

# Nathanael Wong

[n.wong@nyu.edu](mailto:n.wong@nyu.edu)

Courant Institute of Mathematical Sciences, New York University  
251 Mercer St Room 920, New York, NY 10012

**Research Interests: Tropical Meteorology and Dynamics, Climate Modelling, Maritime Continent**

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## Education

- 2019 – 2025      **Harvard University, USA**  
PhD. Earth and Planetary Sciences  
**Advisor:** Professor Kuang Zhiming  
*EPS Merit Award 2019*
- 2015 -- 2019      **Nanyang Technological University, Singapore**  
BSc. Environmental Earth Systems Science, cGPA 4.74  
w. Second Major in Physics, Minor in Mathematics  
*CN Yang Scholars Program*  
*Nanyang Scholarship*

## Work Experience

- 2025 -- Present      **New York University, USA**  
Postdoctoral Research Associate
- 2020 -- 2025      **Harvard University, USA**  
Research Assistant, Teaching Fellow (see below for more details)
- 2024 -- Present      **UN Trade and Development (UNCTAD)**  
Consultant
- 2018                  **California Institute of Technology, California**  
Visiting Student Researcher  
**Advisor:** Professor Tapio Schneider  
*Visiting Undergraduate Research Program*

## Publications

- Wong, N. Z.** & Kuang, Z. (2023, 12). The Effect of Different Implementations of the Weak Temperature Gradient Approximation in Cloud Resolving Models. *Geophysical Research Letters*, 50 (24). doi: 10.1029/2023GL104350
- Sieh, K., Angel, D. S., Herrin, J., Jicha B., Singer, B., Sihavong, V., Wiwegwin, W., **Wong, N. Z.**, & Quah J. Y. (2023, 12), Proximal ejecta of the Bolaven extraterrestrial impact, southern Laos. *PNAS*, 120 (50). doi: 10.1073/pnas.2310351120

Chen, S., **Wong, N. Z.**, Ma, D., Chan, P. W., & Kuang, Z. (2021, 9). Dependence of Precipitation on Precipitable Water Vapor Over the Maritime Continent and Implications to the Madden-Julian Oscillation. *Geophysical Research Letters*, 48 (17). doi: 10.1029/2021GL094648

**Wong, N. Z.**, Feng, L., & Hill, E. M. (2019, 12). GPS-based slip models of one Mw 7.2 and twenty moderate earthquakes along the Sumatran plate boundary. *Geoscience Letters*, 6(1), 8. doi: 10.1186/s40562-019-0138-y

***Submitted (draft copies may be requested)***

**Wong, N. Z.**, Lamraoui F., Vesga-Güiza, A. M, Sanchez-Murillo, R., Duran-Quesada, A., Kuang, Z.; Revisiting the Inherent Assumptions made when Heavy Water Isotopologues are used to Investigate Convective Heating Profiles; Submitted to the *Journal of Geophysical Research: Atmospheres*.

**Wong, N. Z.**; The GeoRegions Ecosystem: A Simple Julia Ecosystem for Gridded and other Spatial Data in Earth Observation; Submitted to *The Journal of Open Source Software*.

***In Preparation (draft copies may be requested)***

**Wong, N. Z.**, Back, L., Kuang, Z.; Convectively-Coupled Waves in the WTG Framework and their Implications on Convective Organization; In preparation for *Journal of Advances in Modeling Earth Systems*.

**Wong, N. Z.**, Feng, L., & Hill, E. M.; Surface temperature  $T_s$  is not a good approximation for water-vapour-weighted mean temperature  $T_m$ ; In preparation for *Geophysical Research Letters*.

***Talks, Conferences and Workshop Proceedings / Abstracts***

JuliaEO, Global Workshop on Earth Observation with Julia 2025, Terceira, Jan 7-11, 2025  
(*invited*) Updates to the GeoRegions.jl Package, and Future Plans for the GeoRegions Ecosystem  
Authors: **Wong, N. Z.**

American Geophysical Union Annual Meeting, Washington DC, Dec 9-13, 2024  
PP43D: “Modelling the Islands of Southeast Asia in Idealized Frameworks”  
Authors: **Wong, N. Z.**

American Geophysical Union Annual Meeting, Washington DC, Dec 9-13, 2024  
A24B-07: “The Weak Temperature Gradient in Cloud Resolving Models, and possible links to Convectively Coupled Waves”  
Authors: **Wong, N. Z.**, Kuang, Z.

Intermediate-Level Workshop on Earth Observation with Julia, Nov 20, 2024  
(*invited*) The GeoRegions Ecosystem: Use cases for NASAPrecipitation.jl and ERA5Reanalysis.jl  
(*invited*) Project work in Julia using DrWatson.jl and Pluto.jl  
Authors: **Wong, N. Z.**

UNCTAD Workshop on Harnessing space technological applications in sustainable urban development, Pretoria, South Africa, Aug 6-8, 2024

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CV (caa 27 August 2025)

*(invited)* Julia Packages for Earth Observation and Analysis  
*(invited)* GeoRegions.jl and NASAPrecipitation.jl  
Authors: **Wong, N. Z.**

4<sup>th</sup> Workshop on Convective Organization and Precipitation Extremes, Trieste, Italy, Jul 9-12, 2024  
Revisiting the Weak Temperature Gradient Approximation in Cloud-Resolving Models  
Authors: **Wong, N. Z.**, Kuang, Z.

Center for Climate Research Singapore Seminar Series, Singapore, Jun 14, 2024  
*(invited)* “Investigating Vertical Profiles of Convective Heating in both Observations and Model Simulations”  
Authors: **Wong, N. Z.**, Lamraoui F., Vesga-Güiza, A. M, Sanchez-Murillo, R., Duran-Quesada, A., Vargas, N. O., Kuang, Z.

UNCTAD Workshop on Harnessing space technological applications in sustainable urban development, Rio de Janeiro, Brazil, Apr 3-5, 2024  
*(invited)* Navigating Julia’s Package Ecosystem  
*(invited)* Creating Julia Packages for Earth Observation  
Authors: **Wong, N. Z.**

JuliaEO, Global Workshop on Earth Observation with Julia 2024, Terceira, Jan 8-12, 2024  
*(invited)* Introduction to Julia: Creating Packages for Earth Observational Work  
Authors: **Wong, N. Z.**

American Geophysical Union Annual Meeting, San Francisco, Dec 11-15, 2023  
A24L-02: “Linking Isotopic Depletion of Precipitation to the Vertical Profiles of Convective Heating in the East Pacific using both Station Observations and Convective-Permitting Simulations”  
Authors: **Wong, N. Z.**, Lamraoui F., Vesga-Güiza, A. M, Sanchez-Murillo, R., Duran-Quesada, A., Vargas, N. O., Kuang, Z.

Center for Climate Research Singapore Seminar Series, Singapore, Aug 16, 2023  
*(invited)* “Bridging the Gap between the theory of the Weak Temperature Gradient and its potential applications to modelling the islands of Southeast Asia”  
Authors: **Wong, N. Z.**, Kuang, Z.

Asia-Oceania Geosciences Society Annual Meeting, Singapore, Jul 30-Aug 4, 2023  
AS32-A021: “Bridging the Gap Between Implementing and Understanding the Weak Temperature Gradient Approximation in Cloud Resolving Models.”  
Authors: **Wong, N. Z.**, Kuang, Z.

Asia-Oceania Geosciences Society Annual Meeting, Singapore, Jul 30-Aug 4, 2023  
AS34-A021: “Modelling the Climatology of Tropical Islands of Different Sizes Using the Weak Temperature Gradient Approximation.”  
Authors: **Wong, N. Z.**, Kuang, Z.

10<sup>th</sup> Northeast Tropical Workshop, Albany NY, Jun 5-7, 2023  
Convection and Tropical Dynamics: “Bridging the Gap Between Implementing and Understanding the Weak Temperature Gradient Approximation in Cloud Resolving Models.”  
Authors: **Wong, N. Z.**, Kuang, Z.

JuliaEO, Global Workshop on Earth Observation with Julia 2023, Terceira, Jan 9-13, 2023  
*(invited)* Hands-on session 1.2: Retrieving satellite and reanalysis data from EO servers

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Authors: **Wong, N. Z.** and Barth, A.

American Geophysical Union Annual Meeting, Chicago, Dec 12-16, 2022  
A26A-06: “An Analysis of WTG Schemes in 3D-Cloud Resolving Models”  
Authors: **Wong, N. Z.**, Kuang, Z.

Kerry Emanuel Symposium, Cambridge, MA, Jun 21-22, 2022  
The inherent instability of the Weak Temperature Gradient Approximation  
Authors: **Wong, N. Z.**, Kuang, Z.

American Geophysical Union Annual Meeting, San Francisco, Dec 9-13, 2019  
A11U-2849: “Converting GNSS Zenith Wet Delays to Precipitable Water: Investigating the Mean and Variability of the Water-Vapor-Weighted Mean Temperature ( $T_m$ ) using Reanalysis Data.”  
Authors: **Wong, N. Z.**, Feng, L. and Hill, E. M.

Asia-Oceania Geosciences Society Annual Meeting, Singapore, Jul 29-Aug 2, 2019  
AS28-A021: “Using GPS-derived Precipitable Water to Monitor Meteorological Events in Singapore.”  
Authors: **Wong, N. Z.**, Feng, L. and Hill, E. M.

American Geophysical Union Annual Meeting, Washington DC, Dec 10-14, 2018  
A43O-3339: “Investigating the characteristics and dynamics of rainfall in Singapore using a GPS-derived proxy to precipitable water.”  
Authors: **Wong, N. Z.**, Feng, L. and Hill, E. M.

American Geophysical Union Annual Meeting, New Orleans, LA, Dec 11-15, 2017  
G43A-0918: “A catalog of coseismic uniform-slip models of geodetically unstudied earthquakes along the Sumatran plate boundary.”  
Authors: **Wong, N. Z.**, Feng, L. and Hill, E. M.

## Teaching Experience

2024 Fall & 2023 Fall	<b>GENED 1094: Confronting Climate Change: A Foundation in Science, Technology and Policy</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Preparation for 2 sections with students</li><li>• Leading/steering of class discussions during sections</li><li>• Grading of homeworks, and projects</li></ul>
2023 Spring	<b>APMTH 115: Mathematical Modelling</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Preparation for section with students</li><li>• Grading of homeworks, and projects</li></ul>
2022 Fall	<b>E-PSCI 50: The Fluid Earth: Oceans, Atmosphere, Climate, and Environment</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Preparation for section with students</li><li>• Creation and preparation of homeworks and projects</li><li>• Grading of homeworks</li></ul>

2022 Spring	<b>Sci 5 An Introduction to Computation for Contemporary Science</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Preparation for section with students</li><li>• Creation and preparation of homeworks and projects</li><li>• Grading of homeworks</li></ul>
2021 Fall & 2020 Fall	<b>EPS 208 Physics of Climate</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Preparation for section with students</li><li>• Grading</li></ul>
2018 Spring	<b>ES0001 Physical Environments of Singapore</b> <i>Official Teaching Assistant</i> <ul style="list-style-type: none"><li>• Prepared for lab sessions</li><li>• Guided groups of students on field trips</li><li>• Facilitated submission of quality fieldwork notebooks</li></ul>

## Scholarships and Awards

2024	NUS Development Grant, Young NUS Fellow
2024	Harvard Griffin GSAS Professional Development Fund
2022	NUS Development Grant, Young NUS Fellow
2019	EPS Merit Award
2015 -- 2019	CN Yang Scholars Program
2015 -- 2019	Nanyang Scholarship

## Technical Skills

**Programming:** Julia, Python, MATLAB, GMT (Generic Mapping Tool), R

**Functional:** LaTeX, Microsoft Office

**Languages:** English (Native), Chinese (Basic)

**Climate Models:** Isca, System of Atmospheric Modelling (SAM), Community Earth System Model (CESM)