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Education

- 2017 - 2023 Ph.D Graduate Student, Dual-title Earth and Space Science and Astrobiology, University of Washington, Seattle, WA.
- 2012 - 2016 B.S., Physics major, University of Oregon Honors College.

Professional Experience

- 2023 - present Postdoc in the NASA Postdoctoral Program, NASA Ames Research Center, California, CA.
- 2017 - 2023 Research Assistant, Planetary Science and Astrobiology, University of Washington, Seattle, WA. Advisor: David Catling.
- 2016 - 2017 Research Assistant, Geophysics, University of Oregon, Eugene, OR. Supervisor: Eugene Humphreys.
- 2014 - 2015 Undergraduate Research Assistant, Geophysics, University of Oregon, Eugene, OR. Supervisor: Dean Livelybrooks.
- 2014 Undergraduate Teaching Assistant, Introductory Physics, University of Oregon, Eugene, OR. Supervisor: Ben McMorran.

Awards and Honors

- 2023 The David A. Johnston Award for Research Excellence, Earth and Space Science Department, University of Washington.
- 2023 NASA Postdoctoral Program fellowship recipient
- 2023 Award for best graphic in presentation, Earth and Space Science Gala, University of Washington.
- 2017 Top Scholar Award, Earth and Space Science Department, University of Washington.
- 2016 Undergraduate Research Award, Physics department, University of Oregon.
- 2016 Undergraduate Honors Thesis: Passed with Distinction, University of Oregon Honors college.
- 2012 Presidential Scholarship Recipient, University of Oregon.

Teaching Experience

- 2019 Teaching Assistant: Intro. Astrobiology (ASTBIO 115; Winter), University of Washington.
- 2018 Teaching Assistant: Intro. Geology (ESS 101; Winter), University of Washington.
- 2014 Undergraduate Teaching Assistant: Intro. Physics (PHYS 251), University of Oregon.

Recent Outreach

- 2022 Astronomy on Tap presentation at Bickerson Brewhouse, Seattle, WA.
- 2022 “Rockin’ Out” volunteer. Rockin’ Out is a K-12 volunteer-based outreach program at the Department of Earth and Space Sciences at the University of Washington.
- 2021 - 2022 Mentoring Maanit Goel, a high school student in Seattle, WA.

Peer-Reviewed Publications

Submitted or under review

- 2024 **Nicholas Wogan**, David Catling, and Kevin Zahnle (2024). Timing and likelihood of the origin of life derived from post-impact highly reducing atmospheres. Under review, *Astrobiology*.

Published

- 2024 Ella Sciamma-O’Brien, Thomas Drant, and **Nicholas Wogan** (2024). In an exoplanet atmosphere far, far away. *Nature News & Views*. DOI:10.1038/s41570-024-00586-2.
- 2024 **Nicholas Wogan**, Natasha Batalha, Kevin Zahnle, Joshua Krissansen-Totton, Shang-Min Tsai, and Renyu Hu (2024). JWST observations of K2-18b can be explained by a gas-rich mini-Neptune with no habitable surface. *Astrophysical Journal Letters*. DOI:10.3847/2041-8213/ad2616.
- 2024 Zoe Todd, **Nicholas Wogan**, and David Catling (2024). Environmental influences on the formation of ferrocyanide and implications for prebiotic chemistry. *ACS Earth and Space Chemistry*. DOI:10.1021/acsearthspacechem.3c00213.
- 2023 **Nicholas Wogan**, David Catling, Kevin Zahnle, and Roxana Lupu (2023). Origin of life molecules in the atmosphere after big impacts on the early Earth. *Planetary Science Journal*. DOI:10.3847/PSJ/aced83.
- 2023 Zachary Cohen, Zoe Todd, **Nicholas Wogan**, Roy Black, Sarah Keller, and David Catling (2023). Plausible sources of membrane-forming fatty acids on the early Earth: a review of the literature and an estimation of amounts. *ACS Earth and Space Chemistry*. DOI:10.1021/acsearthspacechem.2c00168.
- 2022 **Nicholas Wogan**, David Catling, Kevin Zahnle, and Mark Claire (2022). Rapid timescale for an oxic transition during the Great Oxidation Event and the instability of low atmospheric O₂. *Proceedings of the National Academy of Sciences*. DOI:10.1073/pnas.2205618119.
- 2022 Maggie Thompson, Joshua Krissansen-Totton, **Nicholas Wogan**, Myriam Telus, and Jonathan Fortney (2022). The case and context for atmospheric methane as an exoplanet biosignature. *Proceedings of the National Academy of Sciences*. DOI:10.1073/pnas.2117933119.
- 2021 Joshua Krissansen-Totton, Max Galloway, **Nicholas Wogan**, Jasmeet Dhaliwal, and Jonathan Fortney (2021). Waterworlds probably do not experience magmatic outgassing. *The Astrophysical Journal*. DOI:10.3847/1538-4357/abf560.
- 2021 Joshua Krissansen-Totton, Jonathan Fortney, Francis Nimmo, and **Nicholas Wogan**. Oxygen false positives on habitable zone planets around Sun-like stars. *AGU Advances*. DOI:10.1029/2020AV000294.

- 2020 **Nicholas Wogan**, Joshua Krissansen-Totton and David Catling. Abundant atmospheric methane from volcanism on terrestrial planets is unlikely and strengthens the case for methane as a biosignature. *Planetary Science Journal*. DOI:10.3847/PSJ/abb99e.
- 2020 Kevin Zahnle, Roxana Lupu, David Catling, and **Nicholas Wogan**. Creation and evolution of impact-generated reduced atmospheres of early Earth. *Planetary Science Journal*. DOI: 10.3847/PSJ/ab7e2c.
- 2020 **Nicholas Wogan** and David Catling. When is chemical disequilibrium in Earth-like planetary atmospheres a biosignature versus an anti-biosignature? Disequilibria from dead to living worlds. *Astrophysical Journal*. DOI:10.3847/1538-4357/ab7b81.

Selected Conference Presentations

Invited

- 2024 **Nicholas Wogan**. Assessing exoplanet habitability with JWST and the Habitable Worlds Observatory: from the sub-Neptune K2-18b to rocky Earth-like planets. Planetary lunch, University of California Santa Cruz.
- 2024 **Nicholas Wogan**. The photochemistry of hydrogen-rich atmospheres: From the origin of life on Earth to biosignatures on the K2-18b exoplanet. Institute for Geophysics and Planetary Physics seminar, University of California Santa Cruz.
- 2022 **Nicholas Wogan**, David Catling, Kevin Zahnle, and Mark Claire. Rapid timescale for an oxic transition during the Great Oxidation Event and the instability of low atmospheric O₂. NASA Goddard Exoplanets Seminar.
- 2020 **Nicholas Wogan** and David Catling. Atmospheric synthesis of prebiotic molecules on the Hadean Earth. Prebiotic Chemistry and Early Earth Environments Consortium (PCE3), remote conference.

Contributed

- 2023 **Nicholas Wogan**, David Catling, Kevin Zahnle, and Roxana Lupu. Origin of life molecules in the atmosphere after big impacts on the early Earth. American Geophysical Union Fall Meeting, San Francisco, CA.
- 2023 **Nicholas Wogan**, Shawn Domagal-Goldman, Chris Stark, Aki Roberge, Giada Arney, Tyler Robinson. Detecting exo-Earths with the Habitable Worlds Observatory. Habitable Worlds Observatory Conference, Baltimore, MD.
- 2023 **Nicholas Wogan**, David Catling, Kevin Zahnle, and Mark Claire. Rapid timescale for an oxic transition during the Great Oxidation Event and the instability of low atmospheric O₂. Green Bank Astrobiology Conference, Green Bank, WV.
- 2022 **Nicholas Wogan**, David Catling and Kevin Zahnle. Atmospheric nitriles for the origin of life from the atmosphere after large asteroid impacts on the Hadean Earth. Latsis Conference, Zurich, Switzerland.
- 2022 **Nicholas Wogan**, David Catling and Kevin Zahnle. Origin of life chemistry in the atmosphere after large impacts on the early Earth. Astrobiology Science Conference, Atlanta, GA.
- 2021 **Nicholas Wogan**, David Catling and Kevin Zahnle. Molecules for the origin of life from impact-generated atmospheres on early Earth. Simons Foundation Collaboration on the Origin of Life Annual meeting, remote conference.

- 2021 **Nicholas Wogan**, David Catling and Kevin Zahnle. Molecules for the origin of life from impact-generated atmospheres on early Earth. Goldschmidt, remote conference.
- 2019 **Nicholas Wogan** and David Catling. When is chemical disequilibrium in Earth-like planetary atmospheres a biosignature versus an anti-biosignature? Investigating disequilibria from prebiotic to post-biotic worlds. American Geophysical Union Fall Meeting, San Francisco, CA.

Open Source Software

- photochem: <https://github.com/Nicholaswogan/photochem>. A one-dimensional photochemical-climate model.
- clima: <https://github.com/Nicholaswogan/clima>. A one-dimensional radiative transfer code and suite of climate models.
- numbalsoda: <https://github.com/Nicholaswogan/numbalsoda>. A high-performance ordinary differential equation solver for Python.
- NumbaMinpack: <https://github.com/Nicholaswogan/NumbaMinpack>. High-performance non-linear root solving for Python.
- fortran-yaml-c: <https://github.com/Nicholaswogan/fortran-yaml-c>. A YAML parser and emitter for Fortran.