

Curriculum Vitae of Bappa Mukherjee

PERSONAL INFORMATION

Designation: Scientist B, Wadia Institute of Himalayan Geology, Dehradun-248001
Address: Artificial Intelligence Center of Excellence for Geosciences (AICEG),
Wadia Institute of Himalayan Geology, Dehradun-248001, India
Telephone: +91-9798168289; **Email:** bappa.ism@gmail.com
Nationality: Indian; **Date of Birth:** 26/01/1989
Languages: English, Bengali, Hindi

RESEARCH INTEREST & SPECIALIZATION

- Seismic, well logging and petrophysics
- Reservoir characterization
- Identification and quantification of gas hydrates as potential future energy source
- Geophysical signal processing
- Pattern recognition using mono fractal and multifractal analysis
- AI & Machine learning

WORK EXPERIENCE

**09/2021–
04/2022** **Research Associate (Postdoctoral Research Fellow)
Wadia Institute of Himalayan Geology, Dehradun**

Responsibilities: Seismic data interpretation using Convolutional Neural Network (A Deep Learning algorithm).
Seismic image enhancement using Generative Adversarial Networks (GANs).
Velocity and attenuation models of the subsurface from active source seismic data using full waveform inversion (FWI).

**08/2019
09/2021** **Postdoctoral Research Fellow (O.N.G.C. funded project)
Centre of Excellence in Artificial Intelligence, IIT Kharagpur,
India**

Responsibilities: Well log data conditioning using long short-term memory network (LSTM) deep learning network.
Generated an enterprise resource planning (ERP) system for ONGC based on the several workflows in ProcessMaker software, as well as generating an automated decision making system in the intermediate stages of workflow based on the logging of previous decisions of each steps using machine learning technique.

**08/2017–
08/2019** **Postdoctoral Research Fellow (SERB-nPDF)
Marine Seismic Group, CSIR-National Geophysical Research
Institute, Hyderabad, India**

Responsibilities: *Successfully completed the project as a PI*

Project title: *Understanding the heterogeneity of gas hydrate resource distribution for reducing possible management risk using conventional and non-conventional tools for KG basin, India*

Research contribution:

Assess the natural gas hydrate potential and its distribution pattern in Krishna Godavari basin.

Predicted the lithological succession from well log data and available core information using artificial intelligence and hierarchical cluster analysis techniques.

Predicted the petrophysical parameters such as porosity, permeability and gas hydrate saturations using artificial intelligence.

Estimated the gas hydrated saturation using effective medium modelling (EMM) and radial basis function (RBF) interpolation techniques.

Detrended fluctuation analysis (DFA) and modified multifractal detrended fluctuation analysis (MFDFA) was applied to the well log data to understand the fractal pattern of gas hydrate zones.

EDUCATION

07/2013–
03/2017

PhD in Applied Geophysics

Indian Institute of Technology (ISM), Dhanbad, India

Thesis title: Integrated Approach to Study the Heterogeneity of Hydrocarbon Reservoir in Assam-Arakan Basin of North-East India.

Research contribution:

During PhD, I have interpreted the industrial well log data (Bhogpara oil field of Assam-Arakan basin) using classical and advance techniques. Mainly, I have implemented the quick look interpretation technique and geophysical signal processing tools to achieve my target. In particular, I focused on the challenges faced by oil industries, such as: (1) Identified the thin bed (up to ~ 1 m), in automated fashion using Walsh transform and self-developed bed boundary detection algorithm, as well as generated a 3D bed boundary model of the study area; (2) Segregated the stratigraphic formation interfaces using combined wavelet and Fourier transform technique; (3) Segregated the hydrocarbon potential zones and non-potential zones using monofractal analysis (rescaled range analysis, power spectrum density analysis and wavelet based fractal analysis).

08/2010–
05/2013

M.Sc. (Tech.) in Applied Geophysics, 1st Class

Indian School of Mines, Dhanbad, India

Thesis title (M.Sc. (Tech.) dissertation): Tectonics evolution of east coast of India by marine gravity data.

08/2006–
06/2009

B.Sc. (Physics Hons.), 2nd Class

University of Burdwan, India

ACHIEVEMENTS/ AWARDS/ FELLOWSHIPS

2019

Assistant Professor (Contractual), Kerala University of Fisheries and Ocean Studies(KUFOS), Kerala- 682506

2018	SPGNA travel grant, funded by Society of Petroleum Geophysicists North America (SPGNA) to attend 88th Annual Meeting and International Exposition of SEG
2018	International travel support (ITS), funded by science and engineering research board (SERB) to attend 88th Annual Meeting and International Exposition of SEG
2017	Selected in national postdoctoral fellowship scheme of science and engineering research board (SERB-nPDF)
2010	7 th rank in all India M.Sc. entrance test at Indian School of Mines, Dhanbad

TRAINING/ CERTIFICATIONS

12-17, Dec., 2016	Short term training course on “ <i>Geophysical software practices for subsurface imaging</i> ” at IIT (ISM), Dhanbad
18-20, April, 2016	Short term training course on “ <i>Earthquake hazard awareness for real estate technical personnel</i> ” at IIT (ISM), Dhanbad
18-29, June, 2012	Summer training on “ <i>Application of Geophysical Methods</i> ” at Geological Survey of India, ER-Region, Kolkata
25th May - 5th June, 2012	Industrial summer training on “ <i>Seismic Data Acquisition & Processing</i> ” at Oil India Limited, Duliajan, Assam
12-17, April, 2012	Field resistivity survey under the guidance of Dr. P. C. Chandra, organised by Applied Geophysics Dept. of ISM, Dhanbad
03-26, Nov., 2011	“ <i>Geophysical field training</i> ” (Seismic refraction, reflection, Time and Frequency Domain Electromagnetic, MT, Gravity, Magnetic, GPS, Induced Polarization, SP, Multi electrode Resistivity and Resistivity survey’s) for three weeks organised by Applied Geophysics Dept. of ISM Dhanbad at Jaduguda, East Singbhum, Jharkhand, India
5th May - 8th June, 2011	Summer training on “ <i>b-value analysis for N-W HIMALAYA</i> ” at Wadia Institute of Himalayan Geology, Dehradun
15-29, Nov., 2010	“ <i>Winter geological field training</i> ” organised by Applied Geology Dept. of ISM Dhanbad at Bhuli Bansjora, Jharia

OTHER RELEVANT INFORMATION

Programing languages	FORTRAN, C, OOP with C++.
Software’s	MATLAB, Python, ORIGIN, Seismic Unix, SEISAN, MESA, GEOSOFT, ENVI, LogIC, OpendTect, DATA VIEW.
Reviewer of Peer Reviewed Journals	<ol style="list-style-type: none"> 1. Exploration Geophysics (Journal of the Australian Society of Exploration Geophysicists) 2. Carbonates and Evaporites (Springer) 3. Energy Exploration & Exploitation (SAGE, global academic publisher) 4. Pure and Applied Geophysics (Springer)

Declaration

I certify that the information provided above is accurate, to the best of my knowledge. Please do not hesitate to contact me, in case you need more details on the same.

Place: WIHG Dehradun, India

Date: 12th September, 2022

Yours faithfully,

Bappa Mukherjee

(Bappa Mukherjee)

PEER-REVIEWED INTERNATIONAL PUBLICATIONS:

1. **Mukherjee, B.**, Srivardhan, V., Roy, P.N.S., (2016). Identification of formation interfaces by using wavelet and Fourier transform. *Journal of Applied Geophysics*, 128, 140-149.
<https://doi.org/10.1016/j.jappgeo.2016.03.025>
2. **Mukherjee, B.**, Roy, P.N.S., (2017). Fractal analysis of logs to characterize the hydrocarbon and non-hydrocarbon zones of Bhogpara oil field, Northeast India. *Arabian Journal of Geosciences*, 10 (22), 497.
<https://doi.org/10.1007/s12517-017-3282-8>
3. **Mukherjee, B.**, Roy, P.N.S., (2018). Characterization of the hydrocarbon potential and non-potential zones using wavelet based fractal analysis. *FRACTALS*, 22 (1), 1850001.
<https://doi.org/10.1142/S0218348X18500019>
4. Swain, S. K., Roy P.N.S., **Mukherjee, B.**, Sawkar, R.H., (2019). Fractal dimension and its translation into a model of gold spatial proxy. *Ore Geology Reviews*, 110, 102935.
<https://doi.org/10.1016/j.oregeorev.2019.102935>
5. **Mukherjee, B.**, Sain, K., (2019). Prediction of reservoir parameters in gas hydrate sediments using artificial intelligence (AI): A case study in Krishna-Godavari basin (NGHP Exp-02). *Journal of Earth System Science*, 128, 199.
<https://doi.org/10.1007/s12040-019-1210-x>
6. **Mukherjee, B.**, Sain, K., (2019). Bed boundary identification from well log data using Walsh transform technique: A case study from NGHP Expedition-02 in Krishna-Godavari Basin, India. *Journal of Earth System Science*, 128, 214.
<https://doi.org/10.1007/s12040-019-1240-4>
7. **Mukherjee, B.**, Roy P.N.S., Sain, K., (2020). Delineation of hydrocarbon and non-hydrocarbon zones using fractal analysis of well log data from Bhogpara oil field, NE India. *Carbonates and Evaporites*, 35, 22.
<https://doi.org/10.1007/s13146-020-00556-x>
8. **Mukherjee, B.**, Sain, K., (2021). Vertical lithological proxy using statistical and artificial intelligence approach: A case study from Krishna-Godavari Basin, offshore India. *Marine Geophysical Research*, 42 (1), 1-23.
<https://doi.org/10.1007/s11001-020-09424-8>

PUBLICATIONS IN NATIONAL & INTERNATIONAL CONFERENCE

1. **Mukherjee, B.,** Roy, P.N.S., (2016). Comparative study for Unconventional tools application in reservoir characterisations for Bhogpara, N-E, India. Jour. of Geophysics, 37 (2), 65-75.
2. **Mukherjee, B.,** Sain, K., (2018). Bed boundary identification from wire-line log data using Walsh transforms technique: A case study of KG basin, India. SEG International Exposition and 88th Annual Meeting, 3327-3331.
<https://library.seg.org/doi/abs/10.1190/segam2018-2998202.1>

CONFERENCE PROCEEDINGS

1. **Mukherjee, B.,** Roy P.N.S., Sain, K., Pattern recognition of hydrocarbon and non-hydrocarbon zones using fractal analysis of wireline logs: A case study of Bhogpara oil field, NE India. 36th International Geological Congress (IGC), Delhi India during 16-21 August, 2021 (Accepted for oral presentation).
2. **Mukherjee, B.,** Sain, K., Hierarchical cluster analysis and its translation towards spatial lithological proxy. 3rd National Geo-Research Scholars Meet, Wadia Institute of Himalayan Geology, Dehradun, 6-8, June, 2019 (Poster presentation).
3. **Mukherjee, B.,** Sain, K., Lithology prediction for the gas hydrate sediments using artificial intelligence: A case study from Krishna-Godavari Basin, Offshore India (NGHP Expedition-02). 55th IGU held at RNTU, Bhopal, India during 5-7 December, 2018 (Poster presentation).
4. **Mukherjee, B.,** Sain, K., Selection of proper mother wavelet and optimum level of decomposition: Examples from wire-line log data in the KG basin. 55th IGU held at RNTU, Bhopal, India during 5-7 December, 2018 (Poster presentation).
5. **Mukherjee, B.,** Roy P.N.S., Unconventional approach to segregate the potential zones from dry zones. 38th Annual Convention AEG-2015 held at GSITI, Hyderabad, India during 20-22 October, 2016 (Poster presentation).
6. **Mukherjee, B.,** Roy P.N.S., Bed boundary identification using wavelet and Fourier transforms for upper Assam shelf basin, N-E, India. 52nd IGU held at NCAOR, Goa, India during 3-5 November, 2015 (Poster presentation).