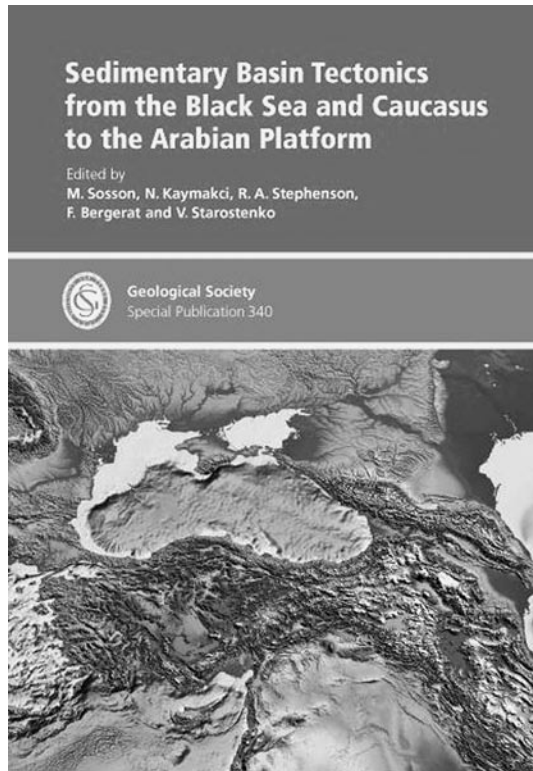


Sedimentary basin tectonics from the Black Sea and Caucasus to the Arabian Platform, edited by M. Sosson, N. Kaymakci, R.A. Stephenson, F. Bergerat & V. Starostenko. Special Publication 340. The Geological Society of London (www.geolsoc.org.uk/bookshop). Hardcover, 509 pages. Price GBP 100.00; fellows GBP 50.00; corporate affiliates GBP 80.00; members other societies GBP 60.00. ISBN 978-1-86239-308-0.



This volume is a compendium of papers resulting from a multidisciplinary study of the post-Palaeozoic tectonic evolution of the Black Sea sedimentary basin and the basins of the Caucasus and the surrounding regions. It presents some of the results of the Middle East Basin Evolution Program (MEBE), and of the two 1996 workshops held in Kiev (Black Sea) and Ankara (Caucasus) under MEBE auspices. The title of the book is long and interesting, but what areas do the studies include? The contributions cover the eastern Balkanides, the Black Sea, the Caucasus, and south-eastern Anatolia, but excludes the Arabian Platform. The contributions are, according to the editors, arranged in five sections: Crustal and lithospheric structure of the Black Sea (4 chapters); Margins of the Black Sea: crustal affinity, basin formation and inversion and neotectonics (4); Basin and tectonic evolution of Greater Caucasus (3); Obduction and collision stages in Lesser Cauca-

sus and eastern Pontides (5); and Stratigraphic and tectonic evolution of the Peri-Arabian suture zone in east and southeast Anatolia (4). Unfortunately, the above five sections are not marked in the list of contents, and the reader, if skipping the editors' introduction, is left wondering about the structure of the book.

The first part of the book is devoted to the Black Sea crustal and lithospheric structure. The first contribution is a short theoretical chapter by Stephenson & Schellart, who discuss the relationship between the geological history of the Black Sea region and the existing geodynamic models and observations of modern back-arc systems. The authors conclude that the general shape of the Black Sea Basin as well as the geometry of its regional intrabasinal structure can be best explained by an asymmetric back-arc extension model.

The nicely illustrated study by Yegorova & Gobarenko explores the crust and upper-mantle structure of the Black Sea Basin (or better: Black Sea basins, i.e., an eastern and a western basin). The multidisciplinary approach includes 3-D gravity analysis, seismic tomography and the reinterpretation of the existing deep seismic refraction data; the study raises several interesting topics for future studies, including the low heat flow in the Black Sea, the origin of the Alushta (Crimea, Ukraine) - Batumi (Caucasus, Georgia) magnetic anomaly, and the strong distinction between P- and S-wave structures of the Black Sea lithosphere.

This study is logically followed by a contribution by Yegorova, Baranova & Omelchenko, who add new information on the crustal structure of the Black Sea Basin by re-evaluating some old Soviet Union deep seismic-sounding data using a computer-based ray-tracing model.

The primary topic of the study by Starostenko, Rusakov, Shnyukov, Kobolev & Kutas is a review of the methane occurrences in the northern Black Sea. Besides the possible

role of deep faults in transporting methane to the sea floor, this work discusses a topic that seems beyond the scope of this publication.

The second part of the book covers the Black Sea margins. Noteworthy is the lengthy contribution by Bergerat, Vangelov & Dimov. The authors use an extensive set of structural data, both from the literature and their own field data, coupled with the analysis of brittle tectonics and stress-tensor reconstructions, to explore the complex geodynamic evolution of the Bulgarian eastern Balkanides. The results shed some new light on the Triassic through Cainozoic regional tectonics, and allow for an accurate determination of stress-field evolution in the eastern Balkanides.

Hippolyte, Müller, Kaymakci & Sangu use an extensive set of nannoplankton data from the central Pontides, Turkey, to date the major tectonic phases. The authors argue that the initial rifting of the western Black Sea basin took place in the Barremian, followed by a major subsidence phase during the Aptian-Albian, thermal uplift during the latest Albian to Turonian, Coniacian-Santonian subsidence, and Early Eocene compression due to block collision between the central Pontides and the Tauride-Anatolian region. The authors do not, however, illustrate any of the index nannofossils that their conclusions are based on.

Another contribution that deals with the timing of tectonic events in the region is presented by Khriachtchevskaia, Stovba & Stephenson. Based on seismic reflection data and 1-D subsidence analysis from some wells located on the Odessa Shelf (Ukraine) and the Azov Sea (Ukraine and Russia), the authors argue that the initial rifting began not later than Aptian-Albian and continued through the Santonian. The Campanian through Middle Eocene is marked by thermal subsidence, followed by inversion tectonics that originated already in the late Middle Eocene.

This part of the book is concluded by Konerding, Dinu & Wong, who focus on the sequence stratigraphy, structure and subsidence history of the Romanian Black Sea shelf. Surprisingly, this work only vaguely deals with sequence stratigraphy, and none of the cross-sections has sequences or systems tracts marked.

The third part of the book is devoted to the Greater Caucasus of Russia, Georgia and Azerbaijan. An important contribution by McCann, Chalot-Prat & Saintot focuses on the geodynamic evolution of the region during the Late Triassic to Late Jurassic Kimmerian events. This extensive, field-based and well-documented study provides new information on the spatial and temporal distribution of sedimentary and volcanic-activity patterns; a minor drawback is the lack of concise conclusions.

A review of the lithological and structural characteristics of the oil- and gas-bearing Transcaucasian intermontane troughs of Georgia is presented by Adamia, Alania, Chabukiani, Chichua, Enukidze & Sadraze, whereas field evidence on thrust geometry, tectonic geomorphology and tectonics of the eastern Greater Caucasus of Azerbaijan is presented by Mosar, Kangarli, Bochud, Glasmacher, Rast, Brunet & Sosson.

The fourth part of the book is focused on the Eastern Pontides (Turkey) and the Lesser Caucasus and adjacent regions (Armenia, Georgia, Azerbaijan). Ustaömer & Robertson present the results of their study of the Artvin supra-subduction rift basin, which is associated with incipient rift magmatism. A combination of detailed tectono-stratigraphic field observations and geochemical analysis of mainly granitic and alkaline volcanics yields new data for the interpretation of the tectonic evolution of the southern continental margin of Eurasia.

The contribution by Sosson, Rolland, Müller, Danelian, Melkonyan, Kekelia, Adamia, Babazadeh, Kangarli, Avagyan, Galoyan & Mosar presents new ideas on the geodynamic evolution of the Lesser Caucasus, identifying two subductions (the Neotethys subducting beneath the Eurasian margin; and intra-oceanic subduction), Late Coniacian-Santonian obduction, and subsequent collision of the South Armenian Block with Eurasia; the collision between the Arabian Plate and the South Armenian Block was initiated during the Middle Eocene to Miocene. The authors show their field and micropalaeontological data, but fall unfortunately short regarding the presentation of the geochemical and $^{40}\text{Ar}/^{39}\text{Ar}$ geochronological data that their work is based on.

A well-documented review of Armenian ophiolites, coupled with new geological, petrological, geochemical and geochronological ($^{40}\text{Ar}/^{39}\text{Ar}$) data is presented by Rolland, Galoyan, Sosson, Melkonyan & Avagyan. According to the authors, the three distinctive ophiolite zones in Armenia (back-arc, ocean-island basalt, and arc) represent a single unit (age 178.7 ± 2.6 Ma) obducted onto the South Armenian Block. The radiolarian biochronology of the sediments covering the ophiolite is provided by Danelian, Asatryan, Sahakyan, Galoyan, Sosson & Avagyan. Their short contribution suggests that the oceanic crust in the area was formed during or most likely before the Bajocian, with volcanic activity continuing until at least the Oxfordian.

Avagyan, Sosson, Karakhanian, Philip, Rebai, Rolland, Melkonyan & Davtyan present the evolution of the recent stress field in the Lesser Caucasus and adjacent regions, driven by the Gondwanian terrain/Eurasia collision and by the convergence of the Arabian and the Eurasian plates.

The fifth part of the book is focused on eastern and south-eastern Anatolia or Asia Minor, Turkey. Kaymakci, Inceöz, Ertepinar & Koç present the Late Cretaceous to recent kinematic evolution of the SE Anatolian Orogen and the Arabian Platform in Turkey. Based on a palaeostress-inversion study of a rich fault-slip dataset, the authors propose five deformation phases; the first and the third are marked by extension, whereas the others are related to subduction.

Kuscu, Kuscu, Tosdal, Ulrich and Friedman use field data, coupled with geochemical and geochronological (Ar-Ar, K-Ar, U-Pb) data to address the evolution of magmatic complexes in the region. The SE Anatolian Orogen is characterised by a transition from subduction-related magmatism (connected with the closure of the Neotethys) to post-collision and late orogenic within-plate magmatism related to the

collision of the SE orogenic belt promontory with northerly derived ophiolites.

Oberhänsli, Candan, Bousquet, Rimmele, Okay & Goff combine petrological and geochronological (Ar-Ar) data and electron microprobe analyses to reconstruct the structural and thermal evolution of the 74 ± 2 Ma metamorphic Bitlis Complex in SE Turkey. The authors suggest an Arabian/Gondwana provenance of the complex. It was never subjected to temperatures above 450°C .

The volume is concluded by Özacar, Zandt, Gilbert & Beck, who use teleseismic P-wave receiver images to map the Moho depth and the V_p/V_s variations beneath the East Anatolian Plateau. The authors show that the crust is thinnest below the Arabian Plate and gradually thickens northwards; the crust is thicker near the Bitlis suture and towards the Anatolia Plate interior.

Such a comprehensive treatment of the Black Sea – Caucasus region is welcome. The flaws mentioned above are not too significant, and the book is quite well produced with a quality of the illustrations ranging from good to excellent. Numerous contributions on various evolutionary aspects of the sedimentary basins in the region were already available, but scattered over hardly accessible local and regional journals; these studies were also commonly limited by political boundaries and suffered from an inability to carry out cross-border research.

Inevitably, in a book like this, the contributions vary greatly regarding their quality – from substantive and well prepared to short and not-so-good. All together, however, the general purpose of the book has been realised, and it provides an up-to-date synthesis of the knowledge on the tectonics of the sedimentary basins in the Black Sea – Caucasus region.

Antun Husinec
St. Lawrence University, Canton, New York, USA
e-mail: ahusinec@stlawu.edu