NEHA HUNKA (maiden name: Neha Joshi)

ASSISTANT RESEARCH PROFESSOR, DEPARTMENT OF GEOGRAPHICAL SCIENCES,
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Dr. Neha Hunka is an Assistant Research Professor at the University of Maryland (UMD). She earned a PhD in 2016 in radar remote sensing and forest loss estimation. She is currently funded by NASA to coordinate the Committee of Earth Observation Satellites (CEOS) Biomass Harmonization activity. The goal of her research is to facilitate the uptake of satellite-based maps of forest carbon/biomass by countries for policy reporting within frameworks of the United Nations Framework Convention on Climate Change (UNFCCC). She works directly with CEOS agencies and several national governments. She is also co-leading the Global Forest Observations Initiative (GFOI) R&D Biomass/Emissions Factors Working Group, the CEOS Land Product Validation protocol for Biomass, and the NASA Carbon Monitoring Systems Biomass Working Group. She is a designated user of the ESA-NASA MAAP cloud-computing platform, promoting open-science algorithms for NISAR and BIOMASS mission data. She has previously been a scientific lead and team member in ESA projects and plays an important role for linking space agencies to global climate policy today.

EDUCATIONAL BACKGROUND

2013 – 2016	PhD – Spaceborne Radar for mapping Forest and Land Use changes	University of Copenhagen, Denmark
2010 – 2011	M.Sc. Carbon Management	University of Edinburgh, UK
2007 – 2010	B.Sc. Earth and Space Sciences	Jacobs University Bremen, Germany

EMPLOYMENT

May 2022 – current	Assistant Research Professor	University of Maryland, USA
June 2016 – May 2022	Remote Sensing Specialist	GISAT s.r.o., Czech Republic
August 2017 – August 2020 (part-time)	Postdoctoral Researcher Associate	International Institute for Applied Systems Analysis (IIASA), Austria
January 2012 – December 2012	GIS and Remote Sensing Analyst	Ecometrica, UK
September 2011 - December 2012	REDD+ Research Assistant	University of Edinburgh, UK

SELECTED PROJECT EXPERIENCE

University of Maryland (2022 – current)

- Science-PI (principal investigator) on NASA Carbon Monitoring Systems grant: Harmonizing Space-based Biomass Maps with Policy Needs - Development of National Prototypes for the UNFCCC Global Stocktake.
- Co-I (co-investigator) NASA Continued Scientific and Data Support of the NASA-ESA Multi-Mission Algorithm and Analysis Platform grant: Supporting tools and scripts to ease utility of GEDI, and future NISAR and BIOMASS data.
- Co-I (co-investigator) on UN FAO Global Transformation of Forests for People and Climate project: Focus Area 1 - Generating new datasets on forest aboveground biomass with NASA GEDI.
- Co-I (co-investigator) on NASA Ecological Forecasting grant: Earth Observation-based restoration and monitoring in Coastal and Forested Protected Areas of West Africa grant.
- Co-I (co-investigator) on CNPq - Brazilian Council of Research grant, Tropical Biomass & Carbon project.

Commercial Sector (2016 – current)

- Scientific Lead for ESA Sentinel-1 for Science Amazonas (S14Amazonas) project. Developed an operational-level multi-temporal forest loss detection algorithm using Sentinel-1 image time series.
- Scientific team member for ESA Sentinels for Common Agricultural Policy (Sen4CAP). Designed operational algorithms for monitoring grassland and agriculture cycles using Sentinel-2 and Sentinel-1 InSAR time series.
- Technical team member for GEOGLAM SIGMA project. Developed methods and the demonstration of a QGIS plugin for the collection of unbiased samples and summary statistics on cropland areas.
- Operation and implementation team member in ESA Earth Observation for Sustainable Development (EO4SD) Urban project: Developed a capacity building plan for training in GIS and remote sensing for urban applications.

RECENT PANELS, WORKSHOPS AND TEACHING EXPERIENCE

October 2024	Co-organizer and presenter at the **GFOI R&D/MGD workshop** on enhancing the informed use of biomass maps in measurement reporting and verification (MRV) procedures in Potsdam, Germany
July 2024	Panelist on the **Intergovernmental Panel on Climate Change (IPCC) Expert Meeting** on reconciling land emission, representing the Earth Observation community, EC JRC, Ispra, Italy
July 2024	Presenter of geostatistical methods for integration of national forest inventories (NFIs) with Earth Observation datasets (NASA GEDI and ESA CCI Biomass) at the **USGS SilvaCarbon 2024 CEOS Workshop** on Connecting Southeast Asia with Space Agencies, Phnom Penh, Cambodia
June 2024	Session lead on the use of NASA GEDI data in forest monitoring systems, as a part of the Global Transformation of Forests for People and Climate: A focus on West Africa project, **United Nations Food and Agriculture Organization (UN FAO)**, Accra, Ghana
March 2024	Organizer and scientific lead of the **CEOS Biomass for Policy workshop**, with the objective of collaboratively reviewing approaches and codes to integrate National Forest Inventory (NFI) data with space-based forest height and biomass maps, Reston, USA
August 2023	Panelist and reviewer for **NASA Earth Venture Suborbital (EVS-4) program**, evaluating proposals for airborne missions for studies of fire-induced clouds, Arctic coastal change, air quality, landslide hazards, shrinking glaciers, and emissions from agricultural lands.
February 2023	Session lead in capacity building workshop on the use of space-based biomass maps for policy at the **USGS SilvaCarbon 2023 CEOS Workshop** on Uptaking Global AFOLU Datasets
October 2022	Course instructor and lecturer on **Introduction to Radar and LiDAR Remote Sensing** (Doctoral and Masters level - GEOG 471: Technologies for Computational Earth Observation) at the University of Maryland, College Park, USA.
July 2018	Course instructor at **SPatial LITeracy 2018 on Synthetic Aperture Radar** for land mapping, Prague, Czech Republic.
November 2017	Course instructor for **Practical Use of SAR technologies** at Agresta S. Coop., Madrid, Spain
January 2013 – March 2016	Course instructor and lecturer on **Introduction to Radar and LiDAR Remote Sensing** (Bachelors and Masters level) at the University of Copenhagen, Copenhagen, Denmark.

PUBLICATIONS, WORKSHOPS AND SCIENTIFIC CONTRIBUTIONS

Relevant peer-reviewed Publications

- **Neha Hunka**, Laura Duncanson, John Armston, R Dubayah, Sean Healey, Maurizio Santoro, Paul May et al. (2024). Intergovernmental Panel on Climate Change (IPCC) Tier 1 forest biomass estimates from Earth Observation. Scientific Data, 11, 1127. https://doi.org/10.1038/s41597-024-03930-9.
- Miroslav Honzák, Geoffrey Roberts, Bradley J Cosentino, Joseph O Sexton, Harrison McKenzie-McHarg, John W Wilson, Min Feng, Alison Thieme, **Neha Hunka** and David Will (2024) Toward the quantification of the climate co-benefits of invasive mammal eradication on islands: A scalable framework for restoration monitoring. Environmental Research Letters, 19 114018, DOI: https://doi.org/10.1088/1748-9326/ad77b7.
- Ben Poulter, Osamu Ochiai, Frank Martin Siefert, Clement Albergel, Stephen Briggs, Mark Dowell, Laura Duncanson, Sven Gilliams, Nancy Harris, Martin Herold, **Neha Hunka** et al. (2023) CEOS Roadmap for Space-Based Support of Agriculture, Forestry and Other Land Use (AFOLU) Emissions and Removals of Greenhouse Gases (V1.0). CEOS (2023).
- **Neha Hunka**, Maurizio Santoro, John Armston, Ralph Dubayah, Ronald McRoberts et al. (2023). On the NASA GEDI and ESA CCI biomass maps: aligning for uptake in the UNFCCC global stocktake. In Environmental Research Letters (Vol. 18, Issue 12, p. 124042), DOI: https://doi.org/10.1088/1748-9326/ad0b60.

- **Neha Joshi**, Edward T. A. Mitchard, Matthew Brolly, Johannes Schumacher, Alfredo Fernández-Landa, et al. (2016). Understanding 'saturation' of radar signals over forests. Scientific Reports, 8, 3505, DOI: https://doi.org/10.1038/s41598-017-03469-3.

- **Neha Joshi**, Matthias Baumann, Andrea Ehammer, Rasmus Fensholt, et al. (2016). A Review of the Application of Optical and Radar Remote Sensing Data Fusion to Land Use Mapping and Monitoring. Remote Sensing, 8, 70, DOI: https://doi.org/10.3390/rs8010070. Received the MDPI Remote Sensing 10th Anniversary Best Paper Award (https://www.mdpi.com/2072-4292/11/15/1790/html)

- **Neha Joshi** (2016). Nuts about Gold: Competition for land in Madre de Dios, Peru. Chapter 7 in Niewöhner J, Bruns A, Haberl H, Hostert P, Krüger T, Lauk C, Lutz J, Müller D, Nielsen J (eds) Land use competition. Ecological, economic and social perspectives. Human-Environment Interactions. Springer, Dordrecht https://link.springer.com/chapter/10.1007/978-3-319-33628-2_7.

- **Neha Joshi**, Edward TA Mitchard, Natalia Woo, Jorge Torres, et al. (2015). Mapping dynamics of deforestation and forest degradation in tropical forests using radar satellite data. Environmental Research Letters, 10 034014, DOI: https://doi.org/10.1088/1748-9326/10/3/034014.

- **Neha Joshi**, Edward TA Mitchard, Johannes Schumacher, Vivian Kvist Johannsen, et al. (2015). L-Band SAR **Backscatter** Related to Forest Cover, Height and Aboveground Biomass at Multiple Spatial Scales across Denmark. Remote Sensing, 7, 4442-4472, DOI: https://doi.org/10.3390/rs70404442.

- Casey M Ryan, Nicholas J Berry, **Neha Joshi** (2014). Quantifying the causes of deforestation and degradation and creating transparent REDD+ baselines: A method and case study from central Mozambique. Applied Geography, 53, 45-54, DOI: https://doi.org/10.1016/j.apgeog.2014.05.014.

- Alasdair JR Rideout, **Neha Joshi**, Karin M Viergever, Mark Huxham, and Robert A Briers (2013). Making predictions of mangrove deforestation: a comparison of two methods in Kenya. Global Change Biology, 19(11), DOI: https://doi.org/10.1111/gcb.12176.

- Sophie Bontemps, **Neha Joshi**, Nicolas Bellemans, Philippe Malcorps, Corrado Avolio, Katja Bajec, **Cosmin** Cara, Laura de Vendictis et al. (2019). Sen4CAP - Sentinels for Common Agricultural Policy Design Justification File ATBD for L4C agricultural monitoring product (http://esa-sen4cap.org/sites/default/files/Sen4CAP_DDF_v1.2_AgriPractices.pdf).

Relevant Pre-prints and Articles in Review/Revision

- **Neha Hunka**, Paul May, Chad Babcock, José Armando Alanís de la Rosa, Maria de los Ángeles Soriano-Luna, Rafael Mayorga Saucedo, John Armston et al. (*in revision*). National forest biomass assessments enhanced with Earth Observation to aid climate policy needs. Submitted to Remote Sensing of Environment, Pre-print available at http://dx.doi.org/10.2139/ssrn.4910141.

- Benjamin Poulter, Guillermo Murray-Tortarolo, Daniel J. Hayes, Philippe Ciais, Robbie M. Andrew, Ana Bastos, Brendan Byrne…**Neha Hunka** et al. (*in review*). The North American Greenhouse Gas Budget: emissions, removals, and integration for CO_2, CH_4, and N_2O (2010-2019): Results from the Second REgional Carbon Cycle Assessment and Processes Study (RECCAP2). Submitted to Global Biogeochemical Cycles.

Published Datasets and Public Code Repositories

- **Neha Hunka**, Laura Duncanson, John Armston, R Dubayah, Sean Healey, Maurizio Santoro, Paul May et al. (2024). Classification of Global Forests for IPCC Aboveground Biomass Tier 1 Estimates, 2020. ORNL DAAC, Oak Ridge, Tennessee, USA. DOI: https://doi.org/10.3334/ORNLDAAC/2345

- **Neha Hunka**, Rajat Shinde, Alex Mandel, and Laura Duncanson. "Global Forest Classification for Intergovernmental Panel on Climate Change (IPCC) Tier 1 Natural Forest Biomass Estimates". Zenodo, August 20, 2024. DOI: https://doi.org/10.5281/zenodo.13346188

- **Neha Hunka**, Paul May, and Laura Duncanson. "Comparison of NFI-based and EO-based Mean Forest Biomass Estimates: Fay-herriot Small Area Estimation". Environmental Research Letters. Zenodo, November 15, 2023. DOI: https://doi.org/10.5281/zenodo.10137632.

- Open-science CEOS Biomass Harmonization Public Repository: https://github.com/CEOSBiomassHarmonization/NASA_CMS/tree/main/NASA_CMS_2023

Recent Invited Talks and Conference Proceedings

- **Neha Hunka** (2024).
  - Intergovernmental Panel on Climate Change (IPCC) Tier 1 forest biomass estimates from Earth Observation.
  - National Forest Inventories and Earth Observation: Can a geostatistical approach fulfill countries' policy reporting needs?

  9-13 September 2024, ForestSAT, Rotorua, Aotearoa New Zealand
- **Neha Hunka** (2023). NASA GEDI Science Team Meeting: How may NASA GEDI and ESA CCI Biomass of aboveground biomass contribute to the UNFCCC GlobalStocktake of 2028, Riverdale, Maryland, USA
- Laura Duncanson and **Neha Hunka** (2024 and 2023). CEOS Strategic Implementation Team Technical Workshop (SIT TW): Harmonizing Biomass Maps with Policy Needs: Development of National Prototypes for the Global Stocktake, ESA ESRIN, Frascati, Italy (2023) and Sydney, Australia (2024).
- **Neha Hunka** (2023). International scientific workshop: The future of land monitoring – technologies, trends, transparency? Center for International Forestry Research (CIFOR), 5 June 2023, Bonn, Germany.
- **Neha Hunka** (2022). EEBIOMASS 6th virtual workshop on "Calibration/ Validation": Biomass harmonization activities and discussion. European Space Agency (ESA), 24 November, Jena, Germany.
- **Neha Hunka** (2022). ESA Living Planet Symposium: Interactive display - Forest and carbon loss in the Amazon basin with the Sentinel-1 time series. 23–27 May 2022 in Bonn, Germany.
- **Neha Joshi** and Edward TA Mitchard (2015). Deforestation and forest degradation in tropical forests using ALOS PALSAR. In: The 2nd PI Workshop for ALOS-2. Tokyo, Japan.

CO-LEAD OF INTERNATIONAL SCIENTIFIC WORKING GROUPS

Guiding discussions and facilitating the exchange of knowledge between international research groups and policy bodies:

- Global Forest Observations Initiative (GFOI) R&D Biomass/Emissions Factors Working Group (https://gfoi-rd.gfz-potsdam.de/)
- CEOS Land Product Validation Biomass Working Group (https://lpvs.gsfc.nasa.gov/AGB/AGB_home.html)
- NASA Carbon Monitoring Systems Biomass Working Group (https://carbon.nasa.gov/wg_cms.html)

INVITED GUEST EDITOR AND REVIEWER FOR ACADEMIC JOURNALS

- Elsevier Forest and Ecology Management: Special Issue Guest Editor for "Application of structural forest indicators from spaceborne lidar to support global conservation, forest management, carbon monitoring systems and climate change mitigation planning"
- MDPI Remote Sensing: Special Issue Guest Editor for "Forest Biomass and Carbon Observation with Remote Sensing"
- Big Earth Data (https://www.tandfonline.com/journals/tbed20)
- Remote Sensing of Environment (https://www.sciencedirect.com/journal/remote-sensing-of-environment)
- Environmental Research Letters (https://iopscience.iop.org/journal/1748-9326)
- Earth Science Informatics (https://link.springer.com/journal/12145)
- Ecological Indicators (https://www.sciencedirect.com/journal/ecological-indicators)
- Applied Geography (https://www.sciencedirect.com/journal/applied-geography)

MEDIA COMMUNICATION

- European Space Agency (ESA): Using a data cube to monitor forest loss in the Amazon (https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-1/Using_a_data_cube_to_monitor_forest_loss_in_the_Amazon)
- National Aeronautics and Space Administration (NASA): NASA-Funded Research Works to Harmonize Biomass Maps (https://www.earthdata.nasa.gov/news/feature-articles/nasa-funded-research-works-harmonize-biomass-maps)
- National Aeronautics and Space Administration (NASA): Summary of the 2023 GEDI Science Team Meeting (https://science.nasa.gov/science-research/earth-science/summary-of-the-2023-gedi-science-team-meeting/)
- University of Maryland Geographical Sciences: New Research Offers Streamlined Way to Assess Forests for Climate Policy (https://geog.umd.edu/news/new-research-offers-streamlined-way-assess-forests-climate-policy)

OTHER SCHOLARSHIPS, RESEARCH FELLOWSHIPS AND AWARDS

- MDPI Remote Sensing 10th Anniversary Best Paper Award (USD 400) (https://www.mdpi.com/2072-4292/11/15/1790)
- Doctoral research fellowship, University of Copenhagen (USD 540,000)
- Post-graduate fellowship grant, University of Edinburgh (USD 7000)
- Full scholarship for bachelor's degree, University of Bremen (USD 53,000)
- Member of President's List for Academic Excellence, University of Bremen
- Full scholarship for International Baccalaureate Studies, United World College (USD 30,000)