Nirdesh Kumar Sharma

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Carrer Objective

My goal is to develop solutions to enhance societal resilience against natural hazards. Currently, I work towards understanding the drivers of natural hazards and their interactions with society. To accomplish my goals, I use Artificial Intelligence and Earth Observation data.

Education

- **Indian Institute of Technology - Delhi** — Delhi, India
  Research Scholar Department of Civil Engineering ; CGPA: 8.75/10 — *Sep. 2020 –*
  - **SERB OVDF scholarship at University of Alberta**: Sep. 2023 - Sep. 2024
- **Indian Institute of Technology - Guwahati** — Guwahati, India
  Master of Technology in Civil Engineering; CGPA: 9.62/10 — *Aug. 2018 – Jun. 2020*
  - **DAAD-KOSPIE scholarship at TU Darmstadt**: Sep. 2019 - Apr. 2020
- **National Institute of Technology- Hamirpur** — Hamirpur(H.P), India
  Bachelor of Technology in Civil Engineering; CGPA: 8.33/10 — *Aug. 2014 – May. 2018*
- **Class XII** — Palampur(H.P), India
  Central Board of Secondary Education; Grade 89.6/100 — *Mar. 2014*
- **Class X** — Baijnath(H.P), India
  Council For The Indian School Certificate Examinations; Grade: 95.2/100 — *Mar. 2012*

Theses

- **Indian Institute of Technology Delhi** — Delhi, India
  Graduate Research Assistant — *Sep. 2020-Present*
  - **Landslide modelling**: Investigating rainfall triggered landslides using land surface models and machine learning
- **Indian Institute of Technology Guwahati** — Guwahati, India
  Research Assistant — *Sep 2019 - Jun 2020*
  - **Soil moisture inversion**: Developed a new image classification algorithm using multisensor data to identify bare areas, followed by an inversion model for soil moisture from Sentinel1 data using machine learning
- **National Institute of Technology Hamirpur** — Hamirpur, India
  Undergraduate Research Student — *Jan. 2018-July. 2018*
  - **Hydrological modelling**: Hydrological and Statistical analysis of multiple rainfall data products for Krishna river basin.

Experience

- **Teaching Assistant- IIT Delhi** — Sep. 2020 - Present
  Teaching Assistant for Numerical Methods, Hydraulic Structures and Engineering Hydrology
- **Teaching Assistant- IIT Guwahati** — Aug. 2018 - July. 2019
  Teaching Assistant for Remote Sensing, and Natural Hazards
- **Larsen and Toubro Limited- INSPIRE Internship** — Jun. 2017-Aug. 2017
  Rework reduction and productivity enhancement of large building project
- **International Institute of Information Technology Hyderabad** — Dec. 2016-Jan. 2017
  Evapotranspiration analysis of Krishna river basin using Thornthwaite model
- **Beas Valley Power Corporation- Government of Himachal Pradesh** — Jun.2015-Aug 2015
  Social, Economical and Ecological impacts of a Hydroelectric powerplant in Beas valley

Awards

Funding Agency	Year	Description	Amount
SERB OVDF	2023-2024	Overseas Visiting Doctoral Fellowship	$2000/month
Ministry of Human Resources	2020-2025	Institute scholarship for doctoral study	₹35000/month
DAAD-KOSPIE	2019-2020	Fellowship for research at TU Darmstadt	€850/month
IIT-Delhi	2023	Overseas Travel Grant(RSTA)	₹150000
Ministry of Human Resources	2018-2020	Institute scholarship for masters study	₹12400/month
Government of Himachal Pradesh	2018	One time grant for Higher studies	₹75000
Associated Cements	2014-2018	Excellence scholarship for undergraduate students	₹12000/year

Projects

- **India Landslide Susceptibility Map (ILSM)**: ILSM is India's first landslide susceptibility map prepared at 1km resolution using an ensemble of multiple machine learning models. The models are fitted over a carefully curated national database of landslide observations and a multitude of geophysical and climatological variables Github
- **A Cloud-based Landslide Identification Algorithm for Rainfall-Triggered Landslides** : Used a combination of satellite rainfall data, optical satellite data, SAR (Synthetic Aperture Radar) data, and landslide susceptibility data to identify and validate the location and extent of historical landslides. The product is developed using Google Earth Engine python API to leverage cloud computing infrastructure for faster computing.
- **Mapping flood vulnerability and resilience over Assam using SAR data**: Used satellite and ground-based data to assess the population's vulnerability to Assam floods. The study mapped the inundation of Assam floods using SAR data and then used socioeconomic data to assess the vulnerability and resilience to floods. GitHub Article
- **Assimilating SMOPS data in NOAH M.P. for generating accurate high resolution soil moisture data products over India**: Combined the NOAH M.P. soil moisture with satellite based soil moisture SMOPs-ASCAT using ensemble Kalman filter to develop accurate soil moisture estimates.The estimates are compared against other remote sensing soil moisture datasets using ground data and are found to be more accurate Article
- **Mapping Change in NO2 concentration over India during COVID using sentinel 5-P data**: NO2 is found in atmosphere due to thermal power plants as well as vehicles. NO2 concentration maps were developed over India to quantify the impact of thermal power plants since vehicle movement was negligible as country was under lockdown during covid. We also showcase the impact of crackers on NO2 air pollution GitHub Article
- **Hydrological and statistical evaluation of ensemble Satellite data products in krishna Basin**: Compared various satellite rainfall data products with ground data products. Developed and validated the runoff using multiple satellite rainfall forcings and MISDC rainfall runoff model

Publications

- **Nirdesh Sharma, Manabendra Saharia, G.V Ramana** : Development of an India Landslide Susceptibility Map (ILSM) using Ensemble Machine Learning (Under Review Catena) GitHub
- **Nirdesh Sharma, Hetal P., Manabendra Saharia**: Towards high resolution flood mapping from SAR data using ensemble deep learning (Manuscript under review)
- **Sharma, N. and Saharia, M.**: DL-AISLE: A Deep Learning framework using Active Learning on Satellite imagery for Landslide identification, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-7155, https://doi.org/10.5194/egusphere-egu23-7155, 2023 Article
- **Sharma, N., Saharia,M.**: Identifying landslides from open-source satellite imagery using cloud computing ISRS-ISG symposium 2022
- **Sharma, N., Saharia, M., Singh, R., 2021** : Toward High-Resolution Soil Moisture Monitoring over India by Combining Remote Sensing Products with Land Surface Models 2021, H55D-0780. Article
- **Sharma, N., Singh, A., P, A., Saharia, M., C T, D., 2021**: Flood Exposure and Social Vulnerability during 2020 Assam Floods (other). Hydrology. https://doi.org/10.1002/essoar.10509510.1 GitHub Article
- **Pandey, R., Sharma, N.K., Saharia, M.**: LoRa-Based Communication System for Monitoring Water Quality of Lakes and Reservoirs, in: 2023 International Conference on Machine Intelligence for GeoAnalytics and Remote Sensing (MIGARS) https://doi.org/10.1109/MIGARS57353.2023.10064590 Article
- **N Sharma**: Using TROPOMI to map change in NO2 over India in covid-19. https://doi.org/10.5281/zenodo.4569495 GitHub Article

Memberships

- **Land Aware**: Life member
- **American Geophysical Union Student Member**: Jan 2021- Dec 2022
- **European Geophysical Union Student Member**: Jan 2022- Dec 2022

Skills

- **Languages**: Python, Google Earth Engine API, MATLAB **Softwares**: SNAP, ArcGIS, NASA-LISF, Q-GIS
- **Productivity**: MS Word, MS Powerpoint, MS Excel **Computation**: High Performance Computing

Certifications

Introduction to Python, Radar Remote Sensing, Python Programming,Matlab fundamentals, Matlab Programming

Research Interests

- Optical and SAR remote sensing.
- Machine Learning and Deep Learning applications in natural hazards.
- Climate change and its impact on natural hazards.
- Parallel processing and Automation.

Extracurricular

- **Member NSS (2014-2018)**: Coordinated field visits for various social welfare schemes
- **Organizer IRCSTC (2015)**: Organized a workshop on climate extremes at NIT Hamirpur in collaboration with NEU Boston
- **Training Placement Representative (2017-2018)**: Coordinated with over 20 companies as member of placement team