Annales Societatis Geologorum Poloniae (2019), vol. 89: 91–94 doi: https://doi.org/10.14241/asgp.2019.15

PREFACE

Jan GOLONKA*, Szczepan J. PORĘBSKI & Sławomir BĘBENEK

AGH University of Science and Technology, Faculty of Geology, Geophysics and Environmental Protection, 30-059 Kraków, al. Mickiewicza 30, Poland; e-mails: jgolonka@agh.edu.pl, spor@agh.edu.pl, sbebenek@agh.edu.pl
** Corresponding author*

Golonka. J., Porębski, S. J., Bębenek, S., 2019. Preface. *Annales Societatis Geologorum Poloniae*, 89: 91–94.

A worldwide explosion of interest in organic carbon-rich mudstones, commonly known as "black shales", stems from the now firmly established fact that such rocks may be not only the sources of hydrocarbons but also potentially productive reservoirs. This industry-driven focus of attention resulted in several breakthroughs in exploration geology, including the interpretation of wireline logging, hydraulic fracturing techniques and reservoir modelling, so that during the last decade a number of shale-gas plays gained production status, particularly in North America. It is not surprising that the eyes of explorationists and oil geologists turned to the Lower Palaeozoic mudrock belt of the East European Craton in Poland, as these rocks extend for a 700-km-long subcrop, attain several hundred metres in thickness, and in burial depth descend to the dry gas window. As a part of this initiative, the Polish National Research and Development Centre (NCBiR) launched the multidisciplinary project ((BG1/GAZGEOLMOD/13) "Construction of the Lower Palaeozoic extent's maps, biostratigraphy, and analysis of the tectonic evolution of the marginal zone of the Eastern European Platform for estimation of unconventional hydrocarbon deposits distribution", aimed at acquiring new high-quality subsurface data and constructing conceptual models that would facilitate prediction of the occurrence of resource-quality mudstone within this continuous, though remarkably heterogeneous reservoir. The project is based on new data obtained from the Polish Oil and Gas Company and Orlen Upstream license areas and on all other geological information available in the public domain. During realization of the project, a workshop held at Srebrna Góra, Sudety Mts, Poland, served as a forum for the integration of results and the exchange of ideas between participants from academia and industry (Figs 1–4). The participants also had the opportunity to examine the Silurian black shales, exposed in the classical Żdanów road section. The main results of the project were presented in the form of a book, printed in Polish (Golonka and Bębenek, 2017). Following an invitation from Annales Societatis Geologorum Poloniae (ASGP), the present editors decided to compile some of the contributions in two issues of vol. 89 of ASGP.

The present issue is a collection of seven papers representing a good sample of the scope of the project. The existing lithostratigraphic classification of the Ordovician and Silurian has been revised and unified with respect to the mudstone formations that occur throughout the Baltic, Podlasie and Lublin basins (Fig. 5; Porębski and Podhalańska, this volume). New palaeoenvironmental interpretations of the Cambrian siliciclastic systems are presented for the Lublin Basin (Stadnik *et al.*, this volume). The sedimentary features of the Cambrian formations document vertical and lateral variations of shallow-marine sedimentary facies, deposited at the rifted western margin of the Baltica palaeocontinent. The lithologic diversity reflects dynamic variation in depositional environments.

Dating by apatite fission-track analysis and zircon (U-Th)/He analysis shows that the maximum burial and maximum temperature of Ediacaran–Lower Palaeozoic strata of the East European Craton varied between the Early Carboniferous in the Baltic Basin and the Early Permian in the SE corner of the Lublin Basin (Botor, Golonka, Anczkiewicz *et al.*, this volume). The numerical modelling of petroleum generation and expulsion indicates that these processes took place mainly in the Devonian and Carboniferous and extended into the latest Silurian along the Teisseyre-Tornquist Zone, while hydrocarbon expulsion occurred with a small delay after generation (Botor, Golonka, Zając *et al.*, this volume).

A new structural model, based on cross-section restoration and subsidence analysis, indicates that Silurian shales in the Lublin Basin acted as a detachment level during the Late Carboniferous shortening (Kufrasa *et al.*, this volume). The geological interpretation of reflective seismics in the Baltic Basin has permitted the recognition of four structural stages that constrained the formation of intervals prospective for unconventional hydrocarbon accumulations (Kasperska *et al.*, this volume). Potential sweet spots in the Ordovician shales of the Baltic Basin are pinpointed on the basis of a combination of the acoustic inversion of seismic data with the petrophysical analysis of well-logs (Cichostępski *et al.*, this volume).

Fig. 1. Discussion during coffee break at Srebrna Góra Conference (May 11th–14th, 2017). Arkadiusz Buniak, Dagmara Krawiec, Bartosz Papiernik, Dariusz Botor and others. Photograph by Szczepan J. Porębski.

Fig. 2. Heated debate at Srebrna Góra Conference. Piotr Krzywiec, Robert Anczkiewicz and Jan Golonka. Photograph by Szczepan J. Porębski.

Fig. 3. Explanation of Srebrna Góra geology before field trip. From left: Alfred Uchman, Anna Waśkowska, Jan Barmuta, Dariusz Botor, Zbigniew Mikołajewski, Sylwia Kowalska, Mariusz Paszkowski and others. Photograph by Szczepan J. Porębski.

Fig. 4. Discussion at outcrop during Srebrna Góra Conference. From left: Robert Anczkiewicz, Kaja Pietsch, Jan Golonka and others. Photograph by Szczepan J. Porębski.

Fig. 5. Sketch map of main tectonic units of sub-Permian basement of Poland and surrounding area (after Mazur and Jarosiński, 2006; Nawrocki and Poprawa, 2006; Mazur *et al.*, 2018). K-LF – Kraków-Lubliniec Fault.

REFERENCES

Golonka, J. & Bębenek, S. (eds), 2017. *Opracowanie map zasięgu, biostratygrafia utworów dolnego paleozoiku oraz analiza ewolucji tektonicznej przykrawędziowej strefy platformy wschodnioeuropejskiej dla oceny rozmieszczenia niekonwencjonalnych złóż węglowodorów*. Wydawnictwo Arka, Cieszyn, Poland, 502 pp. [In Polish.]

Mazur, S. & Jarosiński, M., 2006. Deep basement structure of the Palaeozoic platform in southwestern Poland in the light of Polonaise'97 seismic experiment. *Prace Państwowego Instytutu Geologicznego*, 188: 203–222. [In Polish, with English summary.]

Mazur, S., Krzywiec, P., Malinowski, M., Lewandowski, M., Aleksandrowski, P. & Mikołajczak, M., 2018. On the nature of the Teisseyre-Tornquist Zone. *Geology, Geophysics & Environment*, 44: 17–30.

Nawrocki, J. & Poprawa, P., 2006. Development of Trans-European Suture Zone in Poland: from Ediacaran rifting to Early Palaeozoic accretion. *Geological Quarterly*, 50: 59–76.