

Arindan Mandal

National Postdoctoral Fellow (NPDF)

Interdisciplinary Centre for Water Research (ICWaR), Indian Institute of Science, Bangalore, India

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Education

Ph.D. (Glaciology / Environmental Sciences) Jul 2016 – Feb 2022

Jawaharlal Nehru University, New Delhi

Thesis: "Modeling of mass and energy balance and boundary processes of Chhota Shigri glacier in northern India"

Supervisor: AL. Ramanathan (New Delhi), M. Braun (FAU, Germany)

M.Phil. (Glaciology / Environmental Sciences) Jul 2014 – Jun 2016

Jawaharlal Nehru University, New Delhi

Thesis: "Integrating glacier mass loss and climate in the Lahaul-Spiti region, western Himalaya"

Supervisor: AL. Ramanathan (New Delhi)

M.Sc. (Environmental Sciences) Aug 2011 – Jun 2013

Jawaharlal Nehru University, New Delhi

B.Sc. (Botany Honours) Jul 2008 – Jun 2011

Presidency College / Calcutta University

Work Experience

National Postdoctoral Fellow (NPDF) ongoing

Indian Institute of Science (IISc), Bangalore

Project: Regional glacier modelling and future water availability in Ladakh and Karakoram

Mentor: B. D. Vishwakarma (IISc, Bangalore)

Beyond Fellow Postdoctoral Researcher Dec 2022 – May 2023

AI4EO Future Lab, Technical University of Munich

Project: Machine learning techniques in data processing for glacier mass balance

Mentor: J. Bamber (TU Munich)

Postdoctoral Fellow Mar 2022 – Dec 2022

Indian Institute of Science (IISc), Bangalore

Project: Glacier mass balance modelling in the Ladakh region

Mentor: B. D. Vishwakarma (IISc, Bangalore)

Senior Research Fellow Feb 2021 – Jul 2021

Jawaharlal Nehru University, New Delhi

Work: GNSS, mass balance and meteorology measurements, DEMs-based geodetic analysis

Junior Research Fellow Aug 2013 – Jul 2014

Jawaharlal Nehru University, New Delhi

Work: Indo-Norwegian collaboration, glacier mass balance and meteorology measurements, data analysis

Field Trainer of glacier mass balance measurements Oct 2014

2nd Indo-Swiss Capacity Building Training Programme on Himalayan Glaciology

Scientific Programming and Remote Sensing Skills

Programming / Language

UNIX ●●●●○

Python ●●●●○

R ●●●●○

Remote Sensing and Image Processing

QGIS ●●●●●

Python geospatial ●●●●○

NASA ASP (Stereophotogrammetry) ●●●●○

Climate Data Handling

CDO ●●●●○
Python climate-packages, xarray ●●●●○
CMIP6 cloud processing ●●●○●

ML / Data Science Experience

scikit-learn ●●●●○

Code / Model Development

Developed a point-scale surface energy balance (SEB) model in R which was used to model the 11-year snow sublimation of a Himalayan glacier (PhD paper: <https://tc.copernicus.org/articles/16/3775/2022/>). The reproducible model codes and datasets are available open-access in my [GitHub](#) and Zenodo: <https://doi.org/10.5281/zenodo.6609604>

Award, Recognition and Grant

National Postdoctoral Fellowship (NPDF), SERB, Govt. of India (2-year)	2023-2025
Beyond Fellows Scholarship, Technical University of Munich, Germany (6-month)	2022-2023
Institution of Eminence Postdoctoral Fellowship, Indian Institute of Science (2-year)	2022-2024
EGU22 Early Career Scientist's Travel Support	2021
Best Student Presenter at the UKIERI-WEIGH Conference	2020
DAAD Research Grants – Bi-nationally Supervised PhD in Germany (1-year)	2017-2018
CSIR Foreign Travel Grant, Govt. of India	2017
International Association of Cryospheric Sciences (IACS) Travel Grant	2017
Best Student Poster at the GLACINDIA Workshop (Indo-Norway Initiative)	2016
Rajiv Gandhi National Fellowship (UGC), Govt. of India (5-year)	2014-2018
International Travel Support by SERB, Govt. India	2014

Course and Training

Glacier mass balance modelling using R (ICIMOD, Nepal)	Dec 2020
2 nd SCAR Summer School on Polar Geodesy (St. Petersburg, Russia)	May 2020
Cryospheric modelling course (University of Oslo, Norway)	Jan 2015
KARTHAUS-2014 Glaciology Summer School (Italy)	Sep 2014

Professional Service

- **EGUsphere moderator** (since Nov 2020; preprint moderating and screening)
- **EGU Session Co-Convenor** (2018): Communicating geoscience to the media
- **Group Reviewer** of the Mountain Chapter in IPCC Second Order Draft WG II-2021
- **Reviewer:** Climate Dynamics, International Journal of Climatology, Frontiers in Earth Science – Cryospheric Sciences, The Cryosphere, Scientific Reports, Annals of Glaciology, Journal of Geophysical Research - Atmospheres

Scientific Body / Society Membership

- International Glaciological Society (2015, 2017)
- European Geosciences Union (2020, 2022, 2023)

Science Blog and Podcast

EGU Image of the Week (CR Division)	2016
Suno India Podcast Series on When the Ice Melts (based on my PhD work)	2020

Media Mention

Mongabay - How glaciers in the western Himalaya are reacting to climate change	July 2020
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16. **Mandal, A.**, Angchuk, T., Azam, M. F., Ramanathan, A., Wagnon, P., Soheb, M., Singh, C.: An 11-year record of wintertime snow-surface energy balance and sublimation at 4863 m a.s.l. on the Chhota Shigri Glacier moraine (western Himalaya, India), *The Cryosphere*, 16, 3775–3799, 2022.
15. Vishwakarma, B.D., Ramasankaran, RAAJ., Azam, M.F., Bolch, T., **Mandal, A.**, Srivastava, S., Kumar, P., Sahu, R., Navinkumar, P.J., Tanniru, S.R., Javed, A., Soheb, M., Dimri, A.P., Yadav, M., Devaraju, B., Chinnasamy, P., Reddy, M.J., Murugesan, G.P., Arora, M., Jain, S.K., Ojha, CSP., Harrison, S., Bamber, J.: Challenges in Understanding the Variability of the Cryosphere in the Himalaya and Its Impact on the Regional Water Resources, *Frontiers in Water*, 4, 2022.
14. Kaushik, H., Ramanathan, A., Soheb, M., Sharma SM., Biswal, K., **Mandal, A.**, Singh, C.: Climate change-induced high-altitude lake: Hydrochemistry and area changes of a moraine-dammed lake in Leh-Ladakh. *Acta Geophysica*, 69, 2377–2391, 2021.
13. Angchuk, T., Ramanathan, A., Bahuguna, I.M., **Mandal, A.**, Soheb, M., Singh, V.B., Mishra, S., Vatsal, S.: Annual and seasonal glaciological mass balance of Patsio glacier, western Himalaya (India) from 2010 to 2017. *Journal of Glaciology*, 67(266), 1137-1146, 2021.
12. **Mandal, A.**, Ramanathan, A., Azam, M.F., Angchuk, T., Soheb, M., Kumar, N., Pottakkal, J.G., Vatsal, S., Mishra, S. Singh, V.B.: Understanding the interrelationships among mass balance, meteorology, discharge and surface velocity on Chhota Shigri Glacier over 2002–2019 using in situ measurements. *Journal of Glaciology*, 66(259), 727-741, 2020.
11. Soheb, M., Ramanathan, A., Angchuk, T., **Mandal, A.**, Kumar, N., Lotus, S.: Mass-balance observation, reconstruction and sensitivity of Stok glacier, Ladakh region, India, between 1978 and 2019. *Journal of Glaciology*, 66(258), 627-642, 2020.
10. Kumar, N., Ramanathan, A., Arora, A., Soheb, M., **Mandal, A.**, Sharma, P., Ranjan, S.: Study of isotopic seasonality to assess the water source of proglacial stream in Chhota Shigri Glaciated Basin, Western Himalaya. *Hydrological Processes*, 34(5), pp.1285-1300, 2020.
9. Vincent, C., Soruco, A., Azam, M.F., Basantes-Serrano, R., Jackson, M., Kj  llmoen, B., Thibert, E., Wagnon, P., Six, D., Rabatel, A., Ramanathan, A., **Mandal, A.**: A nonlinear statistical model for extracting a climatic signal from glacier mass balance measurements. *Journal of Geophysical Research: Earth Surface*, 123(9), 2228-2242, 2018.
8. Soheb, M., Ramanathan, A., **Mandal, A.**, Angchuk, T., Pandey, N., Mishra, S.D.: Wintertime surface energy balance of a high-altitude seasonal snow surface in Chhota Shigri glacier basin, Western Himalaya. *Geological Society, London, Special Publications*, 462(1), 155-168, 2018.
7. Engelhardt, M., Ramanathan, A., Eidhammer, T., Kumar, P., Landgren, O., **Mandal, A.**, Rasmussen, R.: Modelling 60 years of glacier mass balance and runoff for Chhota Shigri Glacier, Western Himalaya, Northern India. *Journal of Glaciology* 63, 240 (2017): 618-628, 2017.
6. **Mandal, A.**, Ramanathan, A. L., Angchuk, T., Soheb, M., Singh, V. B.: Unsteady state of glaciers (Chhota Shigri & Hamtah) and climate in Lahaul and Spiti Region, western Himalaya: a review of recent mass loss. *Environmental Earth Sciences*, 75:1233, 2016.
5. Bakke, J., Vasskog, K., Ramanathan, A. L., **Mandal, A.**, Kumar, O., Nesje, A.: The Water Tower of India in a Long-term Perspective – A Way to Reconstruct Glaciers and Climate in Himachal Pradesh during the last 13,000 Years. *Journal of Climate Change*. Vol. 2, No. 1, 103–112, 2016.
4. Singh, V. B., Ramanathan, A. L., **Mandal, A.**: Hydrogeochemistry of high altitude lake: a case study of the Chandra Tal, Western Himalaya, India. *Arabian Journal of Geosciences*, 9:308, 2016.

3. Azam, M. F., Ramanathan, A. L., Wagnon, P., Vincent, C., Linda, A., Berthier, E., Sharma, P., **Mandal, A.**, Angchuk, T., Singh, V. B., Pottakkal, J. G.: Meteorological conditions, seasonal and annual mass balances of Chhota Shigri Glacier, western Himalaya, India. ***Annals of Glaciology***, 57(71), 328-338, 2016.
2. Soheb, M., Ramanathan, A. L., Pandey, P., **Mandal, A.**: Climate Change from Himalayan Glaciers' Perspective—Case Studies from India. ***Journal of Climate Change***. Vol. 1, 27-35, 2015.
1. Azam, M. F., Wagnon, P., Vincent, C., Ramanathan, A. L., Favier, V., **Mandal, A.**, Pottakkal, J. G.: Processes governing the mass balance of Chhota Shigri Glacier (Western Himalaya, India) assessed by point-scale surface energy balance measurements. ***The Cryosphere***, 8, 2195-2217, 2014.