

**Ryan McGranaghan**  
3008 Bunker Hill Road  
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**Principal Data Scientist/Space Physicist**  
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## MISSION STATEMENT

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To be a leader and a student in the New Frontier that exists at the intersection of traditional approaches & physical understanding and state-of-the-art data-driven sciences and technologies that provide a clearer glimpse into the complexity of the human-natural world **for the sake of scientific discovery and societal flourishing**. To use a recognition of the importance of and capabilities to address the full data lifecycle (collection, management, analysis, and communication) to pose, explore, and make progress toward the most compelling questions, particularly in areas that are exceptionally challenging and that have been unyielding to research analysis. To act in service of curiosity and to facilitate and deliver progress commensurate with the needs of society. To embrace and pioneer the **transdisciplinary approaches** that progress in science and technology require.

## CURRENT POSITION

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**Atmospheric and Space Technology Research Associates (ASTRA) LLC** Boulder, CO  
*Principal Data Scientist/Aerospace Engineering Scientist* *January 2019 - Present*

- Applying state-of-the-art statistical inference tools and machine learning techniques to improve the understanding and prediction of space weather phenomena
- Lead ASTRA efforts toward advanced data processing architectures, data analytics, and machine learning and apply innovations to basic and applied scientific pursuits
- Coordinating directions, strategic objectives, and operation of the ASTRA Data Science Working Group

## EDUCATION

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**NASA Jack Eddy Postdoctoral Research Fellow** 2017-2019  
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

## TRANSDICIPLINARY SCIENCE AND ENGINEERING EXPERIENCE

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### **NASA Goddard Space Flight Center**

*Director of creative partnerships and knowledge architecture*

Center for HelioAnalytics

*May 2020 - Present*

- Facilitate *transdisciplinary* connections, coordination and communications
- Apply knowledge in ways that help the Center, its members, and collaborations flourish
- Lead application of new approaches to knowledge representation to benefit modeling and scientific exploration

### **University Corporation for Atmospheric Research**

*Jack Eddy Postdoctoral Research Fellow*

Jet Propulsion Laboratory

*January 2017 - January 2019*

- 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**

*Visiting Research Professor*

Dartmouth College

*July 2016 - January 2017*

- Teaching  
Designed and taught 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**

*Top technical expert, advisor, and consultant for space weather team*

NASA Ames/SETI Institute

*Summers 2017-Present*

- 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).

### **Jet Propulsion Laboratory Heliophysics Mission Design Summer School**

Pasadena, CA

*June - August 2020*

- Instruments Lead

### **Remote Sensing and Atmospheric Research Department**

*Research Assistant*

University of Colorado Boulder

*September 2012 - May 2016*

- Integrated satellite and ground-based data surrounding solar events to accurately describe the local and global high-latitude ionospheric electrodynamics in Earth's atmosphere

### **Colorado Center for Astrodynamics Research**

*Research Assistant*

University of Colorado Boulder

*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

<b>Los Alamos National Laboratory - Space Weather Summer School</b>	Los Alamos, NM <i>Summer 2014</i>
<ul style="list-style-type: none"> <li>• Recipient of Vela Fellowship to integrate space weather and data science through data assimilative research focused on characterization of fine spatio-temporal features of the ionosphere-thermosphere system</li> </ul>	
<b>NCAR Advanced Scholars Program Summer Colloquium</b>	Boulder, CO <i>July 2015</i>
<b>Jet Propulsion Laboratory Visiting Engineer</b>	Pasadena, CA <i>May 2015</i>
<b>Jet Propulsion Laboratory Planetary Sciences Summer School</b>	Pasadena, CA <i>June 2013 - August 2013</i>
<ul style="list-style-type: none"> <li>• Lead systems engineer</li> <li>• Principal investigator for magnetospheric science</li> </ul>	
<b>High Altitude Observatory Space Weather Summer School</b>	Boulder, CO <i>July 2013</i>
<b>Aerospace Concepts Pty Ltd</b>	Canberra Capital Territory, Australia <i>June 2012 - August 2012</i>
<b>NASA Marshall Space Flight Center</b>	Huntsville, AL <i>June 2009 - August 2009</i>
<b>University of Tennessee - Senior Design</b>	Knoxville, TN <i>August 2010 - August 2011</i>

## PRINCIPAL INVESTIGATOR-LED PROJECTS

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### The Heliophysics KNOWledge Network (Helio-KNOW)

*February 2021 - Present*

- Program: NASA Early Career Investigator Program
- A new *convergent* approach to space weather research
- Only space science project chosen in the Convergence Accelerator

### Convergence Hub for the Exploration of Space Science (CHESS)

*May 2019 - Present*

- Program: National Science Foundation Convergence Accelerator
- <https://www.chessscience.com/>
- A new *convergent* approach to space weather research
- Only space science project chosen in the Convergence Accelerator

### PRISM Project for Interconnection Analysis

*May 2019 - Present*

- Program: National Science Foundation Harnessing the Data Revolution
- “Predictive Risk Investigation System (PRISM) for Multi-layer Dynamic Interconnection Analysis”
- <https://sites.google.com/view/prism-prj/home>
- Represent the space science domain in a transdisciplinary network approach to understanding human-natural systems

## NASA GSFC “Opening Pathways”

*June 2018 - Present*

- Identify, open, and curate opportunities for next-generation Heliophysics and transdisciplinary science at Goddard Space Flight Center
- Director of creative partnerships and knowledge architecture for the Center for HelioAnalytics
- Liaison and strategic developer for the NASA Frontier Development Laboratory Program

## NASA SBIR: COgnitive Radio Frequency Utilization by Constellations of Spacecrafts (CORUS)

*August 2018 - Present*

- Led the effort to advance intelligent communication approaches to maximize science data return and resource utilization and ensure resilience in the unpredictable space environment across constellations of satellites

## NASA WHPI Initiative

*June 2019 - Present*

- Geospace Lead and Coordinator of Digital Infrastructure for the *Whole Heliosphere and Planetary Interactions (WHPI) Initiative*

## NASA JPL Data Science Working Group Pilot Project

*June 2019 - Present*

- “Stretching Global Navigation Satellite Systems (GNSS) signals for space weather discovery”
- Coordinate a transdisciplinary team of space physicists, computer scientists, Earth scientists, and data scientists to advance space weather prediction for GNSS signals

## TEACHING EXPERIENCE

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### 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 REVEALING TRANSDISCIPLINARY ACHIEVEMENT

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\*Full list available at ORCID: <https://orcid.org/0000-0002-9605-0007>

### 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] **Ryan M. McGranaghan** and J. Ziegler, T. Bloch, S. Hatch, E. Camporeale, K. Lynch, M. Owens, J. Gjerloev, B. Zhang, S. Skone. Toward a next generation particle precipitation model: Mesoscale prediction through machine learning (a case study and framework for progress). *Space Weather*, n/a(n/a):e2020SW002684. e2020SW002684.

- [3] Toshi Nishimura, **Ryan M. McGranaghan**, and et al. Advances in ionospheric research. In *Multiscale Dynamics in the High-Latitude Ionosphere*. In *Ionosphere Dynamics and Applications* (eds C. Huang, G. Lu, Y. Zhang and L.J. Paxton). AGU Monograph: *Solar/Heliosphere*, chapter 3. American Geophysical Union, 2021. <https://doi.org/10.1002/9781119815617.ch3>
- [4] A. Kellerman, **Ryan M. Mcgranaghan**, J. Bortnik, B. Carter, J. Hughes, R. Arrit, K. Venkataramani, C. Perry, J. McCormick, C. Ngwira, M. Cohen, J. Yue Geomagnetically Induced Currents at Middle Latitudes: 1. Quiet-time Variability. *Space Weather*, n/a(n/a):e2021SW002729. e2021SW002729.
- [5] J. Hughes, **Ryan M. Mcgranaghan**, A. Kellerman, J. Bortnik, R. Arrit, K. Venkataramani, C. Perry, J. McCormick, C. Ngwira, M. Cohen Revealing Novel Connections Between Space Weather and the Power Grid: Network Analysis of Ground-Based Magnetometer and Geomagnetically Induced Currents (GIC) Measurements. *Space Weather*, n/a(n/a):e2021SW002727. e2021SW002727 2021SW002727.
- [6] J.P. Che-Castaldo, R. Cousin, SJ Daryanto, **Ryan M. Mcgranaghan**, et al. Critical Risk Indicators (CRIs) for the electric power grid: a survey and discussion of interconnected effects. *Environ Syst Decis*, 594–615. <https://doi.org/10.1007/s10669-021-09822-2>.
- [7] Haines, C. and Owens, M.J., Barnard, L., Lockwood, M., Ruffenach, A., Boykin, K. and **Ryan M. McGranaghan**. Forecasting Occurrence and Intensity of Geomagnetic Activity with Pattern-Matching Approaches. *Space Weather*, n/a(n/a):e2020SW002624 2020SW002624. e2020SW002624.
- [8] O. Verkhoglyadova, O., X. Meng, A. J. Mannucci, J. -S. Shim, and **Ryan M. McGranaghan**. Evaluation of total electron content prediction using three ionosphere-thermosphere models. *Space Weather*, n/a(n/a):e2020SW002452. e2020SW002452 2020SW002452.
- [9] P. R. Shreedevi, R. K. Choudhary, Smitha V. Thampi, Sneha Yadav, T. K. Pant, Yiqun Yu, **Ryan M. McGranaghan**, Evan G. Thomas, Anil Bhardwaj, and A. K. Sinha. Geomagnetic storm induced plasma density enhancements in the southern polar ionospheric region: a comparative study using st. patrick’s day storms of 2013 and 2015. *Space Weather*, n/a(n/a):e2019SW002383. e2019SW002383 2019SW002383.
- [10] Qingyu Zhu, Yue Deng, Arthur Richmond, **Ryan M. McGranaghan**, and Astrid Maute. Impacts of multiscale FACs on the ionosphere-thermosphere system: GITM simulation. *Journal of Geophysical Research: Space Physics*, 124(5):3532–3542, 2019.
- [11] **Ryan M. McGranaghan**. Scintillation prediction. In Monica Bobra, Chris Holdgraf, James Mason, Paul Wright, Carlos José Díaz Baso, and Ariel Rokem, editors, *HelioML/HelioML: HelioML 0.2.0 (2019-02-22)*, chapter 5. February 2019.
- [12] **Ryan M. McGranaghan**, J. E. Borovsky, and M. Denton. How do we accomplish system science in space? *Eos*, 99, 2018.
- [13] **Ryan M. McGranaghan**, Anthony J. Mannucci, Brian D. Wilson, Christian A. Mattmann, and Richard Chadwick. New capabilities for prediction of high-latitude ionospheric scintillation: A novel approach with machine learning. *Space Weather*, 0, 2018.
- [14] Yiqun Yu, Vania K. Jordanova, **Ryan M. McGranaghan**, 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*, 45(13):6371–6381, 2018.

- [15] E. Camporeale, S. Wing, J. Johnson, C. M. Jackman, and **Ryan M. McGranaghan**. Space Weather in the Machine Learning era: A multi-disciplinary approach. *Space Weather*, 2018.
- [16] **Ryan M. McGranaghan**, 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.
- [17] **Ryan M. McGranaghan**, 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.
- [18] 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.
- [19] **Ryan M. McGranaghan**, 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.
- [20] **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.
- [21] **Ryan M. 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.
- [22] **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.
- [23] **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.
- [24] 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.
- [25] 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.
- [26] **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.
- [27] **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 Astroynamical Sciences Series*, 142(CP11-615), 2012.
- [28] **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**, SJ Klein, A. Cameron, Agnes, E. Young, S. Schonfeld, A. Higginson, R. Ringuette, A. Halford, C. Bard, A. Narock, B. Thompson,. *The need for a Space Data Knowledge Commons*. Structuring Collective Knowledge Journal, <https://knowledgestructure.pubpub.org/pub/space-knowledge-commons> August 2021.
- [2] **Ryan M. McGranaghan**. *Next generation particle precipitation: Mesoscale prediction through machine learning (a case study and framework for progress)*. arXiv, arXiv:2011.10117v1. January 2021.
- [3] Joseph Hughes and **Ryan M. McGranaghan**, Adam Kellerman, Robert Arritt, Jacob Bortnik, Morris Cohen, Karthik Venkataramani, Chigo Ngwira, and Charles Perry. *Revealing Novel Connections Between Space Weather and the Power Grid: Network Analysis of Ground-Based Magnetometer and Geomagnetically Induced Currents (GIC) Measurements*. essoar. doi: 10.1002/essoar.10505933.1. January 2021.
- [4] Cogan Shimizu, **Ryan M. McGranaghan**, Aaron Eberhart, and Adam C. Kellerman. *Towards a Modular Ontology for Space Weather Research*. arXiv, arXiv:2009.12285. September 2020.
- [5] **Ryan M. McGranaghan**, Adam Kellerman, Robert Arritt, Jacob Bortnik, Morris Cohen, Karthik Venkataramani, Jackson McCormick, Joseph Hughes, Chigo Ngwira, and Charles Perry. The heliophysics and space weather open knowledge network: The convergence hub for the exploration of space science (chess). *Earth and Space Science Open Archive*, page 15, 2020.
- [6] **Ryan M. McGranaghan**, Daniel Crichton, Richard Doyle, Barbara Thompson, and Madhulika Guhathakurta. Antidisciplinary: Tackling the technical and social challenges to data science-driven discovery. *Earth and Space Science Open Archive*, page 1, 2020.
- [7] **Ryan M. McGranaghan**, Enrico Camporeale, Kristina Lynch, Jesper Gjerloev, Téo Bloch, Spencer Hatch, Binzheng Zhang, Pete Riley, Mathew Owens, Yuri Shprits, and et al. Novel approaches to geospace particle transfer in the digital age: Progress through data science. *Earth and Space Science Open Archive*, page 1, 2020.
- [8] Anthony Mannucci, Delores Knipp, Huixin Liu, **Ryan M. McGranaghan**, Xing Meng, Surjalal Sharma, Bruce Tsurutani, and Olga Verkhoglyadova. A Chapman Conference on Space Weather: Recommendations for the Community, February 2020.
- [9] Anthony Mannucci, Delores Knipp, Huixin Liu, **Ryan M. McGranaghan**, Surja Sharma, Xing Meng, Bruce Tsurutani, and Olga Verkhoglyadova. The Scientific Challenge of Space Weather Forecasting: Chapman Conference Introduction, February 2020.
- [10] **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.swx-school.lanl.gov/papers/report2014.pdf>, 2014.
- [11] **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.
- [12] 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.

- [13] 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 *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.
- [14] **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.
- [15] 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.
- [16] 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.
- [17] 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.
- [18] 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.
- [19] **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.



## COMMUNITY LEADERSHIP, GUIDANCE, AND SERVICE

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New Jersey Institute of Technology's Institute for Space Weather Sciences (ISWS)

External Advisory Board . . . . .	2020 - Present
NASA Center for HelioAnalytics - Senior Director . . . . .	2020 - Present
Living With a Star Jack Eddy Symposium - Chair of the Steering Committee . . . . .	2020 - Present
Super Magnetometer Initiative (SuperMAG) - Steering Committee . . . . .	2018 - Present
Network for Earth-space Research, Education and Innovation with Data (NEREID) - Council	2021 - Present
Associate Editor - Journal of Space Weather and Space Climate . . . . .	2020 - Present
Member - CEDAR Diversity, Equity, and Inclusion Initiative . . . . .	2020 - Present
Whole Heliosphere and Planetary Interactions (WHPI) Initiative - Geospace Lead . . . . .	2019 - Present
AGU Space Physics and Aeronomy Advocacy Committee . . . . .	2019 - Present
AGU Fellows Nomination Task Force . . . . .	2018 - Present
Proposal Review Panelist - NASA . . . . .	2017 - Present
Proposal Review Panelist - NSF . . . . .	2017 - Present
Journal Reviewer - JGR Space Physics, GRL, Annales Geophysicae, Frontiers in Astronomy,	
Space Weather, Journal of Space Weather and Space Climate, Risk Analysis . . . . .	2015 - Present
Participant - AGU Congressional Visits Day . . . . .	September 2018

## SELECTED DATA AND SOFTWARE DEVELOPMENT

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**R. M. McGranaghan** (2019-ongoing development): Resources, tools, and best practices for data science-for-science education, development, and action. This repository is a community-curated resource that serves researchers in the Earth and Space Sciences (or any discipline) interested to learn about data science and machine learning and to find the most efficacious tools to guide their use. It includes curated lists of resources, challenge data sets and use cases that have applied them effectively, and actionable advice on how to get started.

**R. M. McGranaghan**, Mannucci, Anthony; Mattmann, Chris; Wilson, Brian; Chadwick, Richard (2018): Jupyter notebook script to demonstrate the use of the machine learning databases and analysis for Journal of Geophysical Research: Space Physics manuscript: "New capabilities for prediction of high-latitude ionospheric scintillation: A novel approach with machine learning.". figshare. Dataset.

**R. M. McGranaghan**, ryan.mcgranaghan@colorado.edu; <https://orcid.org/0000-0002-9605-0007>; Mannucci, Anthony; <http://orcid.org/0000-0003-2391-8490>; Mattmann, Chris; et al. (2018): Machine learning databases used for Journal of Geophysical Research: Space Physics manuscript: "New capabilities for prediction of high-latitude ionospheric scintillation: A novel approach with machine learning.". figshare. Dataset.

*Extended list available on GitHub: [rmcgranaghan](#)*

## SELECTED AWARDS, GRANTS & HONOURS

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PI or Co-I on over 10 funded proposals (between 2013-present).

Recognized as an Early Career pioneer in Heliophysics

through NASA Early Career Investigator Program . . . . . 2021 - Present

University Center for Atmospheric Research/NASA Living

With a Star Jack Eddy Postdoctoral Fellow . . . . . 2017 - 2018

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

27<sup>nd</sup> International Union of Geodesy and Geophysics

Young Scientist Award . . . . . 2019

Principle Investigator NASA Jet Propulsion Laboratory Data

Science Working Group Pilot Project - "Stretching GNSS signals for space weather discovery" 2018

Peer Award NASA Goddard Space Flight Center . . . . . 2019

32<sup>nd</sup> 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

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

Tau Beta Pi (national engineering honor society) . . . . . 2010 - Present

Best Group Presentation: NASA MSFC Internship Program . . . . . Summer 2009

## SELECTED PROFESSIONAL COMMUNICATION/ORGANIZATION EXPERIENCE

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### Public Lectures/Communication

Origins Podcast - Host and Producer . . . . . 2019-Present

McGranaghan, R., *A podcast exploring the pivotal moments in thought-leaders' trajectories*

NASA in Silicon Valley Podcast - Guest . . . . . 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*

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*

TEDx University of Colorado Boulder (TEDxCU) - Boulder, CO April 11, 2015

McGranaghan, R., *Living with a star*

### **Selected Organizational Experience**

National Science Foundation Machine Learning in Geospace Exploratory Committee 2020 - Present

McGranaghan, R. Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR) Liaison

NASA Data Infrastructure Workshop Organizing Committee - Virtual May, 2021

NASA Second AI and Data Science Workshop for Earth and Space Sciences Program Committee - Virtual February, 2021

First Jack Eddy Cross-Disciplinary Symposium on Sun-Climate Research Organizing Committee - Virtual June, 2021

American Geophysical Union (AGU) Fall Meeting - Washington, DC December, 2019

McGranaghan, R. Town Hall Session Convener: *Antidisciplinary: Science and Engineering in the Digital Age*

McGranaghan, R. Session Convener: *Space Weather Across the Solar System: New Progress and the Whole Heliosphere and Planetary Interactions (WHPI) Initiative*

McGranaghan, R. Session Convener: *Machine Learning in Space Weather*

International Space Sciences Institute (ISSI) - Bern, Switzerland 2019

McGranaghan, R. Project Coordinator and Principal Investigator: *Novel approaches to multiscale geospace particle transfer: Improved understanding and prediction through uncertainty quantification and machine learning*

American Geophysical Union (AGU) Fall Meeting - Washington, DC December, 2018

McGranaghan, R. Town Hall Session Convener: *Data Science and a New Scientific Frontier in Space Science*

McGranaghan, R. Session Convener: *Convergence in Space Physics and Earth Science: Discovery Through Machine Learning*

McGranaghan, R. Session Convener: *Machine Learning in Space Weather*

NASA Goddard Workshop on Artificial Intelligence - Greenbelt, MD November, 2018

McGranaghan, R. Organizer

Exploring Systems-Science Techniques for the Earth's Magnetosphere-Ionosphere-Thermosphere - Los Alamos, NM July, 2018

McGranaghan, R. Session Convener: *Machine Learning in Geospace*

American Geophysical Union (AGU) Fall Meeting - New Orleans, LA December, 2017

McGranaghan, R. Session Convener: *Frontier Solar-Terrestrial Science Enabled by the Combination of Data-Driven Techniques and Physics-Based Understanding*

Lorentz Workshop, Space Weather: A multi-disciplinary approach - Leiden, Netherlands 2017

McGranaghan, R. Session Convener: *Machine Learning for Space Weather*

Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR)

Summer Meeting 2020 – McGranaghan, R. Session Convener: *Data Science in CEDAR: Progress, Capacity-Building, and Traversing Disciplines*

Summer Meeting 2019 – McGranaghan, R. Session Convener: *The challenge, opportunity, and art of data science for geospace*

## VOLUNTEER WORK

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Council of State Governments Justice Center . . . . .	2019 - present
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- 2016
Volunteer: Love Soup Kitchen . . . . .	2011 - 2012
Volunteer: Goodwill Industries . . . . .	2011 - 2012

## MEMBERSHIPS

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American Astronomical Society . . . . .	2015 - Present
American Astronautical Society . . . . .	2013 - Present
American Geophysical Union . . . . .	2013 - Present
American Institute of Aeronautics and Astronautics . . . . .	2008 - Present

## PROFESSIONAL AND CONTINUING EDUCATION

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- *Project leadership and principal investigator role:* NASA Jet Propulsion Laboratory Planetary Science Summer School, NASA Jet Propulsion Laboratory Heliophysics Mission Design School, NASA PI Launchpad, Science Traceability Matrix, requirements and flowdown, networking across institutions and public and private sectors, storytelling
- *Data science:* Earth Science Informatics Partners (ESIP), NASA Center for HelioAnalytics, NASA Frontier Development Laboratory
- *Science communication and teaching:* Curriculum development, public communication, AGU Space Physics and Aeronomy Advocacy Committee, Podcasting
- *Information representation:* Relational and graph databases, knowledge graphs, data infrastructure
- *Cross- and trans-disciplinary collaboration:* Science of Team Science, NSF Convergence Program, NSF Harnessing the Data Revolution Program, Founder of ‘Flourishing Salons’ series, Founder of ‘AGU Art @ the Science’ initiative, MIT Media Lab, Santa Fe Institute
- *Web programming and development:* Front-end/user design, integrative data analysis systems, rapid prototyping, HTML, Java, d3.js

## TECHNICAL SKILLS

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- *Programming Languages:* Experienced with Python, Matlab, L<sup>A</sup>T<sub>E</sub>X, Fortran, Satellite Tool Kit (STK), C++
- *High Performance Computing:* Apache Spark, Hadoop Distributed File System, Cloud computing, Map-Reduce Paradigm

- *Machine Learning*: Python SciKit Learn, TensorFlow, Keras, NetworkX
- *Cloud Environments*: AWS, Google Cloud Platform
- *Version Control/Collaborative*: GitHub, Jupyter, Docker, Slack, Zoom, Webex, Miro
- *Future of Publication*: PubPub, Binder, Zenodo, FigShare