Data Article

Integrated geoelectrical and geological data sets for shallow structure characterization of the southern margin of the Krzeszowice Graben (Southern Poland)

Tomasz Woźniak, Grzegorz Bania*

Faculty of Geology, Geophysics and Environment Protection, AGH University of Science and Technology, Al. A. Mickiewicza 30, 30-059 Kraków, Poland

Abstract

The data presented in this paper are related to the characterization of the selected part of the southern margin of the Krzeszowice Graben in Southern Poland. The presented data article contains geoelectrical and geological data. The first of them include: three (3) field profiles of 2D electrical resistivity tomography (ERT) and also three (3) 2D ERT resistivity models. The second data set encompasses selected fourteen (14) photomicrographs of thin sections from undertaken Upper Jurassic limestones samples. ERT field data was acquired with the use of SuperSting R8 resistivity meter, while the 2D resistivity models were generated in Res2Dmod software. Both geoelectrical data sets have been processed using Res2Dinv software. From all collected limestones samples thin sections have been prepared and studied for microfacies analysis.

© 2019 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Data

Herein, the data sets constitute the basis for the research article entitled “Analysis of the tectonic and sedimentary features of the southern margin of the Krzeszowice Graben in Southern Poland based...
on an integrated geoelectrical and geological studies” by Woźniak and Bania, 2019 [1]. The attached to this paper data includes: (i) Google Earth KML file with the location of ERT profiles and geological sampling area; (ii) XLS file with ERT electrodes elevations (in local height system); (iii) XLS file with “a” and “n” parameters for dipole-dipole (DD) and Wenner-Schlumberger (WS) arrays used to collect field and forward 2D modeling data; (iv) SuperSting STG files with raw ERT data collected in the field; (v) Raw and processed ERT field data DAT files together with synthetic ERT data calculated during forward 2D modeling DAT files (both data sets can be used for inversion in Res2Dinv software); (vi) Res2Dinv IVP files which contains all inversion parameters used by authors in inversion process; (vii) Res2Dmod MOD files with 2D resistivity models that refer to field data; (viii) Res2Dinv INV files with the inversion results of field and synthetic data sets; (ix) selected thin-section photomicrographs (JPG files) of examined Upper Jurassic limestones. Presented in this paper data numbered from (i) to (viii) are available in Appendix A, whereas the latter, numbered as (ix) are contained in Appendix B. Detailed location of the sampling site is listed in Table 1 and shown in Fig. 1 (blue asterisk).

2. Experimental design, materials and methods

2.1. Geology of the research area

The Krzeszowice Graben, positioned within the southern part of the Kraków-Częstochowa Upland (Southern Poland), is one of the biggest tectonic structure of the regional tectonic unit of Silesian-Kraków Homocline (Fig. 1). The homocline, composed of Mesozoic sedimentary rocks extends on the
NW-SE direction and dips gently, at the low angle, towards NE. Differentiated Mesozoic formations of the homocline overlie unconformably the folded Precambrian and Palaeozoic basement that is disturbed by Kraków-Lubliniec Fault Zone and Krzeszowice-Charsznica Fault (1 and 2 in Fig. 1). It is assumed that Krzeszowice Graben is a structure and product of extensional tectonics which began to affect in Cenozoic and has been generated by the overthrusting Outer Carpathian nappes. It is worth noting that some of the faults that frame the Krzeszowice Graben might have been formed already in Late Jurassic or even earlier and they have been later rejuvenated [e.g., 2], and references therein]. The Krzeszowice Graben is limited respectively, by the Tenczynek Horst to the south and the Ojców Plateau to the north (Fig. 1). From a geological point of view, the predominant role in the geological structure of the graben margins is played by the Upper Jurassic carbonates of variable facies development [3]. They encompass three individual facies such as massive, bedded as well as peculiar basinal facies covering the submarine gravity flows deposits [4]. The latter ones, in particular, occur along the graben margins [5,6]. Marine Miocene clays constitutes a graben filling.

2.2. Data acquisition

The preliminary geological survey encompassing exposure recording and sampling procedure in the research site (Nawojowa Góra quarry) was undertaken previously to the geophysical survey. Standard oriented thin sections for observation with transmitted light microscopy were prepared from limestones samples, which have been spanning the entire thickness of the Upper Jurassic limestones at the lower bench of the quarry (cf. [1], and Fig. 1).

The geoelectrical field survey consists of three ERT profiles which have been performed on 14 July 2017 in the area placed nearby abandoned quarry in Nawojowa Góra (Fig. 1). Profiles (NWG–1, NWG–2 and NWG–3) each about 110 m long, run on the approximately N–S direction. The geographical coordinates of the beginning and end of each profile are presented in Table 1. SuperSting R8 resistivity meter with the set of 56 electrodes has been applied. The electrodes spacing in each profile was 2 m. Data sets have been acquired with dipole-dipole and Wenner-Schlumberger arrays. The collected data for these arrays were then combined into one for each survey line.

The resistivity models were generated through forward 2D ERT modeling using the finite-element method with the application of the Res2Dmod software (ver. 3.02.01). The models were supposed to reflect the field data, so the following parameters were used: 56 electrodes, basic electrode spacing 2 m, the same topographical data as for the appropriate field ERT profiles. For simplicity, calculated apparent resistivity pseudosections have been acquired only with the use of dipole-dipole array with the same ‘a’ and ‘n’ parameters as applied in the field measurements.

2.3. Data processing

The microscopic data, obtained with OLYMPUS SZX10 microscope, have been interpreted using the Dunham [9] textural classification scheme with its later modification.

The measurement data for dipole-dipole and Wenner-Schlumberger arrays obtained during the ERT field survey have been combined. Then, the data was processed in Res2Dinv software (ver. 3.59.119). The ‘RMS error statistics’ option has been applied. It allowed discarding some bad points at cutoff error.
level 20% for all field data sets. The inversion was conducted with two, developed by authors, slightly different sets of parameter settings available in the program. The difference is the use of two different...
variants: robust (L1-norm) and smoothness-constrained (L2-norm) methods [10]. Another program settings are the same for both authors inversion parameter sets. Some of these are: ‘Reduce effect of side blocks’ with ‘Slight’ setting; the same width of inversion mesh blocks; 2 mesh nodes between adjacent electrodes.

Inversion of the synthetic data sets, obtained from the 2D resistivity models have been carried out with the use of Res2Dinv software and with authors ‘robust’ inversion parameters set.

Acknowledgements

This work was supported by the two AGH University of Science and Technology grants: No.15.11.140.637 (Tomasz Woźniak) and No.15.11.140.221 (Grzegorz Bania).

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104157.

References

[1] T. Woźniak, G. Bania, Analysis of the tectonic and sedimentary features of the southern margin of the Krzeszowice Graben in Southern Poland based on an integrated geoelectrical and geological studies, J. Appl. Geophys. 165 (2019) 60–76. https://doi.org/10.1016/j.jappgeo.2019.04.010.
[2] J. Matyszkiewicz, M. Krajeński, A. Kochman, A. Kozłowski, M. Dulinski, Oxfordian neptunian dykes with brachiopods from the southern part of the Kraków-Częstochowa Upland (southern Poland) and their links to hydrothermal vents, Facies 62 (2016) 12. https://doi.org/10.1007/s10347-016-0464-x.
[3] S. Dżułyski, The origin of the Upper Jurassic limestones in the Cracow area, Rocz. Pol. Tow. Geol. 21 (1952) 125–180 (In Polish, with English summary).
[4] J. Matyszkiewicz, I. Felisiak, M. Hoffmann, A. Kochman, B. Kołodziej, M. Krajeński, P. Olchowy, Transgressive callovian succession and oxfordian microbial-sponge carbonate buildups in the Kraków Upland, in: G. Haczewski (Ed.), Guidebook for Field Trips Accompanying 31st IAS Meeting of Sedimentology Held in Kraków on 22nd–25th of June, Polskie Towarzystwo Geologiczne, 2015, pp. 51–74. http://www.ing.uj.edu.pl/documents/4243866/646a50cd-485d-4136-b2bc-d649e9ae869.
[5] J. Matyszkiewicz, The significance of saccocoma-calciturbidites for the analysis of the polish epicontinental late jurassic basin: an example from the Southern Cracow-Wielun Upland (Poland), Facies 34 (1996) 23–40. https://doi.org/10.1007/BF02546155.
[6] T. Woźniak, G. Bania, J.W. Mościicki, M. Ćwiklik, Electrical resistivity tomography (ERT) and sedimentological analysis applied to investigation of Upper Jurassic limestones from the Krzeszowice Graben (Kraków Upland, southern Poland), Geol. Q. 62 (2018) 287–302. https://dx.doi.org/10.7306/gq.1403.
[7] R. Gradziński, Geological Map of Kraków Region without Quaternary and Terrestrial Tertiary Deposits, Wydawnictwa Instytutu Nauk Geologicznych PAN, Kraków, 2009.
[8] R. Habryn, Z. Bula, J. Nawrocki, The Kraków sector of the Kraków-Lubliniec tectonic zone in the light of data obtained from new boreholes of Trojanowice 2 and Cianowice 2, Biul Państw Inst Geol. 459 (2014) 47–60 (In Polish with English summary).
[9] R.J. Dunham, Classification of carbonate rocks according to depositional texture, in: W.E. Ham (Ed.), Classification of Carbonate Rocks, vol. 1, AAPG Memoir, 1962, pp. 108–121.
[10] M.H. Loke, I. Ackworth, T. Dahlin, A comparison of smooth and blocky inversion methods in 2D electrical imaging surveys, Explor. Geophys. 34 (2003) 182–187. https://doi.org/10.1071/EG03182.