CURRICULUM VITAE

DR. VITTAL H.

Assistant Professor, Indian Institute of Technology (Indian School of Mines), Dhanbad, India
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Research and Professional interest:

Climate vulnerability, climate adaptation, climate risk, Hydroclimatology, dynamics of Indian summer monsoon rainfall, heatwaves, drought, tropical cyclones

Education:

Indian Institute of Technology Bombay, Mumbai — India
Doctor of Philosophy — *July 2011 - March 2017*

- Environmental Engineering; 9.0 (C.P.I)

National Institute of Technology Karnataka, Surathkal — India
Master of Technology — *August 2009 – June 2011*

- Environmental Engineering; 8.26 (C.P.I)

Sri Jayachamarajendra College of Engineering, Mysore — India
Bachelor of Engineering — *August 2005 – June 2009*

- Environmental Engineering; 75% (First class with distinction)

Research and teaching experience:

Assistant Professor Grade–1 — Jan 2022 – Present
Department of Environmental Science and Engineering — *IIT (ISM), Dhanbad, India*

Researcher — October 2019 – December 2021
Helmholtz Centre for Environmental Research - UFZ, Leipzig, Germany

- My research work in UFZ mainly focuses on assessing the extremity of recent European drought events in perspective of long-term (i.e. 250- year) period. I also work on improving the understanding of physical mechanism responsible for these extreme drought genesis. In UFZ, I am associated with the project XEROS (eXtreme EuRopean drOughtS: Multimodel synthesis of past, present and future events). The complete description of this project can be seen in XEROS.

Postdoctoral Research Fellow — August 2018 – July 2019
Fulbright-kalam climate fellowship — *IIHR– Hydroscience and Engineering, Iowa, USA*

- Procured the prestigious Fulbright-kalam climate fellowship to work with Prof. Gabriele Villarini, University of Iowa, USA. My research work from this fellowship was on understanding the dynamics of Indian summer monsoon rainfall and also uncovering the aspects of physical mechanism responsible for heatwaves over India – both with observational and climate model perturbation experiment.

Assistant Professor August 2017 – July 2018
Department of Civil Engineering *Manipal Insitute of Technology, Manipal, India*

- Taught under-graduate and post-graduate level courses pertaining to Environmental Engineering. Guided four under-graduate and a post-graduate thesis.

Research Associate Jan 2017 – July 2017
Centre for Environmental Science and Engineering, now ESED *IITB, Mumbai, India*

Awards and fellowship:

- **Fulbright-Kalam Fellowship–2018** from United states-India Education Foundation (USIEF) for pursuing post-doc related to climate change in IIHR–Hydroscience and Engineering, University of Iowa, USA for the year 2018–19
- Received **IITB Award for Excellence in Thesis work** for the year 2015–2017 for the outstanding research contributions
- Received **International Travel Support** from Science and Engineering Research Board (SERB; a statutory body under department of science and Technology), India to attend AGU meet 2015
- Received partial funding of 1000$ from **AGU Natural Hazards Focus Group** to attend AGU meet 2015
- Served as a reviewer for **Journal of Climate**, **Water Resources Research**, **Environmental Research Letters**, **Geophysical Research Lettes**, **Scientific Reports**, **Hydrology and Earth System Sciences** and many more

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International journal articles, book chapters and conference proceedings:

Book Chapters:

1. **Vittal, H.**, & Karmakar, S. (2019). A comprehensive social vulnerability analysis at a national scale. *Climate change signals and response*, 163-176

International journal articles

1. Swain, B., Vountas, M., Singh, A., Anchan, N., Malasani, C. R., Mallick, D., Deroubaix, A., Lelli, L., Patel, N., Alawode, R., Gunthe, S. S., Grainger, R. G., Schmale, J., **Vittal, H.**, Kokhanovsky, A., Wendisch, M., Bösch, H., Burrow, J. P. (2025) Insights of aerosol-precipitation nexus in the central Arctic through CMIP6 climate models. ***npj Climate and Atmospheric Science***, 8 (1), 103.
2. Zhang, W., Wang, S. S. Y., Chikamoto, Y., Gillies, R., LaPlante, A., **Vittal, H.** (2024) A weather pattern responsible for increasing wildfires in the western United States. ***Environmental Research Letters***, 20 (1), 014007.
3. Dalal, G., Chaudhary, S., Dutta, R., Karmakar, S., Koppa, A., **Vittal, H.** (2024) East–West asymmetry in intensity, duration, frequency of heatwaves over Northern India. ***Environmental Research Letters***, 19 (12), 124089.
4. Affram, A., Zhang, W., **Vittal, H.**, Gao, S., Ratterman, C., Zhu, L., Gillies, R. R. (2024) Modulation of the Pacific Meridional Mode on the Dipole Pattern of the CONUS Summertime Precipitation. ***Geophysical Research Letters***, In Print.

5. Dalal, G., Pathania, T., Koppa, A., **Vittal, H.** (2024) Drivers and Mechanisms of Heatwaves in South West India. ***Climate Dynamics***, doi: https://doi.org/10.1007/s00382-024-07242-x.

6. **Vittal, H.**, Rakovec, O., Zhang, w., Koppa, A., Collins, M., Kumar, R (2024) On the role of the Atlantic Meridional Mode in eastern European temperature variability. ***Atmospheric Research***, 297, doi: https://doi.org/10.1016/j.atmosres.2023.107082

7. Kulkarni, S., Anurag, T., Hussain, M., Prasanna, S., **Vittal, H.** (2023) Comparison of multi-objective and single objective calibration for SWAT model: a case study on Musi river basin, India. ***ISH Journal of Hydraulic Engineering***, 29 (5), 714–721

8. Shah, J., Kumar, R., Samaniego, L., Markonis, Y., Hanel, M., Attinger, S., **Vittal, H.**, Rakovec, O. (2023) On the role of antecedent meteorological conditions on flash drought initialization in Europe. ***Environmental Research Letters***, doi: https://doi.org/10.1088/1748-9326/acd8d3

9. **Vittal, H.**, Ghosh, S., Zhang, W., & Kumar, R. (2022) Strong influence of north Pacific Ocean variability on Indian summer heatwaves. ***Nature Communications***, 13, 5349, doi: https://doi.org/10.1038/s41467-022-32942-5, Editors' Highlights

10. Shah, J., **Vittal, H.**, Rakovec, O., Markonis, Y., Samaniego, L., Mishra, V., Hanel, M., Hinz, C., & Kumar, R. (2022) Increasing footprint of anthropogenic warming on flash droughts occurrence in Europe. ***Environmental Research Letters***, doi: https://doi.org/10.1088/1748-9326/ac6888

11. Rakovec, O., Samaniego, L., **Vittal, H.**, Markonis, Y., Moravec, V., Thober, S., Hanel, M., & Kumar, R. (2022). The 2018-20 multi-year drought sets a new benchmark in Europe. ***Earth's Future***, e2021EF002394, doi: https://doi.org/10.1029/2021EF002394

12. Zhang, W., **Vittal, H.**, Wang, S., LaPlante, M. D., Grafin, G., Affram, G., & Kumar, R. (2022). Fewer troughs, not more ridges, have led to a drying trend in the western United States. ***Geophysical Research Letters***, doi: https://doi.org/10.1029/2021GL097089 (Highlighted in **Science** ; doi: https://doi.org/10.1126/science.acz9984)

13. Kulkarni, S., Anurag, T., Hussain, M., Prasanna, S. V. S. N. D. L., & **Vittal, H.** (2022). Comparison of multi-objective and single objective calibration for SWAT model: a case study on Musi river basin. ***ISH Journal of Hydraulic Engineering***, doi: https://doi.org/10.1080/09715010.2022.2120369

14. Zhang, W., Luo, M., Gao, Si, Chen, W., **Vittal, H.**, & Khouakhi, A. (2021). Compound hydrometeorological extremes: drivers, mechanisms and methods. ***Frontiers in Earth Science***, 9, 941, doi: https://doi.org/10.3389/feart.2021.673495

15. **Vittal, H.**, Dharmasthala, S., Koppa, A., Karmakar, S., & Kumar, R. (2021). Climate hazards are threatening vulnerable migrants in Indian megacities. ***Nature Climate Change***, doi: https://doi.org/10.1038/s41558-021-01105-7

16. Malakar, K., Mishra, T., **Vittal, H.**, & Karmakar, S. (2021). District-level risk mapping for the Indian coastline following the IPCC-AR5 framework: A multi-attribute decision-making approach for coastal zone management. ***Journal of Environmental Management***, 294, 112948, doi:https://doi.org/10.1016/j.jenvman.2021.112948

17. **Vittal, H.**, Pathak, A.,& Koppa, A. (2021). Dual response of Arabian Sea cyclones and strength of Indian monsoon to Southern Atlantic Ocean. ***Climate Dynamics***, 1-13, doi:https://doi.org/10.1007/s00382-020-05577-9

18. **Vittal, H.**, Villarini, G., Karmakar, S., Wilcox, L. J.,& Collins, M. (2020). Northward propagation of the Intertropical Convergence Zone and strengthening of Indian summer monsoon rainfall. ***Geophysical Research Letters***, 47(23), e2020GL089823

19. **Vittal, H.**, Rakovec, O., Markonis, Y., Hanel, M.,& Kumar, R. (2020). Increased future occurrences of the exceptional 2018–2019 Central European drought under global warming. ***Scientific reports***, 10(1), 1-10, doi:https://doi.org/10.1038/s41598-020-68872-9

20. **Vittal, H.**, Karmakar, S., Ghosh, S.,& Murtugudde, R. (2020). A comprehensive India-wide social vulnerability analysis: highlighting its influence on hydro-climatic risk. ***Environmental Research Letters***, 15(1), 014005, doi:https://doi.org/10.1088/1748-9326/ab6499

21. **Vittal, H.**,Villarini, G.,& Zhang, W. (2020). Early prediction of the Indian summer monsoon rainfall by the Atlantic Meridional Mode. ***Climate Dynamics***, 54(3), 2337-2346

22. **Vittal, H.**,Villarini, G.,& Zhang, W. (2020). On the role of the atlantic ocean in exacerbating Indian heat waves. ***Climate Dynamics***, 54(3), 1887-1896

23. **Vittal, H.**, Villarini, G.,& Zhang, W. (2020). Fidelity of global climate models in representing the horizontal water vapour transport. ***International Journal of Climatology***, 40(13), 5714-5726

24. Sharma, T., **Vittal, H.**, Karmakar, S.,& Ghosh, S. (2020). Increasing agricultural risk to hydro-climatic extremes in India. ***Environmental Research Letters***, 15(3), 034010, doi:https://doi.org/10.1088/1748-9326/ab63e1

25. Mohanty, M. P., **Vittal, H.**, Yadav, V., Ghosh, S., Rao, G. S., & Karmakar, S. (2020). A new bivariate risk classifier for flood management considering hazard and socio-economic dimensions. ***Journal of environmental management***, 255, 109733.

26. Tripathy, S. S., **Vittal, H.**, Karmakar, S., & Ghosh, S. (2020). Flood risk forecasting at weather to medium range incorporating weather model, topography, socio-economic information and land use exposure. ***Advances in Water Resources***, 146, 103785

27. Sudharsan, N., Karmakar, S., Fowler, H. J., & **Vittal, H.** (2020). Large-scale dynamics have greater role than thermodynamics in driving precipitation extremes over India. ***Climate Dynamics***, 55(9), 2603-2614

28. Zhang, W., **Vittal, H.**, & Villarini, G. (2019). Potential impacts of anthropogenic forcing on the frequency of tropical depressions in the North Indian Ocean in 2018. ***Journal of Marine Science and Engineering***, 7(12), 436

29. Gusain, A., **Vittal, H.**, Kulkarni, S., Ghosh, S., & Karmakar, S. (2019). Role of vertical velocity in improving finer scale statistical downscaling for projection of extreme precipitation. ***Theoretical and Applied Climatology***, 137(1), 791-804.

30. Shashikanth, K., Ghosh, S., **Vittal, H.**, & Karmakar, S. (2018). Future projections of Indian summer monsoon rainfall extremes over India with statistical downscaling and its consistency with observed characteristics. ***Climate Dynamics***, 51(1), 1-15

31. Sharma, T., **Vittal, H.**, Chhabra, S., Salvi, K., Ghosh, S., & Karmakar, S. (2018). Understanding the cascade of GCM and downscaling uncertainties in hydro-climatic projections over India. ***International Journal of Climatology***, 38, e178-e190

32. Singh, S., Ghosh, S., Sahana, A. S., **Vittal, H.**, & Karmakar, S. (2017). Do dynamic regional models add value to the global model projections of Indian monsoon?. ***Climate dynamics***, 48(3), 1375-1397

33. Singh, J., **Vittal, H.**, Karmakar, S., Ghosh, S., & Niyogi, D. (2016). Urbanization causes nonstationarity in Indian summer monsoon rainfall extremes. ***Geophysical Research Letters***, 43(21), 11-269

34. **Vittal, H.**, Ghosh, S., Karmakar, S., Pathak, A., & Murtugudde, R. (2016). Lack of dependence of Indian summer monsoon rainfall extremes on temperature: an observational evidence. ***Scientific reports***, 6(1), 1-12

35. Ghosh, S., **Vittal, H.**, Sharma, T., Karmakar, S., Kasiviswanathan, K. S., Dhanesh, Y., K. P. Sudheer, & Gunthe, S. S. (2016). Indian summer monsoon rainfall: implications of contrasting trends in the spatial variability of means and extremes. ***PloS one***, 11(7), e0158670

36. **Vittal, H.**, Singh, J., Kumar, P., & Karmakar, S. (2015). A framework for multivariate data-based at-site flood frequency analysis: Essentiality of the conjugal application of parametric and nonparametric approaches. ***Journal of Hydrology***, 525, 658-675

37. Singh, J., **Vittal, H.**, Singh, T., Karmakar, S., & Ghosh, S. (2015). A framework for investigating the diagnostic trend in stationary and nonstationary flood frequency analyses under changing climate. ***Journal of Climate Change***, 1(1, 2), 47-65

38. **Vittal, H.**, Karmakar, S., & Ghosh, S. (2013). Diametric changes in trends and patterns of extreme rainfall over India from pre-1950 to post-1950. ***Geophysical Research Letters***, 40(12), 3253-3258

39. Manu, B., Mahamood, S., **Vittal, H.**, & Shrihari, S. (2011). A novel catalytic route to degrade paracetamol by Fenton process. ***International Journal of Research in Chemistry and Environment***, 1, 157

Manuscript under review/preparation:

1. **Vittal, H.**, Zhang, W., Rakovec, O., Gao, Si, & Kumar, R. Strong constraints of Equatorial Pacific on future summer rainfall projections in Central Europe. *Under review*

Details of Research Publications presented in Conferences:

1. **Vittal, H.**, Rakovec O., Hanel M., Markonis Y., Kumar R. Potential impacts of anthropogenic forcing on the consecutive 2018–19 droughts in the central Europe. EGU General Assembly, Virtual, 2020

2. Rakovec O.,**Vittal, H.**, Markonis Y., Luis S., Hanel M., Stephan S., Maca P., Kumar R. The 2018–2019 European drought sets a new benchmark over 250 years. EGU General Assembly, Virtual, 2020

3. Singh J., **Vittal H.**, Sharma T., Karmakar S., Ghosh S. Signature of nonstationary in precipitation extremes over urbanizing regions in India identified through a multivariate frequency analysis, EGU General Assembly, Vienna, Austria, 2016

4. **Vittal H.**, Karmakar S., Ghosh S. Mapping decadal sptio-temporal variation of social vulnerability to hydro-climatic extremes over India, AGU Fall meeting, San Francisco, USA, 2015

5. **Vittal H.**, Singh J., Karmakar S., Ghosh S. Dependence of precipitation extremes on temperature over united states, AGU Fall meeting, San Francisco, USA, 2014
6. Singh J., **Vittal H.**, Karmakar S., Ghosh S. Evidences of significant nonstationarity in precipitation extremes over urbanizing areas in India, AGU Fall meeting, San Francisco, USA, 2014
7. Sen S., **Vittal H.**, Singh T., Singh J., Karmakar S. At-sight design rainfall estimation with diagnostic check for nonstationarity: an application to Mumbai rainfall datasets, Hydro, Chennai, 2013
8. **Vittal H.**, Karmakar S., Ghosh S. Detection of spatio-temporal variatio of rainfall and temperature extremes over India, GU Fall meeting, San Francisco, USA, 2012

Sponsored Project proposals:

1. Attribution of climatic factors influencing the changes in Indian monsoon rainfall extremes and mapping the associated risk to facilitate decision-making, **PI**, United States-India Education Foundation (USIEF), Fellowship award [completed; 08/2018 – 08/2019].
2. Recent Arctic Amplification and Increasing Heatwaves over India, **PI**, Faculty Research Grant, IIT ISM, INR 14 Lakhs [Ongoing].
3. Coastal Risk Analysis (CORAL): An India's perspective, **PI**, SERB SRG, INR 21 Lakhs [Ongoing].

Personal Details

Name as on Passport:	Vittal Hari
Nationality:	Indian
Date of Birth:	7th July 1987
Languages:	English (professional proficiency), Hindi, Kannada (native proficiency)
Gender:	Male
Martial Status:	Married