

DR. VITTAL H.

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Research and Professional interest:

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

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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; 70% (First class with distinction)

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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– Hydrosience 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**

Department of Civil Engineering

August 2017 – July 2018

Manipal Institute 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**

Centre for Environmental Science and Engineering, now ESED

Jan 2017 – July 2017

IITB, Mumbai, India

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**Awards and fellowship:**

- **Fulbright-Kalam Fellowship–2018** from United states-India Education Foundation (USIEF) for pursuing post-doc related to climate change in IIHR–Hydrosience 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:**

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**Book Chapters:**

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

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**International journal articles**

1. Zhang, W., **Vittal, H.**, Wang, S., LaPlante, M. D., Grafm, 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>)
2. 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>
3. **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>
4. 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>

5. **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>
6. **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
7. **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>
8. **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>
9. **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
10. **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
11. **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
12. 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>
13. 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.
14. 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
15. 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
16. 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
17. 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.
18. 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

19. 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
20. 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
21. 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
22. **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
23. 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
24. **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
25. 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
26. **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
27. 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

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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*
2. **Vittal, H.**, Ghosh, S., Zhang, W., & Kumar, R. North Pacific Ocean variability constrains the future projections of heatwave in India. *Under review*
3. Shah, J., **Vittal, H.**, Rakovec, O., & Kumar, R. Increasing footprint of anthropogenic warming on flash droughts occurrence in Europe. *Under review*
4. Rakovec, O., Samaniego, L., **Vittal, H.**, Markonis, Y., Moravec, V., Thober, S., Hanel, M., & Kumar, R. The 2018-20 multi-year drought sets a new benchmark in Europe. *Under review*

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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 spatio-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 variation of rainfall and temperature extremes over India, GU Fall meeting, San Francisco, USA, 2012

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#### 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. XEROS2: EXtreme EuROpean drOughtS – from detection to attribution, **Co-PI**, under evaluation at Deutsche Forschungsgemeinschaft (DFG), Germany.

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#### Editorial service:

1. Guest Editor for a special issue "Risk forecasting of extreme weather" for a journal **Sustainability**, [https://www.mdpi.com/journal/sustainability/special\\_issues/risk-forecasting\\_extreme-weather](https://www.mdpi.com/journal/sustainability/special_issues/risk-forecasting_extreme-weather).

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#### Personal Details

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