



SPG IIT, Roorkee Chapter organised a workshop on computational seismology titled “Seismic source inversion and 3D wavefield simulation” on 12th and 13th April, 2025

(Written by Prof. Vipul Silwal, Mentor, SPG Student Chapter, IITR)

A workshop was conducted by SPG IITR chapter on 12-13 April, 2025 on Computational Seismology, at the Department of Earth Sciences. This two-day workshop was intended to provide hands-on experience and theoretical knowledge in computational seismology. The primary goal was to enable attendees to

understand and apply numerical techniques for seismic source inversion and 3D wavefield simulation. The inaugural ceremony was attended by Head, Prof. Sandeep Singh, Prof. Sagarika Mukhopadhyay, Prof. Simanchal Padhy, and other faculties from the department.

IIT Roorkee SPG Student Chapter

IIT Roorkee SPG Student Chapter organize
A hands-on workshop on

WORKSHOP ON COMPUTATIONAL SEISMOLOGY:
Seismic Source Inversion and 3D Wavefield Simulation

DATE
April 12-13, 2025

TIME
9:00 am - 5:00 pm

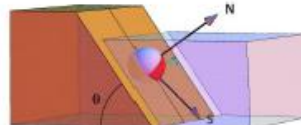
LOCATION
Computer Lab, Earth Sciences Department, IIT Roorkee

About us

The Society of Petroleum Geophysicists (SPG) student chapter at the Indian Institute of Technology Roorkee is a student organization that hosts events, workshops, and lectures related to Earth sciences. The Indian Institute of Technology Roorkee SEG Student Chapter is dedicated to fostering and promoting geoscientific knowledge and activities among students of the Department of Earth Sciences at IIT Roorkee.

Guest Lectures by:

Prof. Abhijit Ghosh, University of California, Riverside, USA
Prof. Bharath Shekar, IIT Bombay
Prof. Simanchal Padhy, IIT Roorkee



Patron
Prof. K. K. Pant
Director
IIT Roorkee

Facilitator
Prof. Sandeep Singh
Head, Department of
Earth Sciences, IITR

Convener
Prof. Vipul Silwal
Mentor, SPG-IITR Chapter
Department of Earth Sciences

Rahul
SPG-IITR Chapter
President

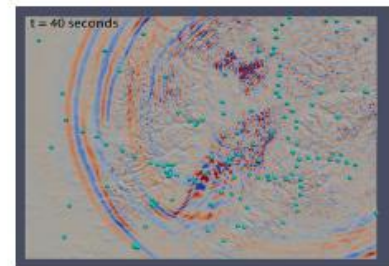
Shubh Sharma
SPG-IITR Chapter
Vice-President

Importance of this Workshop

This two-day workshop will provide participants hands-on experience and theoretical knowledge in computational seismology. The primary goal is to enable attendees to understand and apply numerical techniques for seismic source inversion and 3D wavefield simulation. Through structured sessions, participants will learn about seismic data analysis, moment tensor inversion, and wave propagation modeling using computational tools.

Key topics covered include:

- Basics of seismic data handling using Python.
- Time and frequency domain analysis.
- Seismic source mechanisms and moment tensor inversion using moment tensor uncertainty quantification (MTUQ).
- Synthetics computation using Syngine.
- Spectral element modeling using SPECFEM for homogeneous example.





(Workshop in progress)

Participants

The meeting was attended by 54 participants in online and offline mode. The participants were from IITR, IITKGP, Kurukshetra University, Dharanidhar University,

National Center of Seismology, National Institute of Disaster Mitigation, Shri Ram Global School Mahidol University Thailand (International), and THDC.

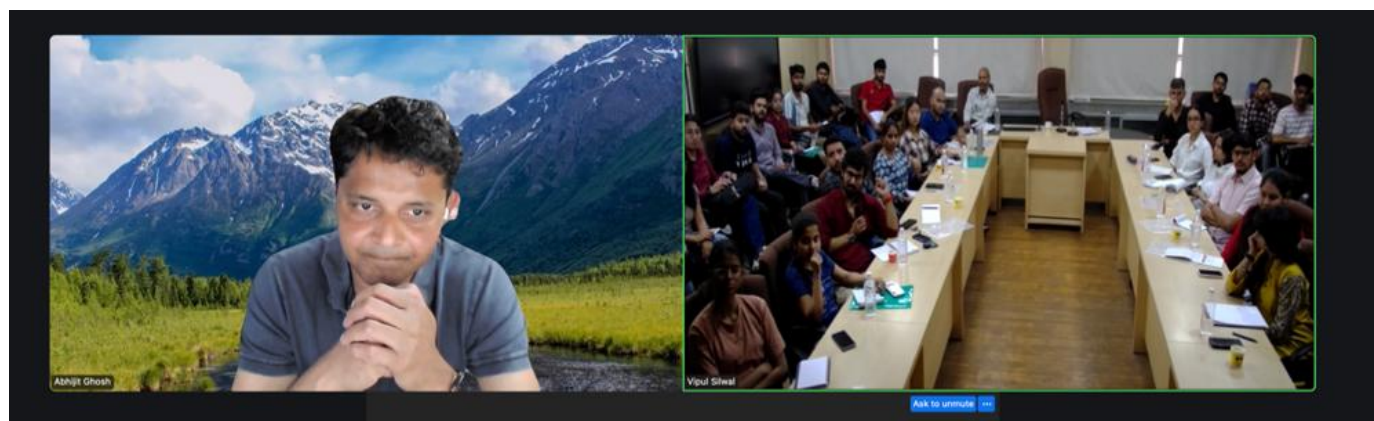
S. No.	Name	Institution	In-person/online
1.	Saurabh Shukla	IIT Kharagpur	In-person
2	Rinku Mahanta	IIT Roorkee	In-person
3	Ritika Kumari	IIT Roorkee	In-person
4	Hirakjyoti Kalita	IIT Roorkee	In-person
5	Mohammad Taqi Daqiq	IIT Roorkee	In-person
6	Aditya Kumar	IIT Roorkee	In-person
7	Krishna Nandan	IIT Roorkee	In-person
8	Amisha Patel	IIT Roorkee	In-person
9	Arpan Sahoo	IIT Roorkee	In-person
10	Arunima Gangopadhyay	IIT Roorkee	In-person
11	Shivkant	IIT Roorkee	In-person
12	Meher Vanshika Nigam	IIT Roorkee	In-person

13	Sneha Gupta	IIT Roorkee	In-person
14	Shubham Tiwari	IIT Roorkee	In-person
15	Aman Garg	IIT Roorkee	In-person
16	Jeevan Jyoti Rout	Dharanidhar University	In-person
17	Dr. Pankaj Kumar	National Institute of Disaster Management	Online
18	Raj Gupta	IIT Roorkee	In-person
19	Ashish Dhiman	IIT Roorkee	In-person
20	Chirag	Shri Ram Global School	Online
21	Shikha Vashisth	National Center for Seismology, Ministry of Earth Sciences	Online
22	Anushka Shinde	IIT Roorkee	In-person
23	SongkhunBoonchaisuk	Mahidol University	Online
24	Shikha Dwivedy	IIT Roorkee	In-person
25	Sobhit Soni	IIT Roorkee	In-person
26	Arpit Kumar Maurya	IIT Roorkee	In-person
27	Prabhat Pandey	IIT Roorkee	Online
28	Ashutosh Singh	IIT Roorkee	In-person
29	ABHISHEK KUMAR PANDEY	IIT Roorkee	In-person
30	Anupa Chakraborty	IIT Roorkee	In-person
31	Shubhneet Sapnawat	IIT Roorkee	In-person
32	Ravindra Kumar Gupta	IIT Roorkee	Online
33	Mohit Pandey	IIT Roorkee	Online
34	C LALLAWMAWMA	IIT Roorkee	Online
35	Ashim Gogoi	IIT Roorkee	Online
36	Jaisingh Verma	IIT Roorkee	Online
37	Shaishav Jha	IIT Roorkee	In-person
38	Sandip Kumar Rana	IIT Roorkee	In-person
39	Deepak Rawat	IIT Roorkee	Online

40	Vaidika Singh	IIT Roorkee	In-person
41	SHASHANK SINGHAL	THDC India Ltd.	Online
42	Garvit Gupta	IIT Roorkee	In-person
43	Saurabh Shridhar Popalwad	IIT Roorkee	In-person
44	Jyoti	Kurukshetra University	In-person
45	Natasha Shaikh	Kurukshetra University	In-person
46	Deepjyoti Sanyal	Kurukshetra University	In-person
47	Suraj Vanshi Kumar Yadav	Kurukshetra University	In-person
48	Purushottam Prasad Shukla	Kurukshetra University	In-person
49	ChabungbamYaiyaisana	Kurukshetra University	In-person
50	Rahul Sharma	Kurukshetra University	In-person
51	Janvi Rana	Kurukshetra University	In-person
52	Diksha	Kurukshetra University	In-person
53	Jhanvi Srivastava	Kurukshetra University	In-person

Lecture sessions

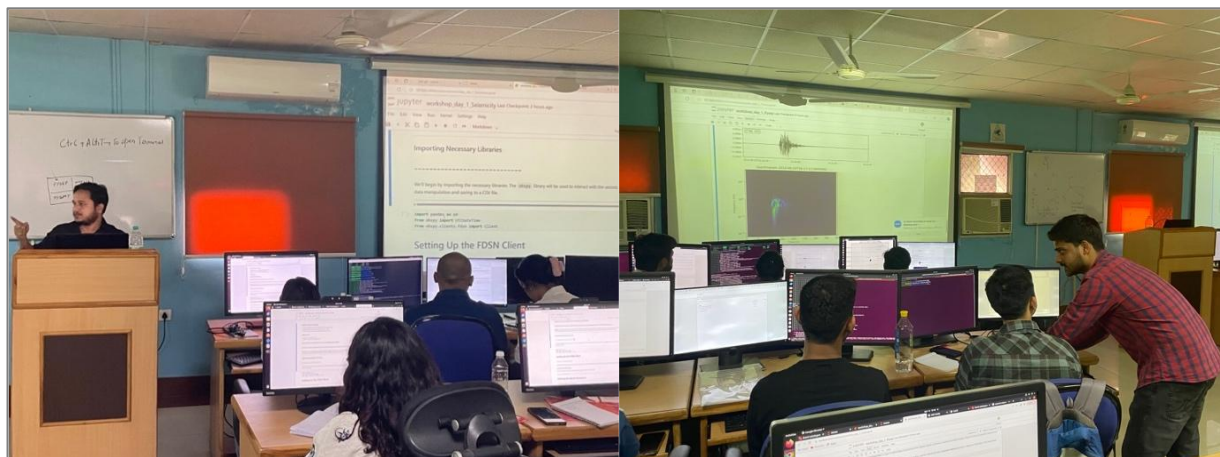
1. Online lectures were delivered by Prof. Abhijit Ghosh, University of California, Riverside. Prof. Abhijit Ghosh delivered a lecture on Machine learning applications in Seismology and showed examples from 2019 Ridgecrest earthquake and 2015 Nepal earthquake.
2. Another online lecture was delivered by Prof. Bharath Shekar, Department of Earth Sciences, IIT Bombay. He discussed about adjoint based location inversion and ambient noise interferometry.



Hands-on-training

Hands on training session was conducted for 2 days. On day 1 students learnt about seismicity and

waveform data analysis using obspy and mtuq from Rinku Mahanta.



(Hands-on-sessions in progress)

On day 2, students learnt about seismic wavefield modeling in 2D heterogenous media and adding topographic variation. This was taught using finite-

element modeling software SPECFEM2D by Ph.D. student Rahul.



Quiz

https://docs.google.com/forms/d/e/1FAIpQLSc_hAKFj0m1AoWlaw1V6vcX56p2iOKY4829-qcmQdm_E_eazvg/viewform

We also organized a quiz at the end of the workshop and following students secured full marks:

1. ArkanilPaul, IITR
2. Shailesh Parvadiya, IITR
3. Priti Kumar, IITR

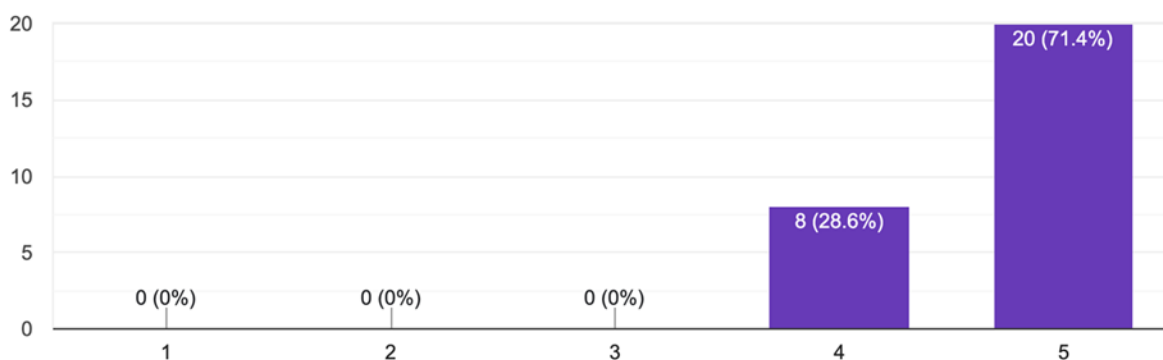
Feedback (Overall Workshop Rating)

We also obtained the feedback from the students who participated in offline mode (**Rating 4.71/5**):

https://docs.google.com/forms/d/1qBYm46Z4-BORe5s6Fp5HiSoo2sb-fBfBZ9m_ZtT2Kgg/edit#responses

How effective were the hands-on sessions?

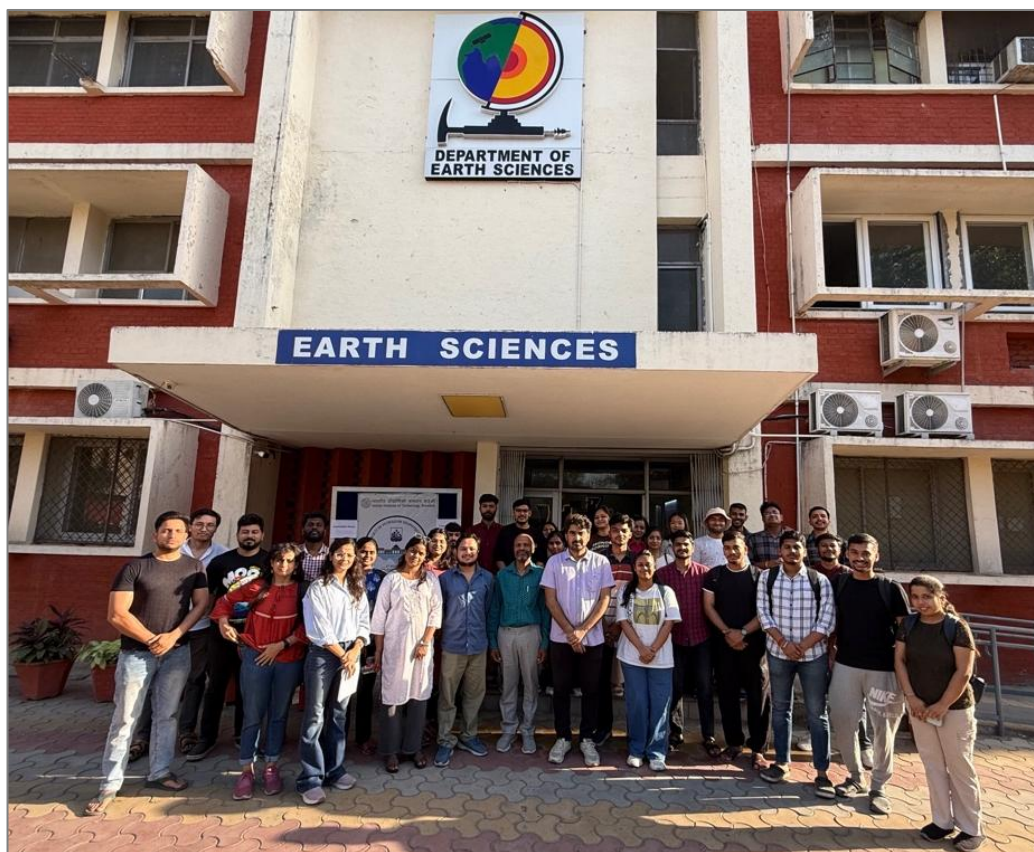
28 responses



Closing ceremony

The workshop ended with a vote of thanks followed by certificate distribution to participants.





(Group photo for the workshop participants)

Geo Snap



Trois Mamelles Mountain (Mauritius). It is known for its unique geological formation featuring three prominent peaks: east, centre, and west peak. The mountain is of volcanic origin, formed by ancient eruptions on the island, and its distinct peaks are a prominent feature of the western landscape. *(Photo courtesy: Ritesh Mohan Joshi)*