

SIMON J. LOCK

School of Earth Sciences
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Key interests

The formation, structure, and evolution of terrestrial and giant planets.
The history of Earth and how it became habitable.
Improving inclusivity and equity through service and public engagement.

EDUCATION

Ph.D. Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA Thesis title: <i>The formation, structure and evolution of terrestrial planets.</i>	2018
M.A. Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA	2014
MSci. (1st Class) Natural Sciences (Experimental and Theoretical Physics), University of Cambridge, Cambridge, UK	2012
B.A. (Hons, 1st Class) Natural Sciences (Experimental and Theoretical Physics), University of Cambridge, Cambridge, UK	2012

PROFESSIONAL EXPERIENCE

NERC Independent Research Fellow. School of Earth Sciences, University of Bristol, UK	2021–present
Planetary Science Option Postdoctoral Scholar. Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA	2018–2021
Graduate Student Fellow. Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA	2012–2018
Masters and Undergraduate Student. Natural Sciences University of Cambridge, Cambridge, UK	2008–2012
SURF Fellow. Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA	2011

AWARDS AND HONORS

UK Natural Environment Research Council (NERC) Independent Research Fellowship	2021–2026
Pellas-Ryder Award, jointly awarded by the Meteoritical Society and the Planetary Division of the Geological Society of America	2019
Planetary Science Option Postdoctoral Fellowship, California Institute of Technology	2018–2021
NASA Earth and Space Science Fellowship	2013–2016
University Certificate of Distinction in Teaching, Harvard University	2013 & 2014
Dirac Prize, St. John's College, University of Cambridge	2012
Morton Prize, St. John's College, University of Cambridge	2012

United Steel Companies Scholarship, St. John's College, University of Cambridge	2011 & 2012
Elected a member of 'The Foundation of the College of St. John the Evangelist in the University of Cambridge' in recognition of academic excellence	2011

FUNDING FOR RESEARCH

UK NERC Independent Research Fellowship	2021–2026
Title: The consequences of the Moon-forming impact for the chemistry of Earth	
Role: PI, Fellow	
Amount: £758,114	
US NSF Geophysics/Petrology and Geochemistry	2020–2022
Title: The effect of rotational evolution on the surface and interior of the early Earth	
Role: Postdoc; science lead. (PI: P. D. Asimow; Co-I: M. Gurnis)	
Amount: \$300,000	
Planetary Science Option Postdoctoral Fellowship, California Institute of Technology	2018–2022
Title: The formation and deformation of Earth's earliest crust	
Role: Postdoctoral Fellow	
Amount: \$58,000	
NASA Earth and Space Science Fellowship	2013–2016
Title: Atmospheric loss during high angular momentum giant impacts	
Role: Graduate student researcher	
Amount: \$90,000	

OTHER FUNDING

STFC University of Bristol Impact Accelerator Account (sub-award)	2025
Title: Commercialising the feel the impact project: Production of a Moon book and educational toys	
Role: PI	
Amount: £14,090	
STFC University of Bristol Impact Accelerator Account (sub-award)	2023–2024
Title: Making planetary impacts accessible to the visually impaired	
Role: PI	
Amount: £5,500	

COMPETITIVELY ALLOCATED FACILITY TIME

JWST Cycle 3	2024–2025
When worlds collide: formation and evolution of a synestia	
Role: coI	
Amount: 16.8 hrs (9 hrs science time)	
JWST Director's Discretionary Time	2023–2024
When worlds collide: formation and evolution of a synestia	
Role: coI	
Amount: 8.6 hrs (4.8 hrs science time)	

TEACHING EXPERIENCE

Guest lecturer, <i>EASC30053: Global Tectonics and Global Geodynamics</i> , University of Bristol	2024
Co-Instructor, <i>EASCM0061: Frontiers in Earth Science</i> , University of Bristol (20 CP)	2023
Leader, <i>The Physics of Planetary Impacts</i> , University of Bristol (unofficial course)	2022–present

Guest lecturer, <i>PHYS106: Stars & Planets</i> , University of Bristol	2022
Guest lecturer, <i>460-506: Structure & Formation of Terrestrial Planets</i> , Rutgers University	2020
Guest lecturer, <i>ASTR-330MN-01: Topics in Astrophysics: ‘Moon’</i> , Mount Holyoke College	2017
Guest lecturer, <i>GEL36: The solar system</i> , UC Davis	2017
Co-instructor & developer, <i>GEL251: Thermodynamics of the Earth and planets</i> , UC Davis	2015
Teaching fellow, <i>SPU30: Life as a planetary phenomenon</i> , Harvard University	2014
Teaching fellow, <i>SPU14: How to build a habitable planet</i> , Harvard University	2013

ADVISING EXPERIENCE

(post-)Graduate students:

Gaikwad, N., MSc, University of Bristol. Secondary supervisor: P. J. Carter	2024
Joiret, S., PhD, Universit de Bordeaux. Visiting student at University of Bristol.	2024
Taylor, L., PhD, University of Bristol. Primary supervisor: Z. M. Leinhardt.	2022–present
Roche, M. J., PhD, University of Bristol. Secondary supervisor: Z. M. Leinhardt.	2022–present
Hollyday, G. O., UC Davis. Primary supervisor: S. T. Stewart.	2016–2020
MS thesis: <i>Educational visualization tools for conveying research: Jupyter notebooks on synestias</i>	

Undergraduate students:

Forshaw, J., University of Bristol. Primary supervisor: O. Lord.	2024–2025
Tanna, P., University of Cambridge. Primary supervisor: A. Bonsor.	2022–2023
MSci thesis: <i>Can we detect moon forming impacts in other star systems?</i>	
Klein, I. A., University of Bristol.	2022–2024
Project: <i>Identification of post-impact bodies beyond the corotation limit</i>	
Pepper, A. C., UC Davis. Secondary supervisor: S. T. Stewart.	2017–2021
Project: <i>Giant impacts between rotating bodies in an Eulerian code</i>	

PUBLIC ENGAGEMENT AND OUTREACH

Ran ‘Feel the impact’ event at Bristol Museum for visually impaired visitors	2025
Organized activities at Festival of Nature, a regional science engagement event	2024
Featured on The Sky at Night (BBC)	2024
Interviewee and advisor on Radiolab episode ‘The Moon Itself’	2024
PI of STFCC IAA: <i>Making planetary impacts accessible to the visually impaired</i>	2023–2024
Advisor on BBC Studios documentary series on the Moon	2023
Led activities as part of the Access to Bristol scheme	2022–present
Participant in Skype A Scientist, a program which matches schools to scientists who lead class discussions about science and what it is like to be a scientist	2020–present
Helped develop tools for cinematic visualisation (Aleo, Lock et al., 2020)	2020
Interviewee on Blue Dot, North State Public Radio	2019
Invited speaker at ‘Astronomy on Tap’, Pasadena	2019
Advisor for new show ‘Imagine the Moon’ at Adler Planetarium, Chicago, IL	2018
Advisor for ‘Strip the Cosmos’ documentary on the Discovery Channel	2018
Talk to Stockton Astronomical Society	2018
Author of popular science articles (see Other Publications)	2017–present
Lead role in organizing activities for UC Davis Picnic Day, a university-wide open day	2016–2018
Press interviews and consultations (e.g., New Scientist, National Geographic, Quanta)	2016–present

SERVICE

Academic service

Organiser of breakout session, Rocky Worlds III conference	2024
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Origin and evolution of atmospheres
 Co-convenor and chair, American Geophysical Union fall meeting 2023
D143A. Exploring Earth's evolution: The Hadean through the present
 Co-convenor of Union session, American Geophysical Union fall meeting 2022
U016. The formation and early evolution of the Earth and the Moon
 Co-convenor, American Geophysical Union fall meeting 2018
DI001. Accretion, differentiation and their longterm consequences for planetary evolution
 Journal reviewer: e.g., Sci. Adv., JGR: Planets, Nature Geo., EPSL, Icarus, PSJ 2017–present
 NASA review panel panelist
 NASA review panel non-panelist reviewer
 External grant reviewer for the Swiss National Science Foundation
 NSF ad hoc reviewer

Departmental/University service

Member of School Research Committee, University of Bristol 2025–present
 Member of hiring committee for new research associate, University of Bristol 2024
 School Research Concordat Champion, University of Bristol 2023–present
 Co-organized ‘Publishing your first paper’ workshop, School of Earth Sciences, University of Bristol 2023
 Member of Advanced Computing Research Centre (ACRC) High Performance Computing (HPC) User Group, University of Bristol 2023–present
 Member of the Staff Disability Forum, University of Bristol 2023–2024
 Co-led discussion on review writing for PhD Students, University of Bristol 2022
 Restarted and organised early career researchers (ERC) coffee 2022–present
 School of Earth Sciences, University of Bristol
 Founder and organizer of the Planets Discussion Group, University of Bristol 2022–present
 Member of the Caltech GPS Local Scholars Committee on Diversity 2020–2021
 Caltech Center for Comparative Planetary Evolution (³CPE) postdoc retreat committee 2020
 Department colloquium events coordinator, UC Davis 2014–2016
 EPS Day coordinator, Harvard University 2013–2014
 Graduate student visit organizer, Harvard University 2012–2013

PROFESSIONAL MEMBERSHIPS

American Geophysical Union 2014–present
 Association of Women Geoscientists 2018–present
 European Association of Geochemistry 2019–present

OTHER SKILLS

Fluent or highly competent in several programming and scripting languages including: C, C++, Fortran, Python, MATLAB, Julia, Bash, and C Shell.

Highly skilled and experienced in scientific communication. Participated in multiple courses on media engagement, scientific communication, and public outreach.

INVITED TALKS AND SEMINARS

American Geophysical Union Fall Meeting, 2024. *When Worlds (probably) Collide: An exoplanet collision remnant observed around ASASSN-21gj.*
 Imperial College London, Department of Earth Science and Engineering seminar, 2024. *Atmospheric loss in giant impacts depends on pre-impact surface conditions.*
 University of Oxford, Department of Earth Sciences seminar, 2023. *Atmospheric loss in giant impacts: The effect of pre-impact surface conditions.*

Origin of Solar Systems (Gordon Research Conference), 2023. *Origin of volatiles on terrestrial planets: Will they stay, or will they go?*

University of Manchester, Department of Earth and Environmental Sciences Seminar, 2022. *Earth in the Emergency Room: Recovery of Earth after the Moon-forming giant impact.*

Rocky Worlds Discussions Series talk, 2022. *Impact-driven atmospheric loss from terrestrial planets.*

University of Cambridge, Department of Earth Sciences Seminar, 2022. *Crust formation and deformation on the rapidly rotating early Earth.*

Geological Society ‘Earth and the Early Moon’ meeting, 2021. *A tectonically active early Earth driven by the tidal recession of the Moon.*

University of Oslo, The Center for Earth Evolution and Dynamics (CEED) seminar, 2021. *Recovery of Earth after the Moon-forming giant impact.*

Taiwan Space Union, Mini-Moon seminar series, 2021. *The synestia story.*

Washington University in St. Louis, Department Colloquium, 2020. *The formation of the Earth and Moon.*

University of California, Santa Cruz, Center for the Origin, Dynamics and Evolution of Planets Seminar, 2020. *The origin of the Moon within a terrestrial synestia.*

Cal Poly Pomona, Physics and Astronomy Department Seminar, 2019. *The origin of the Moon within a terrestrial synestia.*

Moon Workshop, American University of Beirut, 2019. *A review lecture on the formation of the Moon and The origin of the Moon within a terrestrial synestia.*

University of Arizona, Lunar and Planetary Laboratory Colloquium, 2019. *The origin of the Moon within a terrestrial synestia.*

University of California, Los Angeles, Geochemistry Seminar, 2019. *Giant impacts stochastically change the internal pressures of terrestrial planets.*

Carnegie Institute, Geophysical Laboratory, 2019. *The origin of the Moon within a terrestrial synestia.*

Weizmann Institute of Science, Department of Earth and Planetary Sciences, 2019. *The origin of the Moon within a terrestrial synestia.*

Lunar and Planetary Institute, 2018. *The origin of the Moon within a terrestrial synestia.*

ISSI workshop ‘Reading Terrestrial Planet Evolution in Isotopes and Element Measurements’, 2018. *Origin of the Moon, including isotopic constraints on its origin.*

The University of Chicago, Geophysical Sciences Department, 2018. *Recovery of the Earth after the Moon-forming giant impact.*

University of Cambridge, Bullard Laboratories Seminar, 2017. *The last stage of Earth’s formation: Increasing the pressure.*

University of Cambridge, Institute of Astronomy, 2017. *A new exhibit in the planetary zoo: Hot, rotating rocky planets.*

ACCRETE International Interdisciplinary Workshop, 2017. *A new model for lunar origin: Equilibration with Earth beyond the corotation limit.*

American Geophysical Union Fall Meeting, 2016. *Preservation of primordial mantle in the aftermath of a giant impact.*

University of California, Berkeley, CIPS Seminar, 2016. *A new exhibit in the planetary zoo: Hot, rotating rocky planets.*

University of Bristol, Astrophysics Seminar, 2016. *A new model for lunar origin: Equilibration with Earth beyond the hot spin stability limit.*

American Geophysical Union Fall Meeting, 2015. *Condensing the Moon from a MAD Earth.*

The University of Chicago, Geophysical Sciences Department Colloquium, 2015. *Condensing the Moon from a MAD Earth.*

PEER-REVIEWED PUBLICATIONS

Note on publication and authorship: In planetary sciences, it is common to publish fewer, more detailed papers, and the rate of publishing is therefore typically slower than in some related fields, such as

astrophysics. Typically, authors are listed in order of contribution to the work except in the case of co-first authorship (marked with an asterisk) which is becoming increasingly common. Sometimes a senior author or group leader who took a mostly advising role will be listed last. As the field is highly multidisciplinary, there are a number of highly ranked, sub-field specific journals – including *JGR: Planets*, *ApJ*, and *The Planetary Science Journal* – in which high-impact papers are generally published.

Student advisees underlined>.

18. Roche, M. J., **S. J. Lock**, J. Dou, P. J. Carter, J. A. Kegerreis, and Z. M. Leinhardt. Atmospheric loss during giant impacts: mechanisms and scaling of near- and far-field loss. *The Planetary Science Journal*, accepted.
17. Stewart, S. T., **S. J. Lock**, P. J. Carter, E. J. Davies, R. G. Kraus, S. Root, M. I. Petaev and S. B. Jacobsen. Planetary impact vapor plumes and nebular shocks form chondritic mixtures. *The Planetary Science Journal* 6, 108, doi: 10.3847/PSJ/adbe71, 2025.
16. Dou, J., P. J. Carter, **S. J. Lock** and Z. M. Leinhardt. Exploring the catastrophic regime: Thermodynamics and fragmentation in head-on planetary collisions. *Monthly Notices of the Royal Astronomical Society* 534, 758-782, doi: 10.1093/mnras/stae2134, 2024.
15. **Lock, S. J.**, and S. T. Stewart. Atmospheric loss in giant impacts depends on pre-impact surface conditions. *The Planetary Science Journal* 5, 28, doi: 10.3847/PSJ/ad0b16, 2024.
14. Kenworthy*, M., **S. J. Lock***, G. Kennedy*, R. van Capelleveen*, E. Mamajek*, L. Carone*, F.-J. Hambsch, J. Masiero, A. Mainzer, J. D. Kirkpatrick, E. Gomez, Z. M. Leinhardt, J. Dou, P. Tanna, A. Sainio, H. Barker, S. Charbonnel, O. Garde, P. Le Dû, L. Mulato, T. Petit and M. Rizzo Smith. A planetary collision afterglow and transit of the resultant debris cloud. *Nature* 622, 251254, doi: 10.1038/s41586-023-06573-9251254, 2023. *These authors contributed equally to this work.
13. Canup, R. M., K. Righter, N. Dauphas, K. Pahlevan, M. Čuk, **S. J. Lock**, S. T. Stewart, J. Salmon, R. Rufu, M. Nakajima and T. Magna. Origin of the Moon. *Reviews in Mineralogy and Geochemistry* 89 (1), 53102, doi: 10.2138/rmg.2023.89.02, 2023. Part of the *New views of the Moon II* volume.
12. Chidester*, B. A., **S. J. Lock***, K. E. Swadba, Z. Rahman, K. Righter and A. J. Campbell. The lithophile element budget of Earth’s core. *Geochemistry, Geophysics, Geosystems* 23, e2021GC009986, doi: 10.1029/2021GC009986, 2022. *B. A. Chidester and S. J. Lock are co-first authors.
11. Daher H., B. K. Arbic, J. G. Williams, J. K. Ansong, D. H. Boggs, M. Müller, M. Schindelegger, J. Auermann, B. D. Cornuelle, E. B. Crawford, O. B. Fringer, H. C. P. Lau, **S. J. Lock**, A. C. Maloof, D. Menemenlis, J. X. Mitrovica, J. A. M. Green and M. Huber. Long-term Earth-Moon evolution with high-level orbit and ocean tide models. *JGR: Planets* 126, e2021JE006875, doi: 10.1029/2021je006875, 2021.
10. Čuk, M., **S. J. Lock**, S. T. Stewart and D. Hamilton. Tidal evolution of the Earth-Moon system with a high initial obliquity. *The Planetary Science Journal* 2, 147, doi: 10.3847/PSJ/ac12d1, 2021.
9. Stewart, S. T., E. J. Davies, M. S. Duncan, **S. J. Lock**, S. Root, J. P. Townsend, R. G. Kraus, R. Caracas and S. B. Jacobsen. The shock physics of giant impacts: Key requirements for the equations of state. *AIP Conference Proceedings* 2272, 080003, doi: 10.1063/12.0000946, 2020.
8. Aleo, P. D., **S. J. Lock**, D. J. Cox, S. A. Levy, J. P. Naiman, A. J. Christensen, K. Borkiewicz, and R. Patterson. Clustering-informed cinematic astrophysical data visualization with application to the Moon-forming terrestrial synestia. *Astronomy and Computing* 33, 100424, doi: 10.1016/j.ascom.2020.100424, 2020.
7. **Lock, S. J.**, K. R. Bermingham, R. Parai and M. Boyet. Geochemical constraints on the origin of the Moon and preservation of ancient terrestrial heterogeneities. *Space Science Reviews* 216, 109,

doi: 10.1007/s11214-020-00729-z, 2020.

6. Carter, P. J., **S. J. Lock** and S. T. Stewart. The energy budgets of giant impacts. *JGR: Planets* 125, e2019JE006042, doi: 10.1029/2019JE006042, 2020.
5. **Lock, S. J.**, S. T. Stewart and M. Čuk. The energy budget and figure of Earth during recovery from the Moon-forming giant impact. *EPSL* 530, pp 115885, doi: 10.1016/J.EPSL.2019.115885, 2020.
4. **Lock, S. J.** and S. T. Stewart. Giant impacts stochastically change the internal pressures of terrestrial planets. *Science Advances* 5, eaav3746, doi: 10.1126/sciadv.aav3746, 2019.
3. **Lock, S. J.**, S. T. Stewart, M. I. Petaev, Z. M. Leinhardt, M. T. Mace, S. B. Jacobsen and M. Čuk. The origin of the Moon within a terrestrial synestia. *JGR: Planets* 123, pp 910-951, doi: 10.1002/2017JE005333, 2018.
2. **Lock, S. J.** and S. T. Stewart. The structure of terrestrial bodies: Impact heating, corotation limits and synestias. *JGR: Planets* 122, pp 950-982, doi:10.1002/2016JE005239, 2017.
1. Čuk, M., D. Hamilton, **S. J. Lock**, and S. T. Stewart. Tidal evolution of the Moon from a high-obliquity, high-angular-momentum Earth. *Nature* 539, pp 402-406, doi:10.1038/nature19846, 2016.

IN PROGRESS

Student advisees underlined.

1. Joiret, S., G. Avice, L. Ferrière, Z. M. Leinhardt, **S. J. Lock**, A. Mechineau, and S. N. Raymond. Asteroids fail to retain cometary impact signatures. In review.
2. **Lock, S. J.** A tectonically active early Earth driven by the tidal recession of the Moon. Submitted.
3. Tanna, P., **S. J. Lock**, S. T. Hodgkin, and A. Bonsor. Can we detect moon-forming impacts in other star systems? In prep.
4. Kleine, I. and **S. J. Lock**. An automated method for identification of synestias. In prep.
5. Postema, A. N., **S. J. Lock**, and S. T. Stewart. Thermal effects of collisions during rocky planet accretion. In prep.

OTHER PUBLICATIONS

6. **Lock, S. J.**, M. Kenworthy, and Z. M. Leinhardt. The afterglow of an explosive collision between giant planets may have been detected in a far-off star system. *The Conversation*, 2023.
5. **Lock, S. J.** HERCULESv1_user: HERCULES planetary structure code (Version v1.0.0). *Zenodo*, <http://doi.org/10.5281/zenodo.3509365>, 2019.
4. Stewart, S. T., E. J. Davies, M. S. Duncan, **S. J. Lock**, S. Root, J. P. Townsend, and S. B. Jacobsen. Equation of State Model Forsterite-ANEOS-SLVTv1.0G1: Documentation and Comparisons (Version v1.0.0). *Zenodo*, <http://doi.org/10.5281/zenodo.3478631>, 2019
3. **Lock, S. J.** and S. T. Stewart. Origin Story. *Scientific American*, CCCXX, 7, 2019.
2. **Lock, S. J.** Making the Moon: The legacy of Apollo. *The Geographer*, Summer issue, 2019.
1. **Lock, S. J.** A new theory of how the Moon formed. *Scientific American*, 2017.

CONFERENCE PROCEEDINGS

Note on conference attendance: As my work is highly multidisciplinary, my colleagues and I present work at a range of high-profile conferences in different fields, as well as planetary-science specific conferences (e.g., *Lunar and Planetary Science Conference*). Examples of field-specific conferences include

Goldschmidt (geochemistry), the *American Geophysical Union Fall Meeting* (geophysics), and the *American Astronomical Society* (astrophysics). Small workshops that focus on specific questions or topics are also common (e.g., the *ACCRETE workshop*).

Student advisees underlined.

73. **Lock, S. J.**, R. van Capelleveen, M. Kenworthy, M. Temmink, N. Crouzet, D. Gonzalez Picos, G. Kennedy, L. Carone, E. Mamajek, C. Melis, F-J Hambsch, J. Masiero, A. Mainzer, J. Kirkpatrick, E. Gomez, Z. M. Leinhardt, J. Dou, P. Tanna, A. Sainio, H. Barker, S. Charbonnel, O. Garde, P. Le Dû, L. Mulato, T. Petit, and M. Rizzo Smith. When Worlds (probably) Collide: An exoplanet collision remnant observed around ASASSN-21qj (invited). *American Geophysical Union Fall Meeting*, P13C-3088, 2024.
72. Postema, A., S. T. Stewart, and **S. J. Lock**. Thermal and Rotational Effects of Collisions During Rocky Planet Accretion. *American Geophysical Union Fall Meeting*, P44B-01, 2024.
71. Kenworthy, M., R. van Capelleveen, G. Kennedy, **S. J. Lock**, L. Carone, E. Mamajek, E. Gomez, Z. M. Leinhardt, J. Dou, F.-J. Hambsch, J. Masiero, A. Mainzer, J. S. Kirkpatrick, P. Tanna, M. Rizzo Smith, A. Sainio, H. Barker, S. Charbonnel, O. Garde, P. Le Dû, L. Mulato and T. Petit. When Worlds (probably) Collide: An exoplanet collision remnant around ASASSN-21qj. *Exoplanet 5*, Abs. 685, 2024.
70. Roche, M. J., **S. J. Lock**, J. Dou, J. A. Kegerreis, and Z. M. Leinhardt. Atmospheric loss during giant impacts: An improved scaling law for loss mechanics, planet masses, impact velocities, and angles. *Earth and Planets Origin and Evolution Workshop*, 2024.
69. Stewart, S. T., P. J. Carter, **S. J. Lock**, E. J. Davies, R. G. Kraus, S. Root, M. I. Petaev and S. B. Jacobsen. The formation of chondrites by vaporizing collisions between planetesimals. *Earth and Planets Origin and Evolution Workshop*, 2024.
68. Postema, A. N., S. T. Stewart, and **S. J. Lock**. Thermal effects of collisions during rocky planet accretion. *Rochester Impact Workshop*, 2024.
67. Taylor, L., **S. J. Lock**, D. Grant, J., and Z. M. Leinhardt. Constraining the role of giant impacts in planet formation using transit observations of post-impact bodies. *Rocky Worlds Conference III*, 2024.
66. Roche, M. J., **S. J. Lock**, J. Dou, and Z. M. Leinhardt. Quantifying the effect of atmospheric properties on atmospheric loss during planetary collisions using 3D impact simulations. *Rocky Worlds Conference III*, 2024.
65. **Lock, S. J.**, Roche, M. J., J. Dou, S. T. Stewart, and Z. M. Leinhardt. The effect of pre-impact surface conditions on the efficiency of atmospheric loss in giant impacts. *American Geophysical Union Fall Meeting*, DI43B-0036, 2023.
64. **Lock, S. J.**, S. T. Stewart, and M. J. Roche. Atmospheric loss in giant impacts depends on pre-impact surface conditions. *Goldschmidt Conf.*, Abs. 19972, doi: 10.7185/gold2023.19972, 2023.
63. **Lock, S. J.**, S. T. Stewart, and M. J. Roche. Origin of volatiles on terrestrial planets: Will they stay, or will they go? *Gordon Research Conference: Origins of Solar Systems*, 2023.
62. **Lock, S. J.**, and S. T. Stewart. The effect of pre-impact surface conditions on the efficiency of atmospheric loss in giant impacts. *Gordon Research Conference: Origins of Solar Systems*, 2023.
61. Taylor, L., **S. J. Lock**, D. Grant, J. Dou, Z. M. Leinhardt, and H. R. Wakeford. Using transit observations to detect and characterise planetary bodies in the aftermath of giant impacts. *Gordon Research Conference: Origins of Solar Systems*, 2023.

60. Roche, M. J., **S. J. Lock**, J. Dou, and Z. M. Leinhardt. The effect of atmospheric properties on atmospheric loss during giant impacts. *Gordon Research Conference: Origins of Solar Systems*, 2023.
59. **Lock, S. J.** and S. T. Stewart. The effect of pre-impact surface conditions on the efficiency of atmospheric loss in giant impacts. *Lunar & Planet. Sci. Conf.* 54, Abs. 2290, 2023.
58. **Lock, S. J.** and S. T. Stewart. The effect of pre-impact surface conditions on the efficiency of atmospheric loss in giant impacts. *American Geophysical Union Fall Meeting*, DI34A-03, 2022.
57. **Lock, S. J.** and S. T. Stewart. The effect of pre-impact surface conditions on the efficiency of atmospheric loss in giant impacts. *UK Exoplanet Meeting*, 2022.
56. **Lock, S. J.** and S. T. Stewart. The effect of pre-impact surface conditions on the efficiency of giant impact atmospheric loss. *British Planetary Science Conference*, 2022.
55. **Lock, S. J.** and P. D. Asimow. A tectonically active early Earth driven by the tidal recession of the Moon. *Geological Society ‘Earth and the Early Moon’ meeting*, 2021.
54. **Lock, S. J.** and P. D. Asimow. A tectonically active early Earth driven by the tidal recession of the Moon. *AGU Fall Meeting*, Abs. DI022-01, 2020.
53. Chidester B. A., **S. J. Lock** and S. T. Stewart. Planetary differentiation in the aftermath of giant impacts. *AGU Fall Meeting*, Abs. DI021-06, 2020.
52. Chidester B. A., **S. J. Lock**, M. Millot and S. T. Stewart. Metal–silicate equilibration in the aftermath of giant impacts. *Goldschmidt Conf.*, Abs. 416, 2020.
51. **Lock, S. J.** and P. D. Asimow. A tectonically active early Earth driven by the tidal recession of the Moon. *Lunar & Planet. Sci. Conf.* 51, Abs. 1848, 2020.
50. Arbic B. K., H. Daher, J. G. Williams, J. K. Ansong, D. H. Boggs, M. Müller, M. Schindelegger, A. Adcroft, J. Auermann, B. D. Cornuelle, E. Crawford, O. B. Fringer, H. C-P. Lau, **S. J. Lock**, A. C. Maloof, D. Menemenlis, J. X. Mitrovica, M. Green and M. Huber. 4.5 billion years of Earth-Moon evolution from high-level ocean tide and orbital dynamics models: First results. *AGU Ocean Science Meeting*, PL51A-02, 2020.
49. Stewart, S. T., E. J. Davies, M. Duncan **S. J. Lock**, S. Root, J. Townsend, R. G. Kraus, R. Caracas, S. B. Jacobsen and Z. Li. Integrative approaches to building planet Earth: New wide-ranging equations of state. *AGU Fall Meeting*, Abs. P43D-3500, 2019.
48. **Lock, S. J.**, S. T. Stewart, B. A. Chidester and P. D. Asimow. Giant impacts stochastically change the internal pressures of terrestrial planets. *Goldschmidt Conf.*, Abs. 2041, 2019.
47. Chidester, B. A., **S. J. Lock** and S. T. Stewart. Exploring the conditions of metal-silicate equilibration during and after giant impacts. *Goldschmidt Conf.*, Abs. 597, 2019.
46. Stewart, S. T., E. J. Davies, M. Duncan **S. J. Lock**, S. Root, J. Townsend, R. Caracas, R. G. Kraus and S. B. Jacobsen. Shock physics of giant impacts: Transforming rocky planets into supercritical synestias. *APS: SCCM 21*, Abs S6.00004, 2019.
45. Pepper, A. C., **S. J. Lock**, E. J. Davies and S. T. Stewart. Giant impacts between rotating bodies in an Eulerian code. *Lunar & Planet. Sci. Conf.* 50, Abs. 3228, 2019.
44. Carter, P. J., E. J. Davies, **S. J. Lock** and S. T. Stewart. Collapsing impact vapor plumes: A new planetesimal formation environment. *Lunar & Planet. Sci. Conf.* 50, Abs. 1247, 2019.
43. Carter, P. J., E. J. Davies, **S. J. Lock** and S. T. Stewart. High collision velocities between planetesimals during planet growth and migration. *Lunar & Planet. Sci. Conf.* 50, Abs. 1246, 2019.

42. Stewart, S. T., P. J. Carter, E. J. Davies, **S. J. Lock**, R. G. Kraus, S. Root, M. I. Petaev and S. B. Jacobsen. Collapsing impact vapor plume model for chondrule and chondrite formation. *Lunar & Planet. Sci. Conf.* 50, Abs. 1251, 2019.
41. **Lock, S. J.**, S. T. Stewart, P. J. Carter, E. J. Davies, M. I. Petaev and S. B. Jacobsen. Size distribution of chondrules set by droplet breakup and coupling during vaporizing collisions in the nebula. *Lunar & Planet. Sci. Conf.* 50, Abs. 1783, 2019.
40. Stewart, S. T., P. J. Carter, E. J. Davies, **S. J. Lock**, R. G. Kraus, S. Root, M. I. Petaev and S. B. Jacobsen. Impact vapor plume expansion and hydrodynamic collapse in the solar nebula. *Lunar & Planet. Sci. Conf.* 50, Abs. 1250, 2019.
39. **Lock, S. J.**, S. T. Stewart, M. I. Petaev and S. B. Jacobsen. A terrestrial synestia: A new environment for formation of the Moon. *Lunar & Planet. Sci. Conf.* 50, Abs. 1784, 2019.
38. Chidester, B. A., A. J. Campbell, **S. J. Lock** and S. T. Stewart. Constraining the conditions of the Moon-forming giant impact with metal-silicate partitioning of lithophile elements. *AGU Fall Meeting*, Abs. DI11B-0023, 2018.
37. **Lock, S. J.**, S. T. Stewart and M. Čuk. Earth after the Moon forming giant impact: Accounting for all the energy *Lunar & Planet. Sci. Conf.* 49, Abs. 1616, 2018.
36. Carter, P. J., **S. J. Lock** and S. T. Stewart. The energy budgets of giant impacts. *Lunar & Planet. Sci. Conf.* 49, Abs. 2713, 2018.
35. Stewart, S. T., **S. J. Lock** and R. Caracas. Raining a magma ocean: Thermodynamics of rocky planets after giant impacts. *Lunar & Planet. Sci. Conf.* 49, Abs. 1708, 2018.
34. **Lock, S. J.**, S. T. Stewart and S. Mukhopadhyay. The last stage of Earth's formation: Increasing the pressure. *AGU Fall Meeting*, Abs. P53F-07, 2017.
33. Stewart, S. T., **S. J. Lock** and R. Caracas. Raining a magma ocean: Thermodynamics of rocky planets after a giant impact. *AGU Fall Meeting*, Abs. MR34B-01, 2017.
32. Hollyday, G. O., S. T. Stewart, Z. M. Leinhardt, P. J. Carter and **S. J. Lock**. Lunar accretion after a high-energy, high-angular momentum giant impact. *ACCRETE International Interdisciplinary Workshop*, 2017.
31. **Lock, S. J.**, S. T. Stewart, M. I. Petaev, Z. M. Leinhardt, M. T. Mace, S. B. Jacobsen and M. Čuk. A new model for lunar origin: Equilibration with Earth beyond the corotation limit. *ACCRETE International Interdisciplinary Workshop*, 2017.
30. **Lock, S. J.**, S. T. Stewart and S. Mukhopadhyay. Preservation of primordial chemical signatures in Earth's mantle by pressure induced freezing after a giant impact. *Lunar & Planet. Sci. Conf.* 48, Abs. 2390, 2017.
29. Hollyday, G. O., S. T. Stewart, Z. M. Leinhardt, P. J. Carter and **S. J. Lock**. Lunar accretion after a high-energy, high-angular momentum giant impact. *Lunar & Planet. Sci. Conf.* 48, Abs. 2606, 2017.
28. **Lock, S. J.**, S. T. Stewart and S. Mukhopadhyay. Preservation of primordial mantle in the aftermath of a giant impact. *AGU Fall Meeting*, Abs. DI33A-01, 2016.
27. Stewart, S. T., **S. J. Lock**, M. I. Petaev, Z. M. Leinhardt, M. T. Mace, S. B. Jacobsen and M. Čuk. Accretion of the Moon after a high-energy, high-angular momentum giant impact. *AGU Fall Meeting*, Abs. V41D-01, 2016.
26. Bremner, P. M., H. Fuqua, A. Mallik, M. R. Diamond, **S. J. Lock**, S. Panovska, Y. Nishikawa, H. Jimenez-Perez, A. Shahar, W. R. Panero, P. H. Lognonne and U. Faul. Constraints on lunar

- structure from combined geochemical, mineralogical, and geophysical modeling. *AGU Fall Meeting*, Abs. DI34A-07, 2016.
25. **Lock, S. J.**, S. T. Stewart, M. I. Petaev, Z. M. Leinhardt, M. T. Mace, S. B. Jacobsen and M. Čuk. A new model for lunar origin: Equilibration with Earth beyond the hot spin stability limit. *Lunar & Planet. Sci. Conf.* 47, Abs. 2881, 2016.
 24. **Lock, S. J.** and S. T. Stewart. A hot spin stability limit for terrestrial planets. *Lunar & Planet. Sci. Conf.* 47, Abs. 2856, 2016.
 23. Huang, S., M. I. Petaev, W. Wang, **S. J. Lock**, Z. Wu, S. T. Stewart and S. B. Jacobsen. Lunar origin beyond the hot spin stability limit: Stable isotopic fractionation. *Lunar & Planet. Sci. Conf.* 47, Abs. 2261, 2016.
 22. Petaev, M. I., S. B. Jacobsen, S. Huang, **S. J. Lock** and S. T. Stewart. Testing models of the Moon's origin, III: Phase diagram of a proto-Lunar disk and condensation of trace elements. *Lunar & Planet. Sci. Conf.* 47, Abs. 2468, 2016.
 21. Stewart, S. T., **S. J. Lock**, M. I. Petaev, S. B. Jacobsen, G. Sarid, Z. M. Leinhardt, S. Mukhopadhyay and M. Humayun. Mercury impact origin hypothesis survives the volatile crisis: Implications for terrestrial planet formation. *Lunar & Planet. Sci. Conf.* 47, Abs. 2954, 2016.
 20. Čuk, M., D. Hamilton, **S. J. Lock** and S. T. Stewart. Tidal evolution of the Moon from a fast-spinning, high-obliquity Earth. *Lunar & Planet. Sci. Conf.* 47, Abs. 2489, 2016.
 19. Jacobsen, S. B., M. I. Petaev, B. Boatwright, **S. J. Lock** and S. T. Stewart. A new model for lunar origin: Elemental and isotopic constraints. *Lunar & Planet. Sci. Conf.* 47, Abs. 2489, 2016.
 18. **Lock, S. J.**, S. T. Stewart, M. I. Petaev, Z. M. Leinhardt, M. T. Mace, S. B. Jacobsen and M. Čuk. Condensing the Moon from a MAD Earth. *AGU Fall Meeting*, Abs. V23D-07, 2015.
 17. Stewart, S. T. and **S. J. Lock**. The thermal states of accreting planets: From Mars-like embryos to a MAD Earth. *AGU Fall Meeting*, Abs. MR21D-02, 2015.
 16. Mallik, A., H. Fuqua, P. M. Bremner, S. Panovska, M. R. Diamond, **S. J. Lock**, Y. Nishikawa, H. Jimenez-Perez, A. Shahar, W. R. Panero, P. H. Lognonne and U. Faul. Origin and constraints on ilmenite-rich partial melt in the lunar lower mantle. *AGU Fall Meeting*, Abs. DI43A-2610, 2015.
 15. Čuk, M., D. Hamilton, **S. J. Lock** and S. T. Stewart. Tidal evolution of the Moon from a high-obliquity, high-angular-momentum Earth. *AAS, DPS Meeting*, 47, Abs. 309.01, 2015.
 14. Stewart, S. T., **S. J. Lock**, Z. M. Leinhardt, M. Mace and M. Čuk. The role of vaporization in high angular momentum Moon-forming giant impacts. *APS Shock Compression of Condensed Matter Meeting*, Abs. O3.003, 2015.
 13. Stewart, S. T., **S. J. Lock** and S. Mukhopadhyay. How much of the mantle melts in a giant impact? *Lunar & Planet. Sci. Conf.* 46, Abs. 2263, 2015.
 12. **Lock, S. J.**, S. T. Stewart, Z. M. Leinhardt, M. T. Mace and M. Čuk. The post-impact state of the Moon-forming giant impact: Favorable aspects of high-angular momentum models. *Lunar & Planet. Sci. Conf.* 46, Abs. 2193, 2015.
 11. **Lock, S. J.**, S. T. Stewart, Z. M. Leinhardt, M. T. Mace and M. Čuk. The Earth-lunar disk connection: Favorable aspects of a high-angular momentum giant impact. *AGU Fall Meeting*, Abs. P51A-3900, 2014.
 10. Mukhopadhyay, S., S. T. Stewart, **S. J. Lock**, R. Parai and J. M. Tucker. Late impacts and the origins of the atmospheres on the terrestrial planets. *AGU Fall Meeting*, Abs. DI53C-03, 2014.

9. Fuqua, H., P. M. Bremner, M. R. Diamond, G. Garapic, **S. J. Lock**, A. Mallik, Y. Nishikawa, S. Panovska, A. Shahar, P. H. Lognonne, W. R. Panero, U. Faul, M. P. Panning, H. Jimenez-Perez, N. C. Schmerr and Q. C. Williams. Consequences and resolution of lunar lower mantle partial melt. *AGU Fall Meeting*, Abs. P13D-3860, 2014.
8. Stewart, S. T., **S. J. Lock** and S. Mukhopadhyay. Partial atmospheric loss and partial mantle melting during the giant impact stage of planet formation. *AGU Fall Meeting*, Abs. P44A-06, 2014.
7. **Lock, S. J.**, S. T. Stewart and S. Mukhopadhyay. Was the atmosphere lost during the Moon-forming event? *ACCRETE International Interdisciplinary Workshop*, 2014.
6. Jacobson, S. A., A. Morbidelli, D. C. Rubie, D. P. O'Brien, S. N. Raymond, S. T. Stewart and **S. J. Lock**. Planet formation within the grand tack model. *Lunar & Planet. Sci. Conf.* 45, Abs. 2274, 2014.
5. **Lock, S. J.**, S. T. Stewart and S. Mukhopadhyay. Was the atmosphere lost during the Moon-forming giant impact? *Lunar & Planet. Sci. Conf.* 45, Abs. 2843, 2014.
4. Stewart, S. T., **S. J. Lock** and S. Mukhopadhyay. Atmospheric loss and volatile fractionation during giant impacts. *Lunar & Planet. Sci. Conf.* 45, Abs. 2869, 2014.
3. Mukhopadhyay, S., S. T. Stewart, **S. J. Lock**, R. Parai, M. K. Peto and J. M. Tucker. Sculpting the volatile content of the Earth through giant impact-induced atmospheric loss and magma oceans. *AGU Fall Meeting*, Abs. V24B-07, 2013.
2. **Lock, S. J.**, S. T. Stewart, S. Mukhopadhyay and J. M. Tucker. Constraints on the Earth's impact history from the requirement for atmospheric loss. *The Royal Society satellite meeting: Origin of the moon - Challenges and prospects*, 2013.
1. **Lock, S. J.** and S. T. Stewart. Atmospheric loss during high angular momentum giant impacts *Lunar & Planet. Sci. Conf.* 44, Abs. 2608, 2013.