Dr. Shuvajit Bhattacharya

Professional Summary

Business address:	Bureau of Economic Geology,
	The University of Texas at Austin,
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Education

Ph.D. West Virginia University, Morgantown, USA, Geology, 2016
Dissertation: Shale Lithofacies Modeling of the Bakken Formation in the Williston Basin with Dr. Timothy Carr; **Focus areas**: Petrophysics, Machine Learning, and Seismic

M.Sc. Indian Institute of Technology, Mumbai, India, Applied Geophysics, 2010 **Thesis:** Teleseismic Travel Time Residuals in the Deccan Volcanic Province, India with Dr. G. Mohan, **Focus areas:** Earthquake Seismology and Seismic Imaging

B.Sc. University of Calcutta, India, Geology (Honors), Physics (Minor 1), Mathematics (Minor 2), 2008

Professional History

Bureau of Economic Geology, The University of Texas (Austin**,** USA), Research Associate, August 2020- Present

- Perform quantitative 3D seismic interpretation and petrophysical analysis, and machine learning for **energy resources exploration** (including **geothermal energy**), **wastewater disposal**, **carbon** and **hydrogen storage,** primarily in the **Permian Basin** and **Gulf Coast** of Texas and other areas in the US (New Mexico, Louisiana, Michigan, and Alaska)

- Involved in writing research proposals to industries, state, and federal agencies on resource exploration, carbon storage, hydrogen storage, and geothermal energy. Build and collaborate with researchers from academia, state/federal agencies, and industry.

University of Alaska (Anchorage, USA), Assistant Professor, 2017- 2020

Research

- Developed and conducted several research projects on integrated **petrophysics, 3D seismic,** and **machine learning** for energy resources exploration on the **North Slope** and

Cook Inlet basins in Alaska, and other areas in the US (North Dakota, Wyoming, Michigan, and Ohio)

- Received >10 **competitive**, **funded research projects** as PI and Co-PI. Involved in writing research proposals to industries, state, and federal agencies.

- Secured **> $150 million USD** in-kind donations of high-end software and subsurface data from Schlumberger, Ikon Science, CGG, Paradigm, Geosoft, and others for teaching and research purposes.

Teaching

- Designed and delivered 5 courses, such as **Petroleum Geophysics & Petrophysics, Applied Geophysics**, **Integrated Subsurface Mapping & Analysis**, **Geological Data Visualization & Analysis**, and **Environmental Geology.** Received *excellent grade*.

- Advised 2 **graduate students** and 3 **undergraduate students** for academic research projects. Advised more than 20 undergraduate students as their faculty advisor. Initiated and mentored the UAA student team of 5 graduate students for the **AAPG Imperial Barrel Award competition**

College/University Service

- **Chair**, Graduate Program Committee, Department of Geological Sciences, 2018-2020

- Involved in building and continuing collaborations with researchers from academia, state/federal agencies, and industry (2017- 2020). *Raised funds from BP for department.*

Battelle Memorial Institute (Columbus, USA), Petroleum Geoscientist, 2016-2017

- Performed research on subsurface rock formations (sandstone, carbonate, and shale) in the **Appalachian** and **mid-Atlantic basins** in the US, and **Zululand Basin** in South Africa for geosystem assessment, integrated reservoir characterization, carbon storage/utilization, and enhanced oil recovery using 2D/3D seismic surveys and deep petrophysical logs

- Prepared and supported team to build numerous research proposals to the **U.S. Department of Energy (DOE)**, **World Bank**, and others. Total funded project > **$3 million**

- Authored and co-authored 2 project (technical) reports and 6 conference abstracts

West Virginia University (Morgantown, USA), Graduate Research & Teaching Assistant, 2012-2016

- Responsible for core, geophysical log interpretation, facies correlation, and crossplot generation to investigate variation of petrophysical and geomechanical properties, and organic matter content to build **3D geocellular facies model**

- Integrated core and geophysical logs, and machine learning for quantitative shale facies typing and property modeling at multiple scales to understand the depositional history of the **Bakken** and **Marcellus** formations. Worked on projects funded by the **U.S. Department of Energy (DOE).**

- Taught **Petroleum Geology** to graduate and undergraduate students. Also taught **Log Analysis** as required.

EOG Resources (Midland, USA), Summer Intern, 2015

- Completed an **integrated subsurface evaluation** of the Woodford Formation, Permian Basin using geophysical logs (~1,200 wells) and core data (poro-perm and saturation)

- Involved in facies correlation, multi-mineral modeling, mudstone facies typing (mineralogy, organic matter content and brittleness) and regional mapping.

Talisman Energy/ Repsol (Pittsburgh, USA), Summer Intern, 2014

- Performed **3D geological modeling** of the Utica-Point Pleasant formations, Appalachian Basin based on 3D seismic, well log and core data. Involved in advanced petrophysical and geomechanical analysis

- Responsibilities included seismic attribute-assisted-interpretation of Salina Salt structure, extraction of faults and prospective geobodies from 3D seismic and well logs.

Oil & Natural Gas Corporation Limited (Kolkata, India), Wellsite Geologist (Technical Assistant), 2011- 2012

- Monitored wellsite (operational) activities by description, analysis and evaluation of subsurface formations in both onshore and offshore locations using rock cuttings, core, well logs, and seismic.

- Successfully supervised geological operations. Involved in a few offshore *discovery* wells. Received 96.5% (*excellent grade*) in Annual Performance Report, 2012.

National Geophysical Research Institute (Hyderabad, India), Project Assistant, 2010- 2011

- Processed and interpreted seismic data, and analyzed well logs for integrated characterization of gas hydrate reservoirs

- Performed Amplitude Versus Offset (AVO) analysis, rock physical modeling (acoustic velocity, Young's modulus and Poisson's ratio, etc.) and measured gas saturation

National Geophysical Research Institute (Hyderabad, India), Summer Intern, 2009

- Worked on "Application of geophysical techniques for exploration of Gas Hydrate", using sonic log and seismic data. Computed various seismic attributes for better delineation of gas hydrate-bearing zone.

- Performed testing, running of different processing flows and QC check of subsurface data. Formulated algorithms for rock physical modeling in different basins in India.

Areas of Expertise

Petrophysics
Quantitative Seismic Interpretation
Seismic Geomorphology
Machine Learning
Integrated Subsurface Characterization
3D Reservoir Modeling
Carbon Sequestration and Utilization
Fluid Storage
Geohazards

Teaching Experience

- *Undergraduate courses*

  1. **University of Alaska Anchorage:** Environmental Geology (GEOL A115), Geological Data Visualization and Analysis (GEOL A315), Applied Geophysics (GEOL A476), and Integrated Subsurface Mapping & Analysis (GEOL A477)
  2. **West Virginia University:** Petroleum Geology (GEOL 472) and Well Log Analysis (GEOL 479)

- *Graduate courses*

  1. **University of Alaska Anchorage:** Applied Geophysics (GEOL A676), Integrated Subsurface Mapping & Analysis (GEOL A677), and Petroleum Geophysics & Petrophysics (GEOL A678)
  2. **West Virginia University:** Petroleum Geology (GEOL 472) and Well Log Analysis (GEOL 479)

- *Independent studies (graduate)*

  University of Alaska Anchorage: Mudstone Petrophysics (GEOL A697), Poroelasticity (GEOL A697), Earthquake Data Analysis (GEOL A697)

Funding Record (Grants and Scholarships)

- The University of Texas Permian Basin (Attribute-Assisted Seismic Processing and Interpretation consortium), **PI**, $14,000, 2020-2022

- BEG Career Development Publications Award, **PI**, $3,750, 2021
- U.S. Department of Energy research Grant (prime recipient- Battelle, **Co-PI**), $245,562, 2019-2024
- ConocoPhillips Arctic Science and Engineering Endowment Grant (**Co-PI**), $99,892, 2020-2021
- Malamute Energy Research grant (**Lead PI**), $69,493, 2019-2020
- ConocoPhillips Arctic Science and Engineering Endowment Grant (**Lead PI**), $99,755, 2019-2021
- XCD Energy Limited Research grant (**Sole PI**), $64,441, 2019-2020
- UNAC Faculty Initiative Fund (**Co-PI**), $29,969, 2019-2020
- **INNOVATE Award** (**Lead PI**), $25,000, 2019-2020
- Winegarner LLC Research Grant (**Sole PI**), $5,000, 2019-2020
- UNAC Travel Grant, $1,500, 2019
- Malamute Energy Research Grant (**Sole PI**), $103,342, 2018-2019
- Alaska Department of Natural Resources Grant (**Sole PI**), $14,049, 2018-2019
- ConocoPhillips Arctic Science and Engineering Endowment Grant (**Co-PI**), $80,000, 2018-2019
- Schlumberger In-kind Software Donation- UAA (**Sole PI**), ~$131 million, 2017-2020
- RokDoc In-kind Software Donation- UAA (**Sole PI**), ~$18 million, 2017-2019
- U.S. Department of Energy research Grants (3 grants on carbon sequestration and geomechanics)- Battelle (**team member**), ~$3 million, 2016-2017
- World Bank Research Grant- Battelle (**team member**), ~$1 million, 2016-2017
- Battelle Memorial Institute Research Grant (**Sole PI**), $14,000, 2016-2017
- **Archie Memorial Research Grant** in Petrophysics and Development Geology, AAPG, 2015
- Society of Petrophysicists and Well Log Analysts (**SPWLA**) Foundation Grant, 2015
- Society of Exploration Geophysicists (**SEG**) Travel Grant, 2014
- Society of Petrophysicists and Well Log Analysts (**SPWLA**)- Unconventional Resources Scholarship, 2014
- Geological Society of America (**GSA**) Research Grant, 2014
- Norman Foster Memorial Scholarship, Rocky Mountain Association of Geologists (**RMAG**), 2014
- Society of Petrophysicists and Well Log Analysts (**SPWLA**) Foundation Scholarship, 2013
- Pittsburgh Association of Petroleum Geologists (**PAPG**) Grant, 2013
- Bob & Beverly Shumaker Fund, West Virginia University, 2013
- Hess Corporation Fund, 2013
- **VISTA** scholarship recipient from Statoil and **The Norwegian Academy of Science & Letters**, 2012

Awards and Recognitions

- 1st place at SPWLA Annual Conference (Long Beach) Oral Presentation (student), 2015
- 1st place at Pacific Section AAPG Expo (Northridge) Poster Presentation (student), 2015
- 2nd place at AAPG Imperial Barrel competition, Eastern Section USA, 2015

- 3rd place at AAPG Annual Conference (Denver) Poster competition (student), 2015
- Ranked 4th and 6th (**among top 5% candidates**) in B.Sc. (Honors) and M.Sc. examinations, respectively, 2008
- **National Scholar**, Government of India for outstanding academic achievement, 2003

Professional Service

- **Associate Editor**, SEG/AAPG Interpretation Journal (*Induced Seismicity Special Section*), 2022
- **Deputy Associate Editor**, SEG/AAPG Interpretation Journal, 2020- Present
- **Member** of the Society of Exploration Geophysicists International Carbon Solutions Task Force, 2021-present
- **Technical Session Organizer** (geothermal resources) for the American Rock Mechanics Association annual meeting in Texas, 2020-2021
- **Chair,** joint SEG and AAPG annual meeting (*three technical sessions*), Denver, 2021
- **Judge** of graduate student presentations at SEG Student Expo, 2021
- **Chair,** *amplitude variation with offset algorithms* technical session (two poster sessions), Society of Exploration Geophysicists Annual Meeting, Houston, 2020
- **Assistant Editor**, SEG/AAPG Interpretation Journal (*Alaska Special Section*), 2019
- **Associate Editor**, SEG/AAPG Interpretation Journal (*Reservoir Characterization Special Section*), 2019
- **Associate Editor**, SEG/AAPG Interpretation Journal (*Formation Evaluation using Petrophysics and Borehole Geophysics Special Section*), 2019
- **Chair**, *machine learning in subsurface science* technical sessions (oral and poster), AAPG Annual Meeting, San Antonio, 2019
- **Chair**, *reservoir characterization-machine learning* technical session, Society of Exploration Geophysicists Annual Meeting, San Antonio, 2019
- **Chair**, *machine learning and data analytics* technical session, Society of Exploration Geophysicists Annual Meeting, San Antonio, 2019
- **Chair**, *reservoir characterization-novel methods* technical session, Society of Exploration Geophysicists Annual Meeting, San Antonio, 2019
- **Chair**, u*tilizing technology in modern exploration and production* technical session, Eastern Section AAPG Annual Meeting, Columbus, 2019
- **Member** of the executive committee for the Eastern Section AAPG Annual Meeting technical sessions, Columbus, 2019
- **Judge** of technical presentations at the Pacific Section AAPG Annual Meeting, Long Beach, 2019
- **Chair**, *facies classification and reservoir properties* technical session, Society of Exploration Geophysicists Annual Meeting, Anaheim, 2018
- **Chair**, *noise attenuation and signal processing* technical session, Society of Exploration Geophysicists Annual Meeting, Anaheim, 2018
- **Chair** in *geology and data* technical session at the Pacific Section AAPG Annual Meeting, Bakersfield, 2018
- **Chair**, technical program committee (*seismic processing*), Society of Exploration Geophysicists Annual Meeting, Anaheim, 2018

- **Chair**, *geophysics and petrophysics* technical session, Pacific Section AAPG Annual Meeting, Anchorage, 2017
- **Co-chair**, *multi-component seismic* technical session (poster), Society of Exploration Geophysicists Annual Meeting, Houston, 2017
- **Judge** of technical presentations (*machine learning and pattern recognition*) at Society of Exploration Geophysicists Annual Meeting, Houston, 2017
- **Reviewer** of technical papers for Society of Exploration Geophysicists Annual Meeting, Houston, 2017-Present
- **Judge** of technical presentations at the Society of Exploration Geophysicists Annual Meeting, Dallas, 2016
- **Reviewer** of various books and research papers on machine learning, energy exploration, and subsurface geosciences in
  1. Nature Communications
  2. Springer Natural Resources Research,
  3. Elsevier,
  4. Journal of Applied Geophysics,
  5. AAPG Bulletin,
  6. AAPG Environmental Geosciences,
  7. SEG Interpretation,
  8. Geophysics,
  9. Acta Geophysica
  10. IEEE Geoscience and Remote Sensing Letters
  11. Journal of Marine and Petroleum Geology,
  12. Journal of Natural Gas Science and Engineering,
  13. Journal of Petroleum Science and Engineering,
  14. Journal of Petroleum Exploration and Production Technology,
  15. Fuel,
  16. Computers & Geosciences,
  17. International Journal of Coal Geology
  18. Cold Regions Science and Technology
  19. Upstream Oil and Gas Technology,
  20. Texas Water Journal
  21. Arabian Journal of Geosciences,
  22. American Journal of Geosciences, and
  23. Springer Financial Innovation
  Reviewed more than *125* full-length papers and *150* conference abstracts (2015- Present).
- **Reviewer** of research grant proposals (2017- Present) in
  1. National Science Foundation (NSF),
  2. American Chemical Society *(*ACS*)*, and
  3. Natural Sciences and Engineering Research Council (NSERC), Canada
- **Vice-president**, Society of Exploration Geophysicists Student Chapter, West Virginia University (2015- 2016) and Indian Institute of Technology Mumbai (2009-2010)

Community Outreach and Invited Presentations

- Invited speaker at the Energy in Data conference, organized by AAPG, SEG, and SPE, 2022

- Invited speaker at the American Association of Petroleum Geologists Carbon Capture Utilization and Storage international meeting, 2021
- Invited speaker at the Australian Society of Exploration Geophysicists, 2021
- Invited speaker at the European Association of Geoscientists & Engineers Digital Subsurface Conference, 2021
- Invited speaker at TotalEnergies, France, 2021
- Invited speaker at the South Dakota School of Mines and Technology, 2021
- Invited speaker at the University of Texas at Austin, 2021
- Invited speaker at the Alaska Gasline Development Corporation, 2021
- Invited speaker at the Permian Basin Geophysical Society (PBGS), Midland, 2020
- Invited speaker at the Petroleum Engineers Association's international workshop, 2020
- Invited speaker at the Permian Basin Geological Society (PBS-SEPM), Midland, 2020
- Invited speaker at the IISER Bhopal, India, 2020
- Invited speaker at the Alaska Geological Society, 2020
- Invited speaker at the virtual international workshop (organized by University of Texas Permian Basin, US and UPES, India), 2020
- Invited speaker at the Bureau of Economic Geology, University of Texas Austin, 2019
- Invited speaker at the EERC, University of North Dakota, Grand Forks, 2019
- Invited speaker at the New Mexico Bureau of Geology, New Mexico Tech, Socorro, 2019
- Invited speaker at OilSearch Alaska, Anchorage, 2019
- Invited speaker at the AK Geologic Materials Center Technical Session Anchorage, 2019
- Invited monthly luncheon speaker at the joint GSA/AGS/SPE meeting, Anchorage, 2019
- Invited seminar speaker at the College of Engineering, UAA, 2019
- Invited speaker at the Alaska Miners Association Fall Convention, Anchorage, 2018
- Graduate colloquium speaker at the University of Kansas, Lawrence, 2018
- Invited speaker at ConocoPhillips Alaska, Anchorage, 2018
- Invited speaker at the Alaska Geological Society spring technical conference, Anchorage, 2018
- Invited speaker at joint Geophysical Society of Alaska (GSA) and Alaska Geological Society (AGS), Anchorage, 2017
- Invited speaker at the UAA bookstore, Anchorage, 2017
- Invited speaker at the Pittsburgh Association of Petroleum Geologists' monthly meeting, Pittsburgh, 2017
- Invited seminar speaker at the University of Nebraska, Lincoln, 2016
- Invited seminar speaker at the University of Alaska, Anchorage, 2016
- Invited seminar speaker at the Columbus State University, Columbus, 2016
- Invited seminar speaker at the Western Michigan University, Kalamazoo, 2015

Student Advisees

- *Graduate students, 2017- 2020 (UAA)*

1. Scott Pantaleone (MS): Integrated analysis of carbon sequestration potential and risks of fault slip in the Cook Inlet basin, Alaska (completed in 2019). Currently employed at the DOE-NETL, Oregon

2. Timothy Scott Williams (MS): Petrophysical Analysis and Mudstone Lithofacies Classification of The Hue and HRZ Formations, North Slope, Alaska (completed in 2020); internship at ExxonMobil, Texas.

- *Undergraduate students, 2017- 2020 (UAA)*

   1. Richard Collins (BS): Potential for carbon storage and utilization, and risk of induced seismicity in the offshore Cook Inlet (completed in 2018).

   2. Kelsey Anderson (BS): An integrated petrophysical analysis of the HRZ shale on the North Slope using core and well log data (completed in 2019). Currently employed at the Alaska Department of Natural Resources.

   3. Zachary Spath (BS): Micro-CT scan image analysis for automated fracture prediction (completed in 2020). Currently employed at Metallogeny.

- *Graduate student thesis committee, 2017- 2020 (UAA)*

   1. Triffon Tatarin (MS): Graduated in 2019. Currently employed at Chesapeake Energy

   2. Charles Rust (MS): Graduated in 2019. Currently employed at Hilcorp Energy

Peer-Reviewed Publications

1. Pantaleone, S., and **Bhattacharya, S.,** 2021, Hydrologic and Geomechanical Characterization of the Deep Sedimentary Rocks and Basement for Safe Carbon Sequestration in the Cook Inlet Basin, Alaska, International Journal of Greenhouse Gas Control, https://doi.org/10.1016/j.ijggc.2020.103243

2. Williams, T.S., **Bhattacharya, S.,** Song, L., Sharna, S., and Agrawal., V., 2021, Petrophysical analysis and mudstone lithofacies classification of the HRZ shale, North Slope, Alaska, Journal of Petroleum Science & Engineering, https://doi.org/10.1016/j.petrol.2021.109454

3. Song, L., **Bhattacharya, S.**, Webb, Z., Fowler, A., and Lee, V., 2021, Preservation and dilution of organic carbon in the Hue Shale and GRZ on the North Slope of Alaska, International Journal of Coal Geology, https://doi.org/10.1016/j.coal.2021.103678

4. **Bhattacharya, S.,** 2021, A Novel Concept in Unsupervised Time Series Clustering and Class-based Machine Learning on Predicting Shear-Sonic Wave Slowness in Heterogenous Rocks, SEG Geophysics journal (in revision)

5. **Bhattacharya, S.,** Ambrose, W., Ko, L.T., Casey, B., 2021, Integrated detection and investigation of bad borehole section in the Wolfcamp Formation in the Midland Basin using machine learning, petrophysics, and core characterization, SEG/AAPG Interpretation journal (in revision)

6. **Bhattacharya, S.,** and Verma, S., 2020, Seismic Attribute and Petrophysics-assisted Interpretation of the Nanushuk and Torok Formations on the North Slope, Alaska, SEG/AAPG Interpretation journal, 8, pages SJ17-SJ34. https://doi.org/10.1190/INT-2019-0112.1 (As of 2021, *most-downloaded paper [>3,100 downloads] in the journal since 2013, nominated for the best paper award*)

7. Pantaleone, S., and **Bhattacharya, S.,** 2020, Potential for Carbon Sequestration in the Hemlock Formation of the Cook Inlet Basin, Alaska, AAPG Environmental Geosciences, 27, 3, pages 143-164, https://doi.org/10.1306/eg.10221919011.

8. Agrawal, D., Lujan, B., Verma, S., **Bhattacharya, S.**, and Mallick, S., 2020, Seismic Response to Paleo Sand Dunes in the Nugget Formation, in northwestern Wyoming, SEG/AAPG Interpretation journal, 8, 4, pages SR23-SR26, https://doi.org/10.1190/INT-2019-0231.1.

9. **Bhattacharya, S.**, Verma, S., and Rotzien, J.R., 2020, 3D Seismic Imaging of the Submarine Slide Blocks on the North Slope, Alaska, SEG/AAPG Interpretation journal, 8, 4, https://doi.org/10.1190/int-2020-0038.1.

10. **Bhattacharya, S.,** and Carr, T., 2019, Integrated Data-driven 3D Shale Lithofacies Modeling of the Bakken Formation in the Williston Basin, North Dakota, United States, Journal of Petroleum Science & Engineering, 177, pages 1072-1086. https://doi.org/10.1016/j.petrol.2019.02.036

11. **Bhattacharya, S.,** Kavousi, P., Carr, T., and Pantaleone, S., 2019, Application of Predictive Data Analytics to Model Daily Hydrocarbon Production using Petrophysical, Geomechanical, Fiber-optic, Completions, and Surface Data: A Case Study from the Marcellus Shale, North America, Journal of Petroleum Science & Engineering, 176, pages 702-715. https://doi.org/10.1016/j.petrol.2019.01.013

12. **Bhattacharya, S.,** and Verma, S., 2019, Application of Volumetric Seismic Attributes for Complex Fault Network Characterization on the North Slope, Alaska, Journal of Natural Gas Science & Engineering, 65, pages 56-67. https://doi.org/10.1016/j.jngse.2019.02.002

13. **Bhattacharya, S.,** and Mishra, S., 2018, Applications of Bayesian Network Theory and Random Forest for Facies and Fracture Prediction: Case Studies from the Appalachian Basin, USA, Journal of Petroleum Science & Engineering, 170, pages 1005-1017. https://doi.org/10.1016/j.petrol.2018.06.075

14. Verma, S., **Bhattacharya, S.,** Lujan, B., Agrawal, D., and Mallick, S., 2018, Delineation of Early Jurassic aged Sand Dunes and Paleo-Wind Direction in Southwestern Wyoming

using Seismic Attributes, Inversion, and Petrophysical Modeling, Journal of Natural Gas Science & Engineering, 60, pages 1-10. https://doi.org/10.1016/j.jngse.2018.09.022

15. **Bhattacharya, S.,** Carr, T., and Pal, M., 2016, Comparison of Supervised and Unsupervised Approaches for Mudstone Lithofacies Classification: Case Studies from the Bakken and Marcellus Shale, USA, Journal of Natural Gas Science & Engineering, 33, pages 1119-1133. https://doi.org/10.1016/j.jngse.2016.04.055

16. **Bhattacharya, S.,** and Carr, T., 2016, Integrated Petrofacies Characterization and Interpretation of Depositional Environment of the Bakken Shale in the Williston Basin, North America, Petrophysics Journal, 57(2), pages 95-110.

Editor-Invited Publications

1. Shuster, M., **Bhattacharya, S.**, Duncan, I., Eichhubl, P., Hosseini, S., Javadpour, F., Kipper J., Lin, N., Nicot, J.P., and Ren, B., 2021, Hydrogen infrastructure expansion requires realistic framework, Oil & Gas Journal, pages 1-9.

2. **Bhattacharya, S.**, 2021, Using Time-Series Analysis and Class-Based Machine Learning to Predict Rock Properties, AAPG Explorer

3. **Bhattacharya, S.**, and Verma, S., 2020, A tale of two conventional reservoirs: Nanushuk and Torok on the North Slope, Alaska, AAPG Explorer, https://explorer.aapg.org/story/articleid/57468/a-tale-of-two-conventional-reservoirs

4. **Bhattacharya, S.**, and Verma, S., 2020, Emerging Conventional Reservoirs on the North Slope, Alaska, Research Insights, Basin Dynamics Special Publication, 2(5), pages 1-7.

Books and Book Chapters

1. **Bhattacharya, S.,** 2021, A Primer on Machine Learning in Subsurface Geosciences, Springer publishing, 182 pages (sole authored book, 6 chapters)

2. **Bhattacharya, S.,** and Di, H., 2022, Advances in Subsurface Data Analytics: Data-driven and Physics-based Approaches, Elsevier (edited reference book, 11 chapters, in press)

3. Verma, S., **Bhattacharya, S.,** Avseth, P., Lehocki, I., and Fett, T., 2022, Chapter 16: Imaging, interpretation, and workflows in the book on "Deep-water Depositional Systems: Processes and Products", edited by J. Rotzien, O. Catuneanu, R. J. Chuchla, F. J. Hernández-Molina, R. A. Sears, and C. A. Yeilding, Elsevier (in press)

Conference Papers and Abstracts

1. **Bhattacharya, S.,** Haagsma, A., Budros, R., and Bowen, J., 2022, Predicting sweetspots for CCUS in fractured hydrothermal dolomites in Michigan, integrating 3D seismic attributes, seismic inversion, and petrophysics, AAPG CCUS meeting, Houston (in review)

2. **Bhattacharya, S.,** Haagsma, A., Budros, R., and Bowen, J., 2022, Fractured hydrothermal reservoir characterization for CCUS in the Trenton and Black River formations in Michigan, integrating 3D seismic attributes, seismic inversion, and petrophysics, pages 1-4, AAPG-SEG-SPE Energy in Data meeting, Austin, pages 1-4 (in review).

3. **Bhattacharya, S.,** Bump, A., Hosseini, S.A., 2022, Overpressure on the Gulf Coast: Identification and Implications for Carbon Storage, AAPG CCUS meeting, Houston (in review)

4. Trevino, R., Hovorka, S.D., Hentz, T.F., Dunlap, D.B., **Bhattacharya, S.,** DeAngelo, M.V., Rogers, H.H., Prentice, S.M., and Merida, A.L., 2022, A workflow for down-selecting a CCS site, South-Central Geological Society of America Annual Meeting, McAllen (in review).

5. **Bhattacharya, S.,** 2021, Time Series Clustering, Sequence Stratigraphy, and Ensemble Machine Learning for Shear Velocity Prediction in Conventional Reservoirs, European Association of Geoscientists and Engineers Digital Subsurface Conference, 1-5, https://doi.org/10.3997/2214-4609.202181007

6. **Bhattacharya, S.,** 2021, Building Geology-informed Deep Learning Models for better Predicting Elastic Properties of the Spraberry-Wolfcamp in the Midland Basin, SW AAPG Annual Meeting, Dallas

7. Babu, T., Verma, S., **Bhattacharya, S.,** Sur, S., Pandey, V., 2021, Geophysical technologies applications to geothermal exploration in southwest Netherlands, American Geophysical Union, New Orleans

8. **Bhattacharya, S.,** 2021, Automated Detection of Bad Borehole Sections and Evaluation of Log Quality using Toeplitz Inverse Covariance-based Clustering, First International Meeting for Applied Geoscience & Energy Expanded Abstracts (joint SEG and AAPG annual meeting), Denver, https://doi.org/10.1190/segam2021-3581438.1

9. **Bhattacharya, S.,** 2021**,** Unsupervised Multivariate Time Series Clustering and Ensemble Class-based Machine Learning for Automated Shear Wave Velocity Prediction in the Wolfcamp Shale, First International Meeting for Applied Geoscience & Energy Expanded Abstracts (joint SEG and AAPG annual meeting), Denver, https://doi.org/10.1190/segam2021-3581432.1

10. Verma, S., **Bhattacharya, S.,** Chowdhury, N.M., and Tian, M., 2021, A new workflow for multi-well lithofacies interpretation integrating joint petrophysical inversion, unsupervised and supervised machine learning, First International Meeting for Applied Geoscience & Energy Expanded Abstracts (joint SEG and AAPG annual meeting), Denver, https://doi.org/10.1190/segam2021-3584118.1

11. Verma, S., and **Bhattacharya, S.,** 2021, Unsupervised Machine Learning for Interpreting Shelf-to-Basin Seismic Geomorphology and Paleoclimate, European Association of

Geoscientists and Engineers, Annual Meeting, Amsterdam. https://doi.org/10.3997/2214-4609.202112942

12. **Bhattacharya, S.,** Hosseini, S., and Rine, M.J., 2021, Integrating 3D Seismic and Petrophysics to Characterize Hydrogen Storage Capacity in the Pinnacle Reef Reservoirs in the Michigan Basin, GeoGulf (Gulf Coast Association of Geological Societies) Annual Meeting, Austin

13. Sabbagh, R., and **Bhattacharya, S.,** 2021, Quantitative Seismic Characterization of the Spraberry-Wolfcamp in the Midland Basin: Reservoir and Geomechanical Properties, GeoGulf (Gulf Coast Association of Geological Societies) Annual Meeting, Austin

14. **Bhattacharya, S.,** and Verma, S., 2021, Multi-seismic attributes and petrophysical studies for a low-temperature geothermal field in the Netherlands, GeoGulf (Gulf Coast Association of Geological Societies) Annual Meeting, Austin

15. **Bhattacharya, S.,** 2021, Predicting shear sonic velocity integrating the concepts of time series clustering and ensemble class-based machine learning, GeoGulf (Gulf Coast Association of Geologists) Annual Meeting, Austin

16. **Bhattacharya, S.,** and Verma, S., 2021, Machine Learning-assisted 3D Seismic Interpretation of Shelf-to-Basin Geomorphology, GeoGulf (Gulf Coast Association of Geologists) Annual Meeting, Austin

17. **Bhattacharya, S.,** Verma, S., and Di, H., 2021, CNN in polyphase fault classification on the North Slope, Alaska, presented at the AASPI consortium meeting, Oklahoma

18. Pantaleone, S., and **Bhattacharya, S.**, 2020, An Integrated Analysis of the Potential for Fluid Storage, Utilization, and Risks of Fault Slip in the Cook Inlet basin of southcentral Alaska, AAPG Annual meeting, Houston

19. **Bhattacharya, S.**, and Di, H., 2020, Classification and Interpretation of Polyphase Fault Network on the North Slope, Alaska using Deep Learning, 90th SEG annual meeting expanded abstracts, https://doi.org/10.1190/segam2020-w13-01.1

20. Song, L., and **Bhattacharya, S.**, 2020, Changes in Organic Carbon and Redox Conditions During Deposition of the Hue Shale-Gamma Ray Zone on the North Slope, Alaska, AAPG Annual meeting, Houston

21. **Bhattacharya, S.**, Verma, S., and Ha, T., 2020, 3D seismic reprocessing for geologic interpretation of a permafrost-bearing petroleum system on the North Slope, Alaska, 90th SEG annual meeting expanded abstracts, https://doi.org/10.1190/segam2020-3427051.1

22. **Bhattacharya, S.**, Tian, M., Rotzien, J., and Verma, S., 2020, Application of seismic attributes and machine learning for imaging submarine slide blocks on the North Slope,

Alaska, 90th SEG annual meeting expanded abstracts, https://doi.org/10.1190/segam2020-3426887.1

23. **Bhattacharya, S.**, and Verma, S., 2020, Quantitative geophysical interpretation of the Nanushuk and Torok formations on the North Slope, Alaska, Pacific Section AAPG annual meeting, Oxnard.

24. Pantaleone, S., and **Bhattacharya, S.**, 2020, An Integrated Petrophysical and Geomechanical Analysis of Deep Sedimentary Formations for Safe Carbon Storage in the Cook Inlet basin, Alaska, Pacific Section AAPG annual meeting, Oxnard.

25. **Bhattacharya, S.**, 2020, Integrated petrophysical characterization of the Nanushuk Formation on the North Slope, Alaska, Pacific Section AAPG annual meeting, Oxnard.

26. Williams, T.S., and **Bhattacharya, S.,** 2020, Integrated mudstone lithofacies classification of the Hue and HRZ Shale, North Slope, Alaska, American Geophysical Union annual meeting.

27. **Bhattacharya, S.**, 2019, Hydrocarbon Potential of the Nanushuk and Torok Formations on the North Slope, Alaska: Implications for Supersized Oilfield Development, presented at the Pacific Section AAPG annual meeting, Long Beach.

28. **Bhattacharya, S.**, 2019, Application of Machine Learning and Deep Learning for Complex Fault Network Characterization on the North Slope, Alaska, presented at the Pacific Section AAPG annual meeting, Long Beach.

29. Verma, S., and **Bhattacharya, S.,** 2019, Delineation of complex fault network, North Slope, Alaska using seismic attributes, 89th SEG annual meeting expanded abstracts, pages 1893-1897, https://doi.org/10.1190/segam2019-3214607.1

30. Crandall, D., and **Bhattacharya, S.,** 2019, Alaskan Unconventional Shale Core Characterization, presented at the Eastern Section AAPG annual meeting, Columbus.

31. **Bhattacharya, S.**, and Verma, S., 2019, Integrated application of seismic attributes and petrophysical modeling on the Nanushuk and Torok formations on the North Slope, AK: Implications for supersized oilfield development, presented at the AASPI consortium meeting, Oklahoma

32. **Bhattacharya, S.**, and Verma, S., 2019, Geometric attributes to characterize the complex fault styles on the North Slope, Alaska, presented at the AASPI consortium meeting, Oklahoma

33. Kavousi, P., Carr, T., **Bhattacharya, S.,** Elliott, J., Shahkarami, A., Martin, K., 2018, A Fiber-optic Assisted Multilayer Perceptron Reservoir Production Modeling: A Machine Learning Approach in Prediction of Gas Production from the Marcellus Shale, presented at

SPE/AAPG/SEG Unconventional Resources Technology Conference (URTEC), Houston, URTEC ID: 2902641, pages 1-10.

34. **Bhattacharya, S.,** Kavousi, P., Carr, T., 2018, Machine Learning-Assisted Prediction of Daily Hydrocarbon Production using Fiber-optic, Petrophysical, Geomechanical, Engineering, and Surface Data, presented at the Pacific Section AAPG annual meeting, Bakersfield.

35. **Bhattacharya, S.,** Verma, S., 2018, Application of Volumetric Seismic Attributes for Complex Fault Network Characterization on the North Slope, Alaska, presented at the Pacific Section AAPG annual meeting, Bakersfield.

36. Pantaleone, S., Collins, R., **Bhattacharya, S.,** 2018, Carbon Storage, Utilization and Risks in Cook Inlet Basin Alaska, presented at the Alaska Geological Society spring technical conference, Anchorage.

37. Fukai, I., Gupta, N., Hawkins, Haagsma, A., Ganesh, P.R., Kelley, M., Conner, A., Main, J., Scharenberg, M., Larsen, G., Raziperchikolaee, S., Burchwell, A., **Bhattacharya, S.**, 2018, Regional CO_2 Storage Resource and Containment Assessment of Cambrian and Ordovician Formations in Eastern Ohio, presented at the Greenhouse Gas Control Technologies (GHGT) conference in Melbourne, Australia.

38. **Bhattacharya, S.,** and Carr, T., 2017, Application of Data Analytics and Geostatistics for Shale Facies Modeling, presented at Pacific Section AAPG Annual Meeting, Anchorage.

39. **Bhattacharya, S.,** Haagsma, A., Howat, E., Schuetter, J., Conner, A., and Mishra, S., 2017, Machine Learning-assisted Vuggy Carbonate Reservoir Characterization: Application to Mature Oil Fields, presented at Pacific Section AAPG Annual Meeting, Anchorage.

40. **Bhattacharya, S.,** and Carr, T., 2017, Methodology for Multi-scale Shale Lithofacies Modeling: Case Study from the Bakken Formation in North Dakota, presented at Rocky Mountain Section AAPG Annual Meeting, Billings.

41. **Bhattacharya, S.,** and Carr, T., 2017, 3-D Multi-Scale Lithofacies Models of the Upper and Lower Bakken Shale Members of the Williston Basin in North Dakota, USA, presented at AAPG Annual Conference, Houston.

42. **Bhattacharya, S.,** Pasumarti, A., Main, J., and Sminchak, J., 2017, Geomechanical Assessment of Sub-Knox Formations for Safe CO_2 Injection Study in the Midwest U.S, presented at GSA Section Meeting, Pittsburgh.

43. **Bhattacharya, S.,** and Carr, T., 2017, A Workflow for Quantitative Shale Lithofacies Modeling at Multiple Scales: Case Study from the Bakken Formation in North Dakota, presented at GSA Section Meeting, Pittsburgh.

44. Sminchak, J., Main, J., Conner, A., **Bhattacharya, S.,** and Gupta, N., 2017, Geomechanical Factors for Assessing the Effects of Subsurface Injection in the Midwestern U.S., presented at Ground Water Protection Council UIC Conference, Austin.

45. Ganesh, P.R., **Bhattacharya, S.,** Burchwell, A., Conner, A., Fukai, I., Haagsma, A., Kelley, M., Larsen, G., Main, Raziperchikolaee, S., Scharenberg, M., McNeil, C., and Gupta, N., 2017, Characterization and Preliminary Feasibility Assessment of CO_2 Storage and Containment Resources in Deep Saline Cambrian-Ordovician Formations in Eastern Ohio, presented at U.S. Department of Energy conference, Pittsburgh.

46. Pasumarti, A., Raziperchikolaee, S., Sminchak, J., **Bhattacharya, S**., and Gupta, N., 2017, Assessing the Effective CO_2 Storage Capacity of a Reservoir Using a Geomechanical Framework: A Case Study of a Site in the Arches Province of the Midwest U.S., presented at Carbon Management Technology Conference, Houston.

47. Main, J., Ganesh, P.R., Fukai, I., Scharenberg, M., **Bhattacharya, S.,** and Gupta, N., 2017, Identifying CCS Sites and Estimating CO_2 Resource Volumes using a Static Earth Model in the Appalachian Basin in Eastern Ohio, presented at Carbon Capture, Utilization, and Storage Conference, Chicago.

48. Paronish, T.J., **Bhattacharya, S.,** and Carr, T., 2016, Integrated Geologic Analysis from Two Marcellus Shale Science Wells in Northeastern West Virginia, presented at AAPG Annual Conference, Calgary.

49. **Bhattacharya, S**., 2015, Application of Spectroscopy Logs and Trace Element Geochemical Data to the Bakken Mudstone Facies Classification in the Williston Basin, USA, presented at SPWLA Annual Conference, Long Beach.

50. **Bhattacharya, S.,** Carr, T., and Wang, G., 2015, Shale Lithofacies Classification and Modeling: Case Studies from the Bakken and Marcellus Formations, North America, presented at AAPG Annual Conference, Denver.

51. Zhong, Z., **Bhattacharya, S.,** and Carr, T., 2015, Constructing a Geological Model to Estimate the Capacity of Commercial Scale Injection, Utilization and Use of CO_2 in the Jacksonburg-Stringtown Field, West Virginia, USA, presented at AAPG Annual Conference, Denver.

52. **Bhattacharya, S.,** and Carr, T., 2014, Petrofacies Characterization of Bakken Shale in the Williston Basin, North Dakota, presented at AAPG Annual Conference, Houston.

53. Carr, T., **Bhattacharya, S.,** Song, L., and Wang, G., 2014, Importance of Mudrock (Shale) Geologic Parameters to Improved Productivity across the Northern Appalachian Basin, USA, presented at AAPG Eastern section Meeting, Ontario, Canada.

54. **Bhattacharya, S**., 2009, Gas Hydrates: Indian Scenario, presented at All India Students' Symposium (GEOYOUTH).

Technical Reports (Selected)

1. Wisian, K., **Bhattacharya, S.,** Richards, M., 2022, Texas Geologies and Regions Ripe for Geothermal Development (Chapter 2) in the report *The Future of Geothermal Energy in Texas*, edited by Jamie Beards, prepared for Mitchell Foundation.

2. **Bhattacharya, S.,** and Wisian, K., 2021, Initial Report on the Ellington Field, Houston Texas Geothermal Project Site, prepared for SAGE Geosystems, Subcontract UTA21-000522 between Sage and UT BEG, STTR Phase II, 10 pages.

3. Trevino, R. H., Hovorka, S. D., Prentice, S., Hosseini, S. A., Hentz, T. F., **Bhattacharya, S.,** and Guirola, M., 2021, Lower Rio Grande Valley LNG CCS Potential: final report prepared for NextDecade Corporation, under contract no. UTA20-001187, 50 pages.

4. **Bhattacharya, S.,** 2021, New Enhancements to Current Petrophysical Workflows using Machine Learning Concepts and Approaches, TORA Annual Volume, 19 pages.

5. **Bhattacharya, S.,** 2021, Updates on Wolfcamp and Spraberry Formation Evaluation from vertical and horizontal wells, Midland Basin, TORA Annual Volume, 16 pages.

6. Sabbagh, R., and **Bhattacharya S.,** 2021, Reservoir and Elastic Properties from Integrated Seismic Inversion, Attributes, Horizontal Well Petrophysics, and Machine Learning, Midland Basin, with Implications for Rock Fracturability, TORA Annual Volume, 13 pages.

7. **Bhattacharya, S.,** 2020, Heterogeneity of the Wolfcamp Formation in the Northern Midland Basin from a Petrophysical Standpoint, Bureau of Economic Geology, TORA Annual Volume, 13 pages.

8. **Bhattacharya, S.,** 2020, Formation Evaluation in the Permian Basin: New Methodologies and Directions, Bureau of Economic Geology, TORA Annual Volume, 9 pages.

9. Williams, T.S., Anderson, K., and **Bhattacharya, S.,** 2020, Core-based x-ray diffraction, x-ray fluorescence, and pyrolysis data for the Torok, Hue, and HRZ shale formations in the Colville Basin on the North Slope, Alaska, Alaska Division of Geological & Geophysical Surveys GMC Data Report 468, 21 pages, http://doi.org/10.14509/30532

10. Pantaleone, S., and **Bhattacharya, S.,** 2020, Core-based Reservoir and Geomechanical Properties of the Tyonek Formation, Hemlock Formation, Talkeetna Formation, and Mesozoic Igneous Intrusive Complex (Basement) in the Cook Inlet Basin, Alaska, Alaska Division of Geological & Geophysical Surveys GMC Data Report 466, 9 pages, http://doi.org/10.14509/30428

11. **Bhattacharya, S.,** 2020, Preliminary Seismic Analysis of the Albion-Scipio Field, Michigan Basin, prepared for Battelle, Department of Energy project, 23 pages.

Professional Development and Industry Training (Selected)

- Leadership training, UT Austin, 2021
- Data Science & Business Analytics, UT Austin, 2021
- Learning to Teach Online, UNSW Sydney (Coursera), 2020
- Machine Learning Techniques, Society of Exploration Geophysicists, 2019
- Early Career Geosciences Faculty Workshop, University of Maryland, 2018
- UAA CAFÉ lectures for teaching excellence, 2017
- Borehole Geophysics: Theory and Practice, Society of Exploration Geophysicists, 2016
- Reservoir Geomechanics from Stanford University, 2015
- Seismic Geomorphology and Seismic Stratigraphy from Chevron, 2015
- Black Shale Core Workshop from EQT Corporation, 2013
- Managing 3D Seismic Surveys from TOTAL, 2010

Professional Memberships

- Society of Exploration Geophysicists (SEG)
- Society of Petrophysicists and Well Log Analysts (SPWLA)