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Appointments

Assistant Research Scientist, UCLA, Los Angeles, CA

since Aug 2022

Postdoctoral Research Fellow, Jet Propulsion Laboratory, Pasadena, CA

2019-22

Education

Ph.D., Ocean and Climate Physics, Columbia University, New York, NY

2019

Dissertation title: "Regional Geographies of Extreme Heat"

B.S., Atmospheric Science, Cornell University, Ithaca, NY

2014

Magna cum laude with Distinction in Research

Publications

PEER-REVIEWED JOURNAL ARTICLES

23. **Raymond, C.**, Shreevastava, A., Slinskey, E., and Waliser, D. (2024). "Linkages between atmospheric rivers and humid heat across the United States." *Natural Hazards and Earth System Sciences*. doi:10.5194/nhess-24-791-2024.
22. Tuholske, C., Lynch, V., Spriggs, R., Ahn, Y., **Raymond, C.**, Nigra, A., and Parks, R. (2024). "Hazardous heat exposure among incarcerated people in the United States." *Nature Sustainability*. doi:10.1038/s41893-024-01293-y.
21. Bustamante, M., ... **Raymond, C.**, et al. (2023). "Ten new insights in climate science 2023/2024." *Global Sustainability*. doi:10.1017/sus.2023.25.
20. You, J., Wang, S., Zhang, B., **Raymond, C.**, and Matthews, T. (2023). "Growing threats from swings between hot and wet extremes in a warmer world." *Geophysical Research Letters*. doi:10.1029/2023gl1104075.
19. Shreevastava, A., **Raymond, C.**, and Hulley, G. (2023). "Contrasting intra-urban signatures of humid and dry heatwaves over Southern California." *Journal of Applied Meteorology and Climatology*. doi:10.1175/jamc-d-22-0149.1.
18. **Raymond, C.**, Suarez-Gutierrez, L., Kornhuber, K., Pascolini-Campbell, M., Sillmann, J., and Waliser, D. (2022). "Increasing spatiotemporal proximity of heat and precipitation extremes in a warming world quantified by a large model ensemble." *Environmental Research Letters*. doi:10.1088/1748-9326/ac5712.
17. **Raymond, C.**, Waliser, D., Guan, B., Lee, H., Loikith, P., Massoud, E., Sengupta, A., Singh, D., and Wootten, A. (2022). "Regional and elevational patterns of extreme heat stress change in the US." *Environmental Research Letters*. doi:10.1088/1748-9326/ac7343.
16. Ivanovich, C., Anderson, W., Horton, R., **Raymond, C.**, and Sobel, A. (2022). "The influence of intraseasonal oscillations on humid heat in the Persian Gulf and South Asia." *Journal of Climate*. doi:10.1175/jcli-d-21-0488.1.

15. Matthews, T., Byrne, M., Horton, R., Murphy, C., Pielke Sr., R., **Raymond, C.**, Thorne, P., and Wilby, R. (2022). “Latent heat must be visible in climate communications.” *WIREs Climate Change*. doi:10.1002/wcc.779.
14. Mehrabi, Z., ... **Raymond, C.**, et al. (2022). “Research priorities for global food security under extreme events.” *One Earth*. doi:10.1016/j.oneear.2022.06.008.
13. Sengupta, A., Waliser, D., Massoud, E., Guan, B., **Raymond, C.**, and Lee, H. (2022). “Representation of atmospheric water budget and uncertainty quantification of future changes in CMIP6 for the seven U.S. National Climate Assessment regions.” *Journal of Climate*. doi:10.1175/jcli-d-22-0114.1.
12. Speizer, S., **Raymond, C.**, Ivanovich, C., and Horton, R. (2022). “Concentrated and intensifying humid heat extremes in the IPCC AR6 regions.” *Geophysical Research Letters*. doi:10.1029/2021gl097261.
11. **Raymond, C.**, Matthews, T., Horton, R., Fischer, E., Fueglistaler, S., Ivanovich, C., Suarez-Gutierrez, L., and Zhang, Y. (2021). “On the controlling factors for globally extreme humid heat.” *Geophysical Research Letters*. doi:10.1029/2021gl096082.
10. Mukherjee, S., Mishra, A., Mann, M., and **Raymond, C.** (2021). “Anthropogenic warming and population growth may double US heat stress by the late 21st century.” *Earth’s Future*. doi:10.1029/2020ef001886.
9. Rogers, C., Ting, M., Li, C., Kornhuber, K., Coffel, E., Horton, R., **Raymond, C.**, and Singh, D. (2021). “Recent increases in exposure to extreme humid-heat events disproportionately affect populated regions.” *Geophysical Research Letters*. doi:10.1029/2021gl094183.
8. Teitelbaum, C., Sirén, A., Coffel, E., Foster, J., Frair, J., Hinton, J., Horton, R., Kramer, D., Lesk, C., **Raymond, C.**, Wattles, D., Zeller, K., and Morelli, T. (2021). “Habitat use as indicator of adaptive capacity to climate change.” *Diversity and Distributions*. doi:10.1111/ddi.13223.
7. **Raymond, C.**, Matthews, T., and Horton, R. (2020). “The emergence of heat and humidity too severe for human tolerance.” *Science Advances*. doi:10.1126/sciadv.aaw1838.
[as of July 2022, ranked as the #5 climate paper of 2020 by AltMetric score]
6. **Raymond, C.**, Horton, R., Zscheischler, J., Martius, O., AghaKouchak, A., Balch, J., Bowen, S., Camargo, S., Hess, J., Kornhuber, K., Oppenheimer, M., Ruane, A., Wahl, T., and White, K. (2020). “Understanding and managing connected extreme events.” *Nature Climate Change*. doi:10.1038/s41558-020-0790-4.
5. Massoud, E., Massoud, T., Guan, B., Sengupta, A., Espinoza, V., De Luna, M., **Raymond, C.**, and Waliser, D. (2020). “Atmospheric rivers and precipitation in the Middle East and North Africa.” *Water*. doi:10.3390/w12102863.
4. Zscheischler, J., Martius, O., Westra, S., Bevacqua, E., **Raymond, C.**, Horton, R., van den Hurk, B., AghaKouchak, A., Jézéquel, A., Mahecha, M., Maraun, D., Ramos, A., Ridder, N., Thiery, W., and Vignotto, E. (2020). “A typology of compound weather and climate events.” *Nature Reviews Earth and Environment*. doi:10.1038/s43017-020-0060-z.
3. **Raymond, C.**, and Mankin, J. (2019). “Assessing present and future coastal moderation of extreme heat in the eastern United States.” *Environmental Research Letters*. doi:10.1088/1748-9326/ab495d.
2. **Raymond, C.**, Singh, D., and Horton, R. (2017). “Spatiotemporal patterns and synoptics of extreme wet-bulb temperature in the contiguous United States.” *Journal of Geophysical Research: Atmospheres*. doi:10.1002/2017jd027140.

1. Horton, R., Mankin, J., Lesk, C., Coffel, E., and **Raymond, C.** (2016). "A review of recent advances in research on extreme heat events." *Current Climate Change Reports*. doi:10.1007/s40641-016-0042-x.

JOURNAL ARTICLES ACCEPTED, IN REVISION, or SUBMITTED

- Raymond, C.**, Matthews, T., and Tuholske, C. "Post-sunset humid-heat maxima near the Southern Persian/Arabian Gulf." *Submitted*.
- Raymond, C.**, Suarez-Gutierrez, L., Ming, Y., Teixeira, J., and Ting, M. "Substantial discrepancies in historical tropospheric humidity trends." *Submitted*.
- Ivanovich, C., **Raymond, C.**, Sobel, A., and Horton, R. "Stickiness: A new variable to characterize the temperature and humidity contributions toward humid heat." *Accepted*.
- Jing, R., Heft-Neal, S., Kong, Q., **Raymond, C.**, Tuholske, C., Zimmer, A., and Bendavid, E. "Age and sex breakdown of observed recent extreme-heat exposure increases." *Submitted*.
- Madrazo, M., Lee, H., Khodayari, A., Wang, W., Park, T., **Raymond, C.**, Waliser, D., Brosnan, I., and Lee, T. "The impact of climate change on fire danger over the contiguous United States." *Submitted*.
- Matthews, T., Horton, R., **Raymond, C.**, Baldwin, J., Foster, J., Ivanovich, C., and Kong, Q. "Earth's most extreme events and their lethality under climate warming." *Submitted*.
- Mishra, V., Huber, M., Kong, Q., Kumar, R., Parsons, L., **Raymond, C.**, and Tumbe, C. "Climate change will enhance risk of extreme dry and humid heat stress in urban migration hotspots of India." *Submitted*.
- Willett, K., Horton, R., Lo, E., **Raymond, C.**, and Rogers, C. "Humid heat extremes in 2023." *Submitted*.
- Wilson, A., Bressler, R., Ivanovich, C., **Raymond, C.**, Cavazos, T., Sobel, A., Tuholske, C., Horton, R., and Shrader, J. "It's the heat and the humidity: Accounting for humid heat exposure increases projected deaths from climate change, especially among children." *Submitted*.
- Wooten, A., Waliser, D., Lee, H., Massoud, E., and **Raymond, C.** "Which projections do I use? The challenges of selecting a climate model ensemble subset based on stakeholder needs." *Submitted*.

BOOK CHAPTERS and CONFERENCE PROCEEDINGS

- Sengupta, A., Singh, B., DeFlorio, M., **Raymond, C.**, Robertson, A., Zeng, X., Waliser, D., and Jones, J. (2022). "Advances in sub-seasonal to seasonal prediction relevant to water management in the Western United States." *Bulletin of the American Meteorological Society*. doi:10.1175/bams-d-22-0146.1.
- Messori, G., Bevacqua, E., Caballero, R., Coumou, D., De Luca, P., Faranda, D., Kornhuber, K., Martius, O., Pons, F., **Raymond, C.**, Ye, K., Yiou, P., and Zscheischler, J. (2021). "Compound climate events and extremes in the mid-latitudes: Dynamics, simulation and statistical characterisation." *Bulletin of the American Meteorological Society*. doi:10.1175/bams-d-20-0289.1.
- Raymond, C.**, Coumou, D., Foreman, T., King, A., Kornhuber, K., Lesk, C., Mora, C., Perkins-Kirkpatrick, S., Russo, S., and Vijverberg, S. (2019). "Projections and hazards of future extreme heat." In *The Oxford Handbook of Planning for Climate Change Hazards* [W.

Pfeffer, J. Smith, and K. Ebi, Eds.]. Oxford University Press.
doi:10.1093/oxfordhb/9780190455811.013.59.

Raymond, C., Matthews, T., and Horton, R. (2019). "Exceptional heat-humidity combinations increasing faster than expected." Abstract of presentation at the American Meteorological Society Annual Meeting 2019, Phoenix, AZ. *Bulletin of the American Meteorological Society*, 100 (3), 397-398.

Fellowships and Awards

ROSES 22-LCLUC22-0023 (\$270,000 of total \$660,000), NASA [Science PI] 2023-26
 • "Modulation of climate risks by intensification of urban and agricultural land uses in the Arabian Peninsula"
 • Primary grant author (written as postdoc)
ROSES 22-ECOSTRESS22-x (\$219,000 of total \$290,000), NASA [Science PI] 2023-26
 • "Fire-driven changes in landscape water use: A diurnal, multi-ecoregion perspective"
ROSES 21-AIST21-2-0020 (\$315,000 of total \$1.5 million), NASA 2022-25
 • "Open Climate Workbench to support analysis of NASA's high-resolution datasets"
PREEVENTS Conference Grant (\$44,792), NSF 2019
 • "Workshop on Correlated Extreme Events"; grant no. 1928623
Herrenhausen Conf. on Extreme Events Travel Grant (\$3,000), VW Foundation 2019
Dean's Fellowship (\$196,000), Columbia University 2014-19
Lead Teaching Fellowship (\$2,000), Columbia University 2017-18
Teaching Observation Fellowship (\$2,000), Columbia University 2016-17
Hollings Scholarship (\$24,000), NOAA 2012-14

Professional Service and Activities

Facilitating, reviewing, and advising

Working-Group Chair and Steering-Committee Member, Risk KAN 2019-pres.
 • Initiated Compound Events group of the Knowledge Action Network on Emergent Risks & Extreme Events; organize webinars and networking activities for ~300 members
Member, NCAR Climate Data Guide Board of Advisors 2020-23
Guest Editor, iScience special issue on compound events [with J. Zscheischler] 2021-23
 • "Compounding effects as drivers of extreme events in socio-ecological systems"
Review-Panel Member, Lamont-Doherty Chevron Student Initiative Fund 2016-19
Reviewer for journal manuscripts: approximately 8 per year
Reviewer for proposals: NSF Climate & Large-scale Dynamics; NERC Highlight Topics; JPL Data Science Pilots; JPL Strategic University Research Partnership

Workshop planning and conference-session convening

Co-Organizer, 3rd Int'l Conf. on Natural Hazards and Risks in a Changing World 2022-pres.
Instructor and Co-Organizer, 2nd Como Training School on Compound Events 2021-22
 • Planned sessions and supervised group project for workshop in Sep-Oct 2022
Co-Organizer, Workshop on Compound Weather and Climate Events 2020-21
Workshop Lead Organizer, Workshop on Correlated Extreme Events 2017-19
 • Conceptualized and coordinated 175-person workshop at Columbia Univ. in May 2019
Session Co-Chair, AGU Fall Meeting 2019-23
 • Multiple ('innovative' and regular) sessions on compound extreme events and impacts

Session Co-Chair , EGU General Assembly	2019, 2022
Member , AMS Student Conference 2016 Planning Committee	2015-16

Teaching Experience and Activities

Guest Lecturer , UCLA: Advanced Dynamic & Synoptic Meteorology	Winter 2024
Teaching Assistant , Columbia Univ: Dinosaurs & the History of Life	Spring 2017
Teaching Assistant , Columbia Univ: Dynamics of Climate Variab. & Change	Fall 2016
Teaching Assistant , Columbia Univ: Earth's Climate System <i>[lab course]</i>	Spring 2016
Microteaching Facilitator , Columbia Univ.	2017-19
Member , Columbia Univ STEM Education Research Journal Club	2017-19

Outreach and Mentorship

Mentor , Caltech Hybrid Summer Research Connection	Summer 2022
Mentor , NASA Data Intensive Research and Education Center for STEM	2019-pres.
<i>Students/interns (co-)supervised:</i> Klariza Madrazo (undergrad, CSU Los Angeles); Jonathan Barnes (undergrad, Howard Univ)	
Mentor , AGU "Mentoring365" program	2022-pres.
English as a Second Language Instructor , Catholic Charities of New York	2015-17

Presentations as Lead Author/Presenter

"Profiling multivariate climate hazards and impacts in the Arabian Peninsula." AGU Fall Meeting 2023 (San Francisco, CA). Dec. 2023. *Invited.*

"Compound threats from tropical cyclones and humid heat: Assessment and process understanding." AGU Fall Meeting 2023 (San Francisco, CA). Dec. 2023.

"Multivariate climate hazards and impacts: Assessment and process understanding." Climate Analytics seminar (Online). Dec. 2023. *Invited.*

"Physical and societal processes shaping compound events." Ensenada Center for Scientific Research and Higher Education (CICESE), Physical Oceanography seminar (Ensenada, Mexico). Oct. 2023. *Invited.*

"Compound threats from humid heat and storm systems: Assessment and process understanding." George Mason University, Atmospheric, Oceanic, and Earth Sciences seminar (Online). Sep. 2023. *Invited.*

"Increasing spatiotemporal proximity of heat and precipitation extremes in a warming world quantified by a large model ensemble." AGU Fall Meeting 2022 (Chicago, IL). Dec. 2022.

"Processes linking atmospheric rivers and heat stress in the United States." University of North Dakota, Atmospheric Sciences seminar (Online). Nov. 2022. *Invited.*

"Processes linking atmospheric rivers and heat stress in the United States." International Atmospheric Rivers Conference 2022 (Online). Oct. 2022. *Invited.*

"Societal modulation of compound events." 2nd Como Training School on Compound Events (Como, IT). Oct. 2022. *Invited.*

"Sharpening the view of extreme heat stress: Global and regional patterns and their drivers." UC Irvine, Earth System Science seminar (Irvine, CA). Apr. 2022. *Invited.*

"Elevation-dependent projections of extreme heat stress changes in the contiguous U.S." AGU Fall Meeting 2021 (New Orleans, LA). Dec. 2021.

“A close relationship between atmospheric rivers and heat stress in the northern U.S.” AGU Fall Meeting 2021 (New Orleans, LA). Dec. 2021.

“Drivers and projections of global and regional patterns of heat stress.” California Institute of Technology, Yuk lunch seminar (Online). Nov. 2021. *Invited*.

“Drivers and projections of global and regional patterns of heat stress.” UCLA, Atmospheric and Oceanic Sciences seminar (Online). Oct. 2021. *Invited*.

“Sharpening the view of extreme heat stress.” Extreme Value Analysis Conference 2021 (Online). Jun. 2021. *Invited*.

“Extreme heat-humidity combinations and their relationship to hydroclimatic extremes.” NASA Jet Propulsion Laboratory, Terrestrial Hydrology Group seminar (Online). Mar. 2021.

“Investigating the controlling factors for global heat-humidity extremes.” Portland State University, Climate Science Lab seminar (Online). Jan. 2021. *Invited*.

“Extreme heat-humidity combinations and their relationship to hydroclimatic extremes.” Workshop on Compound Weather and Climate Events (Online). Jan. 2021. *Invited*.

“Investigating the controlling factors for global heat-humidity extremes.” AGU Fall Meeting 2020 (Online). Dec. 2020.

“Investigating the controlling factors for global heat-humidity extremes.” Workshop on Mid-Latitude Compound Climate Extremes (Online). Sep. 2020. *Invited*.

“Regional geographies of extreme heat.” NASA Jet Propulsion Laboratory, Center for Climate Sciences seminar (Pasadena, CA). Jan. 2020. *Invited*.

“Climatology and dynamics of disruptive springtime temperature sequences.” AGU Fall Meeting 2019 (San Francisco, CA). Dec. 2019.

“Dynamics of disruptive springtime temperature sequences.” Herrenhausen Conference on Extreme Events (Hanover, Germany). Oct. 2019.

“Regional geographies of extreme heat.” NOAA Geophysical Fluid Dynamics Laboratory, informal seminar (Princeton, NJ). Jun. 2019. *Invited*.

“Regional geographies of extreme heat.” Lawrence Berkeley National Laboratory, informal seminar (Berkeley, CA). Jan. 2019. *Invited*.

“Exceptional heat-humidity combinations in the observational record.” AGU Fall Meeting 2018 (Washington, DC). Dec. 2018.

“Spatiotemporal patterns and synoptics of extreme wet-bulb temperature in the contiguous United States.” EGU General Assembly 2018 (Vienna, AT). Apr. 2018.

“Climatological occurrence and projected changes of cold-shore days along the eastern coast of the United States.” EGU General Assembly 2018 (Vienna, AT). Apr. 2018.

“Parameterization and projection of sea breezes in New York City.” Rutgers Climate Symposium 2017 (New Brunswick, NJ). Nov. 2017.

“Sea breezes and New York City heat waves: interactions, effects, and predictability.” AMS Annual Meeting 2017 (Seattle, WA). Jan. 2017.

“Co-occurrence of extreme temperature and moisture over the continental United States.” AMS Annual Meeting 2017 (Seattle, WA). Jan. 2017.

“Predictability and spatial characteristics of New-York-City-area heat waves.” AGU Fall Meeting 2016 (San Francisco, CA). Dec. 2016.

“Changes in precipitation extremes under two climate-change scenarios.” AMS Annual Meeting 2014 (Atlanta, GA). Jan. 2014.

Science Communication

Podcast

Founder and host of "Climate Quandaries"

since Apr 2023

- This podcast features conversations with fellow scientists on some of the philosophical questions raised by climate change. Available on Spotify, Apple Podcasts, and Google Podcasts.

Publications

The Conversation article (with T. Matthews)

May 2020

- Article title: "Global warming now pushing heat into territory humans cannot tolerate"

New York Times op-ed (with E. Coffel and R. Horton)

Oct 2018

- Article title: "Heat and humidity are a killer combination"

Talks

Invited panelist for Science Facebook Live event on 'Cooling in a warming world'

Dec 2020

AGU Pop-Up Talk on 'The role of a scientist in the 21st century'

Dec 2018

Interviews

French National Commission for UNESCO

2024

Agence France-Presse • E&E News • The Guardian

2023

Bloomberg/Washington Post • Grist • Jet Propulsion Laboratory • NASA Climate • NASA Earth Observatory • PBS Terra

2022

California Council on Science and Technology • CBS News • Discover Magazine •

Franceinfo Radio • Live Science • NASA Climate • New York Times Magazine • Wall Street Journal • Yale Climate Connections

2021

AAAS • Climate Central • National Geographic • Quartz • Science • Scientific American •

Thomson Reuters • Washington Post • Weather.com • Wunderground

2020

CBC Radio

2017

Professional Memberships

American Meteorological Society, 2011-pres. • American Geophysical Union, 2014-pres.

Languages

Programming: MATLAB • Python • R

Foreign: French (C1), Spanish (A2)