frontiers | Frontiers in Earth Science

TYPE Editorial
PUBLISHED 09 May 2023
DOI 10.3389/feart.2023.1191521

OPEN ACCESS

EDITED AND REVIEWED BY
Shuai Yin,
Xi'an Shiyou University, China

*CORRESPONDENCE
Mingjun Zou,
zoumingjun2008@163.com

RECEIVED 22 March 2023
ACCEPTED 18 April 2023
PUBLISHED 09 May 2023

CITATION
Zou M, Wang Z and Zhang J (2023), Editorial: Exploration, exploitation, and utilization of coal-measure gas into the future: Volume II.
Front. Earth Sci. 11:1191521.
doi: 10.3389/feart.2023.1191521

Editorial: Exploration, exploitation, and utilization of coal-measure gas into the future: Volume II

Mingjun Zou[1]*, Zhenzhi Wang[2] and Junjian Zhang[3]

[1]College of Geosciences and Engineering, North China University of Water Resources and Electric Power, Zhengzhou, China, [2]School of Resources and Environment, Henan Polytechnic University, Jiaozuo, China, [3]College of Earth Science and Engineering, Shandong University of Science and Technology, Qingdao, China

KEYWORDS

coal-measure gas, shale, coalbed methane, CO_2, sandstone gas

Editorial on the Research Topic
Exploration, exploitation, and utilization of coal-measure gas into the future: Volume II

Introduction

As climate change-being a dire challenge for all mankind-impinges on every continent, the exigencies of reducing greenhouse gas emissions have gained soaring attention around the world (Zou et al., 2022). Scientists have made strides in understanding the pivotality of unconventional energies (Bustin and Clarkson, 1998; Zou et al., 2018), in particular coal-measure gas (e.g., coal-bed methane, shale gas, and tight sandstone gas), for mitigating global warming (Avci et al., 2021). And, great successes have been achieved over the past decades.

The exploration, exploitation and utilization of coal-measure gas concern the majors of physics, geology, engineering, etc, and there are many hot Research Topic presented recently (Dai et al., 2019). Yet less is known about the measures to achieve the net carbon emissions of coal-measure gas, which entails how to identify its occurrence and production, how to determine its transformation technologies, and how to examine the applicability of its CO_2 geological storage conditions.

Coalbed methane

During the past few decades, China has achieved significant success in the exploration, exploitation, and utilization of coalbed methane, especially in the hot areas of Qinshui and Ordos Basins. Jiang et al. analyzed the pore structure characteristics of coal samples by low-temperature liquid-nitrogen adsorption measurements. Du et al. investigated the cleat and micro-fracture morphology and its aperture, distribution of minerals, and matrix/fracture interactions for the coals of different ranks. Jian et al. provided a new model for solid waste treatment of coal mine and green mining. Wang et al. analyzed the coal-forming

environment during mass extinction in the latest Permian. Li et al. studied coalbed methane accumulation, *in situ* stress, and permeability of low-rank coals in a complex structural region. Shao et al. determined the potential of gas resources in the Huanghebei coalfield and analyzed the sedimentary reservoir control mechanism. Bao et al. analyzed the ionic concentrations, hydrogen and oxygen isotopes, dissolved inorganic carbon isotopes and trace elements for water samples from coalbed methane wells. Jiang et al. studied coalbed methane flow characteristics based on fractal bifurcation fracture network model.

Shale and sandstone gas

Ge et al. investigated and evaluated the shale gas resources in Lucaogou Formation, and identified the reservoir performance, preservation conditions, compressibility and gas bearing property of gas bearing shale intervals. Yu et al. analyzed the convergent deformation of the cavern while considering the spatial variability distribution of the elastic modulus for sandstones. Hu et al. studied on influencing factors and mechanism of pore compressibility of tight sandstone reservoir.

CO_2 injection

CO_2 injection is beneficial for unconventional gas recovery, and gas desorption, diffusion, permeation, and production are the entire process during the injection. Niu et al. conducted the anisotropic permeability test and the CO_2 injectivity simulation test, and established the corresponding numerical models. He et al. solved the problem of inaccurate gas content measurement due to the unclear characteristics of rapid gas desorption in 0–10 s, and improved the gas desorption experimental device. Chen et al. indicated that the integrated technology of gas production and CO_2 capture and sequestration in the coal goafs and the abandoned coal mines can improve the energy production efficiency and reservoir space utilization. Chen et al. compared the changes of pore structure and porosity due to the supercritical CO_2 extraction, and discussed the evolution of pore characteristics change with coal rank because of supercritical CO_2 extraction.

Author contributions

MZ wrote the primary paper, ZW and JZ revised the paper. All authors had reviewed the paper.

Funding

The authors wish to acknowledge financial supports of this study by the National Natural Science Foundation of China under Grant Nos. 41702168 and 42202207.

Acknowledgments

We are grateful to all of the authors who responded to our call to participate in the compilation of this Research Topic. Our gratitude is also extended to all reviewers who kindly reviewed one or more of the manuscripts submitted to this Research Topic and provided valuable comments and recommendations.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Avci, I., Ozarpa, C., and Aydin, M. A. (2021). Mitigating global warming in smart energy grids via energy supply security for critical energy infrastructures. *Int. J. Glob. Warm.* 25 (3/4), 288–305. doi:10.1504/ijgw.2021.10042671

Bustin, R. M., and Clarkson, C. R. (1998). Geological controls on coalbed methane reservoir capacity and gas content. *Int. J. Coal Geol.* 38 (1-2), 3–26. doi:10.1016/s0166-5162(98)00030-5

Dai, J., Qin, S., Hu, G., Ni, Y., Gan, L., Huang, S., et al. (2019). Major progress in the natural gas exploration and development in the past seven decades in China. *Pet. explor. Dev.* 46 (6), 1100–1110. doi:10.1016/s1876-3804(19)60266-1

Zou, M., Wei, S., Huang, Z., Lv, X., and Guo, B. (2018). Simulations on recoverability performances for a coalbed methane field in SE edge of Ordos basin, China. *Fuel* 233, 354–360. doi:10.1016/j.fuel.2018.06.071

Zou, M., Yao, L., Zhang, M., Huang, Z., Xu, R., Ding, Z., et al. (2022). Hydraulic fracture to enhance coalbed methane recovery by using coated ceramsite. *Greenh. Gas. Sci. Technol.* 12 (6), 751–763. doi:10.1002/ghg.2188