

Dr. Roger Blue Stabbins

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Research Interests

I am a planetary scientist with 10+ years of international experience at the intersection of planetary surface science and imaging and spectroscopy instrumentation, with a focus on the Mars system. I am interested in ways of efficiently exploring planetary environments across the Solar System and characterising and mapping their compositional diversity, toward an understanding of the evolution of habitable environments and the emergence of life. I have mathematical, computational, laboratory and field skillsets that I use to analytically, numerically and empirically model and simulate problems in remote compositional analysis and interpretation.

Research Highlights

- *Leading the conception, derivation, and software implementation of a new machine learning multispectral image analysis method for ExoMars PanCam (rover) and ExoMars CaSSIS (orbiter) ([ESS](#)).*
- *Leading the calibration, control & processing software of a laboratory simulator of the MMX OROCHI multispectral imager, used as part of the JAXA Ryugu & Bennu Sample Curation Campaigns ([PEPS](#), [MAPS](#)).*
- *Co-leading (technical-lead) the definition of the science requirements of the ExoMars EnfyS IR Spectrometer, critical for instrument selection by ESA (internal UKSA report).*
- *Co-leading the derivation of a new near-global Mars CaSSIS-like multispectral and colour dataset (in-prep).*

Academic Positions

- 2025 – 2027 ESA Rosalind Franklin Science Knowledge Programme Fellow
The Natural History Museum, London, UK
Expediting Science-Readiness of the EnfyS IR Spectrometer for the ExoMars Rover
- 2024 – 2025 PDRA, UK Space Agency Mars Exploration Grant
The Natural History Museum, London, UK
Exploring the Limits of Material Discrimination with CaSSIS Multiband Imaging
- 2023 – 2024 System Researcher, Japan Aerospace Exploration Agency
Institute of Space & Astronautical Science, Sagamihara, Japan
- 2023 – 2024 JSPS Postdoctoral Fellowship for Research in Japan
Department of Physics, Rikkyo University, Tokyo, Japan
Performance Optimization of the MMX Mission Remote Sensing Imaging Systems
- 2023 – 2024 Honorary Research Fellow
Mullard Space Science Laboratory, University College London, UK
- 2019 – 2022 PDRA, UK Space Agency Aurora Grant
Earth Sciences Department, The Natural History Museum, London, UK
Geochemistry to Geology for the ExoMars Rover: VNIR Spectral Variability

Education

- 2015 – 2022 PhD Planetary Science, UK Space Agency Aurora Studentship
Mullard Space Science Laboratory, University College London, UK
Spectral Imaging Simulations for Planetary Surface Exploration: Preparing for PanCam on the ExoMars Rover
- 2014 – 2015 Centre for Doctoral Training, Media & Arts Technology, EPSRC Studentship
School of Electronic Engineering & Computer Science, Queen Mary U.L., UK
*Exited Doctoral Training Programme after 1 year of Masters study and research.
- 2010 – 2014 MSci Physics, 1st Class Honours
Department of Physics & Astronomy, University College London, UK
Developments Towards a Thermal Mid-Infrared Double-Fourier Interferometer

References available on request.

Professional Roles, Contributions and Mission/Instrument Team Memberships

- 2025 – Present **ExoMars Rover Science Operations Working Group**, Enfys SKP Fellow
Enfys representative for Mission Reference Sample Studies
- June 2025 **NASA Planetary Data, Archiving, Restoration & Tools**, Invited Panel Reviewer
3x Primary Reviewer, 5 day panel, expertise in spectroscopy & open-source software
- May 2025 **Canadian Space Agency ExoMars PanCam x Enfys Ries Crater Field Trip**
Instrument scientist and rapid image analysis software lead
- 2024 – Present **ESA ExoMars TGO CaSSIS**, Science Associate
Multispectral & Colour Working Group, global-mapping product co-lead
- 2024 – Present **JAXA Bennu Sample Curation Campaign**, Science Team Member
OROCHI Simulator Team, protocol definitions & image processing
- 2023 – Present **JAXA Martian Moons eXploration Mission**, Science Working Team Member
TENGOO & OROCHI Team, instrument simulation, science validation
- 2022 – Present **ESA ExoMars Enfys Infrared Spectrometer**, Science Team Member
Science requirements, instrument simulation, science validation
- 2015 – Present **ESA ExoMars PanCam Multispectral Imager**, Science Team Member
Instrument simulation, calibration, operations planning, and image processing
- 2018 – 2019 **ESA ExoFiT (ExoMars-like Rover Field Trials)**, Instrument Scientist
Rover operations, image processing software development, maintenance, and support
- Summer 2018 **Building Habitable Worlds Early Career Meeting**, MSSSL, Lead Convener
Meeting programming, publicity, budget management & administrative tasks
- Autumn 2016 **UKSA MURFI (Mars Utah Rover Field Investigation)**, Instrument Scientist
Instrument field deployment, instrument operations support and image processing
- 2015 – Present Royal Astronomical Society Fellow

Funding and Awards (👑 PI, 🏆 Proposal Author, 🎁 Recipient)

- 2026 👑 Great British Sasakawa Foundation Small Grant Award, 2 weeks, **£2k**
Japan travel grant to support OROCHI imaging of carbonaceous chondrite meteorites
- 2025 🏆 Daiwa Foundation Small Grant, 2 weeks, **£2.5k**
Japan travel grant to support JAXA Bennu Sample Curation with OROCHI
- 2025 – 2027 👑 ESA Rosalind Franklin Science Knowledge Programme Fellow, 2 yrs, **€357k**
Special ESA funding to support key instrument personnel up to 2028 launch
- 2024 – 2025 🏆 UK Space Agency Mars Exploration PDRA, 1.5 yrs, **£207k**
For validation of the Supervised Spectral Parameter Learning method using CaSSIS
- 2023 – 2024 🏆 JSPS Postdoctoral Fellowship for Research in Japan, 1 yr, **¥5.38M**
For knowledge exchange on landed multispectral imaging at the Mars system
- 2019 – 2022 🎁 UK Space Agency Aurora PDRA, 3 yr
To use orbital knowledge to prepare and optimise PanCam multispectral imaging
- 2019 Mullard Space Science Laboratory Team Achievement Award
For contributions to the development of PanCam as part of the MSSSL team
- 2017 ASB Student Travel Award, Astrobiology Society of Britain 7th Conference
- 2017 IUGG Student Travel Award, 1st IUGG Planetary Science Symposium, Berlin
- 2016 1st Prize, Oral Presentation, RSPSoc Wavelength Early Career Annual Meeting
- 2016 1st Prize, Poster Presentation, UK Planetary Forum 13th Early Career Meeting
- 2015 – 2019 🎁 UK Space Agency Aurora Studentship
To prepare for quantitative exploitation of PanCam multispectral data from ExoMars
- 2015 🎁 QMUL Media & Arts Technology Industrial Placement, M+C Saatchi
To develop a gyroscopic haptic force-feedback controller for Virtual Reality
- 2013 🎁 Space Placement in Industry Network, Summer Internship Grant, RAL Space

Selected Open Source Software (👑 Lead, 🏰 Co-lead, 🛠️ Contributor)

👑 bifrost (TBR)	End-to-End Bidirectional Reflectance Spectroscopy Simulations of Enfys
👑 VRDR-Resampler	CaSSIS/OROCHI/etc. spectral resampling of global Mars VNIR dataset
👑 aupy	Aber. Uni. PanCam Emulator Multispectral Colour Processing in Python
👑 sptk	The Spectral Parameters Toolkit: explore the limits of spectral and colour analysis of a given multi- or hyper-spectral instrument
👑 planetary-arosics	CaSSIS, CRISM & CTX cross-instrument co-registration via AROSICS
👑 osp-osc	OROCHI Simulator Control & OROCHI Simulator Processing: multispectral-multiview camera calibration, image processing and analysis software
👑 ExoSpec	ExoMars Spectral Analysis Toolkit for ENVI
👑 SpecSim	End-to-End Spatial-Spectral Radiometric Simulations of PanCam Imaging
🛠️ PCOT	PanCam Operations Toolkit – contributed reflectance calibration method

Selected Seminars, Conference & Science Team Meeting Presentations

Oral (invited)	APEX Seminar, UCL/Birkbeck, London, UK, 28/11/2025
Oral	MMX 9 th Science Working Team Meeting, Baltimore, US, 20/11/2025
Oral	CaSSIS Science Team Meeting, Padua, IT, 13/11/2025
Oral (invited)	Research Seminar, Rikkyo University, JP, 4/8/2025
Oral	European Geophysical Union, Vienna, AU, 1/05/2025
Oral & Poster	British Planetary Science Congress, Leicester, UK, 21/6/2024
Oral (invited)	Research Seminar, Paris Observatory, FR, 24/6/2024
Oral (invited)	Research Seminar, University of Tokyo, JP, 18/1/2024
Oral (invited)	MMX 6 th Science Working Team Meeting, Tokyo, JP, 28–30/3/2023
Oral (invited)	MMX TENGOO & OROCHI Team Seminar, Tokyo, JP, 12/2/2023

Teaching and Supervision

Spring 2026	Reflectance Spectroscopy Theory, UKSA Enfys-Cohort Workshop, Aber. Uni., UK
Summer 2025	Space Instrumentation, STFC Plan. Surf. Summer School, Glasgow, UK
2024 - present	Co-Supervisor (Informal), PhD Thesis, St. Andrews/NHM, S. Hagan-Fellows
2019 - 2025	Co-Supervisor (Informal), PhD Thesis, Imperial/NHM, S. Motaghian (now at ESA)
2017 – 2018	Supervisor, MSc Thesis, UCL, D. Bowden (PhD Leicester Uni. 2022)
2015 – 2016	Teaching Assistant, UCL MSc Planetary Atmospheres and Space Env. & Orbits

Technical Skills

<i>Remote Sensing</i>	Multi- & Hyper-spectral Mars surface data, primarily CaSSIS & CRISM
<i>Laboratory</i>	Radiometric and geometric camera calibration; Goniometric reflectance spectroscopy
<i>Field</i>	Multispectral imaging and IR Spectral reflectance, and rapid analysis software
<i>Computing</i>	Expert: <i>Python, OpenCV, IDL, ENVI</i> ; Experienced: <i>QGIS, PBRT (Physically Based Rendering), C++</i> ; User: <i>Microsoft Office, github, Adobe Suite, and UNIX</i>

Selected Outreach

<i>Talks</i>	Live audience public interview, “Meet the Scientist”, Natural History Museum, 18/2/2026, 7/11/2025, 28/5/2025, Your Universe Festival, Mission to Mars Talk + Panel, UCL, 8/3/2025
<i>Media</i>	Research feature in A&G Magazine, “Hunting for Biosignatures on Mars”, 1/8/2021 Radio + Podcast Interview, Radio St Austell Bay, 19/9/2020
<i>Workshops</i>	The Colours of Mars, interactive activity, DinoSnore Space Theme, NHM, 2025 Roving-with-Rosalind, interactive activity, Great Exhibition Road Festival, 2022 Mission to Mars, Sutton Scholars, workshops for disadvantaged children, 2016–2018

Peer Reviewed Journal Articles & Conference Proceedings

- Stabbins & Kameda, "LOROS: Laboratory Simulations of the Optical Radiometer Composed of Chromatic Imagers (OROCHI) experiment of the Martian Moons eXploration Mission" *Progress in Earth & Planetary Science*, 13, 8 (2026), *Special Collection: Progress on Science & Instruments for Martian Moons eXploration Mission*. Contribution: Conception, methods, software development, investigation, data processing, data analysis, manuscript writing.
- Tahara et al, incl. Stabbins, "JAXA Curation for Bennu samples returned by the NASA's OSIRIS-Rex Mission" *Meteoritics & Planetary Science*, 61, 1, pp. 182-207 (2025). Contribution: methods, experiment design, software development, manuscript writing
- Stabbins et al, "Optimizing ExoMars Rover Remote Sensing Multispectral Science II: Choosing and Using Multispectral Filters for Dynamic Planetary Surface Exploration with Linear Discriminant Analysis" *Earth & Space Science*, 11, 10, e2023EA003398 (2024). Contribution: Conception, methods, software development, data processing, data analysis, manuscript writing.
- Grindrod, Stabbins, et al, "Optimizing ExoMars 2022 Rover Remote Sensing Multispectral Science: Cross-Rover Comparison using Laboratory and Orbital Data" *Earth & Space Science*, 9, e2022EA002243 (2022). Contribution: Conception, methods, software development, data processing, data analysis, manuscript writing.
- Hall et al, incl. Stabbins, "ExoFiT: ExoMars-Like Field Trials – a Mission Simulation." *15th Symposium on Advanced Space Technologies in Robotics and Automation*, ESA-ESTEC, Noordwijk, the Netherlands. (27-28 May 2019). Contribution: Data processing and data analysis
- Balme et al, incl. Stabbins, "The 2016 UK Space Agency Mars Utah Rover Field Investigation (MURFI)" *Planetary & Space Science*, Volume 165, January 2019, Pages 31-56 (2019). Contribution: Data processing, data analysis, and manuscript writing.
- Allender, Stabbins, et al, "The ExoMars Spectral Tool (ExoSpec): an image analysis tool for ExoMars 2020 PanCam imagery" Proc. SPIE 10789, *Image and Signal Processing for Remote Sensing XXIV*, 107890I (2018). Contribution: Methods, software development, data processing, and manuscript writing.
- Coates et al, incl. Stabbins, "The PanCam instrument for the ExoMars rover" *Astrobiology*, 17, 6-7, (2017). Contribution: Methods, manuscript writing.
- Baccichet et al, incl. Stabbins, "Performance Requirements for a Spectral-Spatial Calibration Source for DFM Interferometers" *Fourier Transform Spectroscopy and Hyperspectral Imaging and Sounding of the Environment*, OSA Technical Digest (online) (Optical Society of America, 2015), paper JM3A.10 (1 March 2015). Contribution: Data processing and data analysis.
- Savini et al, incl. Stabbins, "A Thermal Spectral-Spatial Interferometric Test-bed" *Optical and Infrared Interferometry IV*, Proc. SPIE 9146, 91462N (24 July 2014). Contribution: Data processing, data analysis, and manuscript preparation.

Recent (<2-year) Conference and Team Meeting Contributions

- Hirota, Stabbins, et al, "Phase Angle Dependence of Ryugu and Bennu Sample Reflectance Spectra: Implications for MMX/OROCHI Observations", *Japan Geoscience Union – American Geophysical Union Joint Meeting*, Chiba, Japan, (24-29/5/2026)
- Hirota, Stabbins, et al, "Phase Angle Dependence of Small-Body Sample Reflectance Spectra: Examination for MMX/OROCHI Observations", *23rd Asia Oceania Geosciences Society Meeting*, Fukuoka, Japan, (2-7/8/2026)
- Stabbins et al, "Toward Multiview-Multispectral Sensing from the Martian Moons eXploration Spacecraft: Imaging Ryugu & Bennu Samples with the Laboratory OROCHI Simulator", *UK Science Enabled by Small Body Sample Return*, RAS Specialist Meeting, London, (12/12/2025)
- Stabbins & McNeil, "CRISM VRDR OROCHI-Resampled Global Multispectral Map Products", *MMX*

- 9th Science Team Meeting**, Baltimore, US, (18-20/11/2025)
- Stabbins et al**, “Rainbow Vision across the Reality Spectrum: Preparing for Planetary Surface Spectral Sensing across Theoretical, Computational, Laboratory and Field Simulations in the UK and Beyond”, *Impact of UK Planetary Geoscience*, Geological Society, London, UK, (27/11/2025)
- McNeil et al, incl. **Stabbins**, “Seeing Red with CaSSIS: Shocked Plagioclase in the Martian Highlands”, *Impact of UK Planetary Geoscience*, Geological Society, London, UK, (27/11/2025)
- Stabbins et al**, “Supervised Spectral Parameter Learning and other applications of the Spectral Parameters Toolkit for CaSSIS”, *ExoMars CaSSIS Science Team Meeting*, Padua, IT, (12-14/11/2025)
- Magnarini et al, incl. **Stabbins**, “CaSSIS false colours reveal true debris distribution in landslide deposits”, *ExoMars CaSSIS Science Team Meeting*, Padua, IT, (12-14/11/2025)
- McNeil & **Stabbins**, “CRISM VRDR CaSSIS-Resampled Global Multispectral Map Products”, *ExoMars CaSSIS Science Team Meeting*, Padua, IT, (12-14/11/2025)
- McNeil et al incl. **Stabbins**, “Seeing Red: The Curious Case of the Crimson Crust”, *ExoMars CaSSIS Science Team Meeting*, Padua, IT, (12-14/11/2025)
- Tornabene et al incl. **Stabbins**, “Utility of CaSSIS to facilitate co-analysis of CRISM and HiRISE for detailed characterization of the surface: Examples from active and future rover landing sites”, *ExoMars CaSSIS Science Team Meeting*, Padua, IT, (12-14/11/2025)
- Grindrod et al, incl. **Stabbins**, “Enfys: A Near-Infrared Spectrometer for the ExoMars Rosalind Franklin Rover”, *EuroPlanet Science Congress-Division for Planetary Sciences 2025*, Vol. 18, EPSC-DPS2025-154, Helsinki, FN, (7-12/9/2025)
- McNeil et al, incl. **Stabbins**, “Seeing Red: Shocked Plagioclase as Pre-Noachian Stratigraphic Tracers”, *EuroPlanet Science Congress-Division for Planetary Sciences 2025*, Vol. 18, EPSC-DPS2025-617, Helsinki, FN, (7-12/9/2025)
- Stabbins**, “Status Update of Enfys Science Knowledge Programme”, *ExoMars Science Working Team #16*, ALTEC, Turin, IT, (20-22/5/2025)
- Stabbins et al**, “Supervised Spectral Parameter Learning over Jezero Crater with the ESA ExoMars TGO CaSSIS Multiband Imager”, *European Geoscience Union General Assembly 2025*, Vienna, AT, (28/4-2/5/2025)
- Stabbins et al**, “CaSSIS through the Spectral Parameters Toolkit: Supervised Spectral Parameter Learning & Colour Space Exploration”, *ExoMars CaSSIS Science Team Meeting*, Abu Dhabi, UAE, (27-31/01/2025)
- Tornabene et al, incl. **Stabbins**, “Utility of ExoMars-TGO/CaSSIS to facilitate co-analysis of CRISM and HiRISE for detailed characterization of the surface: Examples from active and future rover landing sites”, *EuroPlanet Science Congress 2024*, Berlin, DE, (8-13/9/2024)
- Yada et al, incl. **Stabbins**, “Initial Description Plan for OSIRIS-REx Samples to be Distributed to JAXA”, *86th Annual Meeting of the Meteoritical Society Meeting*, 86-3036-6041, LPI Contrib. 3036, Brussels, BE, (28/7-2/8/2024)
- Tornabene et al, incl. **Stabbins**, “Utility Of ExoMars-TGO/CaSSIS to Facilitate Co-Analysis of CRISM and HiRISE For Detailed Characterisation of the Surface: Examples from Rover Landing Sites”, *Tenth International Conference on Mars 2024*, Pasadena, CA, US (22-25/7/2024)
- Stabbins et al**, “Toward Multiview-Multispectral Sensing from the Martian Moons eXploration Spacecraft: Imaging Ryugu Samples with the Laboratory OROCHI Simulator”, *British Planetary Science Conference 2024*, Session 1G, No. 5, Leicester, UK (19-21/6/2024)
- Stabbins & Grindrod**, “Exploring the Limits of Material Discrimination with CaSSIS Multiband Imaging”, *British Planetary Science Conference 2024*, Abstract No. 27, Leicester, UK (19-21/6/2024)
- Stabbins et al**, “Computationally Simulating Spectral Sensing of Planetary Surface Composition”, *British Space Instrumentation Workshop*, Poster #6, Leicester, UK (18/6/2024)
- Yada et al, incl. **Stabbins**, “Ryugu Sample Distribution Via Four Times of Announcement of Opportunities and Preparation for Bennu Sample Curation Allocated to JAXA”, *54th Lunar and Planetary Science Conference 2024*, LPI Contri. No. 3040, The Woodlands, TX, US, (11-15/3/2024)

References available on request.