

**Nicholas Wogan**  
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University of Washington, Seattle, WA  
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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](https://doi.org/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<sub>2</sub>. *Proceedings of the National Academy of Sciences*. [DOI:10.1073/pnas.2205618119](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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<sub>2</sub>. 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.