Nicholas Wogan
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Education

2017-Present **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

2017-Present **Research Assistant**, Planetary Science and Astrobiology, University of Washington, Seattle, WA. Advisor: David Catling.

- Research topics include the origin of life, the evolution of the Early Earth atmosphere, and interpretation of exoplanet biosignatures.

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 NASA Postdoctoral Program fellowship recipient

2023 Award for best graphic in presentation, Earth and Space Science Gala, University of Washington

2017 Department of Earth and Space Sciences Top Scholar Award, University of Washington

2016 Undergraduate Research Award, University of Oregon Physics department

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 (UW).

2021-2022 Mentoring Maanit Goel, a high school student in Seattle, WA.

Peer-Reviewed Publications

In-Prep

2023 Zoe Todd, **Nicholas Wogan**, David Catling (2023). Environmental influences on the formation of ferrocyanide and implications for prebiotic chemistry. *In-prep.*

2023 **Nicholas Wogan**, David Catling, Kevin Zahnle (2023). Earth's impact history and the timing of the origin of life. *In-prep.*

Submitted

2023 **Nicholas Wogan**, David Catling, Kevin Zahnle, Roxana Lupu (2023). Origin of Life Molecules in the Atmosphere After Big Impacts on the Early Earth. *Submitted, Planetary Science Journal.*

In-Review

2023 Amber Young, Tyler Robinson, Joshua Krissansen-Totton, Edward Schwieterman, **Nicholas Wogan**, Michael Way, Linda Sohl, Giada Arney, Christopher Reinhard, Michael Line, David Catling, James Windsor (2023). On Inferred Chemical Disequilibrium Biosignatures for Proterozoic Earth-Like Exoplanets. *In-review, Nature Astronomy*.

Published

2023 Zachary Cohen, Zoe Todd, **Nicholas Wogan**, Roy Black, Sarah Keller, 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 O_2. *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. *The Astrophysical 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. *The 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. *The Astrophysical Journal*. DOI:10.3847/1538-4357/ab7b81.

Selected Conference Presentations

Invited

2022 **Nicholas Wogan**, David Catling, Kevin Zahnle, Mark Claire. Rapid timescale for an oxic transition during the Great Oxidation Event and the instability of low atmospheric O_2. 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

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 2021, 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.