Dr. Adomas Valantinas

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Research Interests

I study the geological and climatic evolution of Mars, with a focus on aqueous alteration, iron oxide mineralogy, and the habitability of ancient crustal environments. My research combines orbital hyperspectral and multispectral remote sensing from ESA and NASA missions, laboratory spectroscopy and characterization of alteration minerals, machine learning approaches to large planetary datasets, and terrestrial analog fieldwork in volcanic and hydrothermal settings.

Education

10/18–11/22 **Ph.D. Astronomy and Physics**, University of Bern
Thesis: *Bright and Dusty Regions of Mars: New Insights from Experiments and Orbital Color Imaging*
Advisor: Prof. Nicolas Thomas

10/15–10/17 **M.Sc. Geophysics**, University of Copenhagen
Advisor: Prof. Kjartan Kinch

09/11–07/15 **B.Sc. Astronomy and Physics**, Vilnius University
Advisor: Dr. Audrius Bridzius

09/11–06/12 **Astronomy and Physics**, University of Glasgow (year abroad)

Research Experience

09/25–08/26 SNSF *Postdoc.mobility* fellow, ETH Zurich, Switzerland
Advisor: Prof. Cara Magnabosco
Computational skills: Machine learning for hyperspectral and multispectral remote sensing

09/23–08/25 SNSF *Postdoc.mobility* fellow, Brown University, USA
Advisor: Prof. Jack Mustard
Laboratory skills: X-ray crystallography, geochemistry, VNIR/Mid-IR spectroscopy of aqueous alteration minerals

12/22–03/23 Postdoctoral researcher, University of Bern, Switzerland
Advisor: Dr. Antoine Pommerol
Laboratory skills: VNIR spectroscopy of iron oxides

10/18–11/22 Graduate research assistant, University of Bern, Switzerland
Remote sensing skills: Geological and spectral analysis of multispectral camera data
Laboratory skills: Bi-directional reflectance measurements of Martian soil simulants
Numerical modeling skills: Reflectance modeling using Hapke theory

10/15-10/17 Masters degree researcher, University of Copenhagen, Denmark
Laboratory skills: Mastcam-Z calibration target development for NASA's Perseverance rover

Mission Experience

10/18–present ESA's Trace Gas Orbiter (TGO) Colour and Stereo Surface Imaging System (CaSSIS) Science Team collaborator and operations planner (PI: N. Thomas). Planned ∼10 months of CaSSIS observations (11% of total mission time). Science Theme lead for Hydrothermal Processes and Geologic Contacts & Stratigraphy. Contributed 31,000 targets for the CaSSIS targeting database (60% of all team targets).

06/20–present NASA's Mars Reconnaisance Orbiter (MRO) High Resolution Imaging Science Experiment (HiRISE) Science Team collaborator (PI: A. McEwen). Regular contributor to the HiRISE targeting database.

09/22-01/23 Guest participant in the NASA's Double Asteroid Redirect Test (DART) Boarders program (PI: A. Cheng). Observed DART team meetings and was involved in discussions.

10/15–10/17 NASA's Mars 2020 rover Mastcam-Z Science Team collaborator (PI: J. Bell).

First Author Publications

1. **Valantinas, A.**, Mustard, J., Tullo, A. and Head, J.W. (in review at EPSL). Evidence for plutonic magmatism in the Noachian clay-bearing crust of Nili Fossae, Mars. ***ESS Open Archive***. DOI:10.22541/essoar.176235473.32635438/v1.
2. **Valantinas, A.**, Rajsic, A., Mustard, J. et al. (in review at GRL). Impact Modeling and Remote Sensing of Jezero Crater Rim: Implications for Mars Sample Return. ***ESS Open Archive***. DOI:10.22541/essoar.175579625.58968122/v1.
3. **Valantinas, A.**, Mustard, J., Chevrier, V., et al. (2025). Detection of ferrihydrite in Martian red dust records ancient cold and wet conditions on Mars. ***Nature Communications***, 16, 1712. DOI:10.1038/s41467-025-56970-z.
4. **Valantinas, A.**, Thomas, N., Pommerol, A. et al. (2024). Evidence for transient morning water frost deposits on the Tharsis volcanoes of Mars. ***Nature Geoscience***, 17, 608–616. DOI:10.1038/s41561-024-01457-7.
5. **Valantinas, A.**, Becerra, P., Pommerol, A. et al. (2021). CaSSIS color and multi-angular observations of Martian slope streaks. ***Planetary and Space Science***, 209:105373. DOI:10.1016/j.pss.2021.105373.
6. **Valantinas, A.** and Schultz, P. H. (2020). The origin of neotectonics on the lunar nearside. ***Geology***, 48:649–653. DOI:10.1130/G47202.1.
7. **Valantinas, A.**, Kinch, K. M. and Bridzius, A. (2018). Low crater frequencies and low model ages in lunar maria: Recent endogenic activity or degradation effects? ***Meteorit Planet Sci***, 53: 826-838. DOI:10.1111/maps.13033.

Co-Author Publications

1. Munaretto, G., (...) **Valantinas, A.** (2025). Phase reddening of Phobos and Deimos from TGO/CaSSIS observations. ***Astronomy & Astrophysics***, 700, L1. DOI:10.1051/0004-6361/202555720.
2. Bickel, V. & **Valantinas, A.** (2025). Streaks on Martian Slopes are Dry. ***Nature Communications***, 16, 4315. DOI:10.1038/s41467-025-59395-w.

3. Thomas, N., (...) **Valantinas, A.** et al. (2025). Seasonal and short timescale changes on the Martian surface: Multi-spacecraft perspectives. ***Space Science Reviews***, 221, 3. DOI:10.1007/s11214-024-01128-4.

4. Mills, M.M. (...) **Valantinas, A.** (2024). A global dataset of pitted cones on Mars. ***Icarus***, 418, 116145. DOI:10.1016/j.icarus.2024.116145.

5. Pommerol, A. (...) **Valantinas, A.** et al (2022). In-flight radiometric calibration of the ExoMars TGO Colour and Stereo Surface Imaging System. ***Planetary and Space Science***, 105580. DOI:10.1016/j.pss.2022.105580.

6. Munaretto, G. (...) **Valantinas, A.** et al. (2022). Multiband photometry of Martian Recurring Slope Lineae (RSL) and dust-removed features at Horowitz crater, Mars from TGO/CaSSIS color observations. ***Planetary and Space Science***, 105443. DOI:10.1016/j.pss.2022.105443.

7. Dundas, C. M. (...) **Valantinas, A.** et al. (2021). Active Mars: A dynamic world. ***JGR:Planets*** 126, e2021JE006876. DOI:10.1029/2021JE006876.

Professional Service and Leadership

12/17–present Member, AGU. Proposed and will chair the session together with Dr. Mike Wong titled "The Emergence of Life as a Planetary Process" at the 2025 Fall Meeting. Developed this interdisciplinary session to bridge planetary science, astrobiology, and geochemistry communities, promoting collaborative research on life as a planetary-scale process.

01/24–05/25 Led the Astrobiology and Origin of Life (OLA) reading group at Brown University. Organized biweekly seminars bringing together undergraduates, graduate students, postdocs, and faculty to discuss seminal books and papers in astrobiology. Fostered interdisciplinary discussions across career stages and departments (Physics; Earth, Environmental & Planetary Sciences), promoting knowledge exchange and professional development.

01/24 NASA Martian Data Analysis Program (MDAP) proposal reviewer. Evaluated research proposals to advance Mars exploration science and ensure equitable funding distribution across the planetary science community.

03/23&03/25 Lunar and Planetary Science Conference Dwornik judge. Assessed student presentations to recognize excellence in early-career planetary science research and provide constructive feedback for professional development.

09/21–present Active peer reviewer for six major earth and planetary science journals (*Earth Science Reviews*, *Geology*, *Geophysical Research Letters*, *Journal of Geophysical Research*, *Planetary Science Journal*, and *Icarus*).

09/21–present Member, Geological Society of America.

Outreach and Public Engagement

02/25 Expert interviews with Associated Press, CNN, The Guardian, Royal Society of Chemistry (UK), Swiss and Lithuanian national TV stations about the ferrihydrite finding on Mars. Appeared on the Planetary Society Radio podcast "Why is Mars red? A new clue to the history of habitability in Martian dust". ∼500,000 YouTube views accross multiple YouTube channels.

06/24 Expert interviews with CNN, BBC Global (live TV), ABC Australia (live radio), USA Today, New Scientist and others about water frost on Martian volcanoes. Total reach: ∼80,000

Reddit upvotes (front page of reddit.com, views possibly in the millions). Research image selected for the cover of *Nature Geoscience* July 2024 issue.

06/23–present Radio DJ and science communicator at NTS.live and RadioVilnius.live, curating shows combining experimental electronic music with science communication. Developed innovative approaches to make planetary science accessible to diverse, non-academic audiences and remove traditional barriers to science engagement.

06/21 Artistic collaboration with Matteo Taramelli for exhibition "Potentially Uninhabitable Worlds" at Dreiviertel Gallery, Bern, Switzerland.

06/20 Interview with *Ciel et Espace* (French popular science magazine) about active lunar tectonics.

Teaching and Mentoring Experience

02/26–06/26 BSc thesis supervisor, ETH Zurich. Supervised Guilliat Corboz bachelor thesis on "Searching for Hydrothermal Systems on Mars: Using Polygonal Ridges to Map Subsurface Habitability", co-supervised with Prof. Cara Magnabosco.

03/26-09/26 Research intern supervisor, ETH Zurich. Supervising Andrei Girjoaba on machine learning of Mars remote sensing data, co-supervised with Prof. Cara Magnabosco.

09/23–05/25 Research mentor, Brown University. Supervised high school student Rushil Kukreja in spectral analysis of Martian orbital data.

10/18–11/22 Laboratory teaching assistant, University of Bern. Instructed students in optics and thermodynamics laboratory courses, guiding experimental procedures and helping students connect theoretical concepts with practical applications.

11/17–09/18 Private tutor, Lithuania. Provided individualized instruction in physics and mathematics for high school students, developing tailored approaches to improve student comprehension and academic performance.

Grants and Awards

09/25–08/26 SNSF *Postdoc.mobility* fellowship return grant for "Potential for ancient habitability and deep crustal materials preserved in the rim of Jezero crater, Mars" (Role: PI; $155,000)

07/25 American Philosophical Society Baruch Blumberg grant for Astrobiology titled "Decoding Mars Through Iceland: Ferrihydrite as a Key to Past Habitability and Potential Biosignatures" for field work and conference attendance in Iceland (Role: PI; $8,500)

05/25 CIFAR seed funding "Interfaces of Possibility: Modeling Boundary Ecosystems Across Planetary Systems" (Role: Co-PI; $7,200)

09/23–08/25 SNSF *Postdoc.mobility* fellowship grant "Windows into Mars' potentially habitable subsurface in the context of NASA's Perseverance extended mission" (Role: PI; $146,000)

03/20 Lunar and Planetary Institute (LPI) Career Development Award (canceled due to COVID)

12/17 American Geophysical Union (AGU) student travel award ($2,000)

Relevant Workshops and Summer schools

08/25	NASA Planetary Science Summer School (PSSS) for mission design at JPL, Pasedena. Helped design a concept mission to Neptune's moon Triton.
03/25	Canadian Institute for Advanced Research (CIFAR) and Swiss National Science Foundation (SNSF) "Forum on Radical Interdisciplinarity" in Geneva, Switzerland.
06/24	CIFAR Team meeting "Earth 4D: Subsurface Science & Exploration Program Meeting", Quebec City, Canada.
10/23	European Astrobiology Institute "Life in the Sub-Surface: Habitats, Species, Metabolism and Survival Strategies" in the Azores, Portugal.
04/22	European Space Agency workshop "Mars V" at Les Houches, France.
11/18	GeoPlaNet analogue field winter school "Fluid-Rock Interactions in the Solar System", Nantes, France.
07/17	Nordic Astrobiology Network field summer school "Impacts and their Role in the Evolution of Life", Saaremaa, Estonia,
06/16	Nordic Astrobiology Network field summer school "Biosignatures and the search for life on Mars", Iceland,

Field experience

07/25	Project in Iceland Funded by the Baruch Blumberg grant in Astrobiology.
03/24	Characterization of iron rich springs in Block Island, USA. Brown University funded field trip.
11/23	Sampling volcanic and hydrothermal environments in the Azores (Pico, Faial, Sao Miguel and Terceira islands). Funded by SNSF. Analysis of ferrihydrite samples from Terceira published in Valantinas et al. (2025).
06/16	Adenosine triphosphate (ATP) analysis and collection of volcanic tephra in Iceland. Part of the summer school organized by the Nordic Astrobiology Network.

Selected talks

09/24	"Why is Mars red? Recent advances in solving the century-old problem in planetary science", MIT/Harvard Planetary meeting, MIT
05/24	"Are Martian volcanoes dormant?" Planetary lunch bunch meeting, Brown University
10/17	"Neotectonics on the Lunar Nearside", Observatoire de la Côte d'Azur, Nice, France