Mohit Agrawal

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(Curriculum Vitae-April 2019)

PROFESSIONAL APPOINTMENTS

2016- Present **Assistant Professor**
Department of Applied Geophysics
Indian Institute of Technology (Indian School of Mines)
Dhanbad, India.

EDUCATION

2012 – 2016 **PhD in Seismology**
Baylor University, Waco, Texas, USA
Supervised by Prof. Jay Pulliam (Baylor Univ.) & Prof. Mrinal K. Sen (UT, Austin)
Completion date: March, 2016

Thesis Title: Multi Objective Optimization for Seismology (MOOS) with Applications to the Middle East, the Texas Gulf Coast and the Rio Grande Rift.
(Funded by National Nuclear Security Administration and W.M. Keck Foundation)

2006 – 2011 **M.Sc. Tech. in Applied Geophysics**

Integrated 5-year course (through IIT-JEE)
Indian School of Mines, Dhanbad, India.
Dissertation Project: Multifractal analysis of earthquakes in the Haiti region

RESEARCH STUDENTS

*PhD Students***:** 03(Full Time) + 01(Part Time) [All are ongoing]

*Master's Student***:** 13 (ongoing) and 07 completed

SPONSORED RESEARCH PROJECTS

1. *Title***:** A Seismic Transect Across Northeastern India Beneath the Shillong Plateau.
   Agency: Science and Engineering Research Board (SERB), DST **(Serving as PI)**
   Amount Approved: Rs. 43,05000/- (Rupees Forty Three Lakhs and Five Thousands Only)

2. *Title***:** Seismic Site Characterization through Joint Modeling of Complementary Data Functionals. **(Serving as PI)**
   Agency: Faculty Reseach Scheme (FRS), India Institute of Technology (Indian School of Mines), Dhanbad.
   Amount Approved: Rs. 10,000,00/- (Rupees Ten Lakhs Only)

3. *Title***:** To Augment the Post graduate Teaching and Research Facilities in the Department of Applied Geophysics. **(Serving as Co-PI)**
   Agency: Department of Science and Technology (DST)
   Amount Approved: Rs. 1,98,00000/- (Rupees One Crore Ninety Eight Lakhs Only)

RESEARCH EXPERIENCE

May 2017- July 2017 **University of Texas at Austin and Baylor University (On deputation from IIT(ISM) to USA)**

- Worked on H-K stacking of receiver function for the earthquake data Dominican Republic.
- Worked on CCP stacking of Sp receiver functions for earthquake data from TA array and SESAME seismic stations installed in the area of south eastern United States (mostly Georgia and Florida).
- Worked on verifying synthetically the newly developed technique for migration of receiver functions.

January 2012 – May 2016 **Baylor University, Waco, Texas, USA.**

- Carried out joint inversion of multiple datasets using "Very fast simulated annealing" technique to find 1-D seismic velocity models.

- Assessments of constraints, uniqueness, and parameter independence were performed using statistical tools: Posterior probability density (PPD) functions and Model parameter correlation matrix.

- To study the region's subsurface structure a 3D image of the Northeast Caribbean was produced via Ps and Sp receiver functions.

- We developed a new technique for migration of CCP stacked receiver functions. The technique simultaneously finds depths to major discontinuities (Moho and LAB) and S velocity profiles beneath each seismic station in a manner that is similar to velocity analysis in reflection seismology.

July 2010 – May 2011 **Indian School of Mines, Dhanbad (Master's Thesis)**
Title: Multifractal analysis of earthquakes in Haiti region.

- Measured spatial clustering and spatial deformation in space and time of earthquakes.
- Computed fractal correlation dimension (Dc) values to get a view of correlation of past events with each other in the Haiti region.

May 2010 – July 2010 **Colorado State University, Fort Collins, USA.**

- Measured seismic anisotropy in upper mantle at data-rich broadband stations within the Global Seismic Network (GSN).
- Project goal was to use the birefringence of split SKS waves from distant earthquakes to infer the fabric of upper mantle.
- Used multiple tools to process the data so that it could be analyzed, including: Bash scripting, MATLAB, SAC and SOD.

May 2009 – July 2009 **University of Wyoming, Laramie, USA.**

- 3-D modeling of earth (aquifers) with the help of well log data using PETREL. Major goal was to geophysically monitor the carbon sequestrated deep saline aquifers.
- Created a Three- dimensional (3-D) aquifer model (earth model) with the help of Petrel version 2008.1 using well log data for MOXA-ARCH area in Western Wyoming.
- Used structural modeling function in Petrel and different interpolation methods were tested for creating surfaces and most suitable method selected finally for surface modeling.

May 2008 – July 2008 **Wadia Institute of Himalayan Geology, Dehradun, India.**

- To find the depth of Mohorovicic discontinuity in the Himalayan region.
- Worked on eight month's data from different seismic stations.
- Used SEISAN software to read and interpret data and gained sufficient knowledge to identify different types of seismic waves.

TEACHING/ADMINISTRATIVE EXPERIENCES

COURSES TAUGHT			
S.No.	**Year**	**Subject/Course**	**Institute/Dept.**
1.	2018-19 (Winter)	Computational Seismology/M.Tech. (Eq.Sc.E)	
		Earthquake Hazards, Exposure Vulnerability and Risk/ M.Tech. (Eq.Sc.E)	
2.	2018-19 (Monsoon)	Seismic Hazards Zonation/M.Tech. (Eq. Sc. E)	

3.	2017-18 (Winter)	Introduction to Seismology/M.Sc. Tech (AGP)	IIT(ISM)/Applied Geophysics
		Earthquake Hazards, Exposure Vulnerability and Risk/ M.Tech. (EDHRM)	
4.	2017-18 (Monsoon)	Applied Seismology /M.Tech. (EDHRM)	
		Seismic Zonation Hazard/M.Tech. (EDHRM)	
5.	2016-17 (Winter)	Applied Seismology/B.Tech. (Mining Engg.)	
		Earthquake Hazards, Exposure Vulnerability and Risk/ M.Tech. (EDHRM)	
		Introduction to Seismology/M.Sc. Tech (AGP)	
6.	2016-17 (Monsoon)	Seismic Microzonation/M.Tech. (EDHRM)	
		Natural Disasters, Mitigation and Management/M.Tech. (EDHRM)	

ADMINISTRATIVE RESPONSIBILITIES

1. Serving as co-incharge of seismological observatory at IIT(ISM), Dhanbad since July 2016. I have demonstrated seismological observatory set up and its functioning to several visitors at IIT(ISM) since July 2016.
2. Working as tabulator for the department since July 2016.
3. Serving as Faculty Advisor of Department of Applied Geophysics since July 2017.
4. Serving as a member of GATE-JAM institutional committee since February 2019.
5. Serving as time-table in-charge of Applied Geophysics since Aug., 2018.
6. Served as Field In-charge of 15 days field camp to Simultala, Bihar for 2^{nd} year M.Sc. Tech/4^{th} yr Int. M. Tech. students for December 2017 winter field training.
7. Responsible to submit seminar/dissertation marks for the entire department since July 2018.
8. Member of departmental faculty search committee since Nov. 2018.
9. Worked as protocol officer in Basant 2017-18.
10. Member of Departmental Under Graduate Committee (DUGC) since Aug., 2018.
11. Member of Moderation board of M. Tech. (Earthquake Science and Engineering) for session 2018-19 and 2019-20.

12. Member of admission scrutiny committee for 5yrs Integrated M. Tech. through IIT-JEE.
13. Member of admission scrutiny committee for 3yrs M.Sc. Tech. through JAM.
14. Member of admission scrutiny committee for 2yrs M. Tech. (Earthquake Science and Engineering).
15. Member of admission scrutiny committee for ISM JRF in the department of Applied Geophysics.
16. Member of verification of assets (stocks) committee in the department of Applied Geophysics.

PROFESSIONAL AFFILIATIONS

- Member of Indian Geophysical Union (IGU)
- Member of the American Geophysical Union (AGU)
- Member of the Seismological Society of America (SSA)
- Member of the European Geophysical Union (EGU).

OTHER SKILLS

Software: MEDBOW, FUNCLAB, Seismic Analysis Code, GMT, JWEED, TAUP, JWEED etc.
Programming: FORTRAN, MATLAB, PYTHON, Bash Shell Scripting, AWK
Operating System: GNU/LINUX, Mac, Windows

INTERESTS

Table Tennis: Proficient table tennis player.
Cricket: All-rounder in Cricket. Can perform well both with ball and bat.
Yoga: Love to do meditation and yoga every day.

AWARDS AND HONORS

1. Awarded with "***Roland Schlich Established Scientist Support"*** to attend General Assembly of European Geophysical Union 2019 held in Vienna, Austria to orally present our research titled "Estimating depths to subsurface discontinuities use receiver function's velocity analysis".

2. Recipient of "***Early Career Research Award 2017***" from Department of Science and Technology, New Delhi.

3. Awarded 3rd prize in "***Essay Writing Competition for Hindi Pakhwara-2017"*** organized by IIT(ISM), Dhanbad.

4. Recipient of ***"Baylor's Graduate School Travel Award"*** for representing department through poster presentation at AGU 2015 meeting, San Francisco, California.

5. Awarded 2015 "***Student Research grant from Gulf Coast Association of Geological Societies (GCAGS)"*** for research proposal titled "Receiver Functions and Surface Wave Dispersion Modeling of the Crust and Upper Mantle beneath Texas' Gulf Coast".

6. ***"Travel Award from Geology Department at Baylor"*** for poster presentation at SSA 2014 Annual Meeting, Anchorage, Alaska.

7. Recipient of "***Travel Award from Baylor Graduate School"*** for representing department through poster presentation at AGU 2014 meeting, San Francisco, California.

8. Recipient of "***Travel Award from Baylor Graduate School"*** for representing department through oral presentation at AGU 2013 meeting, San Francisco, California.

9. Awarded "**Merit-cum-Means Scholarship"** every year at Indian School of Mines (2006-2011).

10. Awarded **2nd Prize** for poster presentation competition in **SEG workshop 2009** at Indian School of Mines, Dhanbad, Jharkhand, India.

PUBLICATIONS

Published:

1. Gupta, R. K., **M. Agrawal**, S. K. Pal, R. Kumar and S. Srivastava (2019), Site characterization through combined analysis of seismic and electrical resistivity data at a site of Dhanbad, Jharkhand, India, *Environ. Earth. Sci.*, 78: 226. https://doi.org/10.1007/s12665-019-8231-2.

2. Das, M. K., **M. Agrawal**, R. K. Gupta and J. L. Gautam (2019), Lithospheric Seismic Structure beneath Two Broadband Station Sites of the Eastern Part of Chhotanagpur Plateau: New Constraints from Receiver Functions and Dispersion Curves, *Phys. Earth Planet. Inter., 287, 51-94.*

3. **Agrawal, M**., J. Pulliam, M.K. Sen and S. P. Grand (2019), Lithospheric removal beneath the eastern flank of the Rio Grande Rift from receiver function velocity analysis, *Geochem. Geophys. Geosyst., https://doi.org/10.1029/2018GC007911.*

4. Gupta, R. K., Saurabh, S. K. Pal, **M. Agrawal** and M. K. Das (2018), Shear Wave Velocity by Joint Inversion of Horizontal-to-Vertical Spectral Ratios and Dispersion Curves, *Indian Society of Engineering Geology, 14-1, 13.*

5. **Agrawal, M.**, J. Pulliam, M. K. Sen, and H. Gurrola (2015), Lithospheric structure of Texas-Gulf of Mexico passive margin from surface wave dispersion and migrated Ps receiver functions, *Geochem. Geophys. Geosyst. 16, doi:10.1002/2015GC005803.*

6. **Agrawal, M**., J. Pulliam, M. K. Sen, U. Dutta, M. Pasyanos, and R. Mellors (2015), Crustal and uppermost mantle structure in the Middle East: Assessing constraints provided by jointly modeling Ps and Sp receiver functions and Rayleigh wave group velocity dispersion curves, *Geophys. J. Int., 201(2), 783–810.*

7. Mallick, S., P.K. Mukhopadhyay, A. Dwivedi, and **M. Agrawal** (2009). A cost-effective monitoring strategy for carbon-sequestrated deep saline aquifer. *Geohorizon, http://www.spgindia.org/geodec_09/malick.pdf.*

Under Review/In Preparation:

1. Kumar, S., **M. Agrawal**, J. Pulliam, E. P. Rivera and V.A. Huerfano (2018), Crustal thickness and bulk Poisson ratios in the Dominican Republic from receiver function analysis, *Under Review, Earth and Planetary Science Letters.*

2. Kumar, S. and **M. Agrawal** (2017), Joint modeling of receiver functions and dispersion curves for southern Indian Shield, in preparation.

CONFERENCE PRESENTATIONS AND PUBLISHED ABSTRACTS

1. **Agrawal, M.,** J. Pulliam and M.K. Sen (2019), Estimating depths to subsurface discontinuities using receiver function velocity analysis, Geophysical Research Abstracts Vol. 21, EGU2019-977, 2019 EGU General Assembly 2019, Vienna, Austria.

2. Kumar, S., and **M. Agrawal** (2018), Lithospheric structure of Eastern Dharwar Craton by Jointly modelling Ps and Sp receiver functions and Rayleigh wave group velocity dispersion curves, Emerging trends in Geophysical research for Make-in-India (ETGRMI), Indian Institute of Technology (Indian School of Mines), Dhanbad, India.

3. Kumar, S., **M. Agrawal**, J. Pulliam, E. P. Rivera and V. A. Huerfano (2018), Moho depth and Bulk Vp/Vs ratio variation in the Dominican Republic from teleseismic Receiver functions., 40th annual convention, Seminar and Exhibition on "Exploration Geophysics", Association of Exploration Geophysicists (AEG), Indian Institute of Technology Bombay (IIT Bombay), Powai, Mumbai, India.

4. Gupta, R. K., **M. Agrawal**, S. K. Pal, R. Kumar and Saurabh (2018), Site Characterization Through Integrated Approach of HVSR, Dispersion Curves and Electrical Resisitivity Tomography, 40th annual convention, Seminar and Exhibition on "Exploration Geophysics", Association of Exploration Geophysicists (AEG), Indian Institute of Technology Bombay (IIT Bombay), Powai, Mumbai, India.

5. Soni, Y. and **M. Agrawal** (March, 2018), Lithospheric Temperature Variations using Surface Waves, Emerging trends in Geophysical research for Make-in-India (ETGRMI), Indian Institute of Technology (Indian School of Mines), Dhanbad, India.

6. Das, M. K. and **M. Agrawal** (March, 2018), Estimation of Moho Depth and Bulk Vp/Vs Ratios Beneath Texas's Gulf of Mexico Using H-k Stacking Method, Emerging trends in Geophysical research for Make-in-India (ETGRMI), Indian Institute of Technology (Indian School of Mines), Dhanbad, India.

7. Ranjan R. and **M. Agrawal** (2018), Structure health monitoring in IIT(ISM) Dhanbad using Ambient noise, 55th annual convention, Indian Geophysical Union, Bhopal.

8. **Agrawal M**. (2018), Uncertainty analysis in the joint Non Linear modelling of receiver functions , surface wave dispersion and shear coupled-PL phases, Emerging trends in Geophysical research for Make-in-India (ETGRMI), Indian Institute of Technology (Indian School of Mines), Dhanbad, India.

9. Sharma S., P. Pawar, **M. Agrawal** and S.K. Pal (2018), Seismic Site Characterization Using Ambient Noise Technique for IIT(ISM), Dhanbad, Jharkhand, Association of Exploration Geophysicists (AEG), Indian Institute of Technology Bombay (IIT Bombay), Powai, Mumbai, India.

10. Kumar, S., G. Ntuli, **M. Agrawal**, J. Pulliam, E. Polanco Rivera and V.A. Huerfano (2018), Crustal Structure in the Dominican Republic from Receiver Function Analysis, Seismological Society of America (SSA), New Orleans, Lousiana, USA.

11. Kumar, S. and **M. Agrawal** (2017), Crustal and Uppermost Mantle Seismic Structure of Eastern Dharwar Craton by Jointly Modelling Teleseismic Receiver Functions and

Rayleigh Wave Group Velocity Dispersion Curves, Indian Geophysical Union, Hyderabad, INDIA.

12. Das, M. K., **M. Agrawal**, and J. Pulliam (2017), Determination of Crustal Thicknesses and Vp/Vs Ratios along Texas's Gulf of Mexico Using H-κ Stacking, Indian Geophysical Union, Hyderabad, INDIA.

13. **Agrawal, M.,** J. Pulliam, D. Barman, M.K. Sen, and S. Grand (2017), Joint Velocity Analysis of Ps and Sp Receiver Functions and Its Application on the Eastern Flank of Rio Grande Rift, American Geophysical Union, New Orleans, Lousiana, USA.

14. **Agrawal, M.,** J. Pulliam, M. K. Sen, and S. Grand (2015), Lithospheric structure of the eastern flank of the Rio Grande Rift via receiver function velocity analysis*, American Geophysical Union, San Francisco, California.*

15. **Agrawal, M.**, J. Pulliam, M. K. Sen, and H. Gurrola (2015), Receiver Functions and Surface Wave Dispersion Modeling of the Crust and Upper Mantle beneath Texas' Gulf Coast, *Gulf Coast Association of Geological Societies, Houston, Texas.*

16. **Agrawal, M.**, J. Pulliam, M. K. Sen, and S. Grand (2015), Seismic Investigation of Edge Driven Convection Associated with the Rio Grande Rift by velocity analysis of Ps and Sp receiver functions, *SEG/AAPG Student Exposition, Houston, Texas.*

17. Ntuli, G., J. Pulliam, **M. Agrawal**, V. Huerfano, and E. P. Rivera (2015), Ps receiver function imaging of crustal structure and Moho topography beneath the Northeast Caribbean, *American Geophysical Union, San Francisco, California.*

18. Gurrola, H., J. Pulliam, and **M. Agrawal** (2015), Geophysical investigations of the crust and mantle beneath Texas' Gulf Coastal Plain, *American Geophysical Union, San Francisco, California.*

19. Ntuli, G., J. Pulliam, **M. Agrawal**, V. Huerfano, and E. P. Rivera (2015), Ps receiver function imaging of the Northeast Caribbean plate boundary, *Gulf Coast Association of Geological Societies, Houston, Texas.*

20. Ntuli, G., J. Pulliam, **M. Agrawal**, V. Huerfano, and E. P. Rivera (2015), Ps receiver function imaging of the Northeast Caribbean plate boundary, *SEG/AAPG Student Exposition, Houston, Texas.*

21. Ntuli, G., J. Pulliam, **M. Agrawal**, V. Huerfano, and E. P. Rivera (2015), Ps receiver function imaging of the Northeast Caribbean plate boundary, Rocky Mountain Rendezvous**,** *Laramie, Wyoming.*

22. **Agrawal, M**., J. Pulliam, M. K. Sen, and H. Gurrola (2014), Crustal and uppermost mantle structure of Texas's Gulf Coastal Plain from surface wave dispersion and migrated Ps receiver functions, *American Geophysical Union, San Francisco, California.*

23. Ghosh, R., M. K. Sen, P. Mandal, J. Pulliam and **M. Agrawal** (2014), Seismic Velocity Assessment In The Kachchh Region, India, From Multiple Waveform Functionals, *American Geophysical Union, San Francisco, California.*

24. **Agrawal, M.**, J. Pulliam, M. K. Sen, and H. Gurrola (2014), Lithospheric Earth Structure of Texas-Gulf of Mexico from Surface Wave Dispersion and Migrated Ps Receiver Functions, *SEG/AAPG Student Exposition, Houston, Texas.*

25. **Agrawal, M.**, J. Pulliam, M. K. Sen, and H. Gurrola (2014), Seismic structure of Texas-Gulf coastal plain from surface wave dispersion and migrated Ps receiver functions, *Seismological Society of America, Anchorage, Alaska.*

26. **Agrawal, M.**, J. Pulliam, and M. K. Sen (2013), Seismic imaging of the crust and upper mantle beneath the Texas-Gulf of Mexico margin by fitting surface wave dispersion curves and commom conversion point stacking of Ps receiver functions, *American Geophysical Union, San Francisco, California.*

27. **Agrawal, M.**, J. Pulliam, M.K. Sen, R. Mellors, and M. Pasyanos (2013), Seismic velocity estimation in Middle East: Assessing constraints provided by jointly modeling P-to-S and S-to-P receiver functions and group velocity Rayleigh wave dispersion curves, *American Geophysical Union, SEG/AAPG student Exposition, Houston, Texas.*

28. **Agrawal, M.**, J. Pulliam, M.K. Sen, U. Dutta, R. Ghosh, F. Sepulveda, R. Mellors, and M. Pasyanos (2012), Joint, non-linear modeling of receiver functions, surface wave dispersion, and waveforms with formal assessments of constraints. *Monitoring Research Review, Albuquerque, New Mexico.*

REFERENCES

1. Prof. Jay Pulliam, Department of Geosciences, Baylor University, U.S.A. (Jay_Pulliam@baylor.edu)

2. Prof. Mrinal K. Sen, Jackson School of Geosciences, Univ. of Texas, Austin, U.S.A. (mrinal@ig.utexas.edu)

3. Prof. Utpal Dutta, UAA College of Engineering, Univ. of Alaska, Anchorage, U.S.A. (udutta2@uaa.alaska.edu)