

Curriculum Vitae
Preeti Rao, rpreeti@umich.edu

Research interests and expertise

Geospatial analytics, spatiotemporal analysis, geo-computation, spatially-distributed modelling, data science, coupled human-natural ecosystems, greenhouse gas emissions

Education

- May 2013 Department of Earth & Environment, Boston University, Boston, USA
Ph.D. in Geography
- March 2007 Dept of Geography & Environment, University of Southampton, UK; Dept of Physical Geography & Ecosystem Science, Lund University, Sweden; and Faculty of Geo-Information Science & Earth Observation, University of Twente, The Netherlands
Erasmus Mundus M.Sc. in Geo-Information Science & Earth Observation for Environmental Modeling and Management
- March 1995 Indian Institute of Forest Management, Bhopal, India
Masters in Natural Resource Management

Professional Experience

- 2017 - Research Associate and Lab Manager, Jain Lab,
School for Environment and Sustainability (SEAS), University of Michigan
- Remote-sensing based analyses of crop types, zero-till fields
 - Co-advising 4 graduate students
- 2016 - 2017 Research Fellow
SEAS, University of Michigan, Ann Arbor MI
- Human-appropriated NPP in the forests of the Great Lakes Region
 - Understanding spatio-temporal trends in the phenology of Mongolian ecosystems
 - Led two proposals for the NASA CMS and NASA Food Security calls for research funding
- 2013 - 2016 Postdoctoral Research Fellow
Jet Propulsion Laboratory Caltech, Pasadena CA
- Developed innovative fossil fuel carbon emissions data products for on-road and airport sectors at the spatial scale of buildings and streets and for every hour of the year
 - Analyzed spatio-temporal trends in ground water from the GRACE satellite
 - Developed Vapor Pressure Deficit and other drought indicators from the AIRS satellite
- 1999 – 2005 Senior Project Officer
Foundation for Ecological Security, Anand, India (<http://fes.org.in/>)
- Played a key role in the establishment and management of GIS lab.
 - Developed, managed, and analyzed spatial databases using GIS and remote sensing for community-based watershed management and natural resource conservation projects in six different project locations.
- 1997 – 1999 Research Associate
NSF-funded research study on property regimes and deforestation in central Himalaya, Institute of Rural Management Anand, India

Curriculum Vitae
Preeti Rao, rpreeti@umich.edu

- Integrated field data on vegetation status and socio-economic characteristics of forest user groups, and remotely sensed vegetation indices with the help of GIS to understand the determinants of the collective governance of forests in Indian Himalayas.

Research grants & fellowships

- Co-I in NASA ACCESS project (\$919,630) on Methane Source Finder for California (2016-2017)
- California Institute of Technology Postdoctoral Scholar (Oct 2013 – Nov 2016)
- Deland Award (\$3,650) from the Arnold Arboretum of Harvard University, 2011
- Biogeoscience Research Award (\$500), Boston University, 2010
- Teaching and Research fellowships, Boston University, 2008-2012
- Erasmus Mundus Scholarship of European Union for GEM M.Sc., 2005-2007
- Fulbright (Hubert H. Humphrey) fellowship for mid-career professional program in Cornell University, 2005-2006 (declined)
- Fellowship from the Ministry of Environment, Government of India, 1993-1995

Teaching & Training Experience

- Teaching fellow for 7 semesters for different Earth Science, GIS and remote sensing courses at Boston University
- Designed and developed lab curriculum and material for two Earth science courses
- Designed and conducted GIS training programs for field staff at an Indian non-profit

Student Advising and Mentoring

- Currently co-advising 4 graduate students in the Jain lab at SEAS, 2017 onwards
- Mentored Prof Bill Currie's graduate student, 2016-2017
- Co-mentor in NASA's DEVELOP program at JPL Caltech, 2014-2016
- Co-advised an undergrad student's summer project as a grad student in Boston University, 2010-2012

Computing and technical skills

- Statistics and computation: R (including spatial, GPU packages), Python, Matlab
- Cloud computing: Javascript- and python-based Google Earth Engine, GIS-related APIs and Amazon Web Services
- GIS and Remote Sensing: ArcGIS, ArcSDE, Python, OSGeo, GDAL, ENVI/IDL, Erdas Imagine/EML, R, QGIS, GeoDa, and Idrisi
- Remotely sensed data: Landsat, SPOT, MODIS, IRS, IKONOS, Hyperion, LiDAR; GRACE, AIRS, Sentinel-2, Planet, and elevation data from SRTM, GTOPO-30 and Aster
- Operating systems: UNIX, Windows, Linux, Mac
- Field data collection using radiometer, hand-held spectrometer and GPS, isotopic analysis, Burkard spore and pollen sampler
- GIS lab management

Reviewer

Environmental Science and Technology, Ecological Applications, Trees

Peer-Reviewed Publications

- Carranza, V, Rafiq, T, Frausto-Vicencio, I, Hopkins, FM, Verhulst, KR, **Rao, P**, et al. (2018). *Vista-LA: Mapping methane-emitting infrastructure in the Los Angeles megacity*. Earth Syst. Sci. Data, 10, 653–676, 2018
- Decina, SM, Templer, PH, Hutyra, LR, Gately, CK, **Rao, P** (2017). *Variability, drivers, and effects of atmospheric nitrogen inputs across an urban area: emerging patterns among human activities, the atmosphere, and soils*. Science of the Total Environment 609, 1524-1534
- Verhulst, KR, Karion, A, Kim, J, Salameh, PK, Keeling, RF, Newman, S, Miller, J, Sloop, C, Pongetti, T, **Rao, P**, et al. (2017). *Carbon dioxide and methane measurements from the Los Angeles Megacity Carbon Project—Part 1: calibration, urban enhancements, and uncertainty estimates*. Atmospheric Chemistry and Physics: 17(13), 8313-8341.
- **Rao, P**, Gurney, KR, Patarasuk, R, et al. (2017). *Spatio-temporal variations in on-road CO₂ emissions in the Los Angeles Megacity*. AIMS Geosciences: 3(2), 239-267.
- Oda, T, Lauvaux, T, Lu, D, **Rao, P**, et al. (2017). *On the impact of granularity of space-based urban CO₂ emissions in urban atmospheric inversions: A case study for Indianapolis, IN*. Elem Sci Anth, 5: 28, DOI: <https://doi.org/10.1525/elementa.146>
- Feng, S, Lauvaux, T, Newman, S, **Rao, P**, et al. (2016). *LA Megacity: a High-Resolution Land-Atmosphere Modelling System for Urban CO₂ Emissions*. Atmospheric Chemistry and Physics: 16(14):9019-9045, DOI: 10.5194/acp-16-9019-2016.
- Wong, KW, Pongetti, TJ, Oda, T, **Rao, P**, et al. (2016). *Monthly trends of methane emissions in Los Angeles from 2011 to 2015 inferred by CLARS-FTS observations*. Atmospheric Chemistry and Physics, doi:10.5194/acp-2016-232.
- Newman, S, Xu, X, Gurney, KR, Hsu, YK, Li, KF, Jiang, X, Keeling, R, Feng, S, O’Keefe, D, Patarasuk, R, Wong, KM, **Rao, P**, et al. (2016). *Toward consistency between bottom-up CO₂ emissions trends and top-down atmospheric measurements in the Los Angeles megacity*. Atmospheric Chemistry and Physics 16: 3843-3863. DOI:10.5194/acp-16-3843-2016.
- Patarasuk, R, Gurney, KR, O’Keefe, D, Song, Y, Huang, J, **Rao, P**, et al. (2016). *Application of high-resolution fossil fuel CO₂ emissions quantification to urban climate policy in Salt Lake County, Utah USA*. Urban Ecosystems: 1-27. DOI: 10.1007/s11252-016-0553-1.
- **Rao, P**, Hutyra, LR, Raciti, SM, & Templer, PH (2014). *Atmospheric nitrogen inputs and losses along an urbanization gradient from Boston to Harvard Forest, MA*. Biogeochemistry 121: 229–245. DOI: 10.1007/s10533-013-9861-1.
- **Rao, P**, Hutyra, LR, Raciti, SM, & Finzi, AC (2013). *Field and remotely sensed measures of soil and vegetation carbon and nitrogen across an urbanization gradient in the Boston Metropolitan Area*. Urban Ecosystems 16(3): 593-616. DOI: 10.1007/s11252-013-0291-6.
- Raciti, SM, Hutyra, LR, **Rao, P**, & Finzi, AC (2012). *Inconsistent definitions of 'urban' result in different conclusions about the size of urban carbon and nitrogen stocks*. Ecological Applications 22(3): 1015-1035.
- **Rao, P** (2007). *Remote Sensing for assessing vegetational dynamics and productivity of a peatland in southern Sweden*. http://www.itc.nl/library/papers_2007/msc/gem/rao.pdf

Select Presentations/Talks

- Patarasuk, R, **Rao, P**, Gurney, KR et al. *Using the Hestia bottom-up FFCO₂ emissions to identify drivers and hotspots in urban areas*. American Geophysical Union in San Francisco, CA. December 2015. [Invited]

Curriculum Vitae
Preeti Rao, rpreeti@umich.edu

- Reager, J, **Rao, P**, Famiglietti, J, Turmon, M. *Improved Uncertainty Quantification in Groundwater Flux Estimation Using GRACE*. American Geophysical Union in San Francisco, CA. December 2015. [Invited]
- Feng, S, Lauvaux, T, Newman, S, **Rao, P**, et al. *LA Megacity: An Integrated Land-Atmosphere System for Urban CO₂ Emissions*. Poster presented at American Geophysical Union in San Francisco, CA. American Geophysical Union in San Francisco, CA. December 2015.
- **Rao, P**, Gurney, KR, Patarasuk, R, Song, Y, Miller, CE, Duren, RM, & Eldering, A. *Spatio-temporal variations in on-road vehicle FFCO₂ emissions in the Los Angeles megacity*. Carbon Club talk in JPL/Caltech, Pasadena, CA. October 2015. [Invited]
- Duren, RM, Gurney, KR, Hutyra, LR, Miller, CE, Kort, E, **Rao, P**, & Eldering, A. *Characterizing the carbon emissions of megacities*. American Geophysical Union in San Francisco, CA. December 2014.
- **Rao, P**. *Carbon and nitrogen along Boston's urbanization gradient: an integrated approach using field, remotely sensed and socioeconomic data*. Caltech Yuk Lunch Seminar in Pasadena, CA. November 2013. [Invited]
- **Rao, P**, Hutyra, LR, Raciti, SM, & Templer, PH. *Atmospheric nitrogen inputs and losses along an urbanization gradient in Boston*. Harvard University weekly research seminar, Arnold Arboretum in Boston. February 2013. [Invited]
- Hutyra LR, Raciti, SM, **Rao, P**, Templer, PH, & Finzi, AC. *Terrestrial carbon dynamics across gradients of urbanization*, Urbanization and Global Environmental Change Meeting, Phoenix, AZ, October, 2010.

Voluntary Work

- ECA PI Treasurer & parent volunteer at the Early College Alliance@ Eastern Michigan University (2017-2020)
- Volunteered for various events at JPL (2013-2015).
- Sponsorship Director in AYSO South Pasadena, CA (2013-2014).
- Managed and collected weekly pollen data for 3 seasons using Burkard spore and pollen sampler for Prof Christine Rogers, University of Massachusetts, Amherst (2010-2012).
- Volunteered frequently in my son's class room as room parent, gave talks on various topics related to Geography, helped publish students' stories.
- Helped manage the parent database for distributing the school newsletter and organize school events (2007-2012). Helped teach free computer literacy classes for the poor and disadvantaged organized by Saheli, a women's collective in Boston (2007).
- Designed and created maps using ArcGIS for trekking enthusiasts and local communities involved in home-based tourism in Indian Himalayas (1997-2005).