

CENTRE FOR DISASTER MITIGATION AND MANAGEMENT VELLORE INSTITUTE OF TECHNOLOGY (VIT), VELLORE

January – June 2023

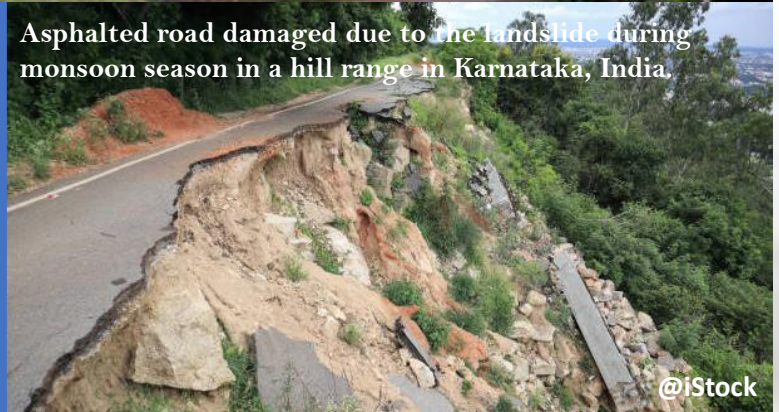
CDMM-Newsletter



Director's Message:

Centre for Disaster Mitigation and Management (CDMM) is functioning with a vision to create a disaster risk free India, through the confluence of the cultures of preparedness, quick response, strategic thinking, and prevention. CDMM is carrying out its activities in line with the Prime Minister's ten point agenda for disaster risk reduction. The thrust areas of the centre are landslides, earthquakes, floods, cyclones and climate change. Research, consultancy, capacity building and support to government in dealing with the natural disasters are primary activities of the centre. I am happy to share the latest newsletter of CDMM, highlighting our dedicated efforts towards a resilient and safer nation.

Asphalted road damaged due to the landslide during monsoon season in a hill range in Karnataka, India.



The wreckage of a collapsed building after the earthquake, Hatay, Turkey



Dr. S. S. Chandrasekaran
Professor & Director
CDMM

Vision:

To create disaster risks free India, through the confluence of the cultures of Preparedness, Quick response, Strategic thinking, and Prevention.

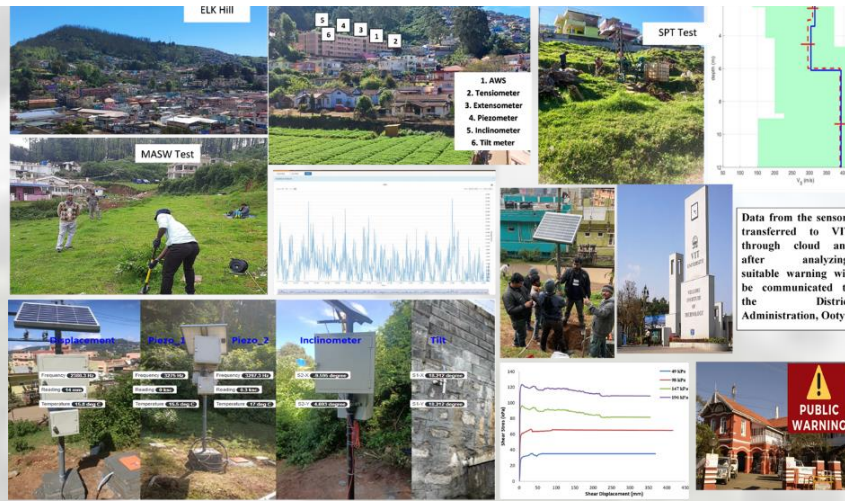
Mission:

Destination- Disaster Risk-Free India

Ongoing Projects

Development of Forewarning System for Landslides in the Nilgiris

PI: Dr. S. S. Chandrasekaran, Co-PI's: G. P. Ganapathy, Dr. K. Ganesan, and Dr. S. Renuga Devi
Under DST – NGP (2020 to 2024)



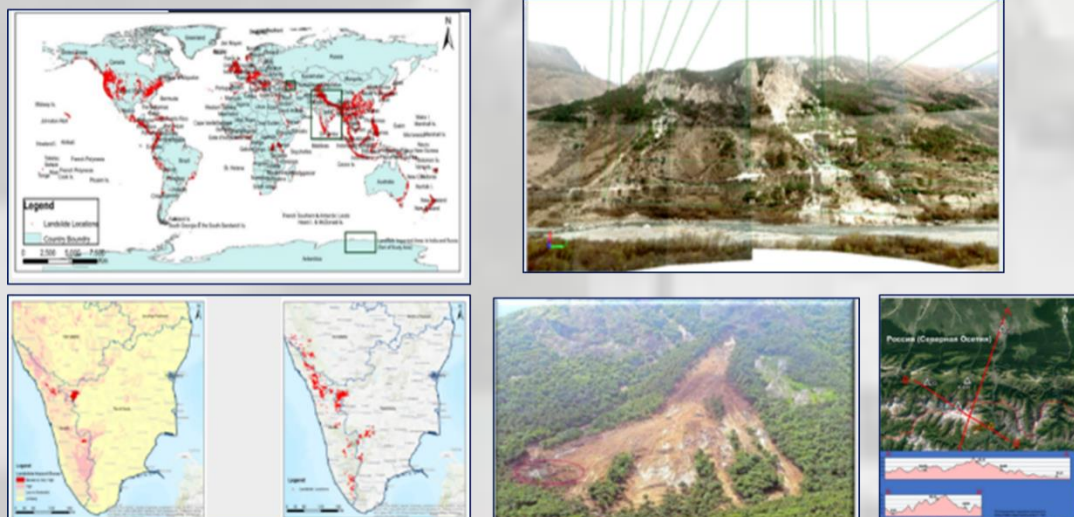
The project aims to monitor the slope at Elk Hill, Ooty, utilizing a range of sensors. This initiative seeks to establish an efficient early warning system guided by detailed geotechnical, geophysical, and hydro-meteorological analyses. Borehole exploration on the slope has been conducted, and sensors installed which measure parameters such as rainfall, matric suction, pore water pressure, displacement angle, and soil movement. ZigBee transmits the collected data to VIT through the cloud. Upon analyzing data from these sensors, we communicate the landslide feasibility to the district administration in Ooty.

Natural Hazards and Monitoring for Mountain Territories in Russia and India

Indian Team: PI: Dr. G. P. Ganapathy, Co –PI's: Dr. S. S. Chandrasekaran, Dr. S. Shantha Kumar, Dr. S. Prabhu, and Dr. Kathiravan

Russian Team: PI: Dr. Vladislav Zaalishvili, Co-PI's: Dr. Nikolaev A. V, Dr. Melkov D.A, and Dr. Burdzieva O.G

Under INDO RUSSIA- DST-RSF



Ongoing Projects

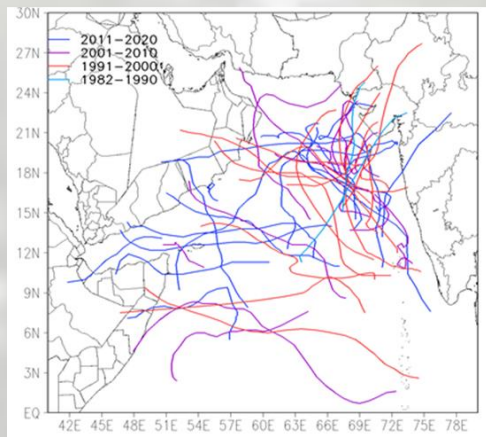
Recent technologies have significantly advanced landslide research, aiming to deepen our understanding of earth phenomena, reduce landslide probability, and enhance disaster preparedness. This project focuses on landslide-prone regions of India and Russia, with the following objectives:

- Development of scientific bases for integrated monitoring of hazardous natural and technogenic processes based on analysis of variations in geophysical parameters of the environment.
- Development of administrative protocols for the exchange of data and the project of the relevant regulatory framework.

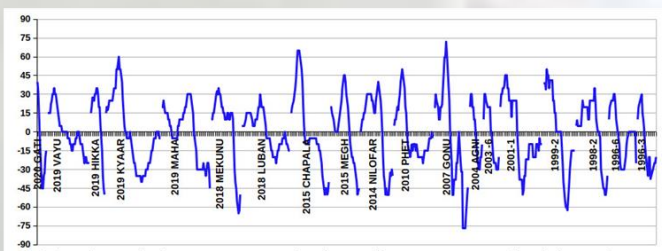
Development of an Atmosphere-Ocean Modeling System in a Gray Zone Scale(1 Km To 5 Km) for Prediction of Severe Tropical Cyclones over the Arabian Sea

PI : Dr. Kuvar Satya Singh, Co-PI: Dr. Parvez Alam under **SERB-CRG (2023-2026)**

Track of Cyclones over Arabian Sea 1982- 2020



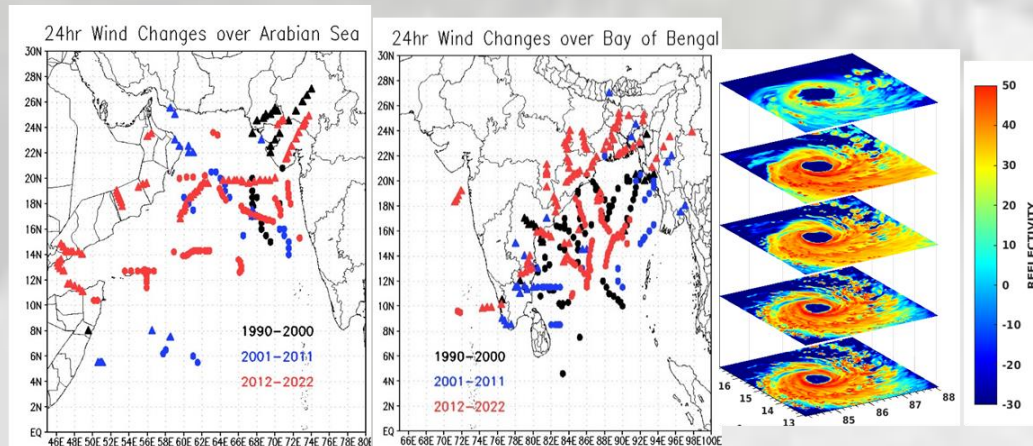
Rapid intensification and dissipation of past 38-years tropical cyclones over Arabian Sea obtained from IMD best-fit tracks data of 19 cases



Tracks of intense tropical cyclones over Arabian Sea during year 1982- 2020. Rapid intensification (wind speed more than 30 knots within 24 hours) of extremely severe cyclonic storms over Arabian Sea using IMD best fit track dataset

Prediction of Rapid Intensification and Inner Core Structure of Intense Tropical Cyclones (Tcs) over North Indian Ocean (Nio) Using Cloud Resolved WRF Model

PI : Dr. Kuvar Satya Singh under **SERB-SIRE (2023)**



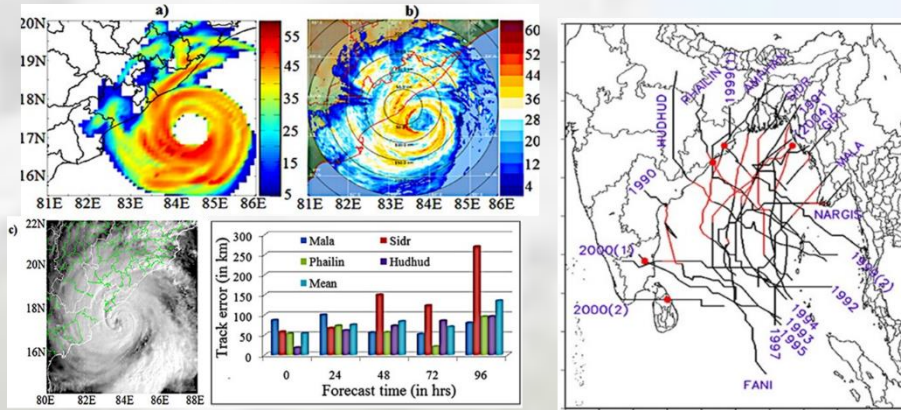
Locations of Rapid intensification associated with tropical cyclones over the North Indian Ocean in past 33 years (1990-2022). Prediction of primary and secondary eyewall using WRF model

These cyclone projects aim to enhance weather forecasts using numerical models, specifically focusing on improving accuracy in both time and space. The primary goal is to mitigate the impact of extreme weather events like cyclones and heavy rainfall, minimizing loss of life and property. The outcomes of these projects can also serve as early warnings. Given the rising frequency of intense tropical cyclones in the North Indian Ocean, accurate forecasts are crucial to addressing the escalating risks associated with these events.

Completed Projects

Prediction of Extreme Severe Cyclonic Storms over North Indian Ocean Using High Resolution Numerical Modeling System for Disaster Preparedness

PI: Dr. Kuvar Satya Singh under SERB-ECRA (2020-2022)

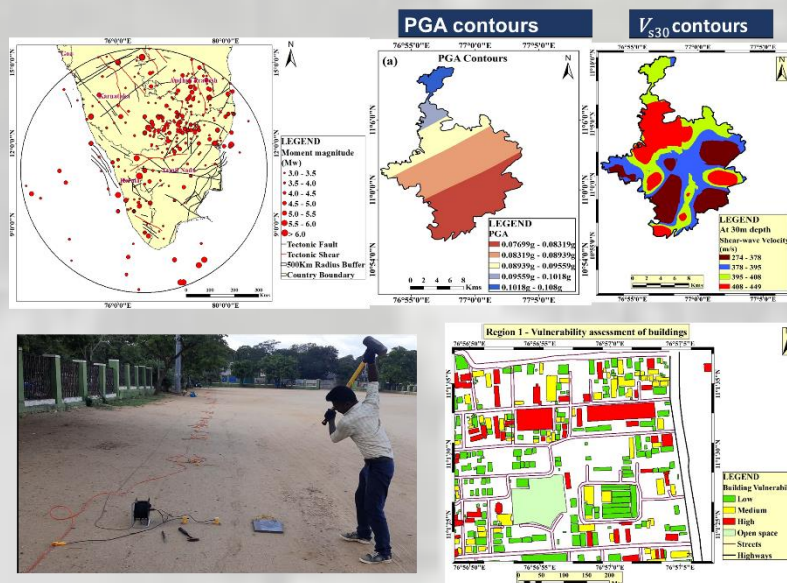


Reflectivity a) Model, b) DWR, c) Satellite Track Errors (in km) and ESCS over the Bay of Bengal region during 1990-2020

- The study reveals increasing characteristics of tropical cyclone parameters over the Bay of Bengal in the last 30 years (1990-2020).
- The ARW model's performance for a 6-day forecast of ESCS Hudhud in 2014 is examined, showing track errors ranging from 61 km to 96 km.
- The project emphasizes the significance of moving nested domains in the WRF model for forecasting ESCS Fani in 2019, with potential real-time monitoring applications.

Urban Seismic Risk Assessment for Coimbatore City

PI : Dr. S S Chandrasekaran; Co- PI's : Dr. G P Ganapathy, and Dr. Sandeep Maithani (IIRS) under RESPOND, ISRO (2020-23)

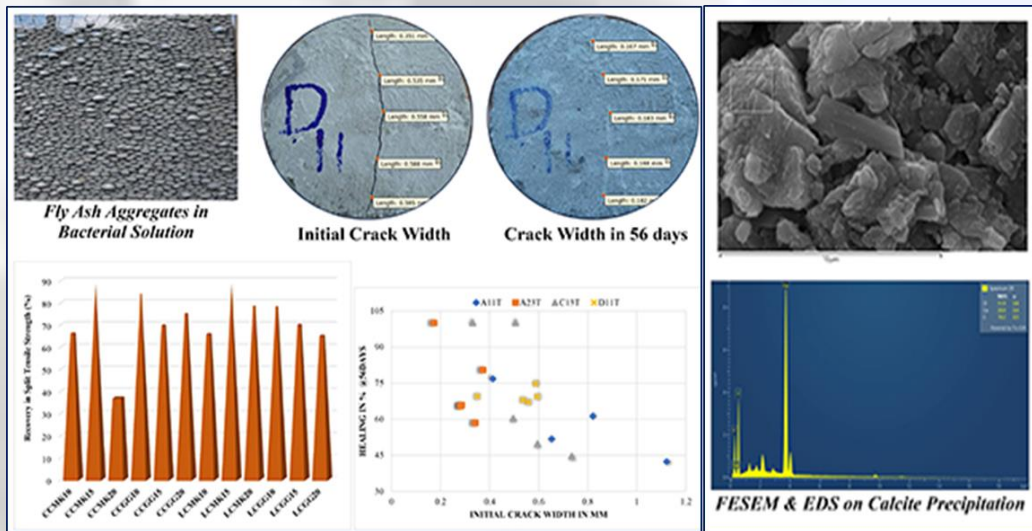


- Seismic-hazard vulnerability map has been created for Coimbatore city.
- In-depth examinations of the sub-soil profile, employing the MASW test, provide insights into surface stiffness.
- This study also guides for the design of earthquake-resistant structures in Coimbatore, Tamil Nadu.

Completed Projects

Development of Self-Healing Property in Conventional and Lightweight Concretes with Various Cementitious Materials

PI: Dr. Rama Mohan Rao. P under AICTE (2020-23)



Bacteria based Self-healing property was developed in both Conventional and light weight concrete with various mineral admixtures. Fly ash aggregates are manufactured and encapsulated the bacteria into them to achieve the high efficiency in self-healing. Microstructural characterization cleared that the healing material is strongest form of CaCO_3 (Calcite).

Cosultancy Project



**Evaluation of Concrete Footings using
Non-Destructive Techniques for PRP- C
Block Phase II**

Investigator: Dr P.Rama Mohan Rao

Co-Investigator: Dr S. Prasanth

Amount: 0.82 Lakh

Events Organized



A workshop titled "Earthquake Resistant Design of Concrete Structures and Its Mitigation Techniques" was conducted on April 28, 2023.

The event saw a total of 61 attendees, including 28 engineers and builders. Notable lectures were delivered by Dr. Doda Goudar G R (IIT Madras), Dr. Rupen Goswami (IIT Madras), Dr. G. P. Ganapathy, and Dr. S. S. Chandrasekaran, covering diverse topics. Dr. S.S. Chandrasekaran also provided a demonstration of MASW during the workshop.

CDMM and in Association with DQAA organized VIT Quality Week 2023 From 28th February to 3rd March 2023.

Mr. Murugesh Prabhu, Sr. Project Engineer, Centre for Development of Advanced Computing (C-DAC), Pune and Dr. Harjeet Kaur, Technical officer- Emergency Management, VHS-CDC, New Delhi delivered lectures.

Training Programme organized on "Fire Emergencies - Mock Exercises" on 16 February 2023.

A total of 178 participants were present, with 149 being students. The mock drill commenced on the CDMM 2nd Floor and concluded at the designated assembly point. Professor G. P. Ganapathy conducted demonstrations and provided hands-on training during the drill.



Outreach Activity on "Fire Safety Sensitization and Hands on Exercise for Men's Hostel Mess Workers and Staffs" on 08 February 2023.

A total of 41 members, including supervisors, security personnel, and storekeepers, attended. Prof. G. P. Ganapathy addressed potential kitchen fire scenarios and outlined swift responses. He clarified attendees doubts and provided instructions on the proper usage of various fire extinguishers.

A workshop titled "Non-Destructive Techniques for Concrete Structures" was conducted on 25 Jan 2023.

A total of 89 participants from diverse fields attended the event. Dr. Ramachandra Murthy (Senior Principal Scientist, CSIR-SERC, Chennai), Dr. P Rama Mohan Rao, and Dr. Arunava Ray delivered lectures on various NDT techniques, including practical demonstrations.





Guest Lectures Organized

1. **Arunava Ray** and **Surendar M** on “Climate Adaptive Planning for Resilience and Sustainability in Multi-Hazard Environment (CAP-RES)” by the resource person **Ms. Pritha Acharya, NIDM Delhi** on 13 April 2023.
2. **Rama Mohan Rao P** and **Ganapathy G.P** on “Cyclone Disaster Mitigation Activities at CSIR-SERC” by the resource person **Dr. Pabbiseti Harikrishna, CSIR-SERC, Chennai** on 13 April 2023.
3. **Kuvar Satya Singh, Yogalakshmi T** and **Purusotham S** on “Software Reliability” by the resource person **Mr. Somashakar Kannan,** on 10 April 2023
4. **Surendar M** and **Arunava Ray** on “Flood Disaster Management: An Overview of GIS and Remote Sensing Applications” by the resource person **Mr. Babin T Praise, Avineon India Pvt. Ltd., Hyderabad,** on 27 March 2023.

FDP Attended

1. **Rama Mohan Rao P** attended the FDP on “Sustainability Technologies for Waste to Energy” on 29 June 2023.
2. **Rama Mohan Rao P** attended the FDP on “Optical Sensors - Fundamentals to Recent Trends” from 22 June 2023 to 23 June 2023.
3. **Priyadharshini B** attended the FDP on “Geohealth Hub for Research and Capacity Building” from 29 May 2023 to 02 June 2023.
4. **Kuvar Satya Singh** attended the FDP on “A Five-Day Online FDP on Emerging Trends of Non-Autonomous System of Differential Equations in Engineering Fields” from 26 May 2023 to 30 May 2023.
5. **Kuvar Satya Singh** attended the FDP on “A Five-Day Online FDP on Application of Applied Mathematics in Engineering Field” from 20 May 2023 to 24 May 2023.
6. **Ganapathy G. P.** attended the FDP on “The 33rd Virtual UNISEC-Global Meeting” on 20 May 2023.
7. **Rama Mohan Rao P** attended the FDP on “Child Protection during Disasters and Emergencies” on 20 April 2023.
8. **Ganapathy G.P.** attended the FDP on “Training on Child Centric Disaster Risk Reduction” from 27 February 2023 to 01 March 2023.
9. **Ganapathy G.P.** attended the FDP on “Child Protection and Child Rights in Disasters and Emergencies consultative workshop” from 23 January 2023 to 25 January 2023.

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January – June 2023

CDMM-Newsletter



Faculty Outreach

1. **Kuvar Satya Singh** on the *“Role of initial conditions in the simulation of real-time extreme events”* at **IIT Mandi, Mandi, India** on 15 June 2023.
2. **Surendar M** on *“Assessment of Himalayan Snow Cover Changes”* at **Vels Institute of Science Technology and Advanced Studies, Chennai, India** on 05 June 2023.
3. **Kuvar Satya Singh** on the *“Numerical Weather Prediction Model and Role of Initial Conditions in NWP for simulation of extreme conditions”* at **VIT Chennai, Chennai, India** on 21 May 2023.
4. **Ganapathy G.P** on *“Earthquake early warning precursors”* at **UNISEC-Global Secretariat, Tokyo, Japan** on 20 May 2023.
5. **Ganapathy G.P** on *“Why we need to understand Earthquakes”* at Jointly organized by the Centre for **Disaster Mitigation and Management and Indian Society of Earthquake Technology (Vellore Chapter), Vellore, India** on 28 April 2023.
6. **Surendar M** on *“Mathematics Beyond Earth: Space Applications and Exploration”* at the **Central University of Tamil Nadu, Thiruvarur, India** on 24 April 2023.
7. **Surendar M** on *“Exploring the Potential of Radar Remote Sensing to Enhance our Understanding of Seasonal Snow Cover in Mountainous Environments”* at **Indian Institute of Technology Bombay and IEEE GRSS chapter Bombay, Mumbai, India** on 23 March 2023.
8. **Ganapathy G.P** on *“Climate Change and Disaster Risk Reduction”* at **Thiruvalluvar University, Vellore, India** on 15 March 2023.
9. **Rama Mohan Rao P** on *“Conditional Assessment of Concrete Structures by Non-Destructive Techniques”* at **Vellore Institute of Technology, Vellore, India** on 25 January 2023.



Industrial Visit

1. **Dr. Arunava Ray** visited the **Lignite Mine 1(NLC India Limited, Neyveli)** to study slope stability in Mine 1 on 29 June 2023.

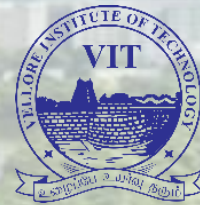


2. **Dr. S.S. Chandrasekaran** and **Dr. Arunava Ray** are visited the **Chennai Metro (CMRL)** on 31 May 2023 along with the M.Tech students to learn about the **construction of diaphragm walls, pile foundations and underground metro stations.**



Student Activities

1. **Reshma M S** presented on *“Prediction of intensity and structure of Very Severe Cyclonic storm Vardha (2016) using high horizontal resolution (1.667 km) WRF model”* in **“3rd International Workshop on BIODIVERSITY AND CLIMATE CHANGE-2023”** at IIT Kharagpur during 16-19th February, 2023.
2. **Km Chanchal** presented on *“An Assessment on Model Horizontal Resolution for Simulation of Kerala 2019 and Chennai 2015 Heavy Rainfall”* in **“3rd International Workshop on BIODIVERSITY AND CLIMATE CHANGE-2023”** at IIT Kharagpur during 16-19th February, 2023.
3. **Thatiparthi Koteshwaramma** presented on *“Performance of the IMDAA regional reanalysis data set on the prediction of extremely severe cyclonic storms over the Bay of Bengal region”* in **“3rd International Workshop on BIODIVERSITY AND CLIMATE CHANGE-2023”** at IIT Kharagpur during 16-19th February, 2023.



List of Journal Publications 2023

1. Tirupati Rao V., **Raja Sekhar Y.**, Exergo-Economic and CO2 Emission Analysis of Bi-Symmetrical Web Flow Photovoltaic-Thermal -System under Diurnal Conditions, Journal of Energy Resources Technology, Transactions of the ASME, Vol:145, Issue: 3, DOI: 10.1115/1.4055225
2. Chiampo F., Shanthakumar S., Ricky R., **Pattukandan Ganapathy G.**, Tannery: Environmental impacts and sustainable technologies, Materials Today: Proceedings, DOI: 10.1016/j.matpr.2023.02.025
3. **Mohan Rao Pannem R.**, Bashaveni B., Kalaiselvan S., The effect of fly ash aggregates on the self-healing capacity of bacterial concrete, Ain Shams Engineering Journal, DOI: 10.1016/j.asej.2023.102261
4. Jena R., Shanableh A., Al-Ruzouq R., Pradhan B., Gibril M.B.A., Khalil M.A., Ghorbanzadeh O., **Ganapathy G.P.**, Ghamisi P., Explainable Artificial Intelligence (XAI) Model for Earthquake Spatial Probability Assessment in Arabian Peninsula, Remote Sensing, Vol:15, Issue: 9, DOI: 10.3390/rs15092248
5. Manoharan S.G., **Ganapathy G.P.**, GIS-based urban social vulnerability assessment for liquefaction susceptible areas: a case study for greater Chennai, India, Geoenvironmental Disasters, Vol:10, Issue: 1, DOI: 10.1186/s40677-022-00230-5
6. Verma G.; Kumar B.; Kumar C.; **Ray A.**; Khandelwal M., Application of KRR, K-NN and GPR Algorithms for Predicting the Soaked CBR of Fine-Grained Plastic Soils, Arabian Journal for Science and Engineering, DOI: 10.1007/s13369-023-07962-y
7. Pochont N.R., **Sekhar Y.R.**, Numerical Simulation of Nitrogen-Doped Titanium Dioxide as an Inorganic Hole Transport Layer in Mixed Halide Perovskite Structures Using SCAPS 1-D, Inorganics, Vol:11, Issue: 1, DOI: 10.3390/inorganics11010003
8. Sahu R.K., Nayak S., **Singh K.S.**, Nayak H.P., Tyagi B., Evaluating the impact of topography on the initiation of Nor'westers over eastern India, Geomatics, Natural Hazards and Risk, Vol:14, Issue: 1, DOI: 10.1080/19475705.2023.2184669
9. Bariker P., Kolathayar S., **Chandrasekaran S.S.**, Lateral Resistance of Finned-Piles in clay Soils: Experimental Investigations and Numerical Studies, Indian Geotechnical Journal, DOI: 10.1007/s40098-023-00748-x
10. Pochont N.R., **Sekhar Y.R.**, Sharma K.V., Thin-film solar cells for vehicle integrated photovoltaic technology: Integration challenges and opportunities in hybrid vehicles, The Future of Solar Power, Pg. No:(153-187)
11. Tirupati Rao V., **Raja Sekhar Y.**, Hybrid Photovoltaic/Thermal (PVT) Collector Systems with Different Absorber Configurations for Thermal Management A Review, Energy and Environment, DOI: 10.1177/0958305X211065575
12. Gyaneshwar A., Mishra A., Chadha U., Raj Vincent P.M.D., Rajinikanth V., **Pattukandan Ganapathy G.**, Srinivasan K., A Contemporary Review on Deep Learning Models for Drought Prediction, Sustainability (Switzerland), Vol:15, Issue: 7

Surviving an Earthquake **Do's and Dont's**



Before

- ❖ Consult a structural engineer to make your house earthquake resistant;
- ❖ Repair deep plaster cracks on walls and ceilings;
- ❖ Fasten shelves securely to walls: place heavy / large objects on lower shelves;
- ❖ Learn the technique of Drop — Cover — Hold'.

During

- ❖ Stay Calm and Do Not Panic;
- ❖ DROP under a table; COVER your head with one hand and HOLD the table till the tremors last;
- ❖ Run outside as soon as the tremors stop — DO NOT use lift;
- ❖ When outside move away from buildings, trees, walls and poles;
- ❖ When inside a vehicle — pull over in an open place and remain inside: avoid bridges.



After

- ❖ Avoid entering damaged buildings:
- ❖ If trapped in rubble:
 - Do not light a matchstick;
 - Cover your mouth with a cloth;
 - Tap on a pipe or wall;
 - Sound a whistle;
 - Shout only as a last resort.
- ❖ Use stairs and NOT lifts or elevators.



Source: NDMA's Newsletter/October 2023

Editorial Board:

Dr. Rama Mohan Rao P (Professor)

Dr. Surendar M (Associate Professor)

Mr. Bhaskar Bashaveni (Research Scholar)

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