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Date generated: May 21, 2023

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.
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

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). Timing and Likelihood of the origin of life derived from post-impact highly reducing atmospheres. 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*.

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, and 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

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 O_2. Greenbank Astrobiology conference.

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.