

Research interests

Earth system sciences:

- Atmosphere – Cryosphere – Hydrosphere interactions
- Regional hydroclimates
- Water and energy budgets

High-altitude climates:

- Glacier dynamics and glacio-hydrology
- Mountain water resources
- Snow processes
- Glacial lake outburst floods

Climate sciences:

- Climate variability and predictability
- Climate extremes

Hydrologic sciences:

- Terrestrial hydrology
- River systems and inland water bodies

Education

- 2018 – 2022 **Ph.D. Climate and Space Sciences**, University of Michigan Ann Arbor (UMich), US
Dissertation: *A Study on the Atmospheric, Cryospheric, and Hydrologic Processes Governing the Evolution of Regional Hydroclimates*. [10.7302/6223](https://hdl.handle.net/10.7302/6223)
- 2014 – 2016 **M.S.E. Civil Engineering** (Hydrology & Hydraulics), UMich
Research project: *Precipitation Systems in the Himalaya-Karakoram Region*.
[10.1175/JHM-D-18-0084.1](https://hdl.handle.net/10.1175/JHM-D-18-0084.1)
- 2008 – 2012 **B.E. Civil Engineering** (Geotechnical Engineering elective),
National University of Sciences & Technology (NUST), Islamabad, Pakistan
Engineering project: *Design of Small Dam for Water Resources Development and Irrigation in the Potohar Plateau*.

Employment

- 2024 – present **Project Scientist**, Climate & Global Dynamics Laboratory, NSF NCAR
- Researcher on projects related to climate modeling, analysis, and projections; climate and hydrometeorological extremes; and hydroclimatic variability.
- 2022 – 2024 **Advanced Study Program (ASP) Postdoctoral Fellow**, NSF NCAR
- PI on project “Assessing the present state and future evolution of coupled glacier and hydrological processes in High Mountain Asia”
- 2016 – 2018 **Focal Person Water Program**, Leadership for Environment and Development Pakistan
- Project manager for USAID-Partnerships for Enhanced Engagement in Research (PEER) project on the Transboundary Kabul River Basin.
 - Researcher and deputy manager for project on “Understanding the Effects of Water Insecurity in Faisalabad, Pakistan”.
 - GIS Officer for project on “Disaster Risk Management Operational Plans for Sindh and Punjab, Pakistan”, funded by the Food and Agriculture Organization of the United Nations (FAO).

- 2013 **Infrastructure Engineer**, Mott MacDonald Pakistan
- Engineer and GIS officer for project on “Satpara Development Project: Preparing Irrigation Master Plan for Satpara Dam Command Area in Skardu, Pakistan”

Graduate research and teaching experience

- 2018 – 2022 **Graduate Researcher**, Dept. of Climate & Space Sciences and Engineering, UMich
Research topics: (1) Atmospheric moisture budget and precipitation over Midwest US and Central Canada; (2) lake-atmosphere interactions; (3) terrestrial hydrology in the Laurentian Great Lakes basin; and (4) Karakoram glaciers
- 2021 **Graduate Student Instructor**, UMich
Course: Our Changing Atmosphere (100-level undergraduate course; ~280 students)
- 2016 – 2018 **Research Associate** (telework), Dept. of Civil & Environmental Engineering (CEE), UMich
Research topic: Monsoons and precipitation systems in high mountain Asia
- 2015 **Visiting graduate researcher**, Dept. of CEE, Colorado State University
Research topic: Coupled Model Intercomparison Project (CMIP) assessments for hydrology over CONUS

Fellowships and awards

- Advanced Study Program (ASP) Postdoctoral Fellowship (2022 – 2024), NSF NCAR
- Rackham Predoctoral Fellowship in Physical Sciences and Engineering (2021 – 2022), UMich
- Next Generation Fellowship in Earth System Sciences (2020 – 2022), University Corporation for Atmospheric Research (UCAR)
- Outstanding Student Paper Award, American Geophysical Union Fall Meeting (2019)
- Rackham Graduate Student Research Grant (2019), UMich
- Michigan Institute for Computational Discovery and Engineering Fellowship (2018 – 2019), UMich
- Fulbright Scholarship (2014 – 2016), U.S. Department of State
- Undergraduate Merit Scholarship (2010 – 2012), NUST

Peer-reviewed publications

Lead author publications

Minallah, S., Steiner, A. L., Ivanov, V. Y., & Wood, A. W. (2023). Controls of variability in the Laurentian Great Lakes terrestrial water budget. *Water Resources Research*, [10.1029/2022WR033759](https://doi.org/10.1029/2022WR033759)

Minallah, S. and Steiner, A. L. (2021): The Effects of Lake Representation on the Regional Hydroclimate in the ECMWF Reanalyses, *Monthly Weather Review*, [10.1175/MWR-D-20-0421.1](https://doi.org/10.1175/MWR-D-20-0421.1)

Minallah, S. and Steiner, A. L. (2021): Analysis of the Atmospheric Water Cycle for the Laurentian Great Lakes Region Using CMIP6 Models, *Journal of Climate*, [10.1175/JCLI-D-20-0751.1](https://doi.org/10.1175/JCLI-D-20-0751.1)

Minallah, S. and Steiner, A. L. (2020): Role of the Atmospheric Moisture Budget in Defining the Precipitation Seasonality of the Great Lakes Region, *Journal of Climate*, [10.1175/JCLI-D-19-0952.1](https://doi.org/10.1175/JCLI-D-19-0952.1)

Minallah, S. and Ivanov, V. Y. (2019): Interannual Variability and Seasonality of Precipitation in the Indus River Basin, *Journal of Hydrometeorology*, [10.1175/JHM-D-18-0084.1](https://doi.org/10.1175/JHM-D-18-0084.1)

Minallah S.*, Lipscomb, W. H.*, Leguy, G. & Zekollari H. (In prep). A framework for three-dimensional dynamic modeling of the Earth's glaciers. *Geoscientific Model Development*. (*Co-first authors

Co-authored publications

Fry L. M., Gronewold A. D., Seglenieks F., **Minallah S.**, Apps D., & Ferguson J. (2022). Navigating Great Lakes Hydroclimate Data. *Frontiers in Water*, [10.3389/frwa.2022.803869](https://doi.org/10.3389/frwa.2022.803869)

Tang, W., and **co-authors** (In prep). Challenges and Opportunities in International Collaborative Research on African Weather, Climate and Environment. *Bulletin of the American Meteorological Society*

GlacierMIP3 team and **co-authors** (In prep). Current climate policies affect multi-century global glacier stabilization. *Nature Climate Change*

Service

International committees:

Land and Land Ice Data Request Task Team for the IPCC Coupled Model Intercomparison Project Phase 7 (CMIP7)

Proposal reviews/panels:

Future Investigators in NASA Earth and Space Science and Technology (FINESST; 2024)

Natural Sciences and Engineering Research Council of Canada (NSERC; 2023, 2024)

Journal reviews:

Geophysical Research Letters, Monthly Weather Review, The Cryosphere, Climate Dynamics, Journal of Hydrometeorology, Journal of Hydrology, Scientific Data

Selection and hiring committees/interview panels:

UCAR Next Generation Fellowship (2024)

ASP postdoctoral fellowship (2024 cohort)

NCAR Earth System Science Internship (2023)

AGU Outstanding Student Presentation Awards (2021 – 2023)

Global Undergraduate Exchange Program, Pakistan (2017, 2018)

Fulbright Program, Pakistan (2017)

Commonwealth Youth Awards, Asia region (2012, 2013)

Primary convener/chair:

Session on *Lakes and Inland Water Bodies* at the AGU Fall Meeting (2020 – 2024)

Institutional committees:

West Asia and North Africa (WANA) Affinity Group organizing team (2023 – present)

NCAR ASP research review committee (2022 – 2024)

NCAR ASP seminar series committee (2023 – 2024)

Programming and modeling experience

- Community Earth System Model (CESM)
- Weather Research & Forecasting Model (WRF)
- WRF-Hydro Modeling System
- Open Global Glacier Model (OGGM)
- Noah-Multiparameterization Land Surface Model
- Python, Jupyter Notebooks
- ArcGIS
- MATLAB
- Unix
- NCL-NCO-CDO

Seminars and oral presentations (select)

Invited

- 09/2024 “Mountain Hydroclimates: Glaciers, Snowpack, and Hydrology in Earth System Models”. Guest Lecturer Series, Department of Earth, Geographic, and Climate Sciences, University of Massachusetts Amherst
- 02/2023 “2022 Floods in Pakistan” and “The High-Mountain Asia Glaciology”. Climate & Global Dynamics Seminar, NCAR
- 03/2021 “Impact of the Atmospheric Moisture Budget on the Seasonality of Great Lakes Precipitation”. [2021 Great Lakes Climate Modeling Workshop](#).
- 12/2020 “Understanding the Hydroclimatic Drivers of Harmful Algal Blooms in the Laurentian Great Lakes Region”. 2020 AGU Fall Meeting, San Francisco, Calif.

Talks

- 06/2024 “Mountain glacier mass balance and dynamics in the Community Ice Sheet Model”. 29th Annual Community Earth System Model (CESM) Workshop
- 06/2024 “Terrestrial Hydrology in the Great Lakes Watershed”. 2024 Noah-MP International Annual Users' Workshop
- 04/2024 “Mountain Glaciers in the Community Earth System Model”. Third Annual Colorado Glaciology Workshop, Boulder, CO.
- 04/2024 “Simulating Mass Balance and Dynamics of Mountain Glaciers within an Earth System Modeling Framework”. 2024 EGU General Assembly
- 02/2024 “Energy and water balance of glaciated watersheds using CLM-Hillslope Hydrology”. [2024 CESM Land Model Working Group Meeting](#).
- 07/2023 “Simulating mountain glacier dynamics with the Community Ice Sheet Model”. 28th General Assembly of the International Union of Geodesy and Geophysics (IUGG), Berlin, Germany.
- 06/2022 “Modeling the Land Surface Water Balance for the Laurentian Great Lakes Watershed”. AGU Frontiers in Hydrology Meeting 2022, Puerto Rico.
- 03/2022 “Modeling the Evolution of Himalaya-Karakoram-Hindukush Glaciers”. [2022 CESM Land Ice Working Group Meeting](#).