REGUPATHI (REGU) ANGAPPAN

Ph.D. Candidate, Johns Hopkins University

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Research Gate | Rate My Professor Profile

FELLOWSHIPS & AWARDS

NASA FINESST, Fall 2019 - Ongoing
Future Investigator in NASA Earth and Space Science and Technology (FINESST), is a 3-year graduate fellowship at $45k/year (known as NESSF prior to 2019).

Journal Club Presentation Award 2022, Fall 2022
Award for best research presentation of the academic year 2021-2022 from the Earth and Planetary Science Department at Johns Hopkins University, which includes monetary award of $2,000, for research related expenses.

Dean's Teaching Fellowship, Spring 2022
Awarded to teach a proposed class for the 2021-2022 academic year titled, "The Grandeur of You & The Universe" through the Johns Hopkins Krieger School of Arts & Sciences. Fellowship includes a stipend of $11,500, graduate tuition, and health insurance for the semester the class is taught.

Journal Club Presentation Award 2021, Fall 2021
Award for best research presentation of the academic year 2020-2021 from the Earth and Planetary Science Department at Johns Hopkins University, which includes monetary award of $2,000, for research related expenses.

Mary Gates Research Scholarship, Fall 2016 - Summer 2017
Research Scholarships.

PETRONAS Scholar Award, Fall 2012 - Summer 2017
Full-ride undergraduate scholarship including stipend from PETRONAS, a Fortune 500, energy company.

RESEARCH PATENTS

Technique of using constellation magnetic field data to derive near-instantaneous maps of Earth's magnetic field

Sept 17 2020

U.S. patent application (Serial No. 63/073834)
Inventors: Anderson, Brian J. (JHU APL, MD), **Angappan, Regupathi** (JHU, MD), Barnes, Robin J. (JHU APL, MD), Vines, Sarah K. (JHU APL, MD), Stanley, Sabine (JHU, MD).

EDUCATION

Ph.D. in Earth & Planetary Science
Johns Hopkins University
Aug. 2017 – Present (expected comp. June 2023)
Thesis title: A Tale of Two Terrestrial Dynamos
Advisor: Prof. Sabine Stanley
Co-advisor: Dr. Brian Anderson

B.Sc. with Honors in Earth & Space Science (Physics)
University of Washington, Seattle
Sept. 2013 – June 2017
Minor: Physics & Math
Departmental GPA: 3.94 (4.0 scale)
Cumulative GPA: 3.82
Honors: Cum Laude, Dean's List all quarters, Departmental Honors

RESEARCH INTERESTS

Planetary Magnetism
Magnetic Field Observations
Dynamo Theory
Magnetohydrodynamics
Planetary Interiors
Planetary Magnetospheres
Geophysics
Fluid Dynamics

Science Education
Science Outreach
Equity, Diversity, & Inclusion in Science

PROFESSIONAL AFFILIATIONS

- American Geophysical Union (AGU)
  Member, Leadership Development/Governance Committee Member, Governance Review Task Force Member
- Open Planetary
  Member
- Mary Gates Foundation
  Scholar

PUBLICATIONS

Book Chapters

- Gillet, N., Gerick, F., **Angappan, Regupathi**., & Jault, D. (2022). A dynamical prospective on interannual geomagnetic field changes. In V. Dehant, M. Mandea, A. Cazenave, & L. Moreira (Eds.), *Probing earth's deep interior using space observations synergistically* (Chap. 4, pp. 71–105). Springer.

Research Articles

- **Angappan, Regupathi**, Anderson, B. J., Barik, A., Vines, S. K., & Stanley, S. (2022). Fast Global Wave Detectionin Geomagnetic Jerk Occurences with Commercial Satellites. *in review*.
- Anderson, B. J., **Angappan, Regupathi**, Barik, A., Vines, S. K., Stanley, S., Bernasconi, P. N., Korth, H., & Barnes, R. J. (2021). Iridium Communications Satellite Constellation Data for Study of Earth's Magnetic Field. *Geochemistry, Geophysics, Geosystems*, *22*(8), e2020GC009515. doi:https://doi.org/10.1029/2020GC009515
- Gillet, N., Gerick, F., **Angappan, Regupathi**., & Jault, D. (2021). A Dynamical Prospective on Interannual Geomagnetic Field Changes. *Surveys in Geophysics*. doi:10.1007/s10712-021-09664-2
- Perera, V., Mead, C., van der Hoeven Kraft, K. J., Stanley, S., **Angappan, Regupathi**, MacKenzie, S., Barik, A., & Buxner, S. (2021). Considering intergroup emotions to improve diversity and inclusion in the geosciences. *Journal of Geoscience Education*, *69*(3), 248–252. doi:10.1080/10899995.2021.1881863

Publications in Preparation

- **Angappan, R.**, Barik, A., Anderson, B. J., Sorathia, K. A., Philpott, L. C., Johnson, C. L., Stanley, S., *High Precision Characterization of Hermian Birkeland Currents*. Paper describing the spatio-temporal structure of Birkeland currents at Mercury, subsequently correcting for these currents to obtain better characterization of Mercury's core dynamo field.
- **Angappan, R.**, Stanley, S., *Probing Mantle Structure Heterogeneities with Iridium Magnetic Field Data*. Paper describing observations of heterogeneities in Earth's mantle based on global magnetic field variations detected by the Iridium Constellation of communication satellites.
- **Angappan, R.**, *Structuring an Undergraduate Course Focused on Empathy in the Earth and Space Sciences*. Paper describing the pedagogy and structure of a recently taught class, *The Grandeur of You & The Universe*.

CONFERENCE PRESENTATIONS

Convened & Chaired Conference Sessions

- *New Insights into Earth's Dynamic Core From Interdisciplinary Perspectives*, AGU Fall Meeting, 2021. Primary Convener: Arveson, S. M. Co-conveners: **Angappan, R.**, Frost, D. A., & Davies C. J.
- *Interdisciplinary Insights into Earth and Planetary Cores*, AGU Fall Meeting, 2022. Primary Convener: **Angappan, R.** Co-Conveners: Gutierrez, S., Berrada, M., & Irving J. C. E.

Invited Presentation

- **Angappan, R.**, Barik, A., Anderson, B. J., Vines, S. K., Stanley, S., (2020) *Geomagnetic Jerks: Observations from the Iridium Constellation of Satellites*, International Space Science Institute. Virtual talk, Bern, Switzerland.
- Anderson, B. J., **Angappan, R.**, Vines, S. K., Sabine, S., Barnes, R. J., (2019) *Rapid cadence estimation of Earth's magnetic field structure reflecting core processes from the Iridium Constellation*, AGU. Invited poster presentation, San Francisco, CA.

Select Research Presentations (As First Author)

- **Angappan, R.**, Barik, A., Anderson, B. J., Viacheslav, M. G., Sorathia, K. A., Philpott, L. C., Johnson, C. L., Stanley, S., (Dec. 2022) *Physics-Based Simulation of Mercury's Magnetosphere to Characterize the Magnetic Field Signatures of Birkeland Currents*, AGU. Oral Presentation, Chicago, IL.
- **Angappan, R.**, Stanley, S., (Dec. 2022) *Designing an Undergraduate Course Focused on Empathy to Empower Scientific Identity and Support Diversity in Earth and Space Sciences*, AGU. Oral Presentation, Chicago, IL.
- **Angappan, R.**, Barik, A., Anderson, B. J., Viacheslav, M. G., Sorathia, K. A., Philpott, L. C., Johnson, C. L., Stanley, S., (2022) *High Precision Characterization of Hermian Birkeland Currents*, COSPAR. Oral presentation, Athens, Greece.

- **Angappan, R.**, Anderson, B. J., Barik, A., Vines, S. K., Sabine, S., (2021) *A Wave of Jerks in Our World's Inside Studied by Phone Joining Space Computers*, AGU. Oral Presentation, New Orleans, LA.
- **Angappan, R.**, Barik, A., Anderson, B. J., Sorathia, K. A., Philpott, L. C., Johnson, C. L., Stanley, S., (2020) *Birkeland Current Correction for Mercury's Core Field Characterization*, AGU. Poster presentation, Virtual. Twitter summary of poster recognized in AGU's From the Prow and social media found here
- **Angappan, R.**, Anderson, B. J., Vines, S. K., Sabine, S., (2019) *From Drifts to Jerks: Characterizing Variations in the Core Field Globally with Iridium*, AGU. Poster presentation, San Francisco, CA.
- **Angappan, R.**, Anderson, B. J., Vines, S. K., Sabine, S., (2018) *Acceleration, Jerks, and External Signals: Global Characterization of Earth's Field on Sub-Annual Time Scales with Space Constellation Measurements*, AGU. Poster presentation, Washington D.C.
- **Angappan, R.**, Anderson, B. J., Vines, S. K., Sabine, S., (2018) *Sub-Decadal Acceleration in Earth's Main Field*, Study of Earth's Deep Interior (SEDI). Poster presentation, University of Alberta, Edmonton, Canada.
- **Angappan, R**. (2017) *Assessment of Detrital Remanent Magnetization Preserved in Glacial Lacustrine Sediment for High-Resolution Correlation of the Lacustrine Sediment Record throughout the Puget Lowland*, Undergraduate Research Symposium. Oral presentation, Mary Gates Undergraduate Research Symposium, University of Washington, Seattle, WA.
- **Angappan, R**. (2015) *Magnetic Signatures in Sediments*, Undergraduate Research Symposium. Oral presentation, Mary Gates Undergraduate Research Symposium, University of Washington, Seattle, WA.

Select Co-authored Research Presentations

- Perera, V., Mead, C., van der Hoevan Kraft, K. J., Stanley, S., Semken, S., Husman, J., **Angappan, R.**, MacKenzie, S., Barik, A., Buxner, S., (2019) *Considering Intergroup Emotions to Improve Diversity and Inclusion in the Geosciences*, AGU. Oral presentation, San Francisco, CA.
- Anderson, B. J., **Angappan, R.**, Vines, S. K., Sabine, S., (2018) *Satellite Constellation Data for Study of Earth's Magnetic Field*, Study of Earth's Deep Interior (SEDI). Poster presentation, University of Alberta, Edmonton, Canada.

ON-GOING RESEARCH PROJECTS

Rapid Geomagnetic Field Changes with Iridium Constellation of Satellites

Earth and Planetary Science, Johns Hopkins University

Collaborators: Barik, A., Anderson, B. J., Vines, S. K., Stanley, S.

- This work leverages the the high cadence global observations of the geomagnetic field with the Iridium satellites and characterizes the spatio-temporal occurrence of rapid geomagnetic field changes globally, yielding insight into core dynamics and properties of Earth's deep interior
- Paper in review: **Angappan, R.**, Barik, A., Anderson, B. J., Vines, S. K., Stanley, S.,*Fast Global Wave Detection in Geomagnetic Jerk Occurrences with Commercial Satellites*, in review (expected publication Fall 2022).
- An undergraduate student project focused on making the data interactive and readily accessible alongside creative scientific art, accompanies the study.

High Precision Characterization of Mercury's Magnetic Field & Interior Structure

Funded by NASA through FINESST 2019

Collaborators: Barik, A., Anderson, B. J., Viacheslav, M. G., Sorathia, K. A., Philpott, L. C., Johnson, C. L., Stanley, S.

- This work quantifies and corrects for the largest external field contributions in magnetic field observations, i.e. the Birkeland Currents, at Mercury in MESSENGER observations. The MHD magnetospheric model, GAMERA, is used to characterize the Birkeland Currents.

Lower Mantle Characterization from Core Magnetic Field Signatures

Earth and Planetary Science, Johns Hopkins University

- This work analyses global geomagnetic field variations to identify how the variations are filtered our by the conductive mantle and characterizes lower mantle structures that are observed.

Core Values Centered STEAM Education

Earth and Planetary Science, Johns Hopkins University

- This work identifies the process involved in designing and teaching a Science, Technology, Engineering, Art, and Math (STEAM) class based on core values as a way to build an inclusive STEAM community and responsible global citizens. this builds on the Earth and Space Science class designed and taught around the core value of empathy.

OTHER RESEARCH EXPERIENCE

NASA Heliophysics Summer School

NASA, UCAR/CPAESS

Summer 2021 — Virtual

- Run by NASA's Living With a Star program and UCAR/CPAESS since 2007, this annual eight-day Summer School focuses on the physics of space weather events that start at the Sun and influence atmospheres, ionospheres and magnetospheres throughout the solar system.
- Admission is competitive; about 35 students are selected to attend each year.

Graduate Research Assistant

Johns Hopkins University

Aug. 2017 – Ongoing — Baltimore, MD.

- Analysis of geomagnetic field from Constellation of Iridium satellites & High precision determination of Mercury's magnetic field and interior structure

Undergraduate Researcher

University of Washington

Summer 2014 – Summer 2017 — Seattle, WA.

- Assessment of detrital remanent magnetization (DRM) in glacial lacustrine sediments.
- Adviser: Dr. Terry Swanson, Univ. Of Washington, Seattle, WA
- Collaborator: Dr. Bernard Housen, Pacific Northwest Paleomagnetic Lab, Western Washington University

Undergraduate Research Leader

University of Washington

Summer 2014 – Summer 2017 — Seattle, WA.

- Student staff member of the Undergraduate Research Program.

TEACHING

JHU Teaching Assistant for Natural Sciences Orientation Workshop

Johns Hopkins University

Fall 2022 — Baltimore, MD.

- Co-led a workshop to orient and guide teaching assistants across the Johns Hopkins University's natural science programs.

The Grandeur of You & The universe

Earth and Planetary Science, Johns Hopkins University

Spring 2022 — Baltimore, MD.

- Developed a syllabus and taught a course that introduces the fundamentals of Earth, planetary and space sciences in a relatable manner by structuring the class around the core value of Empathy. The class was highlighted by the Johns Hopkins Krieger School of Arts & Sciences magazine article, found here, and accompanying interview found here.

JHU Teaching Academy Fellow

Johns Hopkins University

Aug. 2017 – Ongoing — Baltimore, MD.

- Participating in academic career and science communication training opportunities and teaching practicums.

Rayleigh Benard and Mantle Convection

Earth and Planetary Science, Johns Hopkins University

Mar. 17th, 2021 — Baltimore, MD.

- Guest lecturer in Planetary Interiors, AS.270.404, Spring 2021.

Setting Up for Success Modules

Earth and Planetary Science, Johns Hopkins University

Fall 2020 — Baltimore, MD.

- Preparing and co-teaching modules intended to help graduate students be successful in graduate school lead by Prof. Sabine Stanley. Modules I was involved in: Managing Grad School Stress, Applying for Grants and Fellowships, Difficult Conversations, TA'ing, Attending a Conference, and Introduction to Science Communication.

Journal Club Best Practices

Earth and Planetary Science, Johns Hopkins University

Sept. 15th, 2020 — Baltimore, MD.

- Co-lead a class on best practices for giving effective and inclusive departmental research talks to graduate students.

Boundary Layers

Earth and Planetary Science, Johns Hopkins University

Nov. 5th, 2019 — Baltimore, MD.

- Guest lecturer in Planetary Fluids, AS.270.423, Fall 2019.

Undergraduate Teaching Assistant

Earth and Space Science, University of Washington

Jan. 2014 – June 2017 — Seattle, WA.

- Classes taught include Introduction to Earth & Space Science, Minerology & Petrology, Field Geology, and seminars in science communication and research.

Peer Assistant for Calculus

American Degree Program, Taylors University

Dec. 2012 – June 2013 — Kuala Lumpur, Malaysia.

- Selected to teach additional classes to assist undergraduate university students through Calculus I.

Class Teacher and Tutor

Smart Reader Kids Kindergarten

Jan. 2012 – May 2012 — Jitra, Malaysia.

- Served as the class teacher for kindergarten students and taught based on the curriculum developed by Smart Readers. Tutored 4th through 6th graders for English, Malay, and Math.

STUDENT MENTORING

Emma Cummings

Junior, Computer Science, Johns Hopkins University

Starts Summer 2022 — Baltimore, MD.

- Project: Interactive Visualization of Iridium Geomagnetic Data

- Outreach Project: Developing visual-art to convey key takeaways from recent publications that involve Iridium geomagnetic data.

Tuxun (Nick) Lu

Senior, Computer Science & Applied Math and Statistics, Johns Hopkins University

Starts Summer 2022 | Baltimore, MD.

- Bloomberg Distinguished Professor Summer Undergraduate Program Researcher
- Project: Characterizing External Magnetic Fields in Earth's Magnetosphere

Brian Song

Senior, Applied Math and Statistics, Johns Hopkins University

Fall 2021 – Ongoing | Baltimore, MD.

- Project: Iridium Geomagnetic Data Inversion
- Pursuing a masters degree in Data Science at Johns Hopkins University

Amirah, Aida; Joe, Andrea; Amira, Anis; Lee, Bing Yu; Abdul Razak, Fatin

Sophomore, Earth and Space Science, Univ. of Washington

Summer 2016 – Summer 2017 | Seattle, WA.

- Mentorship in paleomagnetic field and lab work & paleomagnetic data analysis

Hushin, Nadrah

Junior, Earth and Space Science, Univ. of Washington

Summer 2016 – Summer 2017 | Seattle, WA.

- Mentorship in paleomagnetic field and lab work & paleomagnetic data analysis
- Currently a Graduate Engineer at Repsol.

PROFESSIONAL SERVICES

AGU Governance Review Task Force Implementation Team

American Geophysical Union

Jul. 2022 – Present

- Task: Using the work of the full task force and the feedback received to develop a final structure for the AGU Board and Council. This team will recommend bylaw changes, a socialization strategy and an implementation plan in line with AGU's strategic plan and the task force's recommendations.

AGU Leadership Development Committee member

American Geophysical Union

Sep. 2021 – Present

- Task: Facilitating the nomination process for selecting candidates for election to the AGU Board and any at-large elected Council positions and helping orient them to their new roles and responsibilities. The committee promotes the development of an organizational mindset of identifying leadership skills and interests and works with the Council, committees, and sections to identify potential leaders for the future. Committee members discuss how to increase volunteer engagement and satisfaction and should be knowledgeable about good governance practices.

Graduate Student Buddy Program Leader

Earth and Planetary Science, Johns Hopkins University

Aug. 2021 – Ongoing

- Task: Co-lead the graduate student buddy program, focused on graduate student mentorship and community building, where starting graduate students are paired with senior graduate student volunteers.

AGU Governance Review Task Force member

American Geophysical Union

Dec. 2020 – Aug. 2022

- Task: Identify how AGU currently works and make recommendations about what is needed to accomplish AGU's new mission, vision and strategic plan. What governance model will enable AGU to continue to lead boldly into the future? What kind of leaders are needed? Where can our volunteer/staff partnerships be strengthened.

Bromery Series Committee member

Earth and Planetary Science, Johns Hopkins University

Jan. 2020 – Sep. 2022

- Task: Identify and invite a diverse lineup of speakers for the department's colloquium (Bromery Series) and organize the agenda for each seminar. Streamline the speaker selection process and ensure it is inclusive.

Future of Teaching Evaluations Focus Group Committee Member

Johns Hopkins University

Spring 2022

- Task: Evaluating how to improve our methods of evaluating teaching effectiveness at Johns Hopkins University as part of a selected graduate student focus group.

Executive Secretary

NASA ROSES Review Panel

2021

Outreach Coordinator

Earth and Planetary Science, Johns Hopkins University

Sep. 2017 – Jan. 2020

- Task: Collaborate with local schools, institutes, and meet up groups to plan and implement outreach activities.

OTHER EMPLOYMENT, LEADERSHIP, AND COMMUNITY SERVICES

Advisor

Counselab

Aug. 2021 – Oct. 2022

- Invited to be professional advisor and mentor especially in the field of planetary science, physics and geoscience education to those who seek guidance to access the following disciplines.

Assistant Resident Director

Haggett Hall, Housing & Food Services, University of Washington

Aug. 2015 – June 2017 Seattle, WA.

- Advised and supervised resident advisers in the community.
- Primary adviser for Rick's Café.
- Managed and oversaw facilities in residence halls.
- Helped with all administrative tasks.
- Managed student conduct load within the university's residential life unit

Resident Advisor

Mercer Hall, Housing & Food Services, University of Washington

Aug. 2014 – June 2015 | Seattle, WA.

- Fostered an inclusive and welcoming community in residence communities to enrich the undergraduate experience of students.
- Lead community development and resident engagement programs.

Faith Talks Speaker

MSA, University of Washington

2015 & 2016 | Seattle, WA.

- Invited speaker at interfaith conference hosted by the Muslim Student Association.