Stanford

Alex Hedgpeth

Postdoctoral Scholar, Earth System Science

Bio

BIO

Alexandra Hedgpeth is a biogeochemist whose research explores how soil carbon cycling in peatlands responds to environmental change. Her work focuses on understanding the mechanisms that regulate carbon storage and greenhouse gas production in both tropical and boreal wetlands, with a particular emphasis on the vulnerability of deep, ancient carbon to modern surface inputs and hydrologic shifts.

Through her Ph.D. research at the University of California, Los Angeles, Alex has developed and applied novel isotopic and geochemical approaches —including implementing radiocarbon dating, stable isotope analyses, and high-resolution molecular characterization—to trace the sources and fates of carbon in peat soils. Her fieldwork spans a range of ecosystems, from ombrotrophic bogs in the Arctic to saturated tropical peat domes in Central America. This comparative framework allows her to identify unifying controls on carbon preservation and loss across climate zones.

Alex's research integrates field measurements, laboratory experiments, and synthesis of global datasets. She is a key contributor to multi-institutional efforts to model peatland carbon cycling under climate change scenarios, including DOE- and NSF-supported initiatives. Her work helps clarify the role of peatlands as both long-term carbon sinks and potential sources of atmospheric CO# and CH# under future disturbance.

In addition to her scientific contributions, Alex is committed to collaborative, interdisciplinary research and has worked closely with partners at national laboratories, the Smithsonian Tropical Research Institute, and international data synthesis networks. She is especially interested in questions with high uncertainty and high relevance to climate feedbacks—such as thresholds in biogeochemical function and the persistence of deep soil carbon under hydrologic change.

STANFORD ADVISORS

- Rob Jackson, Postdoctoral Faculty Sponsor

Publications

PUBLICATIONS

- **From the top: surface-derived carbon fuels greenhouse gas production at depth in a peatland** *BIOGEOSCIENCES*
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- **Root Characteristics Vary with Depth Across Four Lowland Seasonal Tropical Forests** *ECOSYSTEMS*
  Cordeiro, A. L., Cusack, D. F., Dietterich, L. H., Hockaday, W. C., Mcfarlane, K. J., Sivapalan, V., Hedgpeth, A., Neupane, A., Colburn, L., Konwent, W., Oppler, G., Reu, J. C., Valdes, et al

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- **High methane concentrations in tidal salt marsh soils: Where does the methane go?** *Global change biology*
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  2024; 30 (1): e17050

- **Effects of experimental and seasonal drying on soil microbial biomass and nutrient cycling in four lowland tropical forests** *BIOGEOCHEMISTRY*
  Dietterich, L. H., Bouskill, N. J., Brown, M., Castro, B., Chacon, S. S., Colburn, L., Cordeiro, A. L., Garcia, E. H., Gordon, A., Gordon, E., Hedgpeth, A., Konwent, W., Oppler, et al
  2022; 161 (2): 227-250

- **Age and chemistry of dissolved organic carbon reveal enhanced leaching of ancient labile carbon at the permafrost thaw zone** *BIOGEOSCIENCES*
  McFarlane, K. J., Throckmorton, H. M., Heikoop, J. M., Newman, B. D., Hedgpeth, A. L., Repasch, M. N., Guilderson, T. P., Wilson, C. J.
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- **Reducing climate impacts of beef production: A synthesis of life cycle assessments across management systems and global regions.** *Global change biology*
  Cusack, D. F., Kazanski, C. E., Hedgpeth, A., Chow, K., Cordeiro, A. L., Karpman, J., Ryals, R.
  2021; 27 (9): 1721-1736

- **Expert assessment of future vulnerability of the global peatland carbon sink** *NATURE CLIMATE CHANGE*
  Loisel, J., Gallego-Sala, A., Amesbury, M. J., Magnan, G., Anshari, G., Beilman, D. W., Benavides, J. C., Blewett, J., Camill, P., Charman, D. J., Chawchai, S., Hedgpeth, A., Kleinen, et al
  2021; 11 (1): 70-+