

Introduction to “Handbook of Petroleum Geoscience: Exploration, Characterization, and Exploitation of Hydrocarbon Reservoirs”

Soumyajit Mukherjee^{1,*}, Swagato Dasgupta², Chandan Majumdar³, Subhadip Mandal⁴, and Troyee Dasgupta⁵

¹ Department of Earth Sciences, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India

² Department of Applied Geophysics, Indian Institute of Technology (ISM), Dhanbad, Jharkhand, India

³ Geological Services, Schlumberger Asia Services Limited, P21, Navi Mumbai, Maharashtra, India

⁴ Freeport-McMoRan, Morenci Operation, Morenci, AZ, USA

⁵ Department of Earth Sciences, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India

* Author for correspondence: soumyajitm@gmail.com, smukherjee@iitb.ac.in

This edited book consists of 22 main chapters. Chaki et al. (2022a) present how signal processing and machine learning algorithms are applied to characterize hydrocarbon reservoirs. This review article includes algorithms for preprocessing, prediction, and postprocessing for such characterization. Singh and Bharadwaj (2022) present how regression and advanced machine learning algorithms can make petrophysical predictions. The predicted results are then verified using test wells. Chaki et al. (2022b) present an altered guided filter capable of denoising seismic data. Based on real data sets from a hydrocarbon field, performance evaluators using a real hydrocarbon field dataset have been assessed. Chatterjee et al. (2022) present few case studies of challenges faced in geomechanics. They cover drilling and hydraulic fracturing optimization from the Assam-Arakan Basin, production optimization from the basement reservoir in the Kutch Saurashtra Basin (India), and sanding prediction from a reservoir in Ecuador. Sundaram (2022) summarizes theoretical aspects of in situ stress estimation from log measurements. The article covers several inversion processes of geophysical parameters and also discusses the utility of such studies. Clegg and Rodriguez (2022) emphasize the need of 3D inversion and modeling of reservoirs. They elaborate this issue with the help of Azimuthal resistivity images. Djefel (2022) presents the key skill requirements for a geosteering engineer in oil industry. The article will be important for the geoscientist about to join a for geosteering research. Djefel and Clegg (2022) deal with a more specific issue – how the company Halliburton has been handling geosteering-related activities. These authors state that although several sophisticated geosteering techniques are available presently, gamma geosteering continues to be a the simple yet useful method. Saha and Vishal (2022) present how to undertake local calibration for the unconfined compressive strength on a carbonate rock sample. The work elaborates how to test and calibrate rock cores. Roy et al. (2021) present rapid method of documenting lithologic boundaries

using the gamma ray log. Amplitude spectrum of the seismic data was tied with the well-derived output.

Shale has been a very important topic of study in petroleum geosciences in last few decades (e.g. Mukherjee and Kumar (2018)). Singh et al. (2022) review organic porosity in shale reservoirs. Thermal maturity is considered the most crucial factor for the development of nanoporosity in shales. Kibria and Hu (2022) study experimentally reservoir nanopore structures and wettability characters of the USA shale. Hydrocarbon recovery seems to significantly control the connectivity of the matrix pores and the network of fractures. Bakshi et al. (2022) analyze pore characters of the Indian shales. Different kinds of pores are distinguished using scanning electron microscopy. Greater nanopore volume percentages are manifested in terms of lower tightness and better connectivity. Mesoporous samples are tighter.

Klunk et al. (2022) study diagenetic changes in a turbidite through a software-based model. The key point of study has been how fluid flows through the reservoir and non-reservoir sediments. Mazumder et al. (2022a) present an interesting work of using the plate fit model to predict hydrocarbon-bearing rock in the Indian mainland. Their key finding has been that the premised rift sediment can plausibly be targeted for exploration in the Cauvery and the Krishna-Godavari basins. The work is in line with the first author's previous work: Mazumder et al. (2017). Tectonics of the eastern Himalayas have been of great international attention (e.g. Goswami et al. 2018, 2020, 2022). In this context, Bezbaruah et al. (2022) discuss the origin of the Upper Assam shelf area in terms of tectonics amongst Indian, Eurasian, and Burmese plates. Being a petroliferous basin, the study has important implications in hydrocarbon geosciences. Mazumder et al. (2022b) present the basement tectonics of the Assam shelf through compiled geological and geophysical studies. In the authors' language, the work is important since "*Structural highs associated with such fractured areas form promising zones of basement exploration*". Horodyski et al. (2022) discuss how taphofacies can be important in petroleum geoscience. They provide examples from a few Brazilian terrains. Pandey (2022) presents a literature review-cum-original work on the interpretation of seismic images from the petroliferous Jaisalmer Basin from western Rajasthan, India (also see Biswas et al. 2022). He comes up with a fine phase evolution of the basin. Field structural data from this basin has been sparse. Therefore, this work will be invaluable for the next geologist to work on this terrain. Kamruzzaman et al. (2022) present gravity and magnetic studies from the Habiganj gas field (Bangladesh) and evaluated the petrophysical parameters for a specific well from that field. The authors finally postulated two hydrocarbon-bearing zones. Gadkari and Mukherjee (2022) study the b-value in relation to the seismicity from Nepal, Sumatra, Japan, and Chile. In these studied cases the b-value dropped before major earthquakes. Continuous monitoring of b-values is recommended in seismic regions.

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