

Mukund Palat Rao

Assistant Research Professor

[[Google Scholar](#)] [[ORCID](#)] [[ResearchGate](#)]

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Lamont-Doherty Earth Observatory of Columbia University

Education

2014-2020	<i>Ph.D. Earth and Environmental Science</i> , Columbia University, NY, USA
2012-2013	<i>M.A. Climate and Society</i> , Columbia University, NY, U.S.A.
2008-2012	<i>B.Tech. Chemical Engineering</i> , Amrita School of Engineering, Tamil Nadu, India

Appointments

<u>2025-present</u>	<u>Lamont Assistant Research Professor (LARP)</u>
(Primary)	Tree-Ring Laboratory, Biology and Paleo-Environment Lamont-Doherty Earth Observatory of Columbia University, U.S.A.
<u>2026-present</u>	<u>Adjunct Assistant Professor of Climate</u> Climate School, Columbia University, U.S.A.
<u>2026-present</u>	<u>Affiliated Faculty</u> Department of Ecology, Evolution, and Environmental Biology (E3B) & Columbia Center for Archaeology, Columbia University, U.S.A.
<u>2023-2024</u>	<u>Research Associate</u> Department of Plant Sciences, University of California Davis, U.S.A.
<u>2022-2024</u>	<u>Marie Skłodowska Curie Postdoctoral Fellow</u> Global Ecology Unit, Centre de Recerca Ecològica i Aplicacions Forestals (CREAF) Centre for Ecological Research and Forestry Applications, Barcelona, Spain
<u>2021-2024</u>	<u>Postdoctoral Research Scientist</u> Lamont-Doherty Earth Observatory, Columbia University, U.S.A.
<u>2021-2023</u>	<u>Postdoctoral Scholar</u> Department of Plant Science, University of California Davis, U.S.A.
<u>2021-2022</u>	<u>NOAA Climate & Global Change Postdoctoral Fellow</u> Cooperative Programs for the Advancement of Earth System Science (CPAESS) University Corporation for Atmospheric Research (UCAR), U.S.A.
<u>2020-2021</u>	<u>Research Assistant</u> Ecology, Evolution, and Environmental Biology (E3B), Columbia University, U.S.A.
<u>2018-2021</u>	<u>Adjunct Professor of Environmental Studies</u> Department of Environmental Studies, New York University (NYU), U.S.A.
<u>2013-2017</u>	<u>Graduate Teaching Assistant</u> , Columbia University, U.S.A.
<u>2012-2014</u>	<u>Research Assistant</u> , Tree-Ring Laboratory, Lamont-Doherty Earth Observatory of Columbia University (LDEO), U.S.A.

Current research areas

i. Forest carbon cycling; ii. Climate change; iii. Plant ecophysiology; iv. Ecology; v. Dendrochronology; vi. Land-atmosphere interactions; vii. Remote Sensing; viii. Earth system models; ix. Archaeology

Peer-reviewed publications and selected mentions in popular media

Total Citations: 1869 | H-Index: 20 | i10-Index: 27 on [Google Scholar](#)

(Last authorship indicates senior role on a mentee-led publication)

2026

- [41] †Klinek L, Au J, Rodriguez-Caton MR, **Rao MP**, Fety L, Koch GW, & Magney TS. [Summer Heat Stress Amplifies Photochemical Downregulation in Coast Redwoods](#). *Journal of Geophysical Research – Biogeosciences*. [\[link\]](#) †Graduate student mentee.
September 2026 – [\[UC Davis Press Release\]](#)
- [40] †Boeschoten LE, Smith-Martin C, Medina-Vega JA, Anderson-Teixeira KJ, Esbriá LER, Montgomery RA, Picon M, **Rao MP**, Wood TE, Xu X, Zimmerman J, & Uriarte M (2026). [Water limits radial tree growth more than light in an everwet subtropical forest](#). *Global Change Biology*. [\[link\]](#) †Postdoc mentee lead
- [39] Creek D, Hackmann CA, Jucker T, Nemetschek D, **Rao MP**, Salmon Y, Wang M, & Zhang Y (2026). [From microscopic movements to forest-scale insights: the Nordic Dendrometer Meeting and the emergence of a global network](#). *Tree Physiology* (author order is alphabetical). [\[link\]](#)
- [38] †van Tiel N, ††Lenczner G, **Rao MP**, Grossiord C & Tuia D (2026). [Tropical forests are facing increasing risks of exposure to critical temperature thresholds](#). *Proceedings of the National Academy of Sciences - PNAS*. †Graduate student and †† postdoc co-lead [\[link\]](#)
July 2026 – [\[Times of India\]](#); July 2026 – [\[La Opinión de Málaga\]](#); July 2026 – [\[EPFL\]](#);
July 2026 [\[PNAS News\]](#); July 2026 – [\[Phys.org\]](#)
- [37] **Rao MP**, Pacheco-Solana A, Li R, Oryan B, Jensen JE, Rodriguez-Catón M, Klinek L, Pierrat ZA, Ruehr S, Oelkers R, Boeschoten L, Griffin KL, McCormack L, Yang X, Verfaillie J, Baldocchi D, Hise J, Turner A, Scanlon TM, Andreu-Hayles L, Eitel JUH, Pederson N, Griffin D, Stahle D, Maxwell J, Voelker S, Kannenberg S, Peñuelas J, & Magney TS (2026). [Decoupled carbon assimilation and growth responses to aridity in temperate deciduous oaks](#). *Science Advances*. [\[link\]](#)
June 2026 – [\[State of the Planet\]](#); June 2026 – [\[The Guardian\]](#); June 2026 – [\[Washington Weekly\]](#)
June 2026 – [\[Mundiarío\]](#); June 2026 – [\[EuropaPress\]](#); July 2026 – [\[The Weather Channel\]](#)
- [36] Davi NK, Andreu-Hayles L, Leland C, Pacheco-Solana A, **Rao MP**, Cook ER, & Pederson N (2026). [Identifying Hurricane and Sea Level Rise Signatures in Coastal Oak Forests of the Northeastern United States Using a Multi-Proxy Approach](#). *Global and Planetary Change* [\[link\]](#)
Apr 2026 – [\[State of the Planet\]](#)

2025

- [35] †Addo-Danso A, Kristiansen P, **Rao MP**, Wilson B, & Coast O (2025). [Paddock tree arrangement and leaf photosynthetic heat tolerance limits in a temperate tree-pasture grazing system](#). *Journal of Sustainable Agriculture & Environment*. †Graduate student lead. [\[link\]](#)
- [34] van Daalen S, Borghaerts P, & **Rao MP** (2025). [Longleaf Pine in the Low Countries](#). *Dendrochronologia* [\[link\]](#)

- [33] Ma L, Ma J, Yan P, Tian F, **Rao MP**, Peñuelas J, Zhenhong Hu (2025). Planted forests have higher drought risk than natural forests in China. *Global Change Biology*. [\[link\]](#)

2024

- [32] Rodríguez-Catón M, Andreu-Hayles L, Morales MS, **Rao MP**, Nixon T, Vuille M, Rivera JA, Oelkers R, Christie D, Varuolo-Clarke A, Ferrero ME, Magney T, Daux V & Villalba R. A 300-year tree-ring $\delta^{18}\text{O}$ -based precipitation reconstruction for the South American Altiplano highlights decadal hydroclimate teleconnections (2024). *Communications Earth & Environment*. [\[link\]](#)
May 2024 - [\[El Diario\]](#); May 2024 - [\[Sinc\]](#); May 2024 - [\[Ecoportal\]](#)
- [31] Asad F, Adil M, Khan N, **Rao MP**, Alrefaei AF, Almutairi MH, & Ali S (2024). Reconstruction of July-September Standardized Precipitation-Evapotranspiration Index (SPEI) for the Hindu Kush region of Northern Pakistan. *Environmental Research Communications*. [\[link\]](#)
- [30] Pierrat ZA, Magney TS, Cheng R, Maguire AJ, Wong CYS, Nehemy MF, **Rao MP**, Nelson SE, Williams AF, Grosvenor JAH, Smith KR, Reblin J, Stutz J, Richardson A, Logan BA, & Bowling D (2024). The biological basis for using optical signals to track evergreen photosynthesis. *BioScience* [\[link\]](#).
- [29] Asad F, Zhu H, Yaseen T, Huang R, & **Rao MP** (2024). Tree ring derived summer temperature variability over the past millennium in the western Himalayas of northern Pakistan. *Frontiers of Earth Science*. [\[link\]](#)

2023

- [28] Sharifazari S, Palmer JG, Higgins PA, **Rao MP**, Johnson F, Turney CSM, Martin-Benito D, & Andersen MS (2023). 500-year reconstruction of Dez River discharge in southwestern Iran from tree rings. *Journal of Hydrology*. [\[link\]](#)
- [27] **Rao MP**, Davi NK, Magney TS, Andreu-Hayles L, Baatarbileg N, Byambagerel S, Varuolo-Clarke, A, Cook BI, D'Arrigo RD, Pederson N, Odrentsen L, Rodríguez-Catón M, Leland C, Burentogtokh J, Gardner WRM & Griffin KL (2023). Approaching a thermal tolerance tipping point in the Eurasian boreal forest at its southern margin. *Communications Earth & Environment*. [\[link\]](#)
July 2023 - [\[NOAA Climate Program Office\]](#); Aug 2023 - [\[CREAF Blog\]](#)
- [26] Eitel JUH, Basler D, Braun S, Buchmann N, D'Odorico P, Etzold S, Gessler, A, Griffin, KL, Krejza J, Luo Y, Maguire AJ, **Rao MP**, Vitasse Y, Walthert L, & Zweifel R (2023). Towards monitoring stem growth phenology from space with high resolution satellite data. *Agricultural and Forest Meteorology*. [\[link\]](#)
- [25] Kattel G, Paszkowski A, Pokhrel Y, Wu W, Li D, & **Rao MP** (2023). How resilient are the waterways of the Asian Himalayas? Finding adaptive measures for future sustainability. *The Wiley Interdisciplinary Reviews (WIRE) Water*. [\[link\]](#)
- [24] Leland C, D'Arrigo R, Davi N, Anchukaitis KJ, Andreu-Hayles L, Porter T, Galloway T, Mant M, Wiles G, Wilson R, Beaulieu S, Oelkers R, Gaglioti B, **Rao MP**, Reid E, & Nixon T. A (2023). Spatiotemporal Assessment of Extreme Cold in Northwestern North America Following the Unidentified 1809 CE Volcanic Eruption. *Paleoceanography and Paleoclimatology*. [\[link\]](#)
- [23] Pons D & **Rao MP** (2023). Exploring the Potential for a Multi-Decadal Midsummer Streamflow Reconstruction of the Upper Samalá River Basin in Guatemala Using an *Abies guatemalensis* Tree-Ring Chronology. *Dendrochronologia*, 78 (2023) 126059 [\[link\]](#).

- [22] Harley et al. (2023). The Longleaf Tree-Ring Network: Reviewing and expanding the utility of *Pinus palustris* Mill. dendrochronological data across the southeastern United States. *Progress in Physical Geography: Earth and Environment* [[link](#)] (24th co-author, 31 co-authors total).

2022

- [21] Cook BI et al. (2022) Megadroughts in the Common Era and the Anthropocene. *Nature Reviews Earth & Environment*, 3, 741–757. [[link](#)] (27th co-author, 34 co-authors total)
Oct 2022 – [[The Conversation](#)]; Oct 2022 – [[New Scientist](#)]; Oct 2022 – [[Phys.Org](#)]
- [20] Haraguchi M, Davi N, **Rao MP**, Leland C, Watanabe M, & Lall U (2022). Estimating Return Intervals for Extreme Climate Conditions Related to Winter Disasters and Livestock Mortality in Mongolia. *Natural Hazards and Earth System Sciences*, 22, 2751–2770, 2022 [[link](#)]
- [19] Mundo IA, Murray C, Grosso M, **Rao MP**, Cook ER, & Villalba R (2022). Dendrochronological dating and provenance determination of a 19th century whaler in Patagonia (Puerto Madryn, Argentina). *Dendrochronologia*, 74. [[link](#)]
May 2012 - [[Sibylline – Marine Wildlife Center](#)]; Aug 2022 - [[State of the Planet](#)]; Aug 2022 - [[Boston Globe](#)]
Aug 2022 - [[Clarín](#)]; Aug 2022 - [[GIZMODO](#)]; Aug 2022 - [[CONICET](#)]; Aug 2022 - [[Jornada](#)]
Aug 2022 - [[Rhode Island Monthly](#)]; Aug 2022 - [[Daily Mail](#)]; Aug 2022 - [[Mirror](#)]
Aug 2022 - [[The Providence Journal](#)]; Aug 2022 - [[EcoMagazine](#)]; Aug 2022 - [[Newser](#)]
Aug 2022 - [[El Chubut](#)]; Sep 2022 - [[Ancient Archeology](#)]; Sep 2022 - [[Newsweek](#)]; Sep 2022 - [[DiCYT](#)]
Sep 2022 - [[El Cuidadano](#)]; Sep 2022 - [[Smithsonian Magazine](#)]; Sep 2022 - [[Damals](#)]
Sep 2022 - [[Yahoo News](#)]; Sep 2022 - [[New York Times](#)]; Jan 2023 – [[Columbia Magazine](#)]
- [18] Higgins PA, Palmer JG, **Rao MP**, Anderson MS, Turney CSM, & Johnson F (2022). Unprecedented high Northern Australian streamflow linked to intensification of the Indo-Australian Monsoon. *Water Resources Research*, 58, e2021WR030881. [[link](#)]
Mar 2022 - [[The Conversation](#)]; Mar 2022 - [[UNSW](#)]; Mar 2022 - [[EOS Magazine](#)];
Mar 2022 - [[VerveTimes](#)]; Mar 2022 - [[ABC News](#)]
- [17] Wang W, Dong Z, **Rao MP**, Lall U, & Jia B (2022). Last two millennia of streamflow variability in the headwater catchment of the Yellow River basin reconstructed from tree rings. *Journal of Hydrology*, 606, 127387. [[link](#)]
- [16] Rodríguez-Catón M, Andreu-Hayles L, Daux V, Vuille M, Varuolo-Clarke A, Oelkers R, Christie D, D’Arrigo R, Morales M, Christie D, **Rao MP**, Srur A, François V & Villalba R (2022). Hydroclimate and ENSO Variability Recorded by Oxygen Isotopes from Tree Rings in the South American Altiplano. *Geophysical Research Letters*, 49, e2021GL095883. [[link](#)]

2021

- [15] Bishop DA, Williams AP, Seager R, Cook ER, Peteet DM, Cook BI, **Rao MP** & Stahle DW (2021). Placing the east-west United States aridity gradient in a multi-century context. *Environmental Research Letters*, 16, 114043, [[link](#)]. Feb 2022 - [[News4Jax](#)]
- [14] †Leland C, †**Rao MP**, Cook ER, Cook BI, Lapidus B, Staniforth A, Solomon A, Holloway MY & Rodríguez-Catón M (2021). Dendroarchaeological analysis of the Terminal Warehouse in New York City reveals a history of long-distance timber transport during the Gilded Age. *Journal of Archaeological Science: Reports*, 39, 103114. [[link](#)]

†Leland & Rao contributed equally.

Jan 2020 - [[6SQFT](#)]; Feb 2020 [[NYREJ](#)]; Aug 2021 - [[Inside Climate News](#)]

Aug 2021 - [[Earth Institute: State of the Planet](#)]; Aug 2021 - [[Real Estate Capital](#)]

Oct 2021 - [[ESA Frontiers in Ecology and the Environment News Dispatch](#)]

Oct 2021 - [[National Geographic](#)]; Jan 2022 - [[Columbia Magazine](#)]; May 2022 - [[New Yorker Magazine](#)]

Sep 2022 - [[Newsy](#)]; Feb 2023 – [[AGU EOS](#)]; Sep 2025 – [[State of the Planet](#)]

- [13] Davi NK, **Rao MP**, Wilson R, Andreu-Hayles L, Oelkers R, D'Arrigo RD, Nachin B, Buckley B, Pederson N, Leland C, & Suran B (2021). Accelerated recent warming and temperature variability over the past eight centuries in the Central Asian Altai from Blue Intensity in tree-rings, *Geophysical Research Letters*, 48, e2021GL092933. [[link](#)]

Aug 2021 - [[Earth Institute: State of the Planet](#)]

- [12] Rodríguez-Catón M, Andreu-Hayles L, Morales MS, Daux V, Christe D, Coopman RE, Alvarez C, **Rao MP**, Aliste D, Flores F, & Villalba R (2021). Different climate sensitivity for radial growth, but uniform for tree-ring stable isotopes along an aridity gradient in *Polylepis tarapacana*, the world's highest elevation tree-species, *Tree Physiology*, 41, 1353-1371. [[link](#)]

2020

- [11] **Rao MP**, Cook ER, Cook BI, D'Arrigo RD, Palmer JG, Lall U, Uriarte M, Woodhouse CA, Buckley BM, Bishop DA, Jian J, & Webster PJ (2020). Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and flood hazard frequency. *Nature Communications*, 11, 6017. [[link](#)]

Aug 2022 - [[The Probe](#)]; Nov 2020 - [[Earth Institute: State of the Planet](#)]; Dec 2020 - [[Outlook](#)]

Dec 2020 - [[The Indian Express](#)]; Dec 2020 - [[The Dhaka Tribune](#)]; Dec 2020 - [[Nation World News](#)]

Dec 2020 - [[SciDev.net](#)]; Dec 2020 - [[The Times of India](#)]; Dec 2020 - [[The Business Standard](#)]; Jan 2021 - [[Mongabay](#)]
Jan 2021 - [[Nature India](#)]; Nov 2022 – [[AP News](#)]

2019

- [10] Kakinuma K, Yanagawa A, Sasaki T, **Rao MP**, & Kanae S (2019). Socio-ecological interactions in a changing climate in Mongolia. *Sustainability*, 11(21), 5883. [[link](#)]
- [9] **Rao MP**, Cook ER, Cook BI, Anchukaitis KJ, D'Arrigo RD, Krusic PJ, & LeGrande AN (2019). A double bootstrap approach to Superposed Epoch Analysis to evaluate response uncertainty. *Dendrochronologia*, 55, 119-124. [[link](#)]
- [8] Bishop DA, Williams AP, Seager R, Fiore AM, Cook BI, Mankin JS, Singh D, Smerdon JE, & **Rao MP** (2019). Investigating the causes of increased 20th-century precipitation over the southeastern United States. *Journal of Climate*, 32(2), 575–590. [[link](#)]

2018

- [7] **Rao MP**, Cook ER, Cook BI, Palmer J, Uriarte M, Devineni N, Lall U, D'Arrigo RD, Woodhouse, CA, Ahmed M, Zafar MU, Khan N, Khan A, & Wahab M (2018). Six centuries of Upper Indus Basin streamflow variability and its climatic drivers. *Water Resources Research* 54(8), 5687-5701. [[link](#)]
- [6] Leland C, Cook ER, Andreu-Hayles L, Pederson N, Hessel A, Anchukaitis KJ, Byambasuren O, Nachin B, Davi N, D'Arrigo R, Griffin K, Bishop DA, & **Rao MP** (2018). Strip-bark morphology and radial growth trends in ancient *Pinus sibirica* trees from central Mongolia. *Journal of Geophysical Research: Biogeosciences*, 123 (3), 945–959. [[link](#)]

2017

- [5] Pages Hydro2k Consortium (2017). Comparing proxy and model estimates of hydroclimate variability and change over the Common Era. *Climate of the Past*, 13(12), 1851-1900. [[link](#)]
- [4] **Rao MP**, Cook BI, Cook ER, D'Arrigo RD, Krusic PJ, Anchukaitis KJ, LeGrande AN, Buckley BM, Davi NK, Leland C, & Griffin KL (2017). European and Mediterranean hydroclimate responses to tropical volcanic forcing over the last millennium. *Geophysical Research Letters*, 44(10), 5104–5112. [[link](#)]
- [Past Global Changes, Volcanic Impacts on Climate and Society working group contribution]

2016

- [3] Zafar MU, Ahmed M, **Rao MP**, Buckley BM, Khan N, Wahab M, & Palmer J (2016). Karakorum temperature out of phase with hemispheric trends for the past five centuries. *Climate Dynamics*, 46(5), 1943-1952. [[link](#)]

2015

- [2] Davi NK, D'Arrigo R, Jacoby GC, Cook ER, Anchukaitis KJ, Nachin B, **Rao MP**, & Leland C (2015). A long-term context (931–2005 C.E.) for rapid warming over Central Asia. *Quaternary Science Reviews*, 121, 89-97. [[link](#)]
- June 2015 - [[Earth Institute](#)]; June 2015 - [[William Paterson University](#)]
- [1] †**Rao MP**, †Davi NK, D'Arrigo RD, Skees J, Nachin B, Leland C, Lyon B, Wang S-Y, & Byambasuren O (2015). Dzuds, droughts, and livestock mortality in Mongolia. *Environmental Research Letters*, 10(7), 074012. †Rao & Davi contributed equally [[link](#)]
- July 2018 - [[Earth Island](#)]; Mar 2018 - [[Caritas.org](#)]; Jul 2017 - [[Marron Institute](#)]; Mar 2017 - [[NewsWeek](#)]; Jan 2017 - [[The Guardian](#)]; Jun 2015 - [[Earth Institute](#)]; Aug 2015 - [[Environmental Research Web](#)]

Book Chapters (Peer Reviewed)

- [1] Ummenhofer C, Green R, Denniston R, & **Rao MP** (2024). *Past, present, and future of the South Asian monsoon* in The Indian Ocean and its Role in the Global Climate System. Editors: Ummenhofer C, & Hood RR. Publisher: Elsevier. [[link](#)] [[link to book](#)]

PhD dissertation: Hydroclimate variability and environmental change in Eurasia over the past millennium and its impacts. *Advisors:* Edward Cook, Rosanne D'Arrigo, Kevin Griffin, Awarded October 2020 [[link](#)].

Teaching

<i>Fall 2026</i>	Dynamics of Climate Variability & Change, Columbia Univ 54 students (Instructor)
<i>Summer 2021</i>	Climate Change, New York University (NYU) 26 students (Instructor)
<i>Spring 2021</i>	Climate Change, NYU 25 students (Instructor)
<i>Spring 2021</i>	Environmental Quantitative Methods, NYU 21 students (Course Assistant)
<i>Summer 2018</i>	Environmental System Science, NYU 26 students (Co-Instructor , with Leland C.)
<i>Fall 2017</i>	Quant. Models of Nat. & Human Syst., Columbia Univ. 35 students (Lab Instructor)
<i>Fall 2016</i>	Dynamics of Climate Variability and Climate Change Columbia Univ. 30 students (Teaching Assistant)
<i>Fall 2015</i>	Quant. Models of Nat. & Human Syst., Columbia Univ. 40 students (Lab Instructor)

Fall 2013 Quant. Models of Nat. & Human Syst., Columbia Univ. | 39 students (**Lab Instructor**)

Fall 2013 Water Resources and Climate, Columbia. Univ. | 17 students (**Teaching Assistant**)

Total: 10 semesters (6 as instructor); 259 students total

Datasets and Code

- [11] **Rao MP** et al, Decoupled carbon assimilation and growth responses to aridity in temperate deciduous oaks (2026). <https://datadryad.org/dataset/doi:10.5061/dryad.m63xsj4h4>
- [10] Ballou, K et al. PhenoCam Dataset v3.0: Digital Camera Imagery from the PhenoCam Network, 2000-2023. (2025) <https://doi.org/10.3334/ORNLDAAAC/2364/>
- [9] Zimmerman, O et al. PhenoCam Dataset v3.0: Vegetation Phenology from Digital Camera Imagery, 2000-2023. (2025) <https://doi.org/10.3334/ORNLDAAAC/2389>.
- [8] **Rao MP** et al. (2023), Approaching a thermal tipping point in the Eurasian boreal forest at its southern margins, Dryad Dataset [[link](#)] and Zenodo Code [[link](#)].
- [7] Rodríguez-Catón M, Andreu-Hayles L, Daux V, Vuille M, Varuolo-Clarke A, Oelkers R, Christie D, D'Arrigo R, Morales M, Christie D, **Rao MP**, Srur A, François V, & Villalba R. (2022) Hydroclimate and ENSO Variability Recorded by Oxygen Isotopes from Tree Rings in the South American Altiplano. NOAA-National Center for Environmental Information. [[link](#)]
- [6] †**Rao MP**, †Leland C, Cook ER, Cook BI, Lapidus B, Staniforth A, Solomon A, Holloway MY & Rodríguez-Catón M (2021). Dendroarchaeological analysis of the Terminal Warehouse in New York City reveals a history of long-distance timber transport during the Gilded Age. NOAA-National Center for Environmental Information. †Rao & Leland contributed equally. [[link](#)]
- [5] Davi NK, **Rao MP**, Wilson R, Andreu-Hayles L, Oelkers R, D'Arrigo RD, Nachin B, Buckley B, Pederson N, Leland C, & Suran B (2021). Accelerated recent warming and temperature variability over the past eight centuries in the Central Asian Altai from Blue Intensity in tree-rings. NOAA-National Center for Environmental Information. [[link](#)] & [[link](#)]
- [4] **Rao MP**, Cook ER, Cook BI, D'Arrigo RD, Palmer JG, Lall U, Uriarte M, Woodhouse CA, Buckley BM, Bishop DA, Jian J, & Webster PJ (2020). Data for: Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and flood hazard frequency. NOAA-National Center for Environmental Information. [[link](#)]
- [3] **Rao MP**, Cook ER, Cook BI, Anchukaitis KJ, D'Arrigo RD, Krusic PJ, & LeGrande AN (2019). Data for: A double bootstrap approach to Superposed Epoch Analysis to evaluate response uncertainty, Mendeley Data, V1, doi: 10.17632/8p7y29hz5h.1. [[link](#)]
- [2] **Rao MP**, Cook ER, Cook BI, Palmer JG, Uriarte M, Devineni N, Lall U, D'Arrigo RD, Woodhouse, CA, Ahmed M, Zafar MU, Khan N, Khan A, Wahab M. (2018) Data for: Six Centuries of Upper Indus Basin Streamflow Variability and Its Climatic Drivers, NOAA-National Center for Environmental Information. [[link](#)]
- [1] Davi NK, D'Arrigo R, Jacoby GC, Cook ER, Anchukaitis KJ, Nachin B, **Rao MP**, & Leland C (2015). Data for: Northern Mongolia 1000 Year Summer Temperature Reconstruction. NOAA-National Center for Environmental Information. [[link](#)]

Articles (not peer-reviewed)

- [2] **Rao MP** (2023), The Eurasian boreal forest may not be ready for future heat waves, Behind the Paper, Springer Nature Earth and Environmental Sciences Community. July 10, 2023 [[link](#)]

- [1] **Rao MP** & Cook BI (2021), Tree rings reveal a 700-year record of flooding in Bangladesh, *Eos*, 102. 15 October 2021 [[link](#)].

Fellowship Awards

2022-2024	Marie Skłodowska Curie Postdoctoral Fellowship, European Research Council
2021-2022	NOAA Climate & Global Change Postdoctoral Fellowship
2014-2019	Dean's Fellowship, Earth and Environmental Science, Columbia University, U.S.A.
2012-2013	Tuition waiver scholarship, M.A. Climate and Society, Columbia University, U.S.A.

Professional Activities

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- [3] Co-convener and Co-chair, *Impacts of heat, atmospheric conditions, and soil moisture on plants and ecosystems across various scales*, at the European Geoscience Union (EGU) Meeting, 2024.
- [2] Co-convener and Co-chair, *Climate of the Common Era* Session and liaison for Outstanding Student Presentation Award (OSPA) at the American Geophysical Union Fall Meeting, 2022, 2023.
- [1] Site co-PI [LDEO PhenoCam](#) with Oryan B. This site joins a global ecosystem phenology camera network, [PhenoCam](#). It is located on Columbia University's Lamont-Doherty Earth Observatory campus, and continuously monitors the vegetation canopy status of the oak-maple dominated forest of the Palisades Interstate Park, NY, U.S.A. October, 2020 - present.
Nov 2020 - [[State of the Planet](#)]; Nov 2021 & Sep 2023 - [[National Geographic](#)]; Oct 2022 – [[Scenic Hudson](#)];
Oct 2023 – [[Wall Street Journal](#)]; Oct 2024 – [[AFAR](#)]; Oct 2024 – [[CBS News](#)]

Scientific Grants as PI

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- [10] **2026-2031** **NSF Division of Environmental Biology** (DEB Award #[2605547](#))
\$1,173,837 total PIs: Eitel J, Magney T, **Rao MP**, Griffin KL
\$327,495 to Collaborative Research: Improved understanding and monitoring of the effects of climate
Columbia Univ. variability on tree growth across North America
- [9] **2025-2026** **NSF Arctic Social Science** (OPP Award #2124885)
\$378,639 PIs: Andreu-Hayles L, D'Arrigo RD, & **Rao MP**
Tracking Divergent Warming and Tree Growth at Arctic Treeline
- [8] **2024-2027** **NSF Geomorphology and Land Use Dynamics** (Award #2423275)
\$249,810 total PIs: Gutierrez-Jurado HA, & **Rao MP**
\$69,482 to ORE-CZ: The influence of drought, heat waves, and critical zone architecture on water and
Columbia Univ. carbon cycling dynamics of forested dryland agro-ecosystems [[link](#)]
- [7] **2022-2024** **European Research Commission, Marie Skłodowska Curie Postdoc Fellowship**
€172,932.48 The fate of TERRestriAl forest CARBOn from photosynthesis to structural biomass under
climate change (TERRACARB)
- [6] **2021-2022** **NOAA Climate & Global Change Postdoctoral Fellowship**
\$157,440 The fate of forest carbon from photosynthesis to biomass under drought and climate change
- [5] **2021-2023** **Lamont-Doherty Earth Observatory Climate Center, Columbia Univ.**
\$11,000 PIs: **Rao MP**, Pacheco-Solana A, Jensen J, Oryan B, Rodríguez-Catón M, Griffin KL,
Andreu-Hayles L, Boelman N, Commane R, Gentine P, & Davi NK.
Temporal dynamics of tree-growth and photosynthesis and their environmental drivers in the
Lamont Sanctuary.
- [4] **2020-2021** **Chevron Student Initiative Fund, Dept. of Earth and Env. Sc, Columbia Univ.**
\$3,200 PIs: **Rao MP** & Oryan B

- Developing the LDEO PhenoCam network to track the fate of forest carbon from photosynthesis to growth.
- [3] **2015-2016** **Chuo University, Japan**
\$74,533
PIs: Davi NK, Lall U, D'Arrigo RD, Rao MP, Leland C, Haraguchi M
Research on Evaluation of Mean State and Climate Extremes in the Long Meteorological Records in Mongolia.
- [2] **2013-2015** **Lamont-Doherty Earth Observatory Climate Center, Columbia Univ.**
\$11,000
PIs: Buckley BM, Davi NK, & Rao MP
Influence of atmospheric and oceanic forcings on the Southwest and Northeast Monsoons over India: A paleoclimate perspective.
- [1] **04|2013-12|2013** **Chevron Student Initiative Fund, Dept. of Earth and Env. Sc, Columbia Univ.**
\$2,300
PI: Rao MP
A paleoclimate study of the Indian Monsoon using tree-ring based reconstructions

Scientific Grants as Named Collaborator and Co-author

- [2] **2022-2025** **Knowledge Generation Projects 2021, Spanish Ministry for Science and Innovation**
€197,492.00
PIs: Andreu-Hayles L. Research Team: Vallvé M-B, Gutiérrez-Merino E, Solanes JB, González DP. Technical team: Domínguez-Delmás M, Wilson R, Ummenhofer C, **Rao MP**.
Long-term perspective to the current environmental crisis in the Iberian Mediterranean region from dendrochronological and historical archives
- [1] **2017-2023** **NSF Arctic Social Sciences**
\$1,184,346 total
\$459,475 to Columbia Univ. PIs: Honeychurch W, Gardner W, Fowell SJ, Davi NK & Andreu-Hayles L
Student: **Rao MP** Collaborative Research: Climate, human and ecosystem interactions in the face of a rapidly changing North Asian biome [[link](#)]

Awards

- [7] Short-Term Visitors' Program INIA-CISC Spain. Accurate monitoring of tree-growth towards better estimation of forest carbon cycling in the Mediterranean and beyond. €4,000 (May-June 2026).
- [6] Visiting Researcher, IANIGLA-CONICET Mendoza, Argentina. Climate change impacts on tree growth in Argentinian forests | Impacto del Cambio Climático en el crecimiento de los bosques nativos argentinos. Fundación Williams. AR \$2,870,400 (US \$3,000) (September-November 2024)
- [5] *Early Career Mobility Award* | Severo Ochoa Program from the Spanish Ministry for Science and Innovation. Supported a 6-week research visit at the University of Antwerp, Belgium €4,000 (January-March 2024).
- [4] *Fluxnet Secondment Award* | Supported two visits to Universidad Nacional Autónoma de México (UNAM) and Instituto Tecnológico de Sonora (ITSON), Mexico \$5,000 (Apr & Sep 2023).
May 2023 – [[Fluxnet Blog](#)]; Nov 2023 – [[Fluxnet Newsletter](#)]
- [3] *North American Carbon Program Leadership Award* | U.S. Carbon Program. \$1,000 (May 2022).
- [2] *Early Career Scientist Travel Support Award*, European Union (EGU), Vienna, Austria (April 7-12, 2019).
- [1] *Student Travel Matching Grant*, Columbia University Graduate School of Arts and Sciences (GSAS), to attend the American Geophysical Union meeting, New Orleans, U.S.A. \$250 (October, 2017).

Other Grants

- [1] Lamont Campus Life, Columbia Univ, \$242 (04/2018), *Enhancing the operability and comfort of the Lamont nursing and lactation space*, Kim-Blanco P, McCarthy C, Andreu-Hayles L, & Rao MP

Community service to science agencies as proposal reviewer

2023 - NASA Early Career Investigator Program in Earth Science: Land Cover & Terrestrial Ecology
2023 - Swiss National Science Foundation

Scientific community service as manuscript reviewer (unique papers excluding revisions: 40)

American Geophysical Union AGU Books (1), Biogeosciences (1), Climate of the Past (1), Dendrochronologia (5), Earth's Future (1), Earth System Science Data (1), Ecological Monographs (1), Ecology Letters (1), Environmental Research Letters (4), Geophysical Research Letters (3), Global and Planetary Change (1), Journal of Geophysical Research: Biogeosciences (1), International Journal of Biometeorology (1), Journal of Geophysical Research: Atmosphere (1), Nature Climate Change (2), Nature Ecology & Evolution (2), Natural Hazards (1), Nature Geoscience (1), New Phytologist (1), Plos One (2), Remote Sensing of Environment (1), Scientific Reports (2), SoftwareX (1), Trees - Structure and Function (1), Quaternary Science Reviews (1), Quaternary Research (2)

Academic Committees

- [2] 2026 PhD Thesis External Reviewer
Dinámica intranual del crecimiento y vulnerabilidad ante el cambio global en bosques mixtos de Pinus sylvestris y Quercus pirenaica.
Interannual growth dynamics and vulnerability in the face of global change in mixed Pinus sylvestris and Quercus Pirenaica forests
David Almagro Fernández-Tostado, Universidad Politécnica De Madrid (Polytechnic University of Madrid)
- [1] 2025 PhD Thesis Defence, External Committee Member,
Dynamical climate drivers of fire in Western North America and beyond
Tess Jacobson, With Seager R, Ting M, & Bhattacharya T, & Biasutti M

Mentoring activities

- [15] 2026-present *Ms. Margot Grøtland*
Senior year thesis advisor
Department of Earth & Environmental Science, Columbia University
- [14] 2026-present *Ms. Máira Luciana Guimarães Conde*
Ph.D. Dissertation Committee Member
Max-Planck-Institute for Biogeochemistry
- [13] 2025-present *Ms. Nomin Khurelchuluun*
Undergraduate Senior year thesis
Data Science, Columbia University
- [12] 2025-present *Ms. Isabel del Toro*
Ph.D. Dissertation Committee Member
Department of Ecology, Evolution & Environmental Biology (E3B), Columbia Univ.
- [11] 2025-present *Mr. Patrick Zoé Cito Namulisa*
Ph.D. Dissertation Committee Member
Department of Ecology, Evolution & Environmental Biology (E3B), Columbia Univ.
- [10] 2025-present *Ms. Aynsley Kretschmar, Master's Thesis Supervisor*
Thesis: Investigating the forest carbon and climate interactions in boreal Alaska
M.A. Climate and Society, Columbia University, NY, USA
- [9] 2025-present *Ms. Xiao Li Chen*, Undergraduate senior/final year student internship

Thesis: Dendroarchaeology in New York City West 125th Street
Baruch College, NY, USA

- [8] 2025-present *Ms. Shumeng Chen*, Master's Thesis Supervisor
Thesis: How are spring-autumn shoulder seasons changing under climate change
M.A. Climate and Society, Columbia University, NY, USA
- [7] 2023-2024 *Ms. Paula Mostazo*, undergraduate student
CREAF, Spain. Final year thesis advisor
Autonomous University of Barcelona (UAB), Barcelona, Spain
- [6] 2021-present *Ms. Lily Klinek*, Ph.D. student
University of California Davis. Research and academic mentoring
- [5] 2021-2023 *Mr. Troy Nixon*, Technician
Tree Ring Laboratory, Lamont-Doherty Earth Observatory, Columbia University
Processing and maintaining instrumentation in the Lamont Sanctuary Forest
- [4] 2022-2023 *Ms. Olivia Shehan*, Graduate Research Assistant (GRA)
M.A. Climate and Society, Columbia University. Research and academic mentor
- [3] 2021-2022 *Ms. Naveen Dilawar*, Ph.D. student
Lanzhou University, China. Ph.D. dissertation committee member
- [2] 2021-2022 *Mr. Erik George Valentine*, Graduate Research Assistant (GRA)
M.A. Climate and Society, Columbia University. Research and academic mentor
- [1] 2020 *Ms. Dhanya Karuppusamy*, B.Tech. Student
PSG College, Mentor for undergraduate final year thesis, Dendrochronology - drought
and its analysis.

Workshops and Seminars organised

- [6] **Workshop:** International course on the Ecophysiology of tree growth at high resolution: Integrating dendrometers and xylogenesis. Fonti P, von Arx G, Villalba R, Srur A, Mundo I, & **Rao MP**. 23-27th March 2026, Mendoza, Argentina.
- [5] **Workshop:** Combining dendrometer data with other data streams, Nordic Dendrometer Network Meeting, October 14, 2025 [\[link\]](#)
- [4] Nordic Dendrometer Network Meeting, Organising Committee, October 13-15, 2025 [\[link\]](#)
- [3] **50 Years of Advances in Tree-Ring Research.** Organised and presented at this Colloquium, which included talks from multiple lab alumni over the past decades. Also organised the post-colloquium reception. September 5, 2025 [\[link\]](#)
- [2] **Rao MP** (2024). *Visualising and processing dendrometer data in R*. IANIGLA-CONICET, Mendoza, Argentina, November 28, 2024. (In Spanish)
- [1] **Rao MP** hosted by Rudi F (2014). *From dendrochronology to dendroclimatology: Understanding the big picture*. Conducted for undergraduate and master's students at Andalas University, Sumatra, Indonesia, June 9-10, 2014. *Partnerships for enhanced engagement in research (PEER) Science*, to "Strengthen the research and teaching capacity of Andalas University in climate change and natural resources management".

Invited talks, seminars, and guest lectures

- [32] **Rao MP et al.** *The forest carbon cycle under heat and drought: from growth to photosynthesis*. Ecology, Evolution, and Environmental Biology (E3B) Department Seminar, Columbia University, New York, USA, September 22, 2026.

- [31] **Rao MP et al.** *Atmospheric aridity decouples carbon assimilation and growth in temperate deciduous oaks*. North American Forest Ecology Field Week (NAFEW), Montana, USA, June 23-26, 2026.
- [30] **Rao MP.** *The forest carbon cycle under climate change: from photosynthesis to allocation*. INIA-ICIFOR, Madrid, May 12, 2026.
- [29] **Rao MP.** *The forest carbon cycle under climate change: from photosynthesis to allocation*. St. Anthony Falls Laboratory, University of Minnesota, April 14, 2026 [[link](#)].
- [28] **Rao MP.** *The forest carbon cycle under climate change: from photosynthesis to allocation*. Department of Earth Environmental & Resource Sciences, University of Texas at El Paso, March 3, 2026.
- [27] **Rao MP.** *El ciclo del carbono forestal bajo el cambio climático: de la asimilación a la asignación (The forest carbon cycle under climate change: from photosynthesis to allocation)*. CON-CIENCIA EN LAS AMÉRICAS: Conversaciones en Español sobre Cambio Global. Ecological Society of America (ESA) Latin American and Caribbean Chapter, November 18, 2025. [[YouTube Link](#)]
- [26] **Rao MP et al.** *Atmospheric aridity decouples carbon assimilation and growth in temperate deciduous oaks*. Nordic Dendrometer Network Meeting, Oslo, Norway, October 13-15, 2025.
- [25] **Rao MP et al.** *La aridez disocia el crecimiento de la asimilación de carbono en robles caducifolios templados*. Reunión Trinacional de Ecología (Trinational Ecology Congress), Mendoza, Argentina, October 5-10, 2025.
- [24] *Atmospheric aridity decouples carbon assimilation and growth in temperate deciduous oaks*. Ecological Society of America Meeting, Baltimore, USA August 11-15, 2025
- [23] *Atmospheric aridity decouples carbon assimilation and growth in temperate deciduous oaks*. Brodersen Lab, Yale School of the Environment, Yale University, August 5, 2025
- [22] *Volcanoes and Climate: A tree-ring perspective*. Columbia University, Volcanoes and Climate Seminar April 28, 2025.
- [21] *The role of forests in the global carbon cycle and our understanding of past environmental change*. Indian Institute of Technology Kanpur, December 13, 2024.
- [20] *Exploring Lamont's Tree Ring Laboratory, Earth Observations, Conversations with Lamont Scientists*. Lamont-Doherty Earth Observatory of Columbia University, October, 2024 (virtual).
- [19] *La dispersión de la aridez disocia el crecimiento de la asimilación de carbono en robles caducifolios templados*. IANIGLA-CONICET Mendoza, Argentina, September 27, 2024.
- [18] *Aridity dispersion decouples growth from carbon assimilation in temperate deciduous oaks*. EPFL, Switzerland. June 6, 2024.
- [17] *Exploring the decoupling between carbon assimilation and tree growth in North American temperate oaks*. Birmensdorfer Tree-ring Lecture, Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Zurich, Switzerland. March 26, 2024.
- [16] *Exploring the decoupling between carbon assimilation and tree growth in North American temperate oaks*. Plant and Ecosystems (PLECO), Department of Biology, University of Antwerpen, Belgium. February 6, 2024
- [15] *Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and flood hazard frequency*. EGU CL Campfire - If you can't measure it, then reconstruct or model it to better understand past, present and future climates. December 6, 2023 [[link](#)].

- [14] *Climate Models, Past, Present, and Future*. Institute of Technology Sonora (ITSON), September 18, 2023 (in Spanish).
- [13] *All that grows is not green*. Lamont-Doherty Earth Observatory Seminar, May 18, 2023.
- [12] *The forest carbon cycle from assimilation to allocation*. Technological Institute of Sonora (ITSON), Ciudad Obregon, Mexico, April 20, 2023. (In Spanish)
- [11] *Approaching a thermal tipping point in the southern margins of boreal Eurasia*. IANIGLA CONICET Seminar, Mendoza, Argentina, April 10, 2023.
- [10] *Oaks trees don't grow through the growing season*. UC Davis Plant & Environmental Science Seminar, Davis, CA, USA November 9, 2022.
- [9] *Estimating the forest carbon cycle under climate change*. NOAA Seminar, October 31, 2022 (virtual)
- [8] *Hydroclimate variability and environmental change in South Asia over the past six centuries*. Centre for Climate Research and Development (CCRD), Islamabad, Pakistan, September 1, 2022 (virtual).
- [7] *Critical temperature of photosynthesis and tree-growth in the forest carbon cycle*. NOAA Climate & Global Change Workshop, Steamboat Springs, CO, USA, July 17-22, 2022.
- [6] *Extreme heat might threaten photosynthetic carbon assimilation by Siberian larch in the southern edge of the North Asian taiga*. University Corporation for Atmospheric Research, CPAESS Discovery Seminar, March 23, 2022.
- [5] *Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and flood hazard frequency*. Flood Risk and Climate Change Adaptation, February 11, 2022 (virtual).
- [4] *Stories trees tell us about the past and present*. Summer Research Experiences for Undergraduates (REU) lecture, Columbia University, New York, USA, June 15, 2021.
- [3] *Forests and Climate Change*, Science Honors Program, Columbia University, October 31, 2020.
- [2] *Stories trees tell us about the past and present*. Guest lecture, M.A. Science Journalism. An advanced science writing programme for experienced journalists, Columbia University, New York, USA, September 29, 2020.
- [1] *Understanding Coupled Natural and Human Systems: Climate related mass livestock mortality in Mongolia, Volcanoes and European hydroclimate, and Long-term Indus River streamflow*. Centre for Ecological Sciences Seminar, Indian Institute of Science, Bangalore, India, December 10, 2016.

News articles featured or quoted in

- [12] Drought Mutes Northeast Leaf-Peeping Season, New York Times, October 17, 2025 [\[link\]](#)
- [11] Hot spell shows how summers are getting longer and falls shorter in St. Louis, St. Louis Post-Dispatch, October 6, 2025 [\[link\]](#)
- [10] Bright, brief and early: New England's fall foliage may not last long, NBC News, September 20, 2025 [\[link\]](#)
- [9] More ICOS data highlights from ICOS Science Conference 2024, December 19, 2024 [\[link\]](#).
- [8] A Columbia Climate Scientist Reviews Autumn in New York, Columbia Magazine, October 16, 2023. [\[link\]](#)
- [7] How does climate change impact fall foliage, State of the Planet, September 26, 2022. [\[link\]](#)
- [6] What Are Carbon Offsets, and Can They Combat Climate Change?, The Wall Street Journal, July 21, 2022. [\[link\]](#)
- [5] 'Oldest Living Thing on Earth' Discovered in Chile, Al Jazeera, July 19, 2022. [\[link\]](#)

- [4] Signs of Pinochet's coup spotted in Chilean tree rings, Science, January 3, 2022. [[link](#)]
- [3] Rooftop Camera Will Track How Local Forests Change With the Climate, State of the Planet, Earth Institute, Columbia University, November 3, 2020. [[link](#)]
- [2] Raiders of the lost Bark, ScienceLine, July 29, 2018. [[link](#)]
- [1] Profile – 'For the Love of Mother Nature', Amrita Vishwa Vidyapeetham, July 30, 2012. [[link](#)]

Selected scientific conference presentations

2026

- [26] **Rao MP et al.** *Tropical forests are facing increasing risks of exposure to critical temperature thresholds*. 47th New Phytologist Symposium Extreme Heat: extending the thermal limits of life. Córdoba, Spain, June 2-5, 2026. **(talk)**

2025

- [26] **Rao MP et al.** *Atmospheric aridity decouples carbon assimilation and growth in temperate deciduous oaks*. Mary Anning Conference: Novel constraints on the coupling between the water and carbon cycles. Bordeaux, France, June 10-12, 2025. **(talk)**
- [25] **Rao MP et al.** *Aridity decouples carbon assimilation and growth in temperate deciduous oaks*. Missing links in drought research: linking plant physiology, soil hydrology, and climate science across scales. Monte Verità, Switzerland, March 2-7, 2025. **(poster + flash talk)**

2024

- [24] **Rao MP et al.** *Approaching a thermal tipping point in the Eurasian boreal forest at its southern margin*. The Great Thermal Bake-Off, August 9-12 2024, Flagstaff, USA. **(poster + flash talk)**
- [33] **Rao MP et al.** *Summer aridity decouples growth from carbon assimilation in temperate oaks*. European Geosciences Union (EGU) General Assembly, Vienna, Austria, April 14-19, 2024.

2023

- [32] †Klinek L, Au J, **Rao MP**, Wong CSY, Magney T. *Assessing Satellite GPP Products' Ability to Track Seasonal Changes in Sequoia sempervirens Photosynthesis*. American Geophysical Union (AGU) Fall Meeting, San Francisco, USA, December 11-15, 2023. **(talk)** † Student lead
- [31] **Rao MP et al.** *Summer aridity decouples growth from carbon assimilation in temperate oaks*. American Geophysical Union (AGU) Fall Meeting, San Francisco, USA, December 11-15, 2023. **(talk)**
- [30] **Rao MP et al.** *Approaching a thermal tipping point in the Eurasian boreal forest at its southern margin*. Uncertainties in Modelling Physical and Ecological Tipping Dynamics in the Earth System (TIPMIP), November 5-8, Templin, Germany. **(poster + flash talk)**
- [29] **Rao MP et al.** *A paired flux tower-dendrometer network to investigate forest carbon from assimilation to allocation to tree growth*. FLUXNET Meeting 2023, July 11-14, 2023, Brno, Czechia. **(poster + flash talk)**
- [28] **Rao MP et al.**, *Temporal decoupling between carbon assimilation and tree growth in temperate oaks*. European Geosciences Union (EGU), April 23-28 2023. **(poster)**
- [27] **Rao MP et al.**, *Decoupling between carbon assimilation and growth in temperate oaks*. VIII Congreso Forestal, Mendoza, Argentina, March 27-30, 2023. **(talk)**
- [26] **Rao MP et al.** *Temporal decoupling between carbon assimilation and tree growth in temperate oaks*. Vermut Biodiversity, CREAM, March 15, 2023, Bellaterra, Spain. **(talk)**

2022

- [25] **Rao MP** et al., *Asynchronous carbon assimilation and tree growth explains ring-width climate sensitivity of Eastern US temperate oaks*. American Geophysical Union (AGU) Fall Meeting, Chicago, USA, December 12-16, 2022. **(poster)**
- [24] **Rao MP** et al. *Rapidly approaching a thermal tolerance tipping point in the Eurasian boreal forest at its southern margins*. American Geophysical Union (AGU) Fall Meeting, Chicago, USA, December 12-16, 2022. **(poster)**
- [23] **Rao MP** et al. *Rapidly approaching a thermal tolerance tipping point in the Eurasian boreal forest at its southern margins*. Ecological Society of America (ESA) conference, Montréal, Canada August 14-19, 2022. **(talk)**
- [22] **Rao MP** et al. *The potential of tree-ring drought atlases for dating and provenancing archaeological timbers*. AmeriDendro, Montréal, Canada, June 27-30 2022. **(talk)**
- [21] **Rao MP** et al. *Asynchronous phenologies of photosynthetic carbon uptake and tree-growth in Northeastern US temperate oaks*. AmeriDendro, Montréal, Canada, June 27-30 2022. **(poster)**
- [20] ***Rao MP** et al. *The potential of tree-ring drought atlases for dating and provenancing archaeological timbers*. Forests to Heritage, Amsterdam, Netherlands, Apr 2022. **(*Invited talk)**
- [19] **Rao MP** et al. *Asynchronous phenologies of photosynthetic carbon uptake and tree-growth in Northeastern US temperate oaks*. UC Davis Postdoc Symposium, March 2022. **(talk)**
- [18] **Rao MP** et al. *Asynchronous phenologies of photosynthetic carbon uptake and tree-growth in Northeastern US temperate oaks*. American Association for Geographers, February 2022. **(talk)**

2021

- [17] ***Rao MP** et al. *Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and flood hazard frequency*. American Geophysical Union, December 2021. **(*Invited talk)**
- [16] **Rao MP** et al. *Asynchronous phenologies of photosynthetic carbon uptake and tree-growth in Northeastern US temperate oaks*. American Geophysical Union, Dec 2021 **(e-lightning poster)**
- [15] **Rao MP** et al. *Rapidly approaching a thermal tolerance tipping point in the Eurasian boreal forest at its southern margins*. 2nd International Conference of Young Scientists on Climate Change and Environment in Central and Northeast Asia, Ulaanbaatar, Mongolia, Nov 20, 2021 **(virtual talk)**.
- [14] **Rao MP** et al. *Seasonal changes in canopy vegetation at Black Rock Forest after oak loss derived from drone based remote sensing*. Black Rock Forest Symposium, June 28, 2021 **(virtual talk)**.
- [13] Passow M, Buckley B, Oelkers R, & **Rao MP**. *The Lamont-Doherty Tree-Ring Lab and Earth2Class Programs: Sharing Dendrochronology with Students and Teachers*. American Meteorological Society Annual Meeting, U.S.A., January 10-14, 2021. **(talk)**

2019

- [12] **Rao MP** et al. *Photosynthetic heat tolerance, light response, and respiration rates across gradients in the northwestern Mongolian boreal-steppe*. American Geophysical Union, San Francisco, U.S.A., December 9-13, 2019. **(poster)**.
- [11] **Rao MP** et al. *Six hundred years of reconstructed Brahmaputra River flow demonstrate long-term flood risk is substantially underestimated*. American Geophysical Union, San Francisco, U.S.A., December 9-13, 2019. **(talk)**

- [10] **Rao MP** et al. *Seasonal reconstructions of Brahmaputra River discharge and applications for monsoon flooding risk*. European Geosciences Union, Vienna, Austria April 7-12, 2019. **(talk)**.
- 2018**
- [9] **Rao MP** et al. *Sub-seasonal reconstructions of Brahmaputra River discharge Brahmaputra streamflow*. American Geophysical Union, Washington D.C., U.S.A., December 10-14, 2018. **(poster)**.
- [8] **Rao MP** et al. *Estimating variability in the volcanic forced climate response using key year resampling*. 10th World Dendro Conference, Thimpu, Bhutan, June 2-22, 2018. **(talk)**.
- [7] **Rao MP** et al. *Six centuries of Upper Indus Basin streamflow variability and its climatic drivers*. 10th World Dendro Conference, Thimpu, Bhutan, June 2-22, 2018. **(talk)**.
- [6] **Rao MP** et al. *Estimating the variability in volcanic forced climate response using key year resampling*. Volcanic Impacts on Climate and Society, Tucson, AZ, USA. January 12-14, 2018. **(lightning talk + poster)**.
- 2014-2017**
- [5] **Rao MP** et al. (2017). *Five centuries of tree-ring reconstructed streamflow and projections for future water risk over the Upper Indus Watershed*. American Geophysical Union, New Orleans, December 10-16, 2017 **(talk)**. [[link](#)]
- [4] Passow MJ, Takahashi T, Fiore AM, Clifton OE, Nitsche F, McManus JF, Winkler G, Jacobel A, Leland C, & **Rao MP** (2017). *Sharing Cutting-Edge Climate and Paleoclimate Research with Teachers and Students through Earth2Class*. American Meteorological Society (AMS), Seattle, WA, U.S.A., January 22-26, 2017 **(poster)**. [[link](#)]
- [3] **Rao MP** et al (2016). *European hydroclimate response to tropical volcanic forcing over the past millennium*.
- i. American Geophysical Union, San Francisco, CA, U.S.A., December 10-16, 2016 **(poster)**.
 - ii. Volcanic Impact on Climate and Society (VICS), Palisades, NY, U.S.A., June 6-8, 2016 **(talk)**
- [2] **Rao MP** et al. (2015). *Tree-rings as an effective paleoclimate proxy for independent validation of historical climate anomalies*. European Association for South East Asian Studies (EUROSEAS), Vienna, Austria, 11-15th August, 2015 **(talk)**.
- [1] **Rao MP** et al. (2014). *Tree-ring results from Southeast Asia: Myanmar and Vicinity*.
- i. Andalas University, Padang, Indonesia, June 10, 2014 **(talk)**.
 - i. Southern Institute of Ecology, Vietnam Academy of Science and Technology, June 4, 2014 **(talk)**.
 - iii. Atmospheric Circulation Reconstructions over the Earth (ACRE) Southeast Asia meeting, Kuala Lumpur, Malaysia, May 27-28, 2014 **(talk)**.

Leadership Positions

Representative, Campus Life Committee, for the Biology and Paleoenvironment Division and students of Department of Earth and Environmental Sciences, Lamont-Doherty Earth Observatory, Columbia University, (2015-2019, 5 years).

Co-editor and co-designer, magazine [hillScribe](#) Agenda for Survival, Centre for Science and Environment, New Delhi, June 2012.

Elected Chair, ChemAMRITA, student's representative body, Department of Chemical Engineering, Amrita School of Engineering, India, 2011-2012.

Co-editor, Amritadhwani, university magazine, Amrita School of Engineering, India, 2011-2012.

Elected *Student's Representative*, Class of 2012, Department of Chemical Engineering, Amrita School of Engineering, 2011-2012.

Workshops attended

- [10] Network-enabled understanding of plant hydraulics in a changing world, Indiana University - Bloomington, IN, USA, June 23-27, 2025
- [9] An Introduction to Synthetic Aperture Radar (SAR) and Its Applications, NASA's Applied Remote Sensing Training (ARSET). November 2024.
- [8] The Great Thermal Bake Off, Northern Arizona University, Flagstaff, AZ, USA. August 13-16, 2022.
- [7] As Open as Possible, As Closed as Necessary: Keep Calm and Learn How to Open Up Your Science. CREAM Watering Talents, March 7 & 9, 2023.
- [6] The 13th Annual Flux Course, Niwot Ridge, July 25-August 9, 2022
- [5] Dendrochronology Field Week, 10th World Dendrochronology Conference, Bhumthang, Bhutan, June 2-9, 2018.
- [4] Modelling Past Climate Change and Human Adaptation, The Ohio State University, USA, May 4-5, 2018
- [3] Innovative Teaching Summer Institute, Columbia University NY, USA, June 2017
- [2] Community Earth System Model (CESM) Tutorial, NCAR, Boulder, CO, USA. August, 8-12, 2016
- [1] Dendroecological Field Week, organised by Columbia University, Da Lat Vietnam, January 2015

Fieldwork Experience

Argentina, Bhutan, Costa Rica, India, Indonesia, Mexico, Mongolia, Spain, Sweden, United States of America, and Vietnam.

Dendro-archaeology dating and provenance

- [1] Terminal Warehouse, Chelsea, New York, USA for L&L Holding Company, LLC, September 2019

Outreach presentations to science teachers and educators

- [3] **Rao MP**. Teaching in the Hudson Valley, a training workshop for school teachers, July 26, 2017.
- [2] **Rao MP**, Bishop D, & Oelkers R. *More than How Old? Understanding Climate Change from Tree Rings?* Earth2Class Science workshop, April 8th, 2017. To create interactions between high school teachers of science to help them bring science to their class rooms.
- [1] **Rao MP** & Leland C. *Trees, Climate, and Societal Relevance: A Case Study in Mongolia*, Earth2Class Science workshop, September 20th, 2014. [[link](#)]

Community Outreach

- [5] Second Sundays: If a tree feels in a forest? **Rao MP**, Leland C, Gonzalez-Nayeck A, & Chen X, Pioneer Works, April 12, 2026 [[link](#)]
- [4] Science & Society: Do Forests Feel? **Rao MP**, Leland C, & Gonzalez-Nayeck A, Pioneer Works, April 9, 2026 [[link](#)]
- [3] Radio Interview with 'Science Studio' with Dr. Keith Pannell about Dendrochronology and my life and trajectory as a scientist. March 3, 2026 [[link](#)]

- [2] Organised multiple editions of Lamont-Doherty Earth Observatory's [Open House](#), (2012; 2014; 2016; 2017; 2018, 2019).
- [1] Conducted numerous outreach tours and workshops for high-school students, undergraduate college students, and the general public.
- [2] Rodríguez-Catón MR, Srur A, Gimenez M, & **Rao MP**. IANIGLA Abierto, September 27, 2024
- [1] **Rao MP** Climate Change: Past, Present, and Future. Amrita University, August 17, 2023.
Selected workshops and tours at Tree-Ring Laboratory, Lamont-Doherty Earth Observatory
- [33] **Rao MP**, Tree Ring Lab tour for Columbia University MPA-Environmental Science and Policy (40 students), July 8, 2026
- [32] **Rao MP**, Tree Ring Lab tour for Columbia University Department of Earth and Environmental Sciences undergraduate class titled Life System's class (10 students), April 23, 2026
- [31] **Rao MP**, Tree Ring Lab tour for Columbia University Department of Earth and Environmental Sciences undergraduate class titled Life System's class (10 students), April 22, 2026
- [30] **Rao MP**, Tree Ring Lab tour for MPA in Environmental Science and Policy (10 students), February 18, 2026
- [29] **Rao MP**, Tree Ring Lab tour for Science and Environmental Journalism (13 students), February 17, 2026
- [28] **Rao MP**, Tree Ring Lab tour for C²: Carbon & Climate Class (10 students), October 30, 2025
- [27] **Rao MP**, Tree Ring Lab tour for Scientists participating at the NSF Critical Zone All Hands Meeting. August 6, 2025.
- [26] **Rao MP**, Tree Ring Lab tour for 50 MPA Environmental Science and Policy students, June 30, 2025
- [25] **Rao MP** with Leland C. Lycee Francaise de NY, Tree Ring Lab and forest tour with coring demonstration and workshop (40 students), May 25, 2025
- [24] **Rao MP** with Leland C. Lycee Francaise de NY, Tree Ring Lab and forest tour with coring demonstration and workshop (40 students), May 23, 2025
- [23] **Rao MP** History of Climate Change, guest lecture trip (5 students), March 10, 2025
- [22] **Rao MP** Climate & Society class field trip (20 students), November 12, 2021.
- [21] **Rao MP** International Federation of Red Cross Red Crescent (IFRC) Climate Youth Scholars Program, September 23, 2019.
- [20] **Rao MP** St. Bernard School (10 students), May 22, 2019.
- [19] **Rao MP** with Rodriguez-Caton MR. Central American children in foster care at the Cayuga Center, NY (30 children), Ages 8-10 (in Spanish), May 20, 2019.
- [18] **Rao MP** with Leland C. High School group from Connecticut (15 students), March 20, 2019.
- [17] **Rao MP** Historical Geology Class field trip, Queens College (20 students), November 9, 2018.
- [16] **Rao MP** with Leland C. Workshop for staff at the Centre of Sustainable Development, Columbia University to help them develop science outreach modules on dendrochronology for students in rural India to work towards meeting UN Sustainable Development Goals, October 18, 2018.
- [15] **Rao MP** Undergraduate Environmental Science class field trip, Queens College (15 students), July 25, 2018.
- [14] **Rao MP** with Oelkers R. MS 302, Group 2 from Sophie Gerson Healthy Youth middle school, NY (50 students), May 15, 2018.

- [13] **Rao MP** with Oelkers R. MS 302, Group 1 from Sophie Gerson Healthy Youth middle school, NY (50 students), March 28, 2018.
- [12] **Rao MP** seniors' group from The Chappaqua Library, NY, March 16, 2018.
- [11] **Rao MP** with Leland C & Oelkers R. Shadow program for 2 female undergraduate students from Bates College, ME who were considering applying to graduate school, February 22, 2018.
- [10] **Rao MP** 'Meet-a-scientist' interaction and tree-ring workshop with a group of 9 home schooled girls from Highland, NJ (aged 6-14 years), February 21, 2018
- [9] **Rao MP** with Oelkers R & Leland C. Luisa Dessus Cruz, NY (50 students), January 29, 2018.
- [8]. **Rao MP** talk and workshop for a group of high school students (20 students), August 17, 2017.
- [7] **Rao MP** with Bishop D. St. Thomas Aquinas College, NY (33 students), July 27, 2017.
- [6] **Rao MP** with Bishop D. Hewitt School an independent K-12 girls' school in New York City (15 students), May 31, 2017.
- [5] **Rao MP** with Leland C and Bishop D. 5th grade students from St. Bernard School (30 students), May 3, 2017
- [4] **Rao MP** pre-college science and math STEM Scholars program (32 students), July 6, 2016
- [3] **Rao MP** meet-a-scientist workshop on dendrochronology for 6 middle school students, April 7, 2016
- [2] **Rao MP** middle school group from the Lawrenceville School (38 students), July 16, 2015
- [1] **Rao MP** with Leland C and Buckley B. Climate Stewards Club from the Pascack Hills High School in Montvale NJ, November 7, 2014

Languages

Proficient: English, Spanish, Hindi, Malayalam, Catalan, and Urdu

Basic: French, Tamil, Kannada

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