Sachin Alexander Reddy, PhD

Space Scientist & ML Researcher • sachin.reddy@jpl.nasa.gov • redsach.github.io • Los Angeles, USA

Summary

Space physics and applied ML PhD solving problems in Earth and planetary science. Currently a NASA Postdoctoral Fellow at JPL working on transformer-based emulators for ocean world characterization and a co-founder of the JPL *Model Understanding Surrogates and Emulators* (MUSE) task force. Interested in ML for scientific discovery, AI co-scientists, surrogates, and validation in scientific domains.

Research Positions

NASA Jet Propulsion Laboratory	/ Postdoctoral Fellow	01/2025 –
	/ Research Intern	10/2022 – 03/2024
National Institute of Polar Research	/ Postdoctoral Associate	06/2024 – 10/2024
国立極地研究所	/ Postdoctoral Fellow	03/2024 – 05/2024

Education

University College London	/ PhD in Space Physics	07/2020 – 03/2024
	/ MSc in Systems Engineering *(Valedictorian)*	09/2018 – 09/2019
Caltech	/ Visiting Scholar in Planetary Science	10/2022 – 03/2024
Oxford Brookes University	/ BSc in Computer Science & Business	09/2010 – 06/2015

Skills

ML / Modeling: Transformers, GNNs, LSTMs, ensemble methods; uncertainty quantification; explainable AI (SHAP); emulators / surrogates for physical simulation
Frameworks: PyTorch, TensorFlow, JAX (learning), scikit-learn, NumPy, SciPy
Workflow: Spec-driven and agentic development; HPC (NASA Pleiades / JPL clusters); Git, Python, Bash, Julia (learning), LaTeX
Domain: Plasma physics, electromagnetism, fluid dynamics, satellite time-series, planetary environments

Select Publications

[submitted] **Reddy, S. A.**, Azari, A., Cochrane, C., Jia, X., Nordheim, T., Harris, C., Mandrake, L., Vance, S. and Ciuca, I. LEAP: A Rapid Neural Surrogate of Multi-Fluid MHD at Europa. *Nature Comms AI & Computing*

[submitted] **Reddy, S. A.**, Kataoka, R., Nakano, S., Fujita, S., Nakamizo, A. and Pulkkinen, A. Predicting AMPERE Field Aligned Currents with a Long Short Term Memory Model. *JGR: Machine Learning and Computation*

[2025] **Reddy, S. A.**, Pi, X., Forsyth, C., Aruliah, A. and Smith, A. Predictions of Equatorial Vertical Plasma Drift Using a Neural Network Model. *JGR: Earth and Space Science*

[2024] **Reddy, S. A.**, Nordheim, T. A. and Harris, C. Surface Charging of Jupiter's Moon Europa. *The Astrophysical Journal Letters.* 962(2), L29.

[2023] **Reddy, S. A.**, Forsyth, C., Aruliah, A., Smith, A., Bortnik, J., Aa, E., Kataria, D. and Lewis, G. Predicting Swarm Equatorial Plasma Bubbles via Machine Learning and Shapley Values. *JGR: Space Physics.* 128, e2022JA031183. *(Wiley Top Viewed Article 2023.)*

Additional projects and first author works at: redsach.github.io and Google Scholar.

Select Talks	**UC Berkeley** (Lunchtime Seminar); **MIT** (Science Seminar); **NASA Ames** (Science Seminar); **UCLA** (Space Physics Seminar); **JAXA** (Space Plasmas Seminar); **NASA JPL** (Program Seminar, x2); **Caltech** (Postdoc Launch Seminar); **UCL** (APEX Seminar). Given 20+ over 5 years	
Funding	**NASA Postdoctoral Program** / Postdoctoral Fellowship – $178,000	2025
	Japan Society for the Promotion of Science / Postdoctoral Fellowship – $4,000	2024
Honors	**Wiley** / Top Viewed Article in 2023 Award	2025
	UCL / Alan Johnstone Award for Outstanding Scientific Achievement	2023
	UK Government / CIRCE Mission Challenge Coin Award	2023
	UCL / Top of Class Award; Best Research Project Award; GPA 3.9/4.0; *Valedictorian*	2019
Missions	**Europa Clipper** / Science Affiliate	09/2025 –
	Medium-Class Explorer Mission Concept / Science Affiliate	09/2025 –
	CIRCE / SOAR / Phoenix INMS instrument / Affiliate & Mission Ops	2020 – 2022
Service	**JPL Model Understanding & Surrogate Committee** / Co-Founder & Member	2026 –
	NASA Ocean Worlds Working Group / Contributor	2026 –
	AGU Space Physics Advocacy Committee / Member	2025 –
	NeurIPS; JGR Space Weather; JGR Space Physics / Reviewer	2022 –
Industry	**Synergy Circuits** / Design Engineer (aerospace/semiconductor PCBs)	2018
	Gorilla Circuits / Process Engineer (improved yield +4% and productivity +9%)	2016 – 2017