



EUROPEAN REGION NEWSLETTER

Unlocking the Future

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PRESIDENT'S MESSAGE



Dear Reader,

At home for a couple of weeks or so now, after attending the Annual AAPG Conference & Exhibition in Pittsburgh. As it was only my second visit to this city and really the first one to the downtown area I have to say it looks all nice and is comfortable even for Europeans to walk the streets, particularly in such warm and sunny weather

compared to some very cold weather in Europe in late May. The city usually lives by ice hockey and baseball this time of the year, but you can also feel that huge impact of the unconventional shale gas business all around in Pennsylvania. Going outside the city to the fields of Marcellus, this effect is very remarkable in any small city or village you visit. People are talking about shale gas and are willing to listen to us geologists doing our job, "slightly" differently from an "old continent" with the permanent battles and moratoriums on shale gas and hydraulic fracturing we have to face.

The conference in Pittsburgh seems to be a big success with a lot of focus on unconventional but also other topics as well. Prior to the conference, the IBA global competition took a place as well. Our European IBA winner – the Manchester University team put in a strong performance in Pittsburgh, but unfortunately was not placed. The global winning team was from the University of Utah (USA), with second place going to the University of Oklahoma and third place to the Sultan Qaboos University (Oman).

Also the Student Chapter of the Eotvos Lorand University of Budapest was honored at the student reception as Outstanding International SC, recognizing their active participation in the AAPG Student Chapter Program, their utilization of Chapter benefits and focus on communication requirements. Our congratulation goes to the SC leaderships as well as to all members. It is always a pleasure when our European young generation gets attention and is honoured.

The Executive Committee voted at its February 6th meeting to recommend to the HoD a change in the boundary between AAPG's Asia Pacific and European regions. According to the motion, the countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan were transferred to the European Region by HoD vote.

The Country Focus this time covers the new AAPG European Region member Kazakhstan which we welcome with a quite detailed article about the country's petroleum geology.

You'll read about the Pricaspian's known potential, but also about quite unknown territory like the Zaisan Basin in the Kazakhstan's far East. This issue's R&D article is about the never out of date subject of salt dynamics.

Usually June is the kind of month with many transitions within the AAPG. Like previous years, we voted for our new Council

members. First I would like to thank you all who took your time and voted and showed the interest in the AAPG. You have probably already received the email announcing our new President Elect – Jonathan Craig and Treasurer – Knut Jakobsson as well as 15 new delegates to the HoD. They are all listed in this issue of the Newsletter. Congratulations to the newly-elected officers, delegates and thanks to those not being elected this time for their willingness to stand and serve to the ER AAPG. We hope to see them all around and continue to be as active as they have been previously.

I am personally also pleased with several young delegates, these are active members who have been around for some time already and are also our new potential and future of the AAPG. And one final piece of news. Viki Wood from Shell will be our new Newsletter Editor. She already worked with Karen Wagner to prepare this June issue and to learn the process with her. The rest of the team remains the same. Please share my great thanks to Karen for her amazing job done for the ER, her enthusiasm and for mastering the challenges to obtain and edit all of the Country Focus articles as well as the other contributions from our members and authors. I trust she will be around if needed.

I know there has been a constant push from our country representatives to get new Distinguished Lecturers coming to our region. Now we are in a good position with the DL Committee supporting the program for the European Region this coming fall and spring and all speakers being approved. Thus, Terry Engelder of the Penn State University will tour in Europe in October this and March next year and Patrick Corbett of the Heriot-Watt University during the early spring time. Our ER DL Committee Chair Herman Darman will work with his colleague Frank Wieland to make these tours happen. So be ready to show your interest because the announcements will come very soon.

As this is my last note here talking to you as President of the ER AAPG let me thank you for your continued support. It was my pleasure to serve you and see you all around during the various meetings, conferences or workshops. I have been in touch with many of you by email only and yet I feel I leave the European Region in a very healthy condition both financially as well as when it comes to the business plan and the program we continue to build. There is always more to accomplish, but thanks to a great job done by our London office, their amazing logistical support and supportive staffing make things much easier for the European Council to manage and handle. I have no doubt that the coming President Keith Gerdes will continue to grow the region and satisfy our members. I wish all my best and good luck to him. I'll be further serving you as your Past President and will see you around for sure!

Take care and have a great summer,

Vlastimila Dvořáková
AAPG European Region President

Outstanding salt tectonics outcrops: the Sivas Basin, Turkey.

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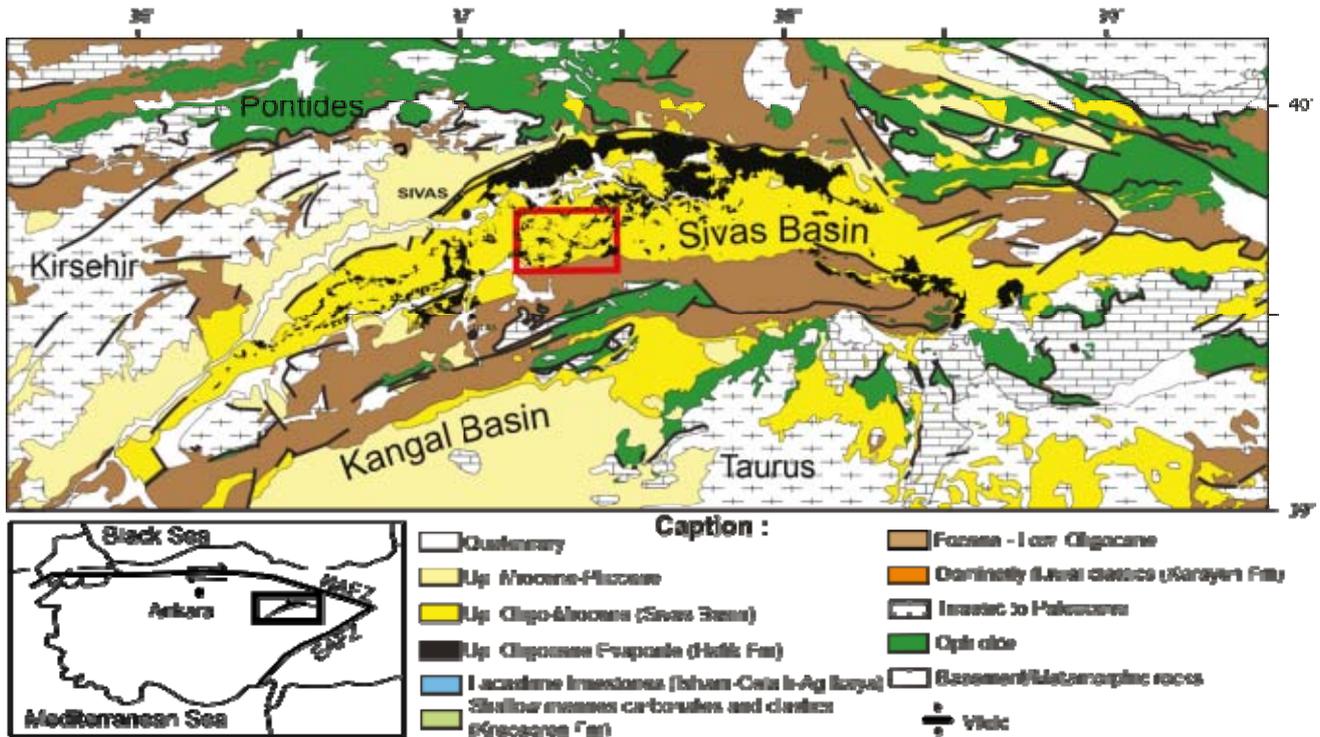


Figure 1: The Sivas Basin in its complex central Anatolia orogenic setting. NAFZ: North Anatolian Fault Zone, EAFZ: East Anatolian Fault Zone.

SUMMARY

The Sivas Basin (Turkey) is an Oligo-Miocene basin developed in an orogenic context above the Neotethys suture zone. A thick evaporitic sequence was deposited during a Mid Oligocene quiet period between the Taurus and Pontides collisional belt. Erosion of the Taurus Mountains shed clastic sediments northward over the evaporitic basin, forming mini-basins and associated evaporite diapirs and walls. During the main shortening phase in the Early Miocene, gypsum overhangs and allocthonous sheets emplaced onto the basins. Most of the classic salt tectonics geometries associated with the development of diapirs are strikingly well exposed, namely halokinetic sedimentary sequences along diapir walls, welds and evaporite glaciers and sheets, minibasins, and overturned turtle wings. These exposures rank as the finest field analogues for classical petroleum provinces controlled by salt tectonics such as in the Gulf of Mexico and Angola.

INTRODUCTION

Recent progresses in seismic acquisition and imaging of salt tectonic structures allow investigation of near- and sub-salt structures. Classic field examples for comparison with buried oil bearing salt basins, deal with radial diapirs exposed in compressive settings and associated with halokinetic sequences such as in Iran, the Alps and Pyrenees forelands and La Popa in Mexico (e.g. Giles and Lawton, 2002). Welds (e.g. La Popa, Paradox Basin USA), canopies (Axel Heiberg and Great Khavir desert in Iran) and

minibasins (Flinders Range, Axel Heiberg) are less common structures (Rowan and Vendeville, 2006; Jackson and Harrison, 2006). The finest analogues are the Axel Heiberg Island in the Canadian Arctic and La Popa in Mexico.

The Central Anatolia Sivas Basin was studied by academic teams over the last 70 years and interpreted in a thrust tectonics framework as part of the surrounding Taurides and Pontides mountain belts. The abundance of evaporites and their apparent complexity were shown to us in 2011 by the academic group working in the DARIUS consortium for paleogeography. The study of the basin as a salt tectonics analogue started in 2012, as a joint project between the University of Pau and Pays de l'Adour, the Sivas Cumhuriyet University, and Total SA.

GEOLOGICAL SETTING

The Sivas Basin (Fig. 1) formed south from the Ankara-Erzincan ophiolitic suture. It is filled by highly deformed Paleocene to Quaternary sediments. The basin covers three major crustal domains: the Pontides belt to the north, the Kırşehir microblock in the middle, and the Taurides belt to the south. It developed in a context of continuing convergence related to the Tethyan closure. It is a composite flexural basin related to both southward thrusting of the ophiolitic sole from the suture zone, and northward thrusting of the Taurus block. An Eocene carbonate platform passing laterally to flysch like emplaced rapidly on top of the ophiolite. After the

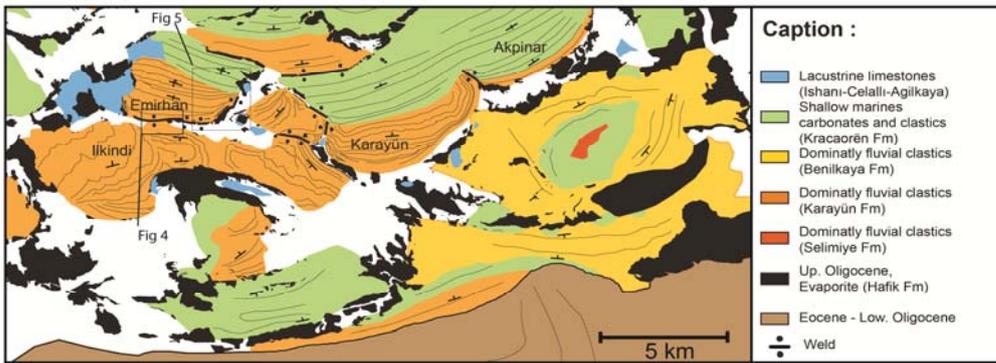


Figure 2: Detailed geologic map of the central Sivas Basin. The wall and basin central area, showing the most impressive minibasins and salt related structures.

folding of the flysch and following the deposition of red clastics (Selimnye Fm.), the Middle Oligocene thick evaporites were deposited during a relaxation/quiescence phase likely involving low angle normal faults. Compression resumed in the Early Miocene, driven by the Arabian Plate collision with Eurasia.

The central zone of the basin exhibits salt tectonic related structures. It is subdivided into three domains separated by a paleo high (Fig. 2) :

- A central domain which can be described as forming a wall and basin area with numerous continental Oligocene minibasins (about 15), truncated by a strong unconformity and overlain by Lower Miocene shallow marine marls. Middle Miocene lacustrine sediments are deposited above large evaporite stocks and unconformably on the tilted continental minibasins.
- A southern domain where the marine sediments are reduced and locally directly overlay the Lower Oligocene Selimnye Fm. The fluvial formation that form the bulk of the minibasin seems absent of the area. Folding and thrust tectonics are recorded in the upper continental Bendilkaya Formation.
- The northern domain characterized by widespread thick evaporites is interpreted as an area of resedimentation of gypsum, partly flowing in a context of inversion of the central domain in the Middle Miocene. The thick evaporite is equivalent to interbedded with the Bendilkaya Fm. This large evaporite layer has flown and is the locus of present-day active minibasin.

Large volumes of gypsum are still preserved in salt walls, at the base and top of minibasins or as sheets while a certain amount of halite, responsible for the mobility has been removed from the system. Halokinesis started during a regional tectonic quiescence, dominated by sedimentary load, and initiation of minibasins was also controlled by the morphology of the basement. The main unconformity records a phase of evaporite exposure at surface, overhang and glacier formation, and rotation of minibasins; related to an increase of shortening.

Most minibasins in the south and north have low angle dips, whereas a strip of four well-exposed basins has been strongly tilted and are sometimes vertical. These four minibasins contain exposures of the finest known analogues of salt tectonic structures, the two most outstanding being Emirhan and Karayün.

SEISMIC SCALE GEOMETRIES: DIRECT ANALOGUES

The Emirhan minibasin (Fig 3, see Fig. 2 for location) presents a 'rocking chair' pattern with growth strata along both sides. A strong evaporite flow toward the east of the basin resulted in a thickening of the lower fluvial reddish sequence to

the west. To the east, the beds are conformable on the evaporites with important thinning and progressive unconformities. On the contrary, the western wall is diapiric with a clear cross-cutting relation between the remnant gypsum feeders and welds and the sediments. On this side and after complete rotation of Emirhan, a younger lacustrine minibasin deposited unconformably onto the thick evaporite stock and the vertically dipping fluvial beds.

The Emirhan minibasin fluvial sequence terminates with a strong angular unconformity. Above it, the marine series records an eastward thickening. On this side, similarly to the western side, Middle Miocene

lacustrine beds overlay and truncate the evaporite stock and the fluvial serie. The marked angular unconformity in Emirhan is considered a consequence of the main compression phase in the Sivas basin, in the Early Miocene, which comes along with the unroofing of the Taurus and shedding of ophiolite clasts in the conglomerates.

The eastern side of the Emirhan minibasin shows bedding which are conformable to the diapiric wall and dragged to form a 90° unconformity close to the evaporite and wedges westwards to an angle of less than 10° to the unconformity, 200m away (Fig. 4). The marine sediments onlap the marine conglomerates above the unconformity. To the south, the gypsum wall is discontinuous, alternating thick pillows and welds. Where the beds are dragged and markedly unconformable, the wall is welded. The setting is analogous to a seismic section from the contractional part of the Angola gravity tectonic system (Fig. 7b). The well encountered a turbiditic channel below the salt canopy. Dipmeter data evidence a structure comparable to the eastern structure of Emirhan minibasin. Three main dip-domains are shown: the two lower ones mark the overturned limb of the mini-basin, the last one just below the salt, an unconformable sequence, thus mimicking the geometries observed in Emirhan.

SUB-SEISMIC GEOMETRIES: FIELD OBSERVATIONS ARE BETTER THAN SEISMIC

Minibasin growth is recorded by angular unconformities and bed rotation along the basin boundaries with the salt feeders. These halokinetic structures are rather well imaged on seismic at minibasin scale. However, local unconformities, hook or "J" structures occurring in the vicinity of diapirs boundaries and welds (often located beneath salt overhangs or canopies) cannot be imaged properly even with the most recent seismic acquisition and require dipmeter data.

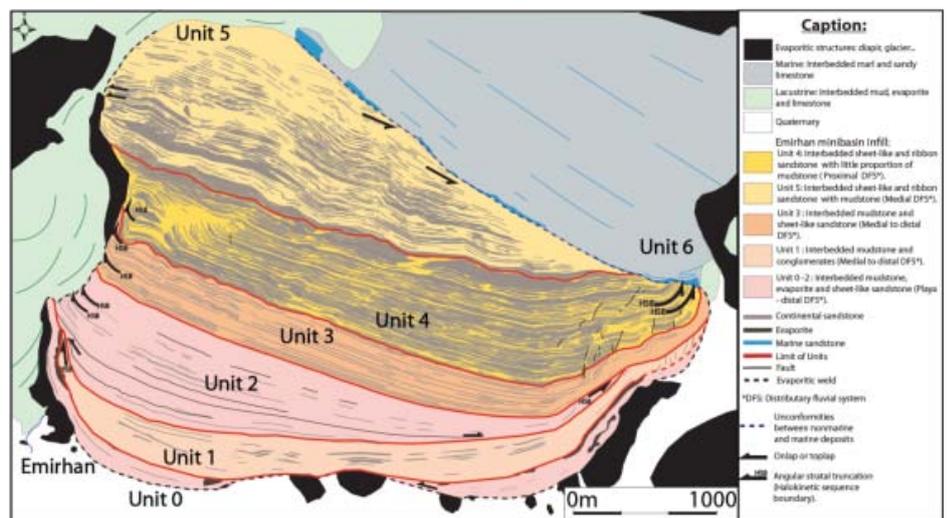


Figure 3: Aerial view and line drawing of the Emirhan minibasin deposits. A-G: Successive sedimentary succession (see text for explanation).

Many examples of both growth and halokinetic sequences can be seen at various scales in the Sivas minibasins (Fig. 2 and 3). Again, the best outcrops are located along the lateral edges of the Emirhan minibasin. The wedges and associated unconformities record the interplay between sedimentation and salt movement. When the evaporite flow dominates, previously deposited sequences are folded and truncated, forming unconformities sometimes covered by spreading salt tongues. One example of halokinetic growth sequences is shown on Figure 5 (see location in Fig. 2). Here, growth strata show an apparent 90° rotation within the basal fluvial series, related to the deflation of the adjacent feeder.

It shows a sedimentary sequence prograding onto the gypsum body when the sedimentary deposition rate was higher than the diapir growth rate. Following a decrease of the deposition rate relatively to the diapir growth, folding of the sequence occurred, ending with the truncation of the folded layers, and deposition of a new sequence. The angular unconformities form bounding surfaces, which separate coherent packages of halokinetic sequences, defined by Giles & Lawton (2002) as 'relatively conformable successions of growth strata genetically influenced by near-surface or extrusive salt movements'. The bulk of the pillow is composed of blocky crystalline translucent gypsum (arrow head) and it is often rimmed by a layer of saccharoid gypsum (light colour on fig. 5).

NEXT STEPS

Classical detailed mapping and logging of the series will be conducted with high resolution satellite images and field work to address the geology of the minibasins, growth and halokinetic sequences, unconformities etc. It is likely to enrich the tectono- sedimentary concepts developed in other salt basin such as La Popa and the Flinders Range (e.g. Giles et al., 2004).

Ages and chronology of events is the most problematic issue. Detailed sequence logging has started, showing striking similarity of sedimentary succession from one basin to another, but to date, no fossils have yet been found in the lower fluvial formations and we hope magnetostratigraphy will help to date and correlate these levels. A fine chronostratigraphy would help quantifying evaporite movements. A second issue relates to the integration of this salt basin into the regional geodynamic setting, dominated by shortening of this area in a general foreland setting. In particular, the role of the basement geometry and structuration appears to be a key control exerted on the basins development, and future deformation.

ACKNOWLEDGEMENTS

Jean Letouzey who discovered the salt tectonic nature of the Sivas basin, Rod Graham and Mike Hudec joined our last field, and contributed to our understanding of the basin. J.P. Callot acknowledges a grant from Total SA "Structural geology Chair" at University of Pau and Pays de l'Adour.

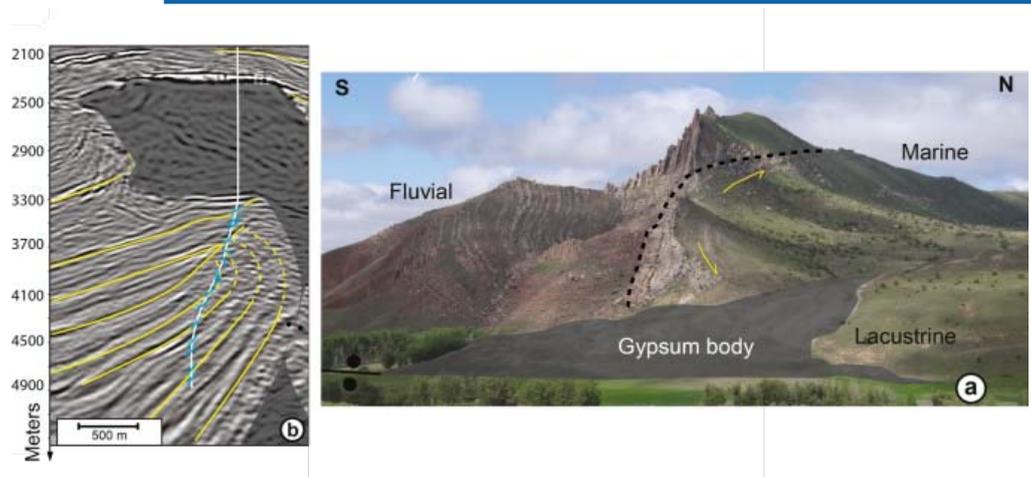


Figure 4 : (a) Growth strata and unconformity in the East of the Emirhan minibasin and (b) an analogue geometry in the deep offshore Angola constrained by dipmeter data along the well (modified from Ringenbach et al., 2013).

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Figure 5 : Feeder and halokinetic sequence at the boundary between the south Emirhan and Ilkindi minibasins, (1) massive gypsum forming the remnant of the diapiric body; (2) fine grained strained gypsum forming the body limit.

The Petroleum Geology of Kazakhstan

by Graham Blackburn

Kazakhstan is a vast and varied country, extending for almost 3,000 km from the Caspian Sea in the west to the Chinese border in the east. Its area of 2,727,300 km² is similar to that of Western Europe, and over 1/3 that of the contiguous United States. Much of the Republic comprises lowland semi-desert and grassy steppe, which dominate in the part of the country lying west of the Aral Sea. To the east are more mountainous areas including the Kazakhstan plateau to the north, Tien Shan to the south and the Altai mountains in the east.

Geologically the country is diverse. The Aral Sea overlies a north-south suture marking the position of the Uralian Ocean, which closed late in the Carboniferous. Much of Western Kazakhstan therefore corresponds to an ancient East European continental block with several Tethyan accreted terranes. Eastern Kazakhstan is largely underlain by the Kazakh continental block, composed of a mosaic of early Palaeozoic continental fragments, possibly of East Gondwanan affinity (Windley et al., 2007).

Western Kazakhstan

The Palaeozoic development of Western Kazakhstan is poorly understood owing to an almost complete absence of Palaeozoic outcrop except in the Southern Ural Mountains, with relatively few wells penetrating Palaeozoic basement. During the mid-Palaeozoic the region lay on the "southeastern" corner of the East European Platform adjacent to two closing oceans, the Uralian to the east and Palaeo-Tethys to the south. Various models have been proposed for the sequence of events leading to the closure of these two oceans, at the end-Palaeozoic and end-Triassic respectively. Several existing models are based on studies of limited areas, and are difficult to reconcile with data from elsewhere in the region. The story is complicated by the presence of intra-continental rifts such as the North Precaspian Rift, the Donets-Karpinsky-South Emba rift and the Kuma-Manych-Karatau rift, with debate as to whether any or all of these represent former oceans or back-arc basins. Figure 1 attempts a simple model for the Palaeozoic development of Western Kazakhstan and surrounding areas. It is based on the "Occam's razor" principle of being the simplest model which accounts for the great majority of available data from over a wide area, but is far from definitive.

In terms of its hydrocarbon prospectivity, Western Kazakhstan can be divided into three broad provinces, the Precaspian Basin in the northwest (though the western flanks of the Basin lie within Russia); Mangyshlak, the wide peninsular area bordering the East Caspian coastline; and Ustyurt which lies between Mangyshlak and the Aral Sea. Oil and gas reservoirs in Mangyshlak are mostly Mesozoic, with Middle Triassic carbonates

comprising the most prolific of several source rocks. The numerous fields here include giants such as Uzen, discovered in 1961 with an estimated STOIP of around 8.4 billion barrels. The Triassic source rock does not extend beneath the extensive Ustyurt Plateau to the east, which largely explains its lower prospectivity, although some fields relying on various secondary sources do exist within Mesozoic and younger reservoirs.

The Precaspian Basin, 1,000 km across (Fig. 2), began to form during the Early to Middle Devonian. It was originally centred on an oceanic rift, the North Precaspian Rift, which failed but acted as the focus for basin subsidence. The basin geometry is also defined by thrust belts in the east (associated with Uralian closure) and south (associated with closure of the Donets-Karpinsky-South Emba rift). The apparently simple elliptical shape of the basin results from a complex interplay of tectonic factors, which in turn influenced the geometry of carbonate build-ups around the basin margins (darker-blue in Fig. 2). The petroleum system within the Precaspian Basin is quite distinct from that of Mangyshlak and Ustyurt, depending primarily on the world-class Domanik (Late Devonian) source rock, and the Lower Permian (Kungurian) salt which forms a regional seal (Fig. 3). These allowed giant fields to accumulate in Devonian-Carboniferous platformal and reefal carbonates such as those hosting the massive Kashagan and Tengiz oil fields and the Karachaganak gas field (and the Astrakhan gas field in Russia). Kashagan has a STOIP of perhaps 38 billion barrels (estimated up to ~13 billion barrels recoverable). The chief drawback is that the association of carbonate reservoirs with anhydrite in the seal has led to the development of high-sulphur hydrocarbons (e.g. around 19% H₂S in Kashagan). Occasional leakage through the seal has created a variety of Mesozoic fields within the Precaspian Basin, which though generally smaller than the sub-salt fields, tend to be low in sulphur.

Eastern Kazakhstan

The greater part of Kazakhstan lies east of the Aral Sea, and includes a number of diverse sedimentary basins (Fig. 4 – but note that the basins of the Tien Shan range in the south, from Afghan-Tajik in the west to the Ili Basins in the east, mostly belong to republics bordering Kazakhstan – Uzbekistan, Tajikistan and Kyrgyzstan). Field size and prospectivity is generally lower than in the West, but there are some large fields. These include Kumkol in the South Turgai Basin, with reported STOIP in excess of 1 billion barrels, which together with similar fields nearby have a Jurassic reservoir, and trapping structures associated with the terminal splay of the long-lived regional strike-slip Talas-Fergana Fault (Moseley & Tsimmer,

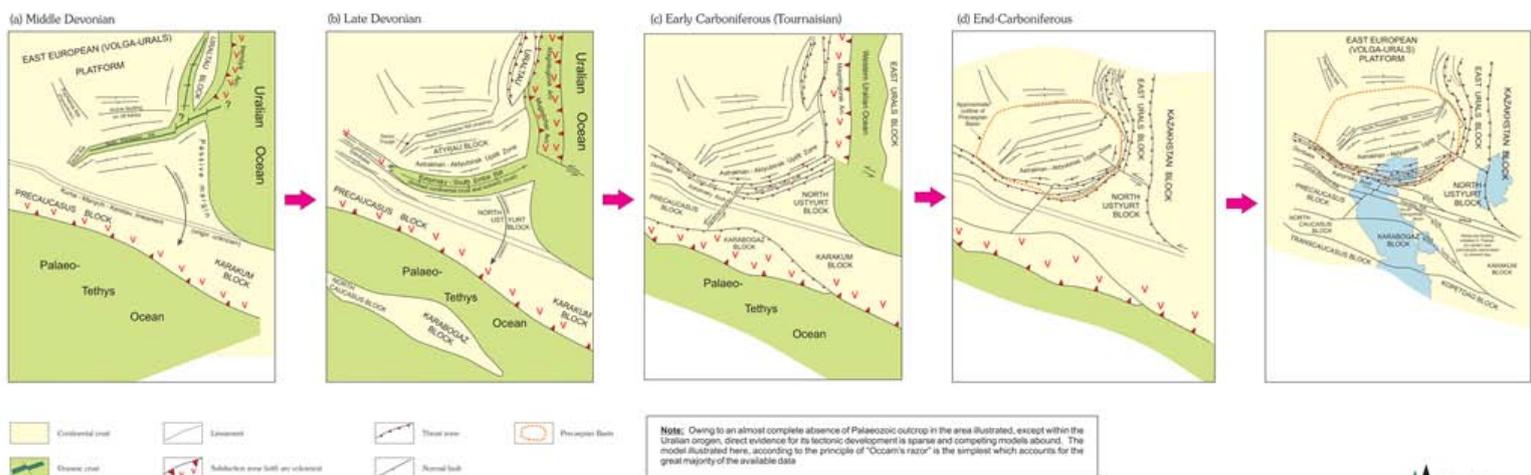


Fig.1. Simplified cartoon illustrating the formation of Western Kazakhstan and surrounding areas (part conjectural).

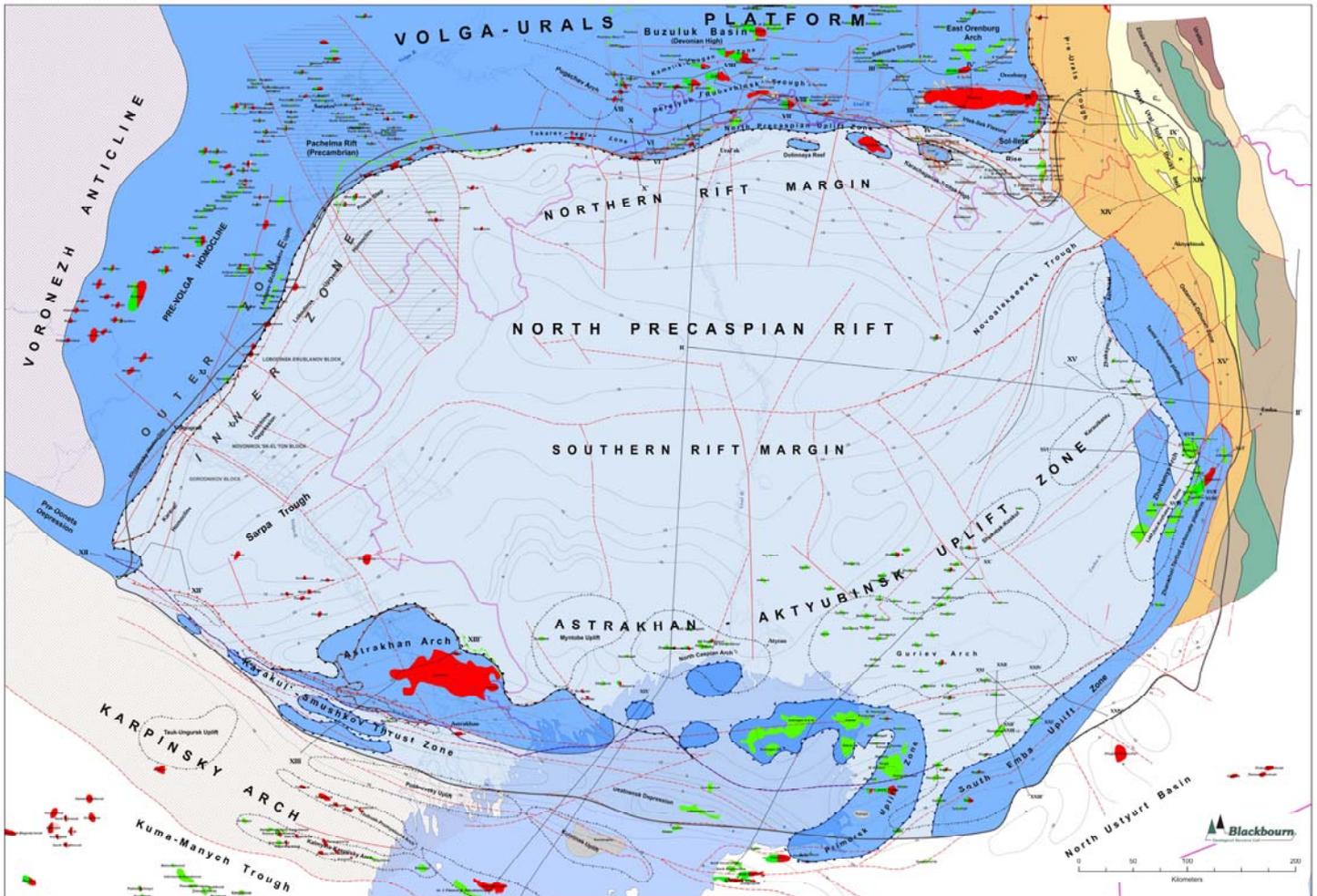


Fig. 2. General map of structure, carbonate distribution and nomenclature for the Precaspian Basin and surrounding areas. Location for South-North cross section (I-I') in Fig. 3.

2000). In contrast, the neighbouring Chu-Sarysu Basin hosts gas within Carboniferous reservoirs which developed on an extensive carbonate platform covering the West Kazakhstan Plateau. This carbonate system was the same age as that which rimmed the Precaspian Basin to the west, though it formed on the facing margin of the contemporary Uralian Ocean. Unfortunately, the absence of an equivalent to the oil-prone Domanik source rock, and less extensive seals, prevents Chu-Sarysu from being a Precaspian look-alike. However, outcrops of platform-margin deposits and associated reefs in the Bolshoi Karatau ridge, the uplifted southwestern edge of the Chu-Sarysu Basin, have been adopted as excellent surface analogues for the Precaspian reservoirs (e.g. Cook et al., 2002).

Each of the basins illustrated in Fig. 4 has a distinct geological history, partly resulting from the complex plate-tectonic setting of the entire area, summarised in cartoon form in Fig. 5. Many of these basins are, for various reasons, underexplored. There is no space to describe them all here, so one example has been selected, from the far east of Kazakhstan: the Zaisan Basin, straddling the border with China (Fig. 4). This is described below.

The Zaisan Basin

Although lying geographically on the East Kazakhstan Plateau, geologically the Zaisan Basin is part of the Irtysh-Zaisan Belt associated with mid-Carboniferous closure of the Ob-Zaisan ocean (Filippova et al., 2001) which led to collision of the Siberian and Kazakhstan continental terranes (Fig. 5b). Part of the Basin probably overlies crust with Siberian rather than Kazakh affinities. The Basin is bounded in the north by the Altai and Kalby mountains, and by the Saur-Tarbagatau mountains in the south. The Chingiz-Tau Ridge separates the Zaisan Basin from the Junggar-Balkhash

Zone of Central Kazakhstan. The Basin is filled by Late Cretaceous and Cenozoic continental deposits over 1,700 m thick (Fig. 6), although hydrocarbons have been discovered within Palaeozoic (Early Permian) basement. The centre of the Basin is occupied by the freshwater Lake Zaisan.

The Zaisan Basin is divided into Northern, Central and Southern tectonic zones, each of which acted as a separate depocentre at different times. Deposition within the Southern Tectonic Zone occurred mainly during the Late Cretaceous and Eocene, in the Northern Zone during the Palaeocene, and in the Central Zone in the Eocene. Only since the Eocene has a substantial proportion of the basin, mainly towards the east, experienced uninterrupted deposition, probably in response to collision of the Indian continent to the south (Buslov, 2004). Deposition in the west began mainly during the Miocene. Lying within a tectonically unstable zone between the Kazakh and Siberian continental blocks and close to major strike-slip lineaments, the area has been subject to a series of tectonic adjustments caused by a variety of far-field and more proximal tectonic activity. Allen et al. (1995) consider that basin formation was initiated during the Late Permian to ?Early Triassic as an extensional structure within the broad sinistral shear zone. However, the precise sequence of tectonic events controlling the development of the various parts of the basin remains speculative.

Palaeozoic and Triassic stratigraphy of the Zaisan Basin. The Palaeozoic underlying the Zaisan Basin includes Silurian and Devonian andesites and basalts overlain by Early Carboniferous clastics and carbonates. Up to 2,000 m of intermediate volcanic rocks accumulated within isolated troughs during the mid-Carboniferous. These are presumably associated with volcanic arcs which developed as the Ob-Zaisan ocean closed.

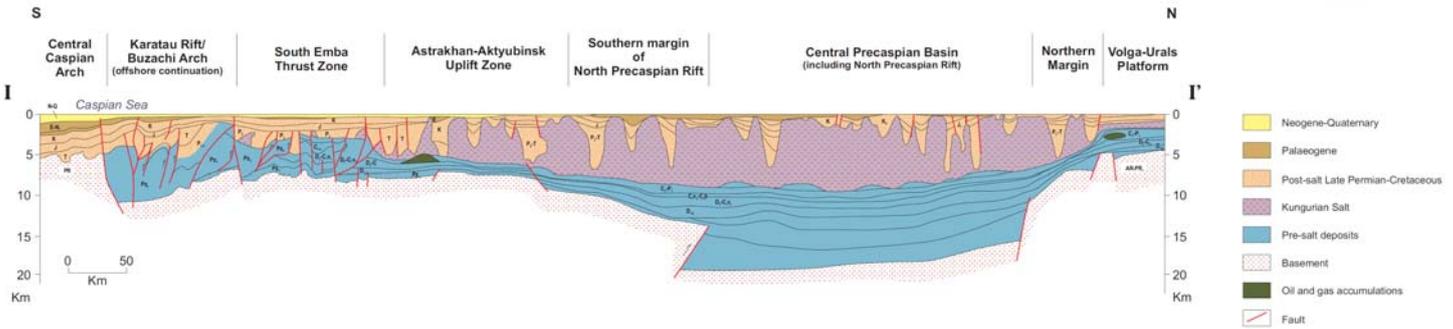


Fig. 3 South-North cross-section through the Precaspian Basin, based on seismic data.

The Late Carboniferous to the Late Triassic is represented by a mainly clastic succession divided into nine recognised formations approaching 5 km thick, although it is unlikely that this thickness was deposited in any one place. Sandstones, siltstones and claystones occur throughout, often with coals. The Lower Permian includes a unit of up to 720 m of grey sandstones and bituminous shales, and beds of limestone, marl and gypsum occur higher in the Permian and into the Early Triassic. A period of uplift and erosion occurred during the mid-Triassic, and this was followed later in the Triassic by the onset of intense and deep weathering which continued into the Early and, in places, the Late Cretaceous.

Cretaceous to Recent stratigraphy of the Zaisan Basin. Late Cretaceous and Cenozoic deposits outcrop along the margins of the Zaisan Basin, where they are variably deformed and overlain by an impermanent Quaternary cover. They thicken into the basin centre where they are less well-known. The best outcrops of these ages, up to 300-600 m thick, are observed within

the foothills of the surrounding mountain belts. There is however no single locality where the entire succession has been penetrated by drilling, since deposition at any one time was concentrated in one or other of the depocentres.

Hydrocarbon prospectivity of the Zaisan Basin. The prospectivity of the Zaisan Basin has been considered as moderately high, especially since the basin continues eastwards into China where oil is reported to have been encountered within Palaeozoic, Mesozoic and Cenozoic horizons. Triassic oils in the Karamai field, for example, occur within a homoclinal structure sealed by an asphalt plug; fault sealing occurs at greater depth. The level of exploration within the Kazakh sector of the Zaisan Basin remains however fairly low.

Orudzheva and Obukhov (1988) state that oil shows occur in the Kenderlyk Sub-Basin in the southeast (Fig. 6). Within the basin as a whole, two stratigraphic intervals are regarded as prospective. The older of these

comprises the Late Palaeozoic to Early Mesozoic section. The TOC of the upper Palaeozoic coals and bituminous shales is high in places, and the potential source rocks are reported to lie within the oil window. The younger prospective interval is the Cretaceous and Cenozoic, which is more widely developed.

The Central Tectonic Zone of the Zaisan Basin, and especially the Pre-Manrak and Pre-Saikhan troughs, are regarded as prospective for oil. The Sarybulak Uplift occurs here at base-Cenozoic level. Khalimov et al. (1991) report that a stratigraphic well drilled to a depth of 4,859 m on the Sarybulak structure, within the Central Tectonic Zone, discovered oil within the Permian in 1988. Testing over the 2,960-2,986 m interval within the Lower Permian yielded 2.3 m³/day of highly viscous oil, high in tar but low in paraffins. This is reported to be similar to the oils found within the Chinese sector of the Basin.

Geothermal studies indicate that the productive horizon has experienced temperatures of 130° C, over 60° C above the present temperature, which has been explained either by uplift and erosion, or by igneous activity. The accumulation is associated with a deep-rooted fault system, interpreted as indicating that it formed by upward migration of hydrocarbons from greater depth.

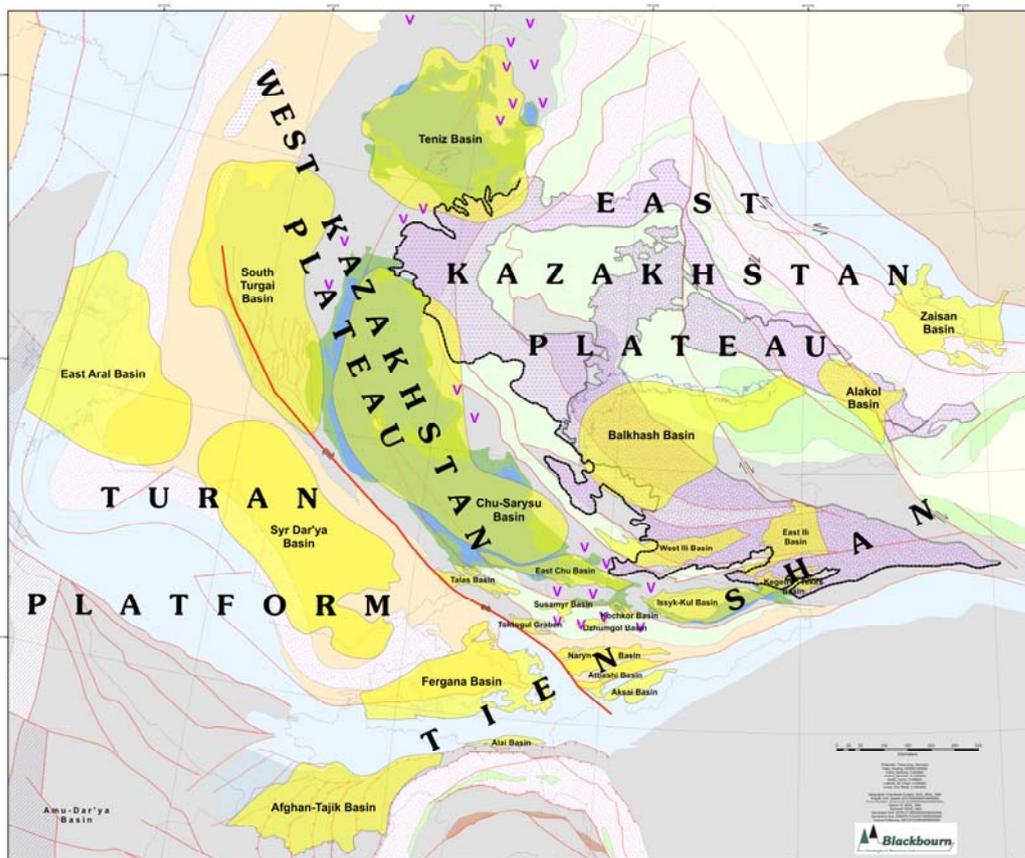


Fig. 4 Location map of the known and prospective hydrocarbon basins of Southeast Central Asia.



Fig. 5 Simplified cartoon illustrating the formation of Eastern Kazakhstan and neighbouring areas of Central Asia (part conjectural).

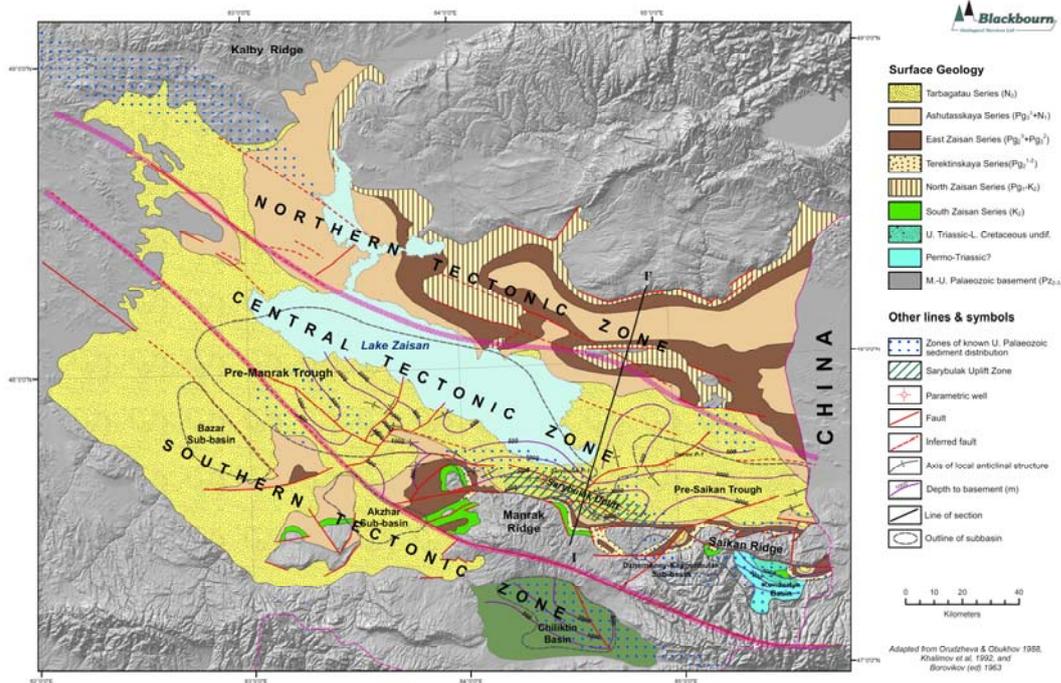


Fig. 6. The Zaisan Basin: outline map of the geology and structure.

In summary, the Zaisan Basin holds a variety of potential reservoirs, especially within the Late Palaeozoic to Early Mesozoic and Late Cretaceous to Pliocene sequences. Potential source rocks include the Early Permian lacustrine shales and Triassic-Jurassic coal-bearing deposits. There appears to be an absence of regional seals, although local seals may be formed by intraformational lacustrine clays or evaporites.

The Zaisan Basin is described here simply as one example of the varied basins in Eastern Kazakhstan. The Republic as a whole offers geological opportunities for all players, from established supergiant fields in relatively mature provinces (drilling began in the Precaspian Basin late in the 19th century) to frontier exploration. The country inevitably presents numerous challenges, both for production and exploration, but some companies have already faced these risks and are being suitably rewarded.

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Petroleum systems of the Paratethys Exploring the Pathway from Europe to Asia

26-27 September 2013 / Call For Abstracts Extended to the 21st June

WEB: europe.aapg.org / EMAIL: europe@AAPG.org



Holiday Inn, Tbilisi, Georgia
Co-chairs: Reinhard Sachsenhofer, Leoben University and Gabor Tari, OMV
Partnered with the Ministry of Energy and Natural Resources of Georgia

AAPG Europe is proud to announce a Regional Conference scheduled to take place on **26-27 September 2013**. This ground-breaking event will take place in the wonderful city of Tbilisi in Georgia, located in the middle of what explorers call the Paratethys region of Central/Eastern Europe and Central Asia.

Recent years have seen a huge rise in E&P activities in regions which were previously underexplored and new frontiers for oil and gas exploration are opening up globally. This comes as a result of improved exploration technologies as well as geopolitical developments which have led to increased accessibility in some countries. Both of these factors apply to some parts of the Eastern Europe, the Former Soviet Union and Central Asia.

Regional and topical themes:

This conference will concentrate on the petroleum systems of the Paratethys from a hydrocarbon exploration and geoscience perspective. The geographic focus will be on the Pannonian, Black Sea, Caspian Sea basins and various Alpine folded belts and their foredeep/foreland basins in the same region including the Alps, Carpathians, Balkans, Pontides, Crimea and the Caucasus. There are many exploration topics which are unique to the Paratethys region which are captured in the session themes.

Who should attend?

This event will be of interest to upstream oil and gas industry professionals exploring the broader area of Central/Eastern Europe and Asia. Participation by academic researchers and students with an interest in hydrocarbon exploration and regional geology is also most welcome.

Planned technical sessions

- Petroleum systems of the Paratethys: what is proven and what is speculative?
- The Maykop Formation and its equivalents in the Paratethys: a regional overview
- Unconventional exploration targets in the Paratethys region
- Sequence stratigraphy in the Paratethys and correlation issues with the global stages
- Improving the stratigraphic resolution within the Paratethys
- The signature of the Messinian sea-level drop in the Paratethys
- Paleogeographic changes in the Paratethys related to the evolution of marine connections
- Case studies of application of geochemistry and basin modelling in the Paratethys region
- The folded belts of the Paratethys: case studies from the Alps to the Caucasus
- Yet-to-find studies in various parts of the Paratethys

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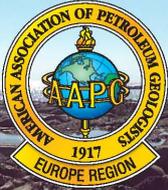


Energy from Nature



PROSPECTIUNI





AAPG EUROPEAN REGION - UPCOMING EVENTS

Petroleum systems of the Paratethys: Exploring the Pathway from Europe to Asia

Tbilisi, Georgia

26-27 September 2013

Call For Abstracts Deadline Extended: 21st June 2013

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To ensure you are the first to know about our events explore our website and uncover a portal of events specifically designed to promote technology and inspire further learning and understanding, alternatively email europe@AAPG.org for more information.

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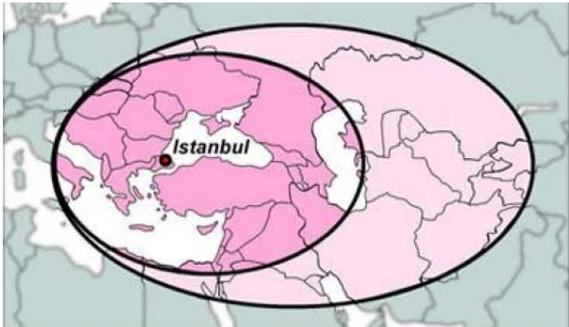
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APPEX Regional will be held in Athens from the 5-7 November 2013.



After the successful inaugural event AAPG European Region is thrilled to announce a second year of APPEX Regional in Istanbul specifically focusing on Eastern Europe, the Black Sea and Caspian, Southern Russia the Stan Countries and the East Mediterranean.

The event will again bring together principals, senior managers, business developers and new venture managers for an unmatched opportunity to network and do business with NOCs, governments, financiers and global E&P deal-makers and decision-makers.

Whether you're looking to buy or sell deals, expand into new areas, find new partners in the Region, or just stay on top of the industry, APPEX Regional is the place to be.

- Your one-stop shop for upstream opportunities in this vital Region.
- The key forum for networking and international deal development, carefully designed to let you do real business.
- Connect with buyers, properties and prospects from around the vital part of Eastern Europe – find the next deal first.
- Explore a programme of regional and topical speakers to keep you on top of trends and discoveries, including finance forum, prospect forums, and with the presence of the International Pavilion bringing Global NOC's.
- Meet, discuss and negotiate deals with the right decision makers.

Over two-and-a-half days, attendees will explore current and future trends in the Region, new oil and gas hot-spots, and discover and debate dozens of upcoming prospects from a Region covering the following countries: Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Greece, Hungary, Israel, Iran, Iraq, Jordan, Kazakhstan, Kosovo, Kyrgyzstan, Lebanon, Macedonia, Mongolia, Montenegro, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, plus some Eastern Mediterranean countries (Italy, Egypt, Libya, Tunisia).

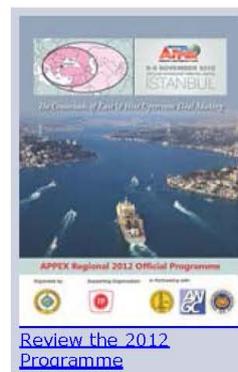
All this takes place in a relaxed, friendly environment that has been carefully designed for maximum networking, allowing attendees to buy, sell and trade prospects and properties, find new strategic partners and clients, and stay one step ahead of the competition.

There are limited exhibition booths, which will go quickly so please reserve your booth space at APPEX Istanbul as soon as possible. [Contact Fionn Devine](#) (+44 207 434 1399).

Important Dates

Save the Date	05-07 Nov 2013
Deadline for Abstract Submission	Watch for Details

Hosted by



The 14th National Symposium of Geology and Geophysics Students Bucharest, 2013 The 1st Romanian AAPG Chapters' Leadership Meeting

by Georgian Manuc (President AAPG BSC) and Roxana Stanca (Secretary of AAPG BSC)



Fig.1 – Students at the Icebreaker party party

Founded in 1999, at the same time as the two other student chapters from Iasi and Cluj-Napoca (both Romanian cities), the AAPG Bucharest Student Chapter (BSC) revitalized an older tradition of a national student symposium organized for geosciences students. This event is organized annually and alternately by these three student chapters. Its main purpose is to sustain Romanian geosciences research through student contributions (BSc, MSc and PhD), however two other very important objectives of this event are helping undergraduates to enter the professional world easily and also to find out about the programs of our parent societies AAPG, SEG, EAGE, SEG and SPE.

This year it was BSC's turn to organize the National Symposium of Geology and Geophysics Students and our vision about how it was supposed to turn out was rather bold. The older students, who gained their experience during former events organized by our chapter, were elected as team coordinators; the younger members had to gather information about what each team was doing and had to register as a volunteer for one of them.

The participating students came from six universities: University of Bucharest, "Babes – Bolyai" University of Cluj – Napoca, "Alexandru Ioan Cuza" University of Iasi, Faculty of Mineral Resources and Environment of Baia-Mare, University of Oil and Gas Ploiesti and University of Petrosani. Including professors and professionals, the total number of

participants reached ~ 100 out of which 80 were students, surpassing our expectations.

During the first evening, the organizing team prepared a networking night for all of the participants. The event took place in Stuf VamaVeche and we had a concert followed by some karaoke time. This event was aimed to improve the interaction between students and other attendees. The easy going atmosphere facilitated the bonds created between the participants.

THE SYMPOSIUM

The next morning, the students had to wake up early for the technical sessions held at the Faculty of Geology and Geophysics. This was the most important part of the symposium, taking into consideration the fact that the students had the opportunity to present their work. After spending months researching and writing, this was the moment when they could make their work known among the geosciences community gathered from all across the country. The program started at 9.30 AM and lasted until 3 PM. Each category took place in its own room: Environmental Engineering and Geophysics; Mineralogy, Crystallography and Petrology; Palaeontology and Stratigraphy; Sedimentology and the Geology of Hydrocarbon Resources. The presentations were well attended by students, professors and also professionals and young professionals from the petroleum industry. The judging committee was represented mainly by professors from our Faculty and also from the University of Cluj.

THE SHORT COURSES AND EXHIBITION EVENTS

The 6th of April started out with two short courses, held in parallel. One was hosted by Terry McCance from PetroSantander, "Introduction to Petroleum Geology", and the other one hosted by Dr. Vasile Badiu; "Integrated Reservoir Modelling Technology", a lecturer from the Society of Petroleum Engineers.



Fig.2 – Students in the presentation room

Both short courses offered the students the chance to interact with a professional from the industry. Both mentors came prepared with exercises that were linked to the subject of their course. Mr. McCance gave the students a set of mapping exercises consisting of building a contour map, several different structural maps at different depth intervals and information on the source rock, reservoir, trap presence and charging. In the other presentation room, Mr. Badiu focused first on understanding the benefits of joining the SPE student chapter. Afterwards he introduced the students to the software packages used in the industry for building reservoir models and explained the importance of building such models.

After the short courses the program continued with another event - the **Job Fair** - at which 5 companies participated; Prospectiuni SA, Danubian Energy Consulting, PetroSantander SRL, Petrom (member of OMV group) and GeoEcoMar National Institute, but also representatives from our newly founded SPE chapter and from the more mature AAPG, SEG, EAGE and SEG chapters attended. The exhibition hall represented a great opportunity for the students to interact with people from the industry, and get familiar with the services their companies offered, and their enrollment programs. For the lucky ones who came prepared with their CV's, the Job Fair made the establishment of a connection with their potential future employers possible.



Fig. 3 – Exhibition hall



Fig. 4 – Andrei Panaiotu (ER SC Committee member) explaining the rules of Meet-n-Greet

AAPG chapter in their city. At the end of the meeting, the entire group reached the conclusion that such a gathering should be held at least once a year, being very important for the development of Chapters' leaders. Each participant had something to learn from the others Chapters' experiences.

The National Symposium ended as it started: in a relaxing space at Ageless Club. The participants' dedication and hard work were repaid with an entire night of socialization, dancing and singing. The surprise of the night was an AC/DC tribute band concert which stirred the whole crowd.

THE FIELD TRIP

On 7th of April 2013, the last day of the Symposium, 35 students (from all the six Universities) accompanied by Dr. Denisa Jianu and Dr. Barbara Soare left at 7 AM from Bucharest to Brasov County, Racos, where the field trip took place. Here the students had the opportunity to see one of the few places in Romania where we can find basalts with peridotite xenoliths (mantle source), scoria, pumice stone and some basaltic columns.

Finally, we would like to express our gratitude to AAPG for the understanding, support and confidence that they have shown towards us throughout this project as well as past projects. Another round of thanks goes to all the companies and institutes (Prospectiuni S.A., PetroSantander SRL., ExxonMobil, Danubian Energy Consulting, Zeta Petroleum, Raffles Energy, GeoEcoMar National Institute) who helped us organize this event, not just through their financial contribution, but also through materials, participation and advises. Last, but not least, we do thank the Faculty of Geology and Geophysics, University of Bucharest, and the Romanian Geological (SGR) and Geophysical (SRG) Societies as without their help we could not have realized these 4 wonderful days.

THE MEET – N – GREET (AAPG EVENT)

At the same time with the Job Fair, another activity was in progress: the Meet – n – Greet which was inspired by similar events from the international conferences organized by AAPG where the students from BSC had attended (AAPG ICE, Milan, 2011). The participants, registered in advance, were split into teams, each one being coordinated by an industry representative. The latter was supposed to give as much information as possible about what they were doing for a living in the petroleum industry and also tips that any future employee from this domain should know in order to succeed. Furthermore, the students were encouraged to ask questions. The three winners of the Network Challenge associated with this event were awarded a geology book and free place (all expenses paid) in one of our summer projects.

AAPG ROMANIAN CHAPTERS' LEADERSHIP MEETING

The National Symposium represented an opportunity for Chapter leaders to gather and discuss the main problems encountered during their terms. Therefore, the AAPG leadership meeting was attended by the presidents and the vice-presidents of the student chapters from Iasi, Cluj and Bucharest and also a representative of the Ploiesti University, who expressed their wish to found an

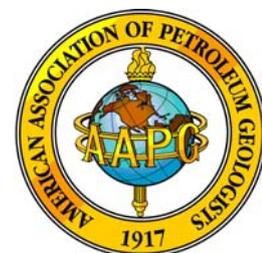


Fig. 5 – Students inside the Racos crater and scoria cone

HOW TO RECEIVE THE AAPG-ER NEWSLETTER

AAPG members are automatically associated with the Region that corresponds with their mailing address. For example, Rio de Janeiro mailing address will be assigned for purposes of AAPG mailings, etc. with the Latin American Region. To change this designation, a member need only contact AAPG Headquarters by email and request there the Region assignment on their membership record be changed.

Requests for this change are directed to Linda Burris at lburris@aapg.org. ■



**EUROPEAN
REGION**

Petroleum Geology in the Heart of Industry - short course 2013 organized by the Aberdeen University AAPG SC

By János Csizmeg, President of Eötvös SC

This year two members of Eötvös AAPG SC (Ágnes Király, Attila Balázs) and Lisbon University AAPG SC had the chance to participate in the short course "Petroleum Geology in the Heart of Industry" organized by the Aberdeen University AAPG SC. It was the second time that the Eötvös SC got an invitation and we all hope that this successful cooperation between the chapters will continue in the future.

The week (6th – 14th April) contained several exciting programs including field trips, a conference and interesting exercises given by experts from the E&P industry.

During the week we visited the Halliburton and the BP headquarters in Aberdeen where we could learn about their activities in the North Sea area and about the changing world of exploration.

We participated in a few field trips where we studied the geological and geodynamical evolution of Scotland. We visited outcrops of Devonian Old Red Sandstone and investigated some more recent sedimentological features too.

One of the more unique parts of the event was a conference held at King's College, Aberdeen University, about the economical, legal and geological aspects of hydrocarbon exploration in the 21st century.

In summary it can be said that this week was an unforgettable one for every participant. We had the chance to experience some cutting edge aspects of geophysics and geology, examined how companies work in the heart of the oil industry and last but not least we made some new friends in the Lisbon and Aberdeen AAPG Student Chapters.



Participants of the short course in the real heart of the European E&P industry



Examine well log instrument at Halliburton



How we look our future in the petroleum industry

INSPIRING CHANGE - 4th International Geosciences Student Conference

by Aurelian Roeser
SGS Chairman

From 25th to 28th April 2013, the Student Geoscientific Society (SGS) and its AAPG, SEG, and EAGE Student Chapters hosted the 4th International Geosciences Student Conference (IGSC) in Berlin, Germany. 328 delegates from 22 countries realized that the IGSC 2013 is their mutual opportunity to spread the vision of Inspiring Change from the heart of Europe to the world.

The IGSC 2013 Technical Program provided a unique and diversified platform to unite a broad range of aspects of the past, the present, and the future of the geosciences. Students and young professionals from virtually all geoscience disciplines showed their research results in 61 oral and 44 poster presentations in 20 technical sessions under the following four themes: Resources & Energy, Sustainable Living, Hazards & Risks, and Fundamental Research. Experts from industry and academia informed the delegates about the latest job opportunities at a recruitment exhibition and shared their experience in 11 high-quality lectures, short courses, workshops, and field trips. Amongst other events, International shale gas experts from the Shale Gas Information Platform (SHIP) invited the delegates to a summary and open discussion on the growing body of scientific evidence on the potential environmental impact of shale gas in the light of the current public debate, including a look at the ramifications of increased global usage of natural gas in the future.

The prize for the best poster presentations was awarded to Frederike Wittkopp (Utrecht University) and Aurélie Privat (Institut Polytechnique LaSalle Beauvais). Ralf Milke (Freie Universität Berlin) won the 1st SGS Geosciences Slam by elating the audience with his presentation on "Is it opal? How to drink beer for science". Igor Karpov and Sergey Yaskevich (both Novosibirsk State University) demonstrated their outstanding technical knowledge and fighting spirit as champions of the SEG European Challenge Bowl sponsored by Total.

The IGSC 2013 Social Program kicked off with the opening ceremony and icebreaker reception gathering delegates and geoscience professionals from the Berlin-Brandenburg Metropolitan Region for welcoming speeches, music performances as well as for an especially motivating keynote speech held by Alessandro Airo (Freie Universität Berlin).

On Friday, 26 April, the Museum für Naturkunde Berlin served as an exclusive location for the truly unforgettable Praehistorica Conference Evening. Fossil celebrities, such as the largest mounted dinosaur in the world, welcomed 171 attendees for food and drinks in the nightly illuminated building of the largest museum of natural history in the whole of Germany.

On Sunday, 28 April, 252 conference attendees convened for a glorious finale to this excellent event by dancing into the night at the farewell gala at the restaurant "Spindler & Klatt" with direct access to the banks of Berlin's main river Spree.

We are honoured and happy that so many students, faculty members, industry professionals, and society representatives heard and followed our call for Inspiring Change. SGS would like to thank the many volunteers of the IGSC 2013 Organizing Committee, our co-hosts Geo.X and Freie Universität Berlin, our platinum sponsors Total and Prospectiuni, our gold sponsors AAPG, SEG, EAGE, and ExxonMobil, as well as the many silver sponsors, bronze sponsors, and supporters from the industry, academia, and media. We hope that all delegates and sponsors will stay in the IGSC family over the coming years because the continuation of what they experienced and demonstrated at the IGSC 2013 is not just an option, but rather an obligation in "imaging" the future of our sciences and society.

Don't miss to watch also our video podcasts [here!](#)



Fig. 1 Opening Ceremony: SGS Vice Chairman Manuel Quiring welcoming more than 400 delegates and guests to the IGSC 2013

Fig. 2 Students discussing their research results during a morning poster session on geochemical investigations

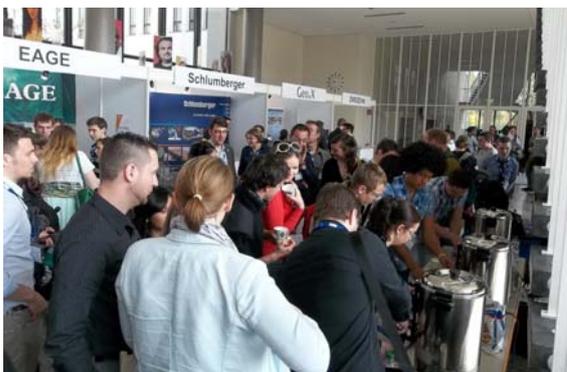
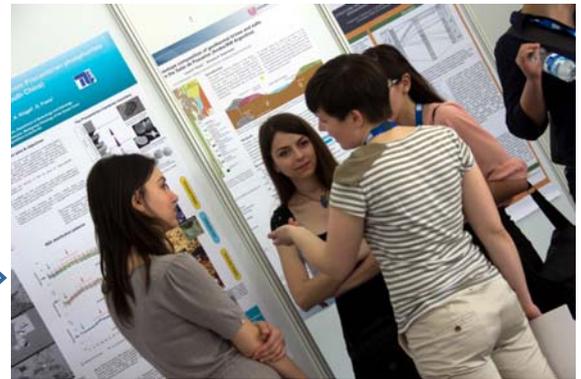


Fig. 3 Delegates refreshing themselves during a coffee break in the exhibition lobby

Fig. 4 Stephan Reinert and Prof. Dr. Christoph Heubeck (both Freie Universität Berlin) presenting the Petrosphere, an experimental reservoir simulator





University of Utah wins AAPG Imperial Barrel Award

Dave Cook

Past President AAPG European Region

Co-Chair AAPG IBA Committee

Eleven university teams from the AAPG Sections and Regions competed for the 2013 Imperial Barrel Award at the Annual Convention in Pittsburgh in May. Each team presented the results of an exploration evaluation of a well and seismic dataset to a panel of nine senior company representatives. There was intense competition between the teams and the quality of the presentations was extremely high. The University of Utah were the outright winners of the AAPG Imperial Barrel Award, with the University of Oklahoma being presented with the Selley Cup (2nd place) and Sultan Qaboos University of Oman taking the Stoneley Medal (3rd place).

Over 100 teams from 30 countries took part in the programme. Each Region and five of the US Sections held semi-finals, the winners of which took part in the final competition in Pittsburgh. The teams competing in the final were as follows:

- Middle East Region, Sultan Qaboos University of the Oman
- European Region, University of Manchester, UK
- Asia-Pacific Region, Institut Teknologi Bandung, Indonesia
- Latin America Region, University of the State of Rio de Janeiro, Brazil
- Canada Region, Dalhousie University, Newfoundland
- Africa Region, Nnamdi Azikiwe University, Nigeria
- Pacific Section, University of Alaska at Fairbanks
- Rocky Mountain Section, University of Utah
- Eastern Section, University of Wisconsin
- Gulf Coast Section, Texas A&M University
- Mid Continent Section, University of Oklahoma.

The Imperial Barrel Award programme is the most prestigious exploration competition for graduate students and provides petroleum geoscience training each year to more than 500 students worldwide. It would not be possible for the AAPG to conduct the programme without the generous support of our numerous corporate sponsors. If you or your company would like to sponsor the programme please contact me at drdrcook@hotmail.com or visit the AAPG IBA website at www.aapg.org/iba.



University of Utah, winners of the 2013 AAPG Imperial Barrel Award

Eötvös Student Chapter won AAPG's Outstanding International Student Chapter Award

By Timi Havril and Lilla Tokes (newly elected Vice-president and President of AAPG ESC)



Discussion on the formation and evolution of Lake

Schlumberger announced on the 20th May 2013 its contribution of five scholarships to the American Association of Petroleum Geologists' (AAPG) Outstanding Student Chapter Awards. Two universities were selected as the 2013 Chapter winners and four additional universities were awarded "honorable mention student chapter" scholarships. The Eötvös Student Chapter (ESC, Budapest, Hungary) from Eötvös Loránd University was one of the prize winners. On behalf of the ESC, the award was received by András Németh (MOL Plc., Hungary) in Pittsburgh, at the AAPG Annual Convention and Exhibition.

The Eötvös Student Chapter was established three years ago in 2010 by geology and geophysics students, supported by the Hungarian Oil and Gas Plc. (MOL Plc.) and the Physical and Applied Geology Department of the Eötvös Loránd University. Now, the number of the active and enthusiastic members exceeds 50 students.

Field trips, drilling site visits, short courses, workshops and professional meetings both at national and international levels are organized continuously by the Student Chapter, assisted by János Csizmeg (Student Chapter President) and Prof. János Haas (Student Chapter Faculty Advisor). The Eötvös Loránd University has been consistently represented by some of its most excellent members at AAPG Imperial Barrel Award (European Region) since 2008.

In March, the Eötvös Loránd University was one of the stations of the EAGE Student Lecture Tour, where the guest lecturers were Dr. Bjorn Wygrala (basin modeling specialist at Schlumberger) and Dr. István Vető (organic geochemistry expert). Over 60

students and experts participated in the lectures. The main topics were Petroleum Systems Modeling, and Shale Gas Perspectives. Our latest workshop was on 30th May and the subject was: Discussion on the Neogene Pannonian Basin. The main topics were e.g. the stratigraphy, particularly the sequence stratigraphy of the Pannonian Basin and the Messinian events which are all hot topics in Hungary. We invited several recognized presenters both from the industry and from academia. The event received great interest; the audience filled the lecture hall, and university students as well as professionals were present in great number. The students benefited from the experience as the topic is not extensively discussed in the regular coursework. The workshop was a great occasion for András Németh to deliver the Outstanding International Student Chapter Award to János Csizmeg and Prof. János Haas.

We are honoured to receive this prize and will continue our activities with undiminished enthusiasm. The upcoming program will include an international field trip in the Southern Alps, in Italy, with approximately 30 participants from Eötvös Student Chapter and also from other European Student Chapters from Miskolc, Cluj-Napoca, Bucharest, Aberdeen, LaSalle Beauvais and Leoben.

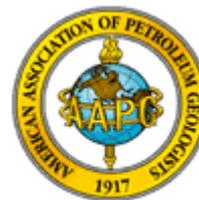
If you are interested in our activities for more information please visit our website: <http://aapg.elte.hu/>



The presidential committee of Eötvös Student Chapter with the Outstanding International Student Chapter Award.

European Region of AAPG 2013 Election Results

**President-Elect (2-Year Term: 2013-2015)
Treasurer (2-Year Term: 2013-2015)
and
Region Delegate to the AAPG House of Delegates
(3-Year Term: 2013-2016)**



Dear AAPG European Region members,

On behalf of the AAPG Headquarters and AAPG European Region President, Vlasta Dvorakova, we are pleased to announce the following newly-elected AAPG leadership positions for the European Region Leadership. Their respective terms of office begin 1 July 2013.

President-Elect, 2-Year Term: 2013-2015

Jonathan Craig, Eni Exploration and Production, Italy

Treasurer, 2-Year Term: 2013-2015

Knut Jakobsson, Norwegian Petroleum Directorate, Norway

**Delegates to the AAPG House of Delegates,
3-Year Term: 2013-2016**

Helen Cromie, Maersk Oil, Denmark
Jonathan Craig, Eni Exploration and Production, Italy
Peter Burri, Geo-Energie Suisse AG, Switzerland
Sigrunn Johnsen, Talisman, Norway
Gabor Tari, OMV, Austria
Peter Kukla, RWTH Aachen University, Germany
Charlotte Hamilton, Maersk Oil Norway AS, Norway
Dave Cook, Retired, ExxonMobil, UK
Isabelle le Nir, Schlumberger, France
Vlasta Dvorakova, Czech Geological Survey, Czech Republic
John R.V. Brooks, Brookwood Petroleum Advisors Limited, UK
Martin Jentsch, ExxonMobil Russia Inc., Russia
Rafal Kudrewicz, Polish Oil and Gas Company, Poland
Andras Nemeth, MOL Hungarian Oil and Gas Plc., Hungary
Morten Rye-Larsen, Fortis Petroleum, Norway

**Alternate Delegates to the AAPG House of Delegates,
3-Year Term: 2013-2016**

Charles Speh, Milestone Exploration Limited, UK
Wolfgang Nachtmann, CanArgo Georgia Limited, Austria
Hasan Sarikaya, Turkish Petroleum Corporation, Turkey
Fadi Nader, IFP Energies Nouvelles (IFPEN), France
Nick Lagrilliere, Maersk Oil, Denmark
Neculae Pandele, OMV Petrom S.A., Romania

They join the current AAPG European Region leaders:

President, 2-Year Term: 2013-2015

Keith Gerdes, Shell International Exploration and Production, Netherlands

Past President, 2-Year Term: 2013-2015

Vlasta Dvorakova, Czech Geological Survey, Czech Republic

Secretary, 2-Year Term: 2012-2014

Helen Cromie, Maersk Oil, Denmark

**Region Member of the AAPG Advisory Council,
3-Year Term: 2011-2014**

Andrea Moscariello, University of Geneva, Switzerland

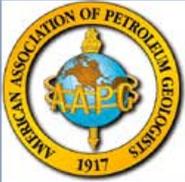
**Region Delegates to the AAPG House of Delegates,
3-Year Term: 2011-2014**

Michael Hauck, Germany
Jan de Jager, Netherlands
Idar Kjorlaug, Norway
Nuno Pimentel, Portugal

**Region Alternate Delegates to the AAPG House of Delegates,
3-Year Term: 2011-2014**

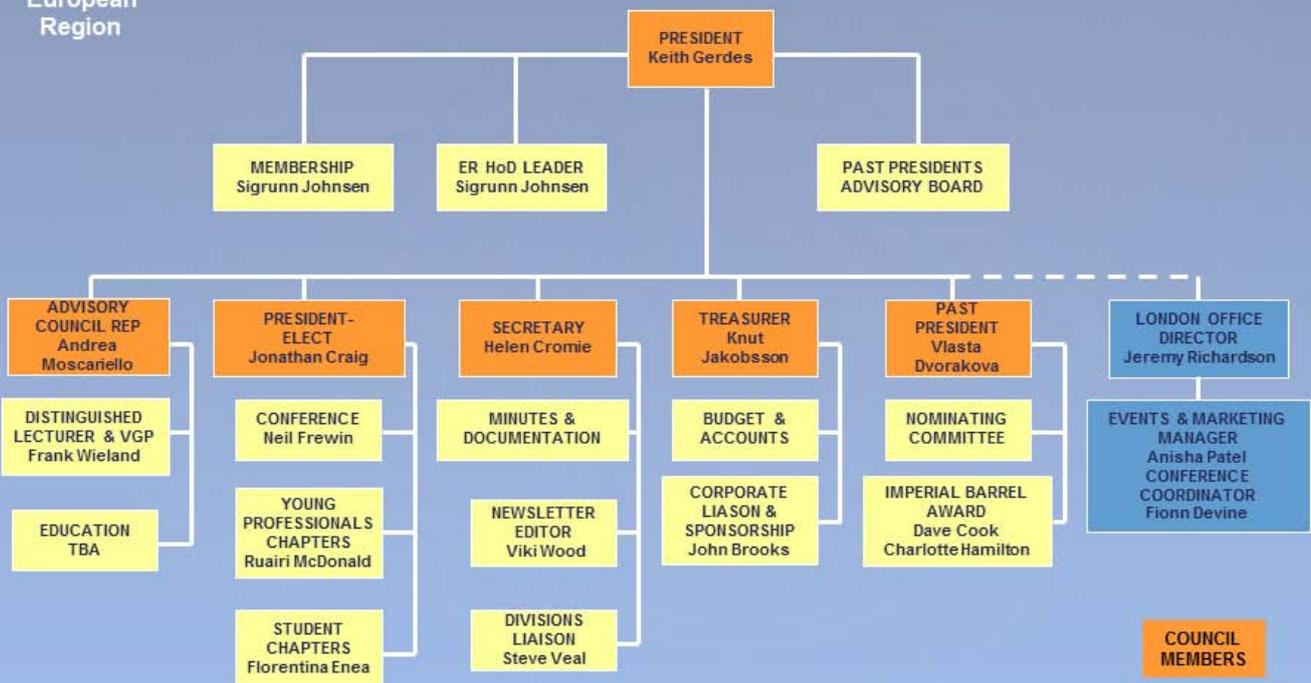
Aafke Bouma, France
Herman Darman, Netherlands

Congratulations and thank you to of all these outstanding leaders for their service to the European Region of AAPG.



European Region

Region Council Organisation 2013-14



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