

Vikram S. Chandel

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Education

- Indian Institute of Technology Bombay Bombay
PhD., Centre for Climate Studies 2020–2025
CGPI 9.45
- Indian Institute of Technology Bombay Bombay
M. Tech., Water Resource Engineering 2017–2019
CGPI 9.78
- National Institute of Technology Hamirpur Hamirpur
B. Tech., Civil Engineering 2013–2017
CGPI 8.59
- Chapslee Garden School Shimla
Class 12th, (Non-Medical Sciences), 2011–2013
95.6 %

Experience

- Postdoctoral Research Fellow (December 2025 to present)
Prof. Kirti Rajagopalan, Biological Systems Engineering, Washington State University
- Analysis of historical and changing frequency of sequential droughts in the Pacific Northwest with climate change.
- Senior Research Associate (July 2025 to November 2025) 'AI/ ML based data assimilation for Urban Rainfall Nowcasting'
Prof. Subimal Ghosh, Center for Climate Studies, IIT Bombay
- Leveraging weather radar observations and high-resolution numerical weather prediction model forecasts to improve predictions from the nowcasting to daily timescales using deep learning models.
- Junior Research Fellow (June 2019 to Dec 2019) 'Downscaling for hydro-climatic projections with CMIP5 simulations to assess Impacts of Climate Change'
Prof. Subimal Ghosh, Civil Engineering Department, IIT Bombay
- Performed bias correction and downscaling over the Indian region using machine learning techniques.

Publications

Selected Publications.....

- Chandel, V. S., Murtugudde, R., and Ghosh, S. (2026). Regional dynamics of India's monsoon driven by negative covariance and distinct moisture sources. **Climate Dynamics**, 64(7), 323.
- Chandel, V. S., Banerjee, B., Karmakar, S., and Ghosh, S. (2025). Deep learning based statistical downscaling for enhanced representation of Indian monsoon rainfall with subseasonal variability and extremes. **Journal of Geophysical Research: Atmospheres**, 130(19), e2025JD044167.
- Chandel, V. S., Chauhan, T., Iyer, K. K., Ghosh, S., and Murtugudde, R. (2025). North–South asymmetry of pre-monsoon rainfall over the Western Ghats in India. **International Journal of Climatology**, 45(13), e70046.
- Chandel, V. S., Bhatia, U., Ganguly, A. R., and Ghosh, S. (2024). State-of-the-art bias correction of climate models misrepresent climate science and misinform adaptation. **Environmental Research Letters**, 19(9), 094052.
- Chandel, V. S. and Ghosh, S. (2021). Components of Himalayan river flows in a changing climate. **Water Resources Research**, 57(2), e2020WR027589.

Other Peer-Reviewed Publications.....

- Verma, A., Khadke, L., Tripathy, P., Dubey, N., Khandare, A., Eldhose, E., Das, R., Chandel, V. S., Chauhan, T. A., Budakoti, S., Sampelli, A., Gupta, M., and Ghosh, S. (2026). Terrestrial linkages between carbon and

water cycle interactions in India. **Environmental Research Communications**, 8(9), 092001.

- Tripathy, P., Murtugudde, R., **Chandel, V. S.**, Zope, P. E., and Ghosh, S. (2026). Hyperlocal urban extreme rainfall forecast system: A convolutional neural network-transfer learning-based downscaling approach. **Urban Climate**, 68, 102995.
- Eldhose, E., Ganguly, A. R., Chatterjee, S., Chauhan, T., **Chandel, V. S.**, and Ghosh, S. (2025). Robust causality and false attribution in data-driven earth science discoveries. **Physical Review E**, 112(2), 025309.
- Jain, S. K., Sinha, R., Mondal, A., Mujumdar, P. P., Vegad, U., **Chandel, V. S.**, Ponukumati, P., and Singh, A. (2025). Hydrology and water management in the Anthropocene: challenges and opportunities with particular reference to India. **Current Science**, 128(4), 353–367.
- Chauhan, T., **Chandel, V. S.**, and Ghosh, S. (2024). Global land drought hubs confounded by teleconnection hotspots in equatorial oceans. **npj Climate and Atmospheric Science**, 7, 15.
- Verma, A., **Chandel, V. S.**, and Ghosh, S. (2022). Climate drivers of the variations of vegetation productivity in India. **Environmental Research Letters**, 17(8), 084023.

Journal (submitted/in preparation).....

- Eldhose, E., Chauhan, T., **Chandel, V.**, Ghosh, S., and Ganguly, A. R. (2024). Causal Analyses Suggest Moisture Deficit and Radiation Drive Carbon-Dioxide Growth Rate in the Atmosphere Although Uncertainties Remain. Authorea Preprints.([preprint](#))

Reports.....

- Banerjee, R; Ghosh, S; Jana, A; Mishra, T; Narayan, K.; Parthasarthy, D.; Rao, A; Venkataraman, C; **Chandel, V**; Ghimiray, M; Haran, S; Jajal, P; Kapoor, T; Kathsala, S; Kumar, P; Pandey, N; Patil, T; Singh, N; Singh, N; Tibrewal, K. (2022). **Rajasthan State Action Plan on Climate Change 2022**.

Conference.....

- **Chandel, V.** and Ghosh, S.: Role of spatial covariance in regulating interannual variability of Indian Summer Monsoon rainfall, EGU General Assembly 2024, Vienna, Austria, 14–19 Apr 2024, EGU24-14603, <https://doi.org/10.5194/egusphere-egu24-14603>, 2024.
- **Chandel, V.**, Ghosh, S. (2023): Understanding contribution from different streamflow components in Himalayan rivers, XXVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG) (Berlin 2023).
- **Chandel V. S.**, Saini S., Jain D. K., Chauhan T. A., Bisaria N., and Shankar V., Morphometric analysis of five watersheds of Hamirpur district, Himachal Pradesh, 3rd International Conference on Sustainable Energy and Built Environment, 2017 (ICES'17), VIT University, Vellore
- Shekhawat K.P., Chauhan T. A., **Chandel V. S.**, and Shankar V., Inflow forecasting of Teesta-V reservoir, India, using ARIMA, ANN and ANFIS model, Civil Engineering Conference – Innovation for Sustainability (CEC – 2016), NIT Hamirpur

Research Work

- **PhD. Thesis** '*Data-Driven High-Resolution Indian Monsoon Downscaling with Preserved Climate Dynamics.*' Prof. Subimal Ghosh, Civil Engineering Department, IIT Bombay, Civil Engineering Department, IIT Bombay
 - **Evaluating Quantile Mapping based precipitation downscaling**
We investigated the artifacts introduced by Quantile Mapping techniques in downscaled precipitation. Our analysis revealed that Quantile Mapping tends to overcorrect model outputs, attenuate complex climate change signals, and fail to improve inter-variable dependencies within the model outputs. This analysis emphasized the importance of a process based evaluation of downscaling methods.
 - **Investigating 10% Interannual Variability of Indian summer monsoon rainfall**
Given the critical importance of accurately representing interannual variability in downscaling models, we examined the contribution of Indian subregions to the interannual variability of all-India monsoon rainfall. We employed a Lagrangian-based moisture tracking model to quantify oceanic and terrestrial moisture sources for each subregion and analyzed the influence of negative covariance between Northeast India and Central India on the variability of all India monsoon rainfall.
 - **Statistical Downscaling with Deep Learning**
Using an encoder-decoder neural network, we conducted statistical downscaling of Indian Summer Monsoon rainfall, with a focus on accurately representing extreme events. We benchmarked the model's performance against standard

Quantile Mapping techniques and other deep learning-based methods on a daily, subseasonal and interannual timescales. Additionally, our analysis underscores the critical importance of incorporating dynamical variables, which are often overlooked in super-resolution-based downscaling algorithms.

○ **Masters Thesis** '*Improved glacier-melt modelling for better simulations of Himalayan River Basins*'
Prof. Subimal Ghosh, Civil Engineering Department, IIT Bombay

- Performed hydrological modeling of five Himalayan river basins using Variable Infiltration Capacity(VIC) model integrated with a temperature-index approach based glacier-melt model.
- Model was calibrated with the the basin-wide mass balance and observed discharge.

○ **B Tech. Projects**

Prof. Vijay Shankar Dogra, Civil Engineering Department, NIT Hamirpur

- Analyzed the efficiency of Artificial Neural Network (ANN) technique to forecast rainfall and model runoff in Himalayan catchments.
- Morphometric analysis of five watersheds in Himachal Pradesh. Studied linear aspects, areal aspects and relief aspects of Himalayan catchments.

Awards, Fellowships, and Achievements

- Alexander von Humboldt Research Fellowship, Alexander von Humboldt Foundation, Germany
- Naik and Rastogi Excellence in Thesis Award, IIT Bombay
- Mainak Das Excellence in Publication Award, Centre for Climate Studies, IIT Bombay
- All India Rank 82 out of approximately 129,000 candidates, Graduate Aptitude Test in Engineering (GATE)
- SJVN Silver Jubilee Merit Scholarship for outstanding performance in the Class 12 CBSE examinations (awarded for four years)

Technical Skills

- **General**
 - Machine learning and Deep learning.
 - Geo-spatial analysis and statistical analysis of large climate datasets.
- **Modelling** VIC hydrological model, Dynamic recycling model
- **Data analysis frameworks:**
 - Proficient in: Python 3(Numpy, Scipy, Matplotlib, Pandas), Matlab, CDO
 - Also basic ability with: C, R, Java, Bash, Fortran
- **Operating Systems:** Linux and high performance computing clusters
- **Software Skills:** QGIS, ArcGIS, Inkscape, MS Excel, MS Word

Online Courses

- Deep Learning Specialization (Coursera)
- Machine Learning (Coursera)
- Writing in Sciences (Coursera)
- Algorithmic Toolbox (Coursera)

Referees

- Professor Subimal Ghosh,
Dept. of Civil Engineering, Indian Institute of Technology Bombay, India.
Interdisciplinary program in Climate Studies, Indian Institute of Technology Bombay, India.
Phone: +91-9930663969, Email: subimal.ghosh@gmail.com
- Dr. Kirti Rajagopalan (Associate Professor)
Department of Biological Systems Engineering, Washington State University, Pullman, USA.
Phone: +1 (509) 335-0174, Email: kirtir@wsu.edu

- Professor Auroop R Ganguly,
Civil and Environmental Engineering, Northeastern University, Boston, USA.
Pacific Northwest National Laboratory (PNNL), Richland, USA
The Institute for Experiential AI, Northeastern University, Boston, USA
Phone: +1 (865) 924-7034, Email: a.ganguly@neu.edu
- Professor Udit Bhatia,
Civil Engineering, Indian Institute of Technology Gandhinagar, India.
Phone: +91-7015720544, Email: bhatia.u@iitgn.ac.in
- Professor Subhankar Karmakar,
Environmental Science and Engineering Department, Indian Institute of Technology Bombay.
Interdisciplinary program in Climate Studies, Indian Institute of Technology Bombay, India.
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