis*

Living With a Star - Portland, OR 2014

    McGranaghan, R., *Forecasting the impact of equinoctial high-speed stream structures on thermospheric responses and an extension to solstitial events*

Coupling and Energetics of Atmospheric Regions (CEDAR) Data Assimilation and Inverse Problems
Workshop - Seattle, WA 2014

    McGranaghan, R. et al., *Adaptive technique for conductivity covariance refinement*

American Institute of Aeronautics and Astronautics (AIAA)/American Astronautical Society (AAS)
Spaceflight Mechanics Conference - Santa Fe, NM 2014

    McGranaghan, R. et al., *LiAISON tracking for a lunar far-side sample return mission*

AAS/AIAA Specialist Conference - Kauai, HI 2013

    1. McGranaghan, R. et al., *Interplanetary departure stage navigation by means of LiAISON orbit determination architecture*

    2. McGranaghan, R. et al., *Navigating a crewed lunar vehicle using LiAISON*

AAS/AIAA Specialist Conference - Girdwood, AK 2011

    McGranaghan, R. et al., *A Survey of mission opportunities to trans-neptunian objects*

**Selected Seminars/Team Meetings/Summer Schools**

Massachusetts Institute of Technology Media Lab - Boston, MA November, 2017

    McGranaghan, R. et al., *Ushering in a new frontier in space science*

UCLA - Los Angeles, CA April, 2017

    McGranaghan, R. et al., *Space weather as a complex system: Improving understanding of magnetosphere-ionosphere coupling in the age of assimilation and data science*

Boston College (Institute for Scientific Research Seminar Series) - Chestnut Hill, MA December, 2016

    McGranaghan, R. et al., *Assimilative specification of three dimensional ionospheric conductivity and application to global magnetosphere-ionosphere-thermosphere modeling*

Dartmouth College (Departments of Applied Math, Engineering, and Physics and Astronomy Seminar
Series) - Hanover, NH January, 2016

    McGranaghan, R. et al., *Space weather as a complex system: Improving conductivity modeling for the satellite and assimilation age*

Arizona State University (Department of Applied Math Seminar Series) - Tempe, AZ January, 2016

    McGranaghan, R. et al., *Space weather from the applied math perspective: Improving conductivity modeling for the satellite and assimilation age*

Johns Hopkins University Applied Physics Laboratory - Baltimore, MD November, 2015

    McGranaghan, R. et al., *Improving conductivity modeling for the satellite and assimilation age*

Laboratory for Atmospheric and Space Physics - Boulder, CO October, 2015

McGranaghan, R. et al., *Ionospheric conductivity: Importance and improved modeling*
Space Weather Prediction Center (SWPC) Weekly Colloquium - Boulder, CO                July 30, 2015
McGranaghan, R. et al., *Advancing upper atmospheric research: space weather forecasting and improved conductivity modeling*
Jet Propulsion Laboratory: Ionospheric and Atmospheric Remote Sensing Group Seminar - Pasadena, CA                2015
McGranaghan, R. et al., *Improving ionospheric conductivity modeling for the satellite and data assimilation era*
Air Force Office of Space Research, Space Sciences Annual Review - Albuquerque, NM                2015
McGranaghan, R. et al., *Global conductivity modeling: A path to better ionospheric prediction*
Los Alamos National Laboratory Space Weather Summer School - Los Alamos, NM                2014
McGranaghan, R. et al., *Multi-layered conductivity modeling for 3-D high-latitude ionospheric electrodynamics analysis*
Jet Propulsion Laboratory Planetary Sciences Mission Review Board - Pasadena, CA                2013
Alibay, F., McGranaghan, R. et al., *Taking Remote and In-situ Data to Explore Neptune and Triton (TRIDENT): Systems engineering mission design*

**Selected Poster Presentations**
Lorent Workshop (Space weather: A multi-disciplinary approach) - Leiden, Netherlands                2017
McGranaghan, R. et al., *Next Generation Methodologies to Advance Space Weather Monitoring and Predictability: A New Perspective through Network Analysis*
Jet Propulsion Laboratory Postdoc Research Day - Pasadena, CA                2017
McGranaghan, R. et al., *Next Generation Methodologies to Advance Space Weather Monitoring and Predictability: A New Perspective through Network Analysis*
Coupling, Energetics, and Dynamics of Atmospheric Research (CEDAR) and Geospace Environment Modeling (GEM) Workshop - Keystone, CO                2017
McGranaghan, R. et al., *Finding multi-scale connectivity in our geospace observational system: Network analysis of total electron content*
Joint Coupling, Energetics, and Dynamics of Atmospheric Research (CEDAR) and Geospace Environment Modeling (GEM) Workshop - Santa Fe, NM                2016
McGranaghan, R. et al., *Reconstruction of three-dimensional auroral ionospheric conductivities via an assimilative technique*
3rd International Conference on GPS Radio Occultation (ICGPSRO) - Taipei, Taiwan                2016
McGranaghan, R. et al., *Reconstruction of three-dimensional auroral ionospheric conductivities via an assimilative technique and extension using COSMIC data*
American Geophysical Union Fall Meeting - San Francisco, CA                2015
McGranaghan, R. et al., *Reconstruction of three-dimensional auroral ionospheric conductivities via an assimilative technique*
National Center for Atmospheric Research (NCAR) Advanced Studies
   Program (ASP) Summer Colloquium - Boulder, CO                2015
McGranaghan, R. et al., *Primary modes of high-latitude conductance variability: Improved modeling and Empirical Orthogonal Function (EOF) analysis*
Geospace Environment Modeling (GEM) Summer Meeting - Snowmass, CO                2015
McGranaghan, R. et al., *Primary modes of high-latitude conductance variability: Improved modeling and Empirical Orthogonal Function (EOF) analysis*
Space Weather Workshop - Boulder, CO                2015
McGranaghan, R. et al., *A fast, parameterized model of upper atmospheric ionization rates, chemistry, and conductivity*
American Geophysical Union Fall Meeting - San Francisco, CA                2014
McGranaghan, R. et al., *High-latitude conductivity modeling: New data and improved methods*
Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) - Seattle, WA                2014

McGranaghan, R. et al., *Forecasting the impact of equinoctial high-speed stream structures on thermospheric response*

Space Weather Workshop - Boulder, CO · 2014

McGranaghan, R. et al., *Forecasting the impact of equinoctial high-speed stream structures on thermospheric responses*

American Geophysical Union Fall Meeting - San Francisco, CA · 2013

1. McGranaghan, R. et al., *Signatures of the seasonal variation in thermospheric density*
2. Day, M. D., McGranaghan, R. et al., *Neptune and Triton: A study in future exploration*

Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) - Boulder, CO · 2013

McGranaghan, R. et al., *Signature of Russell-McPherron effect on thermospheric density*

NASA Marshall Spaceflight Center Summer Student Symposium · 2009

McGranaghan, R. et al.*Damage tolerance capabilities of graphite composite materials for the ARES I interstage*

## Volunteer Work

Mentor: Boulder Valley School District
(BVSD) Science Research Seminar (SRS) . . . . . . . . . . . . . . . . . . . . . . . . . 2014 - 2016
Instructor/Mentor: We Want Our Future (WeWOF) . . . . . . . . . . . . . . . . . . 2011 - 2016
Executive Board Member: Students for the
Exploration and Development of Space (SEDS) . . . . . . . . . . . . . . . . . . . . 2011- Present
Volunteer: Love Soup Kitchen . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2011 - 2012
Volunteer: Goodwill Industries . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2011 - 2012

## Memberships

Super Magnetometer Initiative (SuperMAG) - Steering Committee . . . . . . . . 2018 - Present
American Astronomical Society . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2015 - Present
American Astronautical Society . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2013 - Present
American Geophysical Union . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2013 - Present
Society of Satellite Professionals . . . . . . . . . . . . . . . . . . . . . . . . . . . . 2013 - Present
Tau Beta Pi (national engineering honor society) . . . . . . . . . . . . . . . . . . 2010 - Present
American Institute of Aeronautics and Astronautics . . . . . . . . . . . . . . . . 2008 - Present
Brother in Sigma Chi Fraternity Beta Sigma Chapter . . . . . . . . . . . . . . . 2007 - Present

## Technical Skills

- *Programming Languages*: Experienced with Matlab, Python, LaTeX, Fortran, IDL, git, Satellite Tool Kit (STK), C++, Copernicus, Mission Analysis and Operational Navigation and Toolkit Environment (MONTE)

- *Software*: Mac OS X, Microsoft Office, Linux (Ubuntu and Redhat Distributions specifically)

- *High Performance Computing*: Hadoop Spark, Hadoop Distributed File System, Cloud computing, Map-Reduce Paradigm

- *Machine Learning*: Python SciKit Learn, TensorFlow, Keras