Editorial introduction to 'Geological Development of Anatolia and the Easternmost Mediterranean Region'

A. H. F. ROBERTSON[1]*, O. PARLAK[2] & U. C. ÜNLÜGENÇ[2]

[1]*School of GeoSciences, University of Edinburgh, West Mains Road, Edinburgh EH9 3JW, UK*

[2]*Department of Geological Engineering, Çukurova University, 01330 Balcalı, Adana, Turkey*

**Corresponding author (e-mail: Alastair.Robetson@ed.ac.uk)*

The present set of 22 papers stems from the 7th International Symposium on Eastern Mediterranean Geology that was held in Adana, Turkey, 18–22 October 2010. After its initiation in 1992, in Adana this international conference has been held successively in Jerusalem (Israel) in 1995, Nicosia (Cyprus) in 1998, Isparta (Turkey) in 2001, Thessalonica (Greece) in 2004 and Amman (Jordan) in 2007. The Cyprus and Thessalonica conferences were followed by substantive publications, including one with a focus on Cyprus (Panayides *et al.* 2000) and another mainly concerned with the Balkan region (Robertson & Mountrakis 2006). A subset of the papers that were presented at the 7th Adana meeting, together with some others, have been prepared and edited for the present volume.

Anatolia and the surrounding region provide an excellent opportunity for the study of fundamental geological processes, including rifting, seafloor spreading, ophiolite genesis and emplacement, collision, continental assembly and neotectonics. This volume should interest a wide cross-section of international researchers, including those concerned with hydrocarbons, mineral deposits and seismic risk, and also postgraduate students and advanced undergraduates. The papers highlight the role of fieldwork, the multidisciplinary nature of much of the current research in the region, the role of teamwork and the strong contribution being made by young scientists.

Following an **introductory chapter**, the volume is divided into four sections covering different aspects of the region as a whole. The area discussed mainly lies within Turkey, Cyprus and Syria. **Section 1** is made up of a small number of papers that are mainly concerned with the Pontide belt of northern Turkey. **Section 2** is concerned with the geological development of the Tauride and Anatolide belts of central and southern Anatolia, especially the Triassic–Jurassic period of rifting and passive margin development and the Late Cretaceous period of ophiolite genesis and emplacement. **Section 3** is mainly concerned with the formation of sedimentary basins during closure of several Mesozoic ocean basins and the related structural development during Late Cretaceous to Pliocene time. Finally, **Section 4** is devoted to aspects of the structural development of the region, mainly during the Pliocene–Quaternary (i.e. neotectonics) when the plate configuration was essentially as it is today. The area covered by each paper is shown in Figure 1.

The introduction by **Robertson *et al.*** covers the southern part of Anatolia and the adjacent easternmost Mediterranean region that was the main subject of the international conference. The main focus is on Late Permian–Recent time. A review of the Late Precambrian–Recent geological development of the easternmost Mediterranean region is published elsewhere (Robertson *et al.* 2012).

The authors discuss alternative interpretations of the Mesozoic–Cenozoic inter-relations of the various crustal units that make up the region. In particular, they consider whether these should be interpreted as individual microcontinents separated by Mesozoic small ocean basins or as parts of larger continental units (i.e. microcontinents). The Anatolides in the north are generally interpreted as the metamorphosed equivalents of the Taurides, although different reconstructions exist. The Anatolides are commonly seen as the northern, leading edge of the Mesozoic Tauride–Anatolide continent that subducted and underwent high-pressure/low-temperature (HP/LT) metamorphism during Late Cretaceous–Early Cenozoic time. The Anatolides are divided into two parts, namely the HP/LT-metamorphosed Afyon–Bolkar Dağ zone in the south, which can be closely correlated with the Taurides, and the very HP/LT Tavşanlı Zone further north, which also shows some affinities with the Taurides but is less well understood. The Kırşehir Massif is interpreted as a rifted continental block that was separated from a larger Tauride continent to the south by a Mesozoic oceanic basin known as the Inner-Tauride Ocean. However, uncertainties remain, including the reconstruction

From: Robertson, A. H. F., Parlak, O. & Ünlügenç, U. C. (eds) 2013. *Geological Development of Anatolia and the Easternmost Mediterranean Region*. Geological Society, London, Special Publications, **372**, 1–7.
First published online March 21, 2013, http://dx.doi.org/10.1144/SP372.23

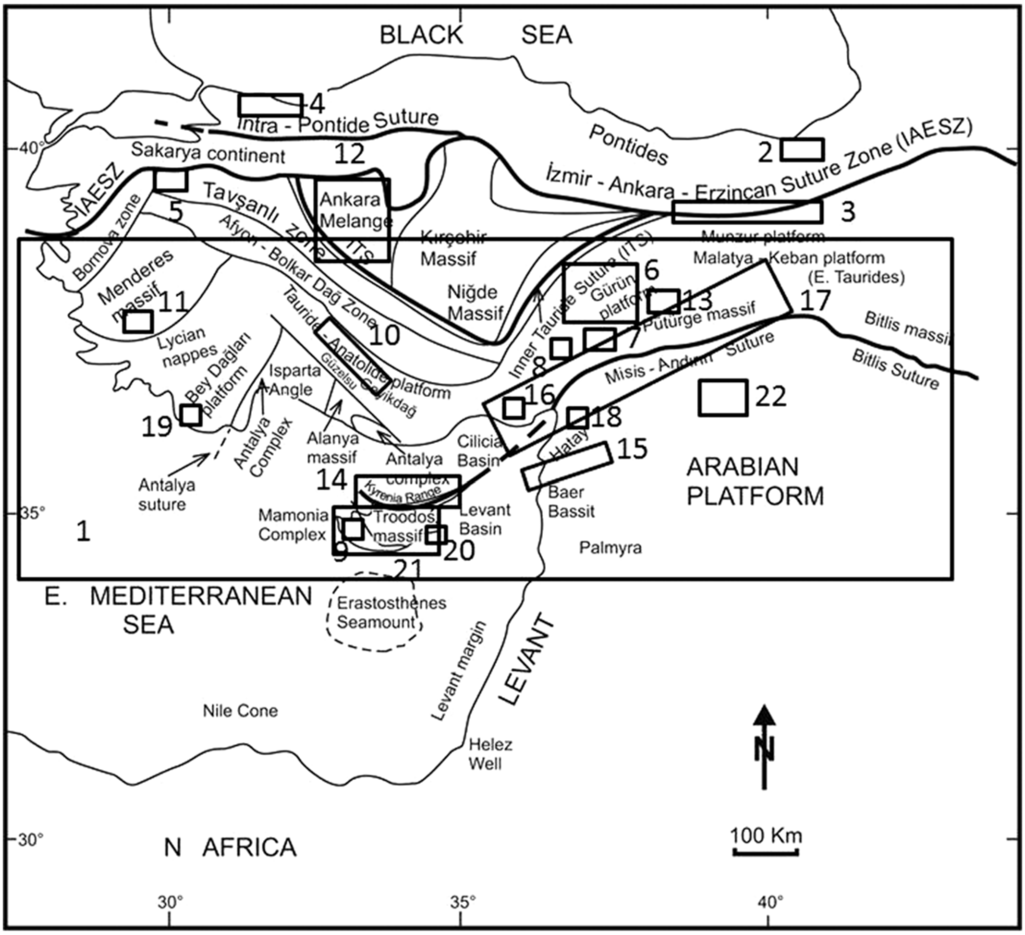

Fig. 1. Main tectonic subdivision of Anatolia and the easternmost Mediterranean region showing the approximate areas covered by each of the papers in this volume.

of the Anatolides in western Anatolia and the Bitlis and Pütürge massifs in SE Anatolia. The authors use their preferred regional reconstructions as a basis for palaeogeographical sketch maps for Permian to Miocene time.

Section 1: Late Palaeozoic–Early Cenozoic of the Pontides

The Pontides exhibit a long history of mainly active margin processes from Late Palaeozoic to Early Cenozoic time. There is currently much interest in determining the timing of assembly of the Pontide belt and identifying where the component tectonic units originally came from. **Ustaömer *et al*.** use U–Pb dating of zircons to determine the timing of intrusion of Variscan and Cimmerian granites and associated meta-sedimentary rocks in the easternmost Pontides. They show that one or more crustal units rifted from Gondwana during the Early Palaeozoic and then drifted northwards, followed by amalgamation with Eurasia during Late Palaeozoic time. The emplacement of the granitic rocks is believed to have been associated with high-temperature metamorphism of sedimentary country rocks in the roots of a magmatic arc. Jurassic granites were intruded later, related to continuing northward subduction and back-arc rifting along the Eurasian margin.

Parlak *et al*. present a detailed account, supported by new geological mapping and also petrographical and geochemical evidence of the nature and origin of the Mesozoic ophiolite that are widely exposed in the Eastern Pontides. Although dismembered, complete ophiolite sequences can be recognized, as explained for each of the main ophiolitic massifs. The associated tectonostratigraphy is also summarized including the rocks above and below the ophiolites. Geochemically, all of the ophiolites are of supra-subduction zone type and can be related to northward subduction of a Mesozoic oceanic basin, generally known as the İzmir–Ankara–Erzincan Ocean. An outstanding issue is the age (or ages) of the ophiolites, since both Jurassic and Cretaceous ages have been reported from ophiolitic rocks in the Pontides as a whole.

The closure of the Mesozoic İzmir–Ankara–Erzincan Ocean involved subduction, collision and post-collisional magmatism. **Gülmez *et al*.** discuss the Middle Eocene magmatic rocks of the westernmost Pontide region. The authors present a large body of field, petrographical, geochemical and isotopic data for the magmatic rocks. The geochemisty is interpreted and modelled in terms of magma source and crystallization processes. Previously both subduction and post-collisional settings have been proposed to explain these rocks. Based on new field, petrological and geochemical evidence, the authors favour a post-collisional setting involving magmatism triggered by slab break-off. In this case the İzmir–Ankara–Erzincan Ocean sutured and associated slab break-off triggered distinctive magmatism. An Early–Mid Eocene timing of closure of the İzmir–Ankara–Erzincan Ocean is supported by evidence from the Taurides (see below).

Section 2: Late Palaeozoic–Early Cenozoic of the Taurides–Anatolides

The mountainous region of southern Turkey is dominated by the mainly unmetamorphosed Late Precambrian–Cenozoic rocks of the Taurides. The Anatolides to the north are widely interpreted as lithological equivalents of the Taurides that experienced HP/LT metamorphism during the Late Cretaceous–Early Cenozoic closure of the Mesozoic İzmir–Ankara–Erzincan Ocean. The Taurides–Anatolides, together, document the development of the northern margin of Gondwana until the Triassic when one or more continental fragments split off to open several adjacent Mesozoic oceanic basins. Ocean crust and ophiolites formed within several Mesozoic ocean basins during Triassic–Cretaceous time. This was followed by northward subduction and the progressive re-assembly of continental fragments to form the present-day Tauride–Anatolide belt during Late Cretaceous–Early Cenozoic time. Several papers investigate different aspects of the geological development of the Taurides–Anatolides, including rifting, ophiolite genesis, subduction and collision.

Özbey *et al*. give a detailed description and interpretation of the westernmost outcrop of the Tavşanlı zone. Based on detailed mapping, they explain the lithostratigraphy, structure and geological development, supported by geochemical data for a range of igneous and sedimentary rocks. Taking account of regional comparisons, they interpret the Tavşanlı Zone as a continental fragment that rifted from Gondwana during the Triassic and drifted northward until it accreted to the Eurasian margin, represented by the Sakarya continent, during the Late Cretaceous. The meta-volcanic rocks are seen as largely related to Triassic rifting of a continental fragment (or fragments) from the Tauride–Anatolide continent. A subduction chemical signature in some of the volcanic rocks is explained by melting of upper mantle lithosphere that was chemically influenced by previous (unrelated) subduction in the region.

In contrast to the western and central Taurides, the eastern Taurides have received relatively little attention but are highlighted in this volume. The eastern Taurides are difficult to interpret owing to an array of neotectonic strike-slip faults. A key area is the Gürün carbonate platform, centred on the town of Gürün, and adjacent relatively allochthonous units including ophiolites and related melange units. **Robertson *et al*.** provide a summary and interpretation of a large part of eastern Anatolia. They specifically interpret the Gürün carbonate platform as part of the Tauride continent during Late Palaeozoic–Mesozoic. Ophiolites and accretionary melange were emplaced southwards over the northern margin of this continental unit during latest Cretaceous time. However, sedimentation continued further south on the Gürün carbonate platform into the Eocene when further southward thrusting took place. The authors show that post-Mid-Eocene strike-slip faults in the area are commonly right-lateral. The authors infer >60 km of northeastward (right-lateral) displacement of the Gürün platform and cover units during pre-Plio-Quaternary time (when left-lateral strike-slip dominated). This interpretation explains the presence of Late Cretaceous ophiolite-related material (Kemaliye Formation) to the south of the Gürün (Tauride) platform from the Late Cretaceous onwards.

Further south, the Eastern Tauride region includes a belt of Upper Cretaceous ophiolites that can be restored as remnants of a huge sheet of oceanic lithosphere that was emplaced southwards onto the Tauride-related Bitlis and Pütürge continental massifs during latest Cretaceous time. **Parlak *et al*.** present field, petrological and geochemical data for one of the most complete ophiolite bodies in this belt, namely the İspendere ophiolite.

Geochemical evidence indicates that the İspendere ophiolite developed by spreading above a northward-dipping subduction zone during the Late Cretaceous and, as such, can be compared with a variety of supra-subduction zone-type ophiolites in the Eastern Mediterranean and elsewhere. The authors highlight several possible modern analogues, especially in the SW Pacific region. The source ocean basin was either the Southern Neotethys or a related small ocean basin further north (Berit ocean) in different interpretations (see introductory chapter).

The Mesozoic ocean basins within the present area of the Easternmost Mediterranean exhibit long histories of subduction, prior to final closure. Subduction is evidenced by arc magmatism of several different ages. The Malatya and Keban carbonate platform in SE Anatolia and some adjacent ophiolitic rocks are cut by Late Cretaceous granitoid bodies, which have been interpreted as the result of northward subduction.

Subduction is also recorded by HP/LT metamorphism, notably of the Anatolides. Most of the known HP/LT metamorphism is of Late Cretaceous–Paleocene age (e.g. in the Anatolides). Here, **Karaoğlan *et al*.** show that, in addition, unusual high-pressure/high-temperature granulite-facies metamorphic rocks occur as trails of blocks within a dismembered metaophiolite (Berit metaophiolite). This forms part of one of the two main ophiolite belts in eastern Anatolia (same belt as the İspendere ophiolite; see above). In addition, the granulite-facies rocks and the structurally overlying continental margin rocks (Malatya platform) are cut by unmetamorphosed arc-type granitic rocks. Both the high-pressure/high-temperature metamorphic rocks and the cross-cutting granitic rocks are radiometrically dated as Eocene. This implies an extended history of subduction, exhumation and arc magmatism along an active continental margin in SE Turkey. The formation of the granulite facies rocks requires an accentuated heat flow for which ridge subduction is a possible mechanism.

Despite the record of Late Cretaceous and Eocene subduction-related plutonic rocks, there is relatively little evidence of associated arc volcanism (i.e. extrusive and tuffaceous rocks) in southern Anatolia. It is, therefore, interesting that Late Cretaceous glass-rich volcaniclastic sediments depositionally overlie ophiolitic rocks in western Cyprus (Kannaviou Formation). **Gilbert & Robertson** focus on previously little known exposures of the volcaniclastic sediments that overlie a westward extension of the well-documented South Troodos Transform Fault Zone. Based on field, petrographical and geochemical evidence (including electron probe data), the authors interpret the volcaniclastic sediments as the product of contemporaneous Late Cretaceous arc volcanism. Geochemical data are given for comparable silicic volcanic rocks that are exposed in the western part of the Kyrenia Range in northern Cyprus. These rocks have been interpreted as part of a continental margin arc. The likely source of the Late Cretaceous volcaniclastic sediments in western Cyprus was therefore a magmatic arc located near, or along, the southern margin of the Tauride continent.

The Taurides are dominated by a stack of thrust sheets mostly made up of unmetamorphosed continental margin and oceanic units that were assembled during Late Cretaceous–Early Cenozoic time. **Mackintosh & Robertson** test whether the thrust sheets can be simply restored by assuming in-sequence, piggy-back-type thrusting as previously assumed. Ophiolitic rocks and related melange are located near the base of the thrust stack. This was previously taken to imply the existence of a Cretaceous ‘mini-ocean’ bounded by Tauride units. The authors present structural and sedimentary evidence showing that the thrust sheets were emplaced in two main stages. The first during the Late Cetaceous resulted from collision of a northward-dipping subduction zone with the Tauride–Anatolide continent (‘soft collision’), while the second resulted from the final closure of the ocean to the north during the Early Eocene. The second, Eocene phase of emplacement (‘hard collision’) gave rise to large-scale re-thrusting of the initially emplaced thrust stack (i.e. out-of sequence thrusting). The authors restore the thrust sheets as a Mesozoic north-facing passive margin onto which ophiolites and accretionary melange were emplaced (southwards) during the Late Cretaceous, followed by Early–Mid Eocene collision-related re-thrusting.

The Menderes Massif of western Anatolia, which has affinities with the Tauride–Anatolide continent, underwent collision, subduction and later exhumation during Late Cretaceous–Miocene time. The timing of these events and the processes involved continue to be debated. Here, **Teyssier *et al*.** present new evidence for the structural fabrics recorded in gneissose rocks in the southern Menderes Massif. They focus on the role of deep-crustal flow at high temperature (*c*. 550 °C) and draw a comparison with the Tauern Widow in the Alps, where orogen-parallel pure-shear extension has produced a corrugated fabric during orogenic collapse. A similar corrugated fabric is described from the southern part of the Menderes Massif, which is suggested to be of Mid–Late Eocene age. The corrugations are interpreted as the result of constriction in an orogen-parallel direction perpendicular to the crustal flow direction, with some interesting tectonic implications.

Section 3: Late Cretaceous–Pliocene sedimentary basins and structural development

The closure of the Mesozoic basins between the Tauride–Anatolide continent and Eurasia during Late Cretaceous–Early Cenozoic time paved the way for the development of a series of syn- to post-collisional basins that are characterized by a wide range of deep-marine to subaerial sedimentary rocks and related igneous rocks. However, subduction of at least one of Mesozoic oceanic basin in the south (Southern Neotethys) continued until Early–Mid Miocene time, followed by progressive and diachronous collision of the Eurasian and African plates in the easternmost Mediterranean region.

The largest cluster of Late Mesozoic–Early Cenozoic basins, known as the central Anatolian basins, straddles central Anatolia to the west and south of the Kırşehir continental unit. Here, **Nairn *et al*.** report on an integrated study of several of the Central Anatolian basins which are located to the west of the Kırşehir Massif. The main focus is on the Late Cretaceous–Middle Eocene Kırıkkale, Çankırı, Tuz Gölü and Haymana basins. Based mainly on new sedimentological, micropalaeontological and igneous geochemical data, the authors infer the geological development of these basins as a whole. The Kırıkkale and Tuz Gölü basins developed on oceanic crust during the Late Cretaceous. In contrast, the adjacent Haymana basin represents a forearc basin that was constructed on accretionary melange and the Pontide continental margin to the north. The combined information is used to develop a new tectonic model that revolves around the later stages of closure of two Mesozoic oceans in the region, namely the İzmir–Ankara–Erzincan ocean in the north and the Inner Tauride ocean further south. The authors' preferred interpretation is that oceanic crust remained in the region until Late Palaeocene–Early Eocene, ruling out tectonic models that invoke latest Cretaceous final continental collision.

The equivalent sedimentary basins to the east of the Kırşehir Massif have received much less attention. One of these, the Darende Basin is discussed by **Booth *et al*.** The authors present a detailed account of the basin based on mapping, sedimentary logging, sedimentological and structural data and geochemical data for Eocene extrusive igneous rocks. The authors explain how the basin developed from the Maastrichtian–Late Eocene, following the emplacement of accretionary melange and ophiolitic rocks onto the Tauride carbonate platform. In contrast to some of the other basins, Paleocene sedimentation is effectively absent. However, marine sedimentation resumed during the Eocene. The basin was then deformed and exposed, but later experienced a short-lived marine transgression during the Miocene. A two-stage development of the basin is proposed in which the early stage of basin development (Late Cretaceous) was influenced by late-stage subduction beneath Eurasia, while the later stage (Eocene) was influenced by regional continental collision (and possibly by subduction of the Southern Neotethys to the south).

The timing and processes of closure of a Mesozoic ocean basin (Southern Neotethys) in the easternmost Mediterranean region continue to be debated. Today, Cyprus is located astride the plate boundary between the African and Eurasian plates. The structural history of this plate boundary can be well documented in Cyprus because of uplift during the Pleistocene. However, what constitutes collision? Is it the first contact of opposing (typically thinned) conjugate margins beneath the deep sea; the first collision of more or less full-thickness continental crust, or emergence from the sea to produce non-marine clastic sediments? Bearing on this problem, **McCay & Robertson** present a large body of structural data from the Kyrenia (Girne) Range in the north of Cyprus that was measured in sedimentary rocks of Miocene to Pleistocene age. The Range experienced three main tectonic phases after the Late Cretaceous: first, Mid-Eocene thrusting; second, Late Miocene–earliest Pliocene thrusting and folding; and third, Pleistocene uplift. A relatively small number of faults with measurable kinematic data (slickensides) were observed to cut Pleistocene sediments. Many of the faults have clearly been reactivated. The structural data are consistent with a combination of northward convergence and left-lateral strike-slip; that is overall sinistral transpression (which is strongly compartmentalized). The fault patterns also indicate that the Ovgos (Dar dere) Fault lineament to the south of the Kyrenia Range is kinematically linked to the Kyrenia Range, especially its southern margin. The structures are interpreted to reflect deformation along the northern margin of the Southern Neotethys during later-stage subduction and diachronous continental collision.

The African plate and the Anatolian microplate are today separated by a broad zone of left-lateral shear, which extends from Cyprus to the Levant continental margin and beyond. Several tectonic lineaments can be traced onshore into Syria and southern Turkey. The southernmost of these is the El-Kabir Lineament in northern Syria. This key crustal lineament is discussed by **Hardenberg & Robertson**, utilizing a combination of sedimentary and structural data from the onshore El-Kabir Basin and shallow seismic reflection data from the offshore. The authors present mainly structural data, especially from a well-exposed coastal area near Latakia city. Additional sedimentary and structural data are presented and interpreted for the northern and southern flanks of the El-Kabir Basin and its interior. The El-Kabir lineament is interpreted as a long-lived zone of crustal weakness that was repeatedly reactivated. The lineament is interpreted as having been active in a compressional/strike-slip (transpressional) mode during the Eocene, followed by opening of the El-Kabir Basin in a sinistral transtensional setting during the Miocene. The onshore basin was uplifted regionally during and after the Late Pliocene while offshore the lineament continued to be active as a subsiding basin.

The Late Cenozoic–Recent time period in central Anatolia was characterized by a variety of post-collisional and strike-slip settings. In contrast, the Southern Neotethys remained partially open until the Mid-Miocene in SE Anatolia, as noted above. In addition, the Eastern Mediterranean Sea remained, with evidence of oceanic crust or highly stretched continental crust beneath it that can be interpreted as a remnant of the Southern Neotethys and its margins. The northern margin of the easternmost Mediterranean Basin is characterized by several onshore/offshore sedimentary basins of which the largest and best documented is the Adana Basin.

The sediments in the uppermost part of the Adana Basin were previously mapped as Late Miocene (Messinian) to Pliocene in age. Here, **Cipollari *et al*.** present a detailed micropalaeontological analysis of well-studied sections, mainly utilizing ostracods, calcareous nannoplankton and both benthic and planktic foraminifera, supplemented by $^{87}Sr/^{86}Sr$ age determinations. This allows a differentiation of latest Miocene Lago Mare facies v. earliest Pliocene (Zanclean) facies. Two infra-Messinian stratigraphical discontinuities and a Zanclean flooding surface are recognized. The earliest transgressive sea appears to have been slightly reduced in salinity owing to mixing with the pre-existing brackish Lago-Mare. The new data, including palaeowater-depth estimates (epibathyal and bathyal) are used to refine understanding of the changing palaeoenvironments and to estimate the subsequent rate of uplift of the Adana Basin.

Section 4: Late Miocene–Recent Neotectonics

Neotectonic faulting in Anatolia and the surrounding region is critically important in view of the risk of earthquakes related to fault displacement. Neotectonic faulting has mostly been studied on a relatively local basis. However, considerable insights can be gained by study of an entire kinematically linked fault array. Here, **Duman & Emre** present the results of comprehensive mapping of the left-lateral East Anatolian transform fault zone that extends across SE Anatolia to the easternmost Mediterranean Sea. The East Anatolian transform fault marks the southern boundary of the Anatolian microplate that is escaping towards the Aegean, bounded to the north by the right-lateral North Anatolia Fault. The authors provide detailed field maps of the various segments making up the East Anatolian transform fault zone, which are discussed individually, followed by a comparison that highlights the processes involved and additionally identifies several areas of apparently high seismic risk.

A number of important questions remain about the East Anatolian transform zone, one of which concerns the linkage of the Dead Sea Transform Fault, northwards with the Karasu rift in southern Turkey. Here, **Boulton** presents the results of a mainly structural study of the southern part of the Karasu Rift that is interpreted as an extensional and transtensional lineament. Most of the faults that could be measured in the field are extensional. Three extensional events are recognized; the first is considered to relate to pre-Middle Miocene collisional-related flexural uplift; the second to strike-slip faulting (probably Late Miocene); and the third to propagation of either the Dead Sea Fault or the East Anatolian transform fault into the Karasu rift area.

Another key area is the junction of the Cyprus arc with the Aegean arc further west, an area where processes of westward tectonic escape and extension related to rollback of oceanic crust were potentially active. Here, **Över *et al.*** analyse fault data from Late Miocene–Quaternary sediments of the Eşen Çay basin near the onshore junction of the two arcs. The fault inversion procedure revealed both extension and strike–slip (characterized by a NW–SE trending σ_3 axis). The results suggest that a NW–SE trending σ_3 dominated during Mio-Pliocene time, followed by a change to a dominantly NE–SW trending σ_3 during Quaternary to Recent time. The authors favour a setting of overall southward slab rollback for the development of the Neogene–Pleistocene sedimentary basins and related structures.

The southern part of Cyprus lies just north of the major tectonic lineament that extends eastwards to link with the Levant (Arabian) margin, as noted above. There are two contrasting interpretations of the geological history of this lineament. These involve either dominantly strike-slip since the Late Cretaceous or generally northwards subduction beneath Cyprus during this time period.

In one interpretation, **Harrison *et al*.** infer that subduction in the easternmost Mediterranean had ended by latest Cretaceous time, followed by strike-slip displacement, with the uplift of the Troodos Massif in the south of Cyprus being related to transpression along a restraining bend. An accurate chronology for the timing of the uplift events (regional and local) is important in any tectonic model. Here, the authors focus on the later Quaternary tectonic and sedimentary development of a key area in SE Cyrus where processes and products can be well demonstrated. In particular, new ^{14}C and luminescence dating is provided for Late Pleistocene shallow-marine sediments. Deposition took place during successive marine isotopic stages and indicate rapid uplift at least during the last *c.* 36–40 ka. The relative altitude of several older (Holocene) marine deposits is also suggestive of rapid uplift, which is inferred to have taken place on an island-wide basis.

In another interpretation, northward subduction in the easternmost Mediterranean region continued into the Cenozoic, potentially until the Late Pliocene. This model is supported by **Kinnaird & Robertson**, who utilize the Neogene sedimentary record and numerous fault measurements throughout the southern part of the island to infer the evolution of the stress regime through time. The Miocene basins of the southern part of Cyprus document a compressional setting during the Early Miocene, followed by extension during Late Miocene–Pliocene time. Somewhat different settings are inferred for the basin in western Cyprus (Polis basin) compared with the Mesaoria basin to the north of the Troodos massif. Optically stimulated luminescence (OSL) profiling of faults and folds, combined with other available information, suggests that strike-slip was active in southeastern and south-central Cyprus during the Late Pleistocene, while west-verging folding and related faulting affected SW Cyprus during the same time interval. Regional uplift was focused on the Troodos massif during Late Pliocene–Pleistocene time and this can be largely explained by the collision of the Eratosthenes Seamount with a subduction zone to the south of Cyprus. In the authors' interpretation, collision was followed by a switch to left-lateral strike slip ('tectonic escape') during the Late Pliocene–Recent. There is thus little difference between the interpretations of Harrison *et al.* v. Kinnaird *et al.* for this relatively recent time period.

Post-collisional faulting (and localized folding) continued to affect the Arabian foreland after suturing of the Southern Neotethys by Mid-Miocene time. Geomorphological, sedimentary and structural evidence can be combined to indicate crustal movement during this post-collisional time period. **Trifonov *et al*.** report on segments of the Euphrates River valley in northern Syria which expose fluvial sediments that provide a sensitive indicator of fault activity. Comparisons of the heights of fluvial terraces and dated lavas flows across the river valley indicate that faulting influenced the course of the Euphrates during Pliocene to Quaternary time.

In summary, the present set of papers illustrates the diversity of processes involved in the on-going construction of the Anatolian continent and the easternmost Mediterranean region. Future progress will depend on posing and testing hypotheses of crustal development. This will require targeted field-based research, much of it multidisciplinary, in the context of a well-developed chronology.

We particularly thank Dr Şaziye Bozdağ for acting as secretary to the 7th Symposium of Eastern Mediterranean geology. We also thank those who helped by reviewing papers for this volume. The manuscript benefited from a review of Randell Stephenson. The editors would also like to thank the GSL staff and Hannah Sime for her patient project management of this volume.

References

Panayides, I., Xenophontos, C. & Malpas, J. (eds) 2000. *Proceedings. Third International Conference on the Geology of the Eastern Mediterranean*. Geological Survey Department, Nicosia, Cyprus.

Robertson, A. H. F. & Mountrakis, D. (eds) 2006. *Tectonic Development of the Eastern Mediterranean Region*. Geological Society, London, Special Publications, **260**.

Robertson, A. H. F., Parlak, O. & Ustaömer, T. 2012. Overview of the Palaeozoic-Neogene evolution of Neotethys in the Eastern Mediterranean region (southern Turkey, Cyprus, Syria). *Petroleum Geoscience*, **18**, 381–404, http://dx.doi.org/10.1144/petgeo2011-091