

# EUROPEAN REGION NEWSLETTER

## Unlocking the Future

June 2014, Vol. 9

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#### Instructions to authors

Editorial correspondence and material submitted for publication should be addressed to the Editor to [viki.wood@shell.com](mailto:viki.wood@shell.com). All materials should be sent by the 15<sup>th</sup> of the month before issue publication. All submissions are subject to editorial review and revision.

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### PRESIDENT'S MESSAGE



Dear Reader,

Welcome to the July edition of the European Region's newsletter. Since the last newsletter we have held our regional conference in Barcelona which also hosted the Regional AGM. In this newsletter I will share

some highlights from my AGM presentation which serve to give a snapshot of the current healthy status of the AAPG and the European Region in particular. Our two guiding principles continue to be the delivery of great geoscience to our members whilst safeguarding the future health of the AAPG with a clear focus on recruitment and there are clear indications of success in both of these areas.

The following highlights give you an idea of how we are doing in achieving those goals.

- AAPG Global Membership continues to grow. Our global membership exceeds 42,000 at present and continues to increase. Some 43% or 18,100 of those AAPG members are International members and the European Region represents 27% of that International cohort. For comparison the entire global membership of the EAGE sits at around 17,000. The AAPG is a healthy vibrant organisation which continues to attract professional geoscientists from around the world.
- European Regional membership continues to grow – by an impressive 28% in the last year to over 4,800 members. In addition there are now 56 registered student chapters. In the last twelve months the Region has provided over 35,000 Euros to support student chapter activities and we have already committed a further 22,000 Euros for YP and student events for the coming year. As I reported in the last newsletter this year's European Region IBA competition involved the largest number of University teams (26) ever with representatives from all parts of the region.

Our goal to deliver great geoscience continued throughout the year as the range and number of geoscience topics and events continued to broaden and expand in more locations throughout the region.

- During the year the region organised four geoscience technical workshops (GTW) in Italy, Georgia and the UK on topics ranging from induced seismicity, through carbonate petroleum systems to carbon capture and sequestration.
- The 2014 APPEX meeting in London was the best ever attended with over 700 delegates and exhibitors and we returned to Barcelona for our regional conference with a theme on fold and thrust belts.
- Geoscience delivery was further augmented by two very successful Distinguished Lecturer Tours by Terry Engelder and Pat Corbett who between them visited 32 cities in total.

So we can look back on the last 12 months as a year to be proud of thanks to the outstanding contributions from the London Regional Office and all of our volunteer officers who provide me with such excellent support. But what of the future?

Throughout the year I have continuously canvassed the views of our members and encouraged all members of the Regional

Council to do the same as we strive to deliver the products and services that our membership requests. The region continued to modernize and globalise its procedures and events with an increasing number of Student Chapters and more Young Professionals serving the organisation as officers. Our activity plan for the next year will continue to focus on geoscience delivery with GTW's and core workshops already planned in Italy and the UK; global and regional AAPPEX meetings in London and Istanbul; and our support of the Istanbul ICE meeting in September this year – register soon if you have not already done so - which will be followed by our regional conference in Lisbon in 2015.

Our focus on the recruitment of the petroleum geoscientists of the future will continue and has already led to a significant increase in the number of student chapters in our region and a regional reach from Lisbon to Moscow and Athens to Oslo. We plan an equally successful self-funding IBA regional final in Prague next year and an extension of our DL program which acts as one of our most effective recruiting tools. The motion passed at the HoD this year to reduce the requirement of membership support to a single sponsor will greatly assist in our recruitment of new members of all levels of experience. I am continually impressed by the commitment of our members and volunteer officers and was delighted to see that this was recognized by the global AAPG leadership at the Annual Conference in Houston this year with the award of Distinguished Service Awards to three members from the European Region – David Cook, Peter Burri and Brett Fossum; the Grover Murray Award for Global Education to Professor Joe Cartwright; and Honorary Membership being bestowed on Istvan Berczi for the outstanding service he has given to this organisation over a number of years.

Our goals for the future are clear; we will continue to improve and expand the dialogue with our members and evergreen the Value Proposition of AAPG membership; we will deliver great geoscience and expand our services in response to requests from our membership and use the full range of methods and means at our disposal to do so; we will support all moves to make the organisation more modern and efficient; and continue our recruitment drive to ensure the future health of the global AAPG organisation.

My colleagues on the Regional Council and our volunteer officers can only deliver on this promise with the support and active involvement of you, our members. There is an open invitation to all members to help shape the future of the AAPG in three main ways – shaping our future geoscience delivery by forwarding any ideas for workshops and conferences to our Conference Manager, Neil Frewin; engaging and assisting the organisation in the creation of new meetings and/or by serving as an officer in the regional organisation; and assisting with the recruitment of new geoscience professionals amongst your friends and colleagues. I wish you and your families an excellent summer and would like to thank you for the support you have given me during my first year in office.

Safe travels,

**Keith Gerdes**  
 AAPG European Region President

## Elastic Anisotropy of Shales ... revisited

by Marina Pervukhina <sup>£</sup> and Patrick N.J. Rasolofosaon <sup>§</sup>

to be presented at the 16th International Workshop on Seismic Anisotropy (16IWSA), Natal, Brasil

<sup>§</sup> IFP Énergie nouvelles, Rueil-Malmaison, France

<sup>£</sup>CSIRO, Earth Science and Resource Engineering, Australia

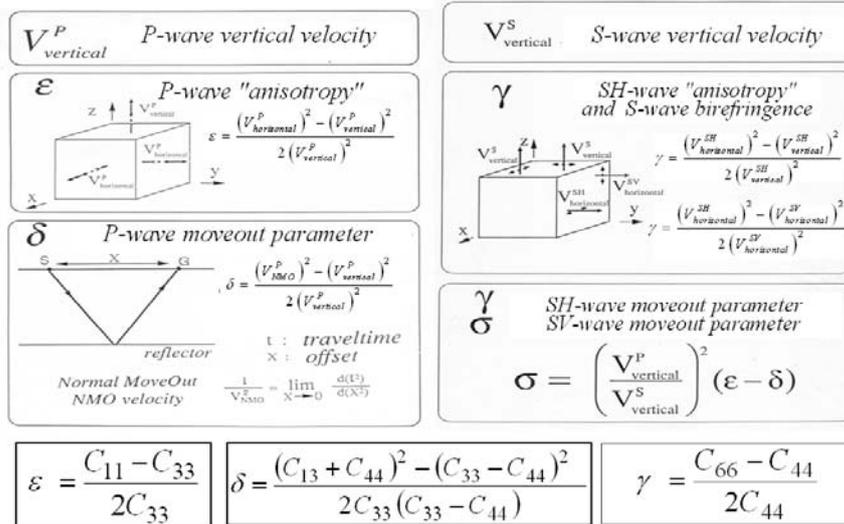


Fig.1: Definitions of the anisotropy parameters  $\varepsilon$ ,  $\delta$ ,  $\gamma$  and  $\sigma$  of VTI and their link with measurable quantities for the P wave (left) and for the S waves (right).

### INTRODUCTION

The presence of fractures and/or shale are among the main causes of seismic anisotropy in geological media, as is the case for instance in the recently discovered offshore pre-salt oil reservoirs of Brazil. Seismic anisotropy induced by the presence of shale is the topic of this study. By combining two shale databases ([1] and [2]) we aim to extract the major trends in the relation between seismic anisotropy and compaction/diagenesis. More precisely the main objective of our work is to check if there is any major link between shale anisotropy and compaction.

### THE CONSIDERED EXPERIMENTAL DATABASES ON SHALE

Two anisotropy databases are considered in this work. The first database [1] appeared to be a nearly exhaustive database at the time of its publication (Thomsen, personal communication). It is composed of 59 samples of shales or shaly formations. The second database [2] is composed of 37 shale samples with different mineralogical compositions, silt and clay fractions, and porosities. Both databases are combined in order to analyze the major trends with respect to seismic anisotropy and compaction. Note that this composite shale database is characterized by its great diversity, either in terms of mineral composition, or in terms of burial depth and geologic age, and as a consequence in terms of level of compaction/diagenesis.

### DEFINITION OF THE CONSIDERED ANISOTROPIC PARAMETERS

All the considered rock samples are assumed transversely isotropic (TI) with a vertical

symmetry axis. The anisotropy parameters considered in the present work are the classical parameters  $\varepsilon$ ,  $\delta$ ,  $\gamma$  and  $\sigma$  first introduced by [1], and illustrated by Fig.1.

The first anisotropy parameter  $\varepsilon$  is roughly the relative difference between the P-wave velocities in the horizontal direction and in the vertical direction. The anisotropy parameter  $\gamma$  is the equivalent of the parameter  $\varepsilon$  for the SH-wave (i.e., the horizontally polarized S-wave). The parameter  $\gamma$  happens to be also equal to the S-wave birefringence coefficient for propagation in the horizontal direction. More precisely,  $\gamma$  is also roughly equal to the relative difference between the SH-wave velocity and the SV-wave (i.e., the vertically polarized S-wave) velocity for propagation in the horizontal direction.

The third parameter  $\delta$ , that is to say the P-wave moveout parameter, is roughly equal to the relative difference between the P-wave moveout velocity and the P-wave vertical velocity. The last parameter  $\sigma$ , that is to say the SV-wave moveout parameter, is the equivalent of the parameter  $\delta$  for the SV-wave. Note that the SH-wave moveout parameter is also equal to  $\gamma$ .

### EFFECT OF BURIAL AND COMPACTION ON SEDIMENT PROPERTIES

One of the most important effect of burial on sedimentary formations is the reduction of porosity and the velocity and stiffening increase (e.g., [3] and [4]). In seismics, many empirical relationships between porosity, or velocity, and the depth of burial and geologic age are used (e.g., [5] and [6]). Shale, as any sedimentary formation, is not an exception to the rule. A practical consequence is the trend observed on the shale database, and illustrated by Fig.2, corroborating the simultaneous increase of both P-wave vertical velocity  $V_p$ , and S-wave vertical velocity  $V_s$ , with the density  $\rho$ . The corresponding depth data being available for only some of the considered samples actually corroborate the effect of burial both on densities and on velocities.

### EFFECT ON THE ANISOTROPY PARAMETERS

Up to now we did not deal with anisotropy. Here we check if the anisotropy parameters of shale follow some general trend linked with compaction. For this, crossplots similar to those of the previous figure are shown on Fig.3

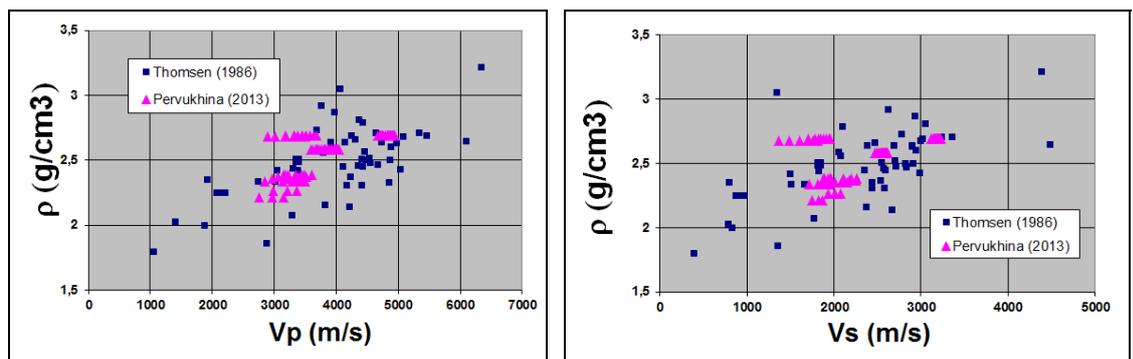


Fig.2: Density  $\rho$  as function of the P-wave vertical velocity  $V_p$  (Left), and of the S-wave vertical velocity  $V_s$  (Right) from the shale database of Thomsen (1986) and Pervukhina et al. (2013).

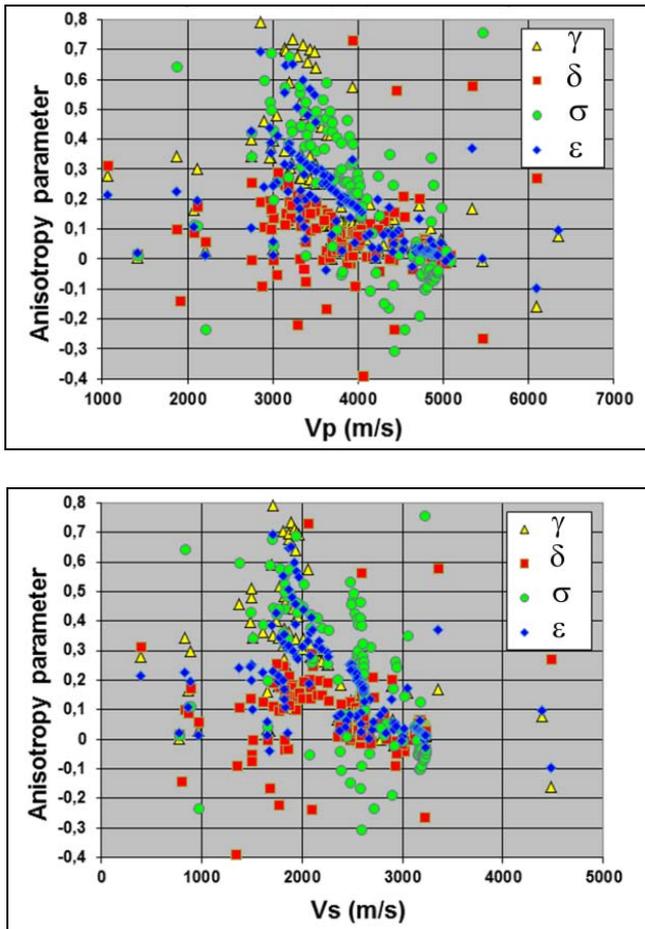


Fig.3: Crossplot between the anisotropy parameters  $\epsilon$ ,  $\delta$ ,  $\gamma$  and  $\sigma$  and (left) the qP-wave vertical velocity  $V_p$ , or (right) the qS-wave vertical

velocity  $V_s$  (sub-figure on the left side), or the qS-wave vertical velocity (sub-figure on the right side). In contrast with the previous figures, no clear trend is observed for any of the anisotropy parameters. The systematic absence of anisotropy increase with velocity increase seems to imply that burial and/or compaction has no first order effect on seismic anisotropy increase. In other words, contrary to what has been conjectured by some authors (e.g., [7]) there is no first order correlation between compaction and anisotropy strength. This is one of the main results of the present work.

Furthermore there even seems to be a weak reversal trend between the anisotropy parameters  $\epsilon$  (blue diamonds) and  $\sigma$  (green circles), and both velocities. This very rough decrease of  $\epsilon$  and  $\sigma$  with velocity increase can simply be explained by the increase of both velocities  $V_p$  and  $V_s$  with compaction/diagenesis. Because both velocities are present in the denominators of the mathematical expressions of the anisotropy parameters (see details in next section), an increase of both reference velocities  $V_p$  and  $V_s$  tends to slightly decrease any of the anisotropy parameters. Another possible explanation of the anisotropy decrease with the velocity increase is that the latter is caused with the increase of silt fraction, the fraction of nonclay minerals. Typically the increase of the silt fraction results in lower anisotropy parameters [8]. However, this effect is small if silt inclusions are distributed as isolated inclusions floating in the clay matrix.

#### RELATION BETWEEN THE ANISOTROPY PARAMETERS

In contrast, the crossplot between the anisotropy parameters  $\gamma$  and  $\epsilon$  exhibits clear positive correlation, as illustrated by Fig.4. In other words one observes an increase of  $\gamma$  with  $\epsilon$ . Note that this is not the case for the remaining anisotropy parameters  $\delta$  and  $\sigma$  (not shown here for

conciseness). This is in agreement with the theoretical work of [9] who described the elastic anisotropy of shales, assuming transverse isotropy for both the "crystal" symmetry and the Orientation Distribution Function of the "crystals". We put the word crystal between quotation marks because, instead of crystals, shale is arranged in groups of parallel clay platelets, called "domains" by [10]. The main result is that the more aligned are the clay platelets, the larger the anisotropy parameters  $\gamma$  and  $\epsilon$ , which is corroborated by many experimental results. Note that this is not so clear for the remaining anisotropy parameters. Thus the increase of  $\gamma$  with  $\epsilon$  observed on Fig.4 is not really surprising, and is linked with the orientation of the clay platelets. Furthermore, because neither  $\gamma$  nor  $\epsilon$  increases with any of the velocities  $V_p$  and  $V_s$ , the increase of the clay platelets alignment is definitely not linked to the level of compaction, at least to the first order, as sometimes conjectured.

#### DISCUSSION

First of all we are aware that the intrinsic anisotropy of the clay platelets and their orientation distribution function are not the only causes of elastic anisotropy in shale. Some complicating factors, such as the anisotropic distributions of discontinuities/porosity and the presence of aligned silt inclusions have drawn much less attention but have also been studied (e.g., [2], [8] and [11]). However, because the shale samples of [2] have been included in our database, we think that these complicating factors should not substantially change the above conclusions, at least to the first order. Furthermore, note that the actual existence of such discontinuities in shale in natural condition is still controversial (e.g., [12] and [13]).

Because compaction can be excluded as a major cause of seismic anisotropy in shale, shale platelet alignment, clearly concomitant with the presence of seismic anisotropy in shale, can simply be due, for instance, to the condition of deposition of the sediments. For instance in turbiditic environment one would expect a stochastic misalignment of the clay platelets, inducing quasi random Orientation Distribution Function of the clay platelets. As a consequence we could expect weak overall seismic anisotropy. In contrast, in a quiet deposition environment one would expect a good alignment of the clay platelets in the direction perpendicular to the gravity at the time of sediment deposition. As a consequence the resulting seismic anisotropy is expected to be stronger.

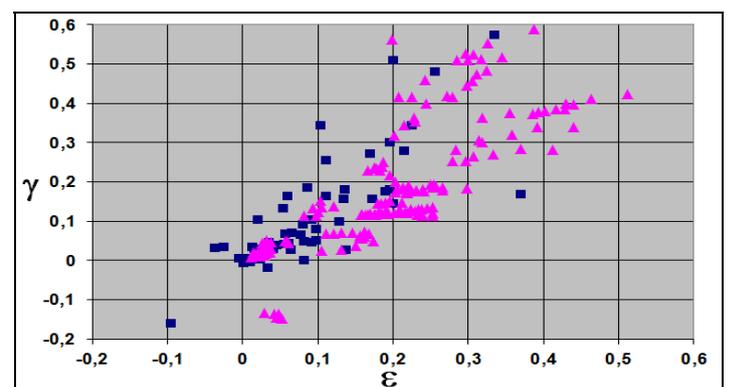


Fig.4: Crossplot of the anisotropy parameters  $\epsilon$  and  $\gamma$  from the shale database of Thomsen (1986) and Pervukhina et al. (2013).

#### CONCLUSIONS

By combining the two shale databases ([1] and [2]) we extracted the major trends in the relation between seismic anisotropy and compaction. It clearly appears that compaction does not play a first order role in seismic anisotropy. As a consequence the increase of the clay platelets alignment is definitely not linked to the level of compaction, at least to the first order, as sometimes conjectured. Otherwise there would be a systematic correlation between the increase of anisotropy strength and the velocity increase, which is at odds of what is experimentally observed. Furthermore, compaction/diagenesis tending to increase all the velocities, in particular the

reference vertical P and S-wave velocities in the definition of the anisotropy parameters, even somehow contributes to weakly decrease the anisotropy parameters, which is roughly observed experimentally. In spite of some first attempts [2] Rock Physics models that completely describe these major trends are still lacking and are strongly encouraged.

#### ACKNOWLEDGEMENTS

M. Pervukhina is grateful to CSIRO internally funded Multiphysics Rock Characterization project for support. P. Rasolofosaon gratefully acknowledges IFP Energies Nouvelles for permission to present this contribution. ■

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**ATYRAUGEO - 2015**



### The III International Scientific Geological Conference "AtyrauGeo-2015"

**May 26-27, 2015 Atyrau, Kazakhstan**

#### Announcement and Invitation

Association of Petroleum Geologists of Kazakhstan (APGK) is pleased to announce the Third International Scientific Geological Conference "AtyrauGeo-2015" on the **"CASPIAN OIL REGION DEEP HORIZON CHALLENGES AND HYDROCARBON GENESIS"**

This event will take place in Atyrau city, the oil capital of Kazakhstan, on May 26-27, 2015. The Conference is organized by the Association of Petroleum Geologists of Kazakhstan (APGK).

For detailed information please address to: Tatyana Tomachkova, APGK Executive Director, e-mail: [info@ongk.kz](mailto:info@ongk.kz). Please, visit website [www.ongk.kz](http://www.ongk.kz), or call us by phone: +7 (7122) 30-41-28, fax: +7 (7122) 27-13-69.

## Ayoluengo - the Only Onshore Oil Field in Spain - Celebrates the 50<sup>th</sup> Anniversary of The Discovery (1964-2014) by Inaugurating an Oil Museum

by Jorge Navarro  
[AGGEP](#) President

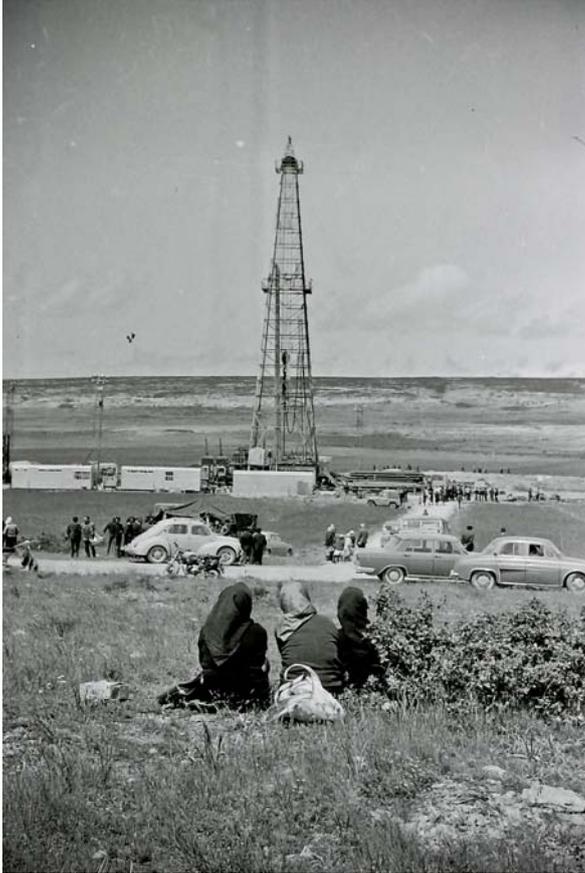


Figure 1: Ayoluengo-1 well – Photo courtesy of Federico Velez

The Ayoluengo field commonly cited as the only oil field in onshore Spain was discovered in June 1964. Now, 50 years later the field is still active, with an average production of some 100 barrels oil per day and a total cumulated oil production of nearly 17 million barrels of oil. On June 2014 the 50<sup>th</sup> anniversary of the discovery will be commemorated. The celebration is mainly sponsored by the municipality of the nearby village of Sargentos de la Lora (Burgos) on collaboration - among others- with the University of Burgos, Fundación Repsol and by the AAPG-affiliated Spanish Association of Petroleum Geologists and Geophysicists (AGGEP). A number of events will be held to celebrate the anniversary, including the inauguration of an oil Museum in Sargentos de la Lora, the first one of this category in Spain. The Museum will be aimed to illustrate visitors about the oil industry and their products, but mainly is focused on the upstream, introducing into the petroleum system concept and the wide variety of geological, geophysical and engineering techniques used on the exploration and production industry. An important part of the exhibition is dedicated to the Ayoluengo field geology and its history, captured in an excellent collection of photos provided by the villagers and local newspapers, together with press clippings, documentaries of the mid-60s, educative panels, geological 3D models, drilling and production material and an authentic working rod pump.

The Ayoluengo field is located about 300 km north of Madrid, in the Basque-Cantabrian Basin, a geological region where natural oil seeps, tar and asphalts have been recognized since the early 20th century. The region was considered as highly promising and most of the hydrocarbon exploration effort in Spain during the 1940s and 1950s was focused in this area. Some basic underground mining was carried in the region during the 1940s to exploit the tar sands, but eventually abandoned because of poor economic results. On the early 1960s, surface geological mapping and modern reflection seismic equipment allowed identify a faulted anticline in an Upper Cretaceous carbonate flat plateau, an agricultural terrain mostly dedicated to growing potatoes, where the exploration well Ayoluengo-1 was located with the main objective of testing the Lower Jurassic carbonates at some 4000 meters depth.

On June 6<sup>th</sup> 1964, the Ayoluengo-1 oil discovery well tested 85 barrels oil per day from an unexpected 5-meter thick sandstone bed of Late Jurassic-Early Cretaceous age located at 1350 meters depth. It was the first oil discovered in Spain after more than 100 exploration dry holes. It brought great expectations in the region, presumed to become a prolific 'black gold' region. The oil discovery gained national attention, with

a large coverage of the media and attracting many curious and visitors to the wellsite as shown in the photograph taken in June 1964. A 'Texas oil boom in Spain' was headlined by some national newspapers. The discovery also revitalized the seismic and drilling activity in the region, but subsequent exploration

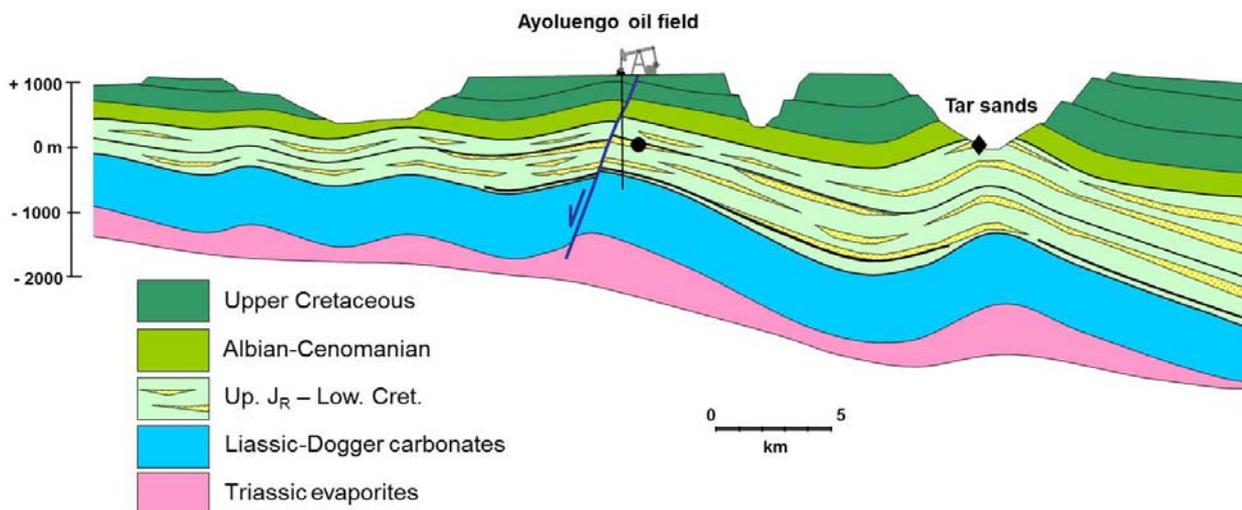


Figure 2: Field schematic cross section for the Ayoluengo field

drilling only tested uncommercial oil flow rates. Now, even after years of intense exploration activity, surprisingly the Ayoluengo field still remains as a unique oil discovery, being the only onshore commercial oil field in Spain, but also the only one in the entire Iberian Peninsula. This anomalous geological singularity has brought recurrent discussions among petroleum geologists because it is difficult to explain why an oil petroleum system is uniquely working at this particular field within a vast land territory.

The Ayoluengo field consists of a NE-SW oriented and fractured anticline with a series of thin lenticular sandstones packages of Late Jurassic-Early Cretaceous age. More than 50 separated oil and gas sandstones beds have been identified. Some are as thick as 10 meters, but the average is only 2 to 3 meters. Areal extent of these lenticular sandstone bodies varies widely. Some are quite restricted, while others are laterally continuous. The sandstones have mean porosity values of 18% and permeability up to 1 Darcy. Most of the individual reservoir layers are isolated by shales and compartmentalized by faults, what makes the Ayoluengo field to be considered as not a single field but the grouping of more than 100 independent small fields. The organic-rich marls and black shales of Liassic age have been largely considered as the only source of the oil, but this is still far from clear. The deep erosion by rivers in nearby areas allows observe on outcrops most of the elements of the Ayoluengo petroleum system: tar impregnated sandstones, the claimed Liassic source rock and text-book faulted anticlines.

The first Ayoluengo oil production started on 1967, reaching the peak production at 5200 barrels of oil per day in 1969 and since then production has gradually declined. Oil is produced by rod pumps, locally and popularly known in Spanish as 'caballitos'. The small amount of produced natural gas is used to power the rod pumps motors and to generate the electricity used in the field. A total number of 52 wells have been drilled in the field, the last one on year 1990. At present time only 10 wells are active. Many of the infill wells encountered undepleted oil bearing sandstone beds, indicating the field complexity. A 3D seismic of 390 km<sup>2</sup> was acquired on year 1988 aimed at identify undrained reservoir beds and better estimate remaining reserves but unfortunately poor results were obtained.

The possibility of observe working rod pumps on the field and visit the surface facilities, together with the large amount of well data and seismic coverage available and the spectacular geological exposures in the nearby areas has long time provided Ayoluengo field as an excellent opportunity to introduce students and non-technical people into the oil exploration and production industry. However, this will be now enhanced by the inauguration of the oil Museum, which will introduce visitors in the world of petroleum science and technology together with the history of the Ayoluengo field. ■

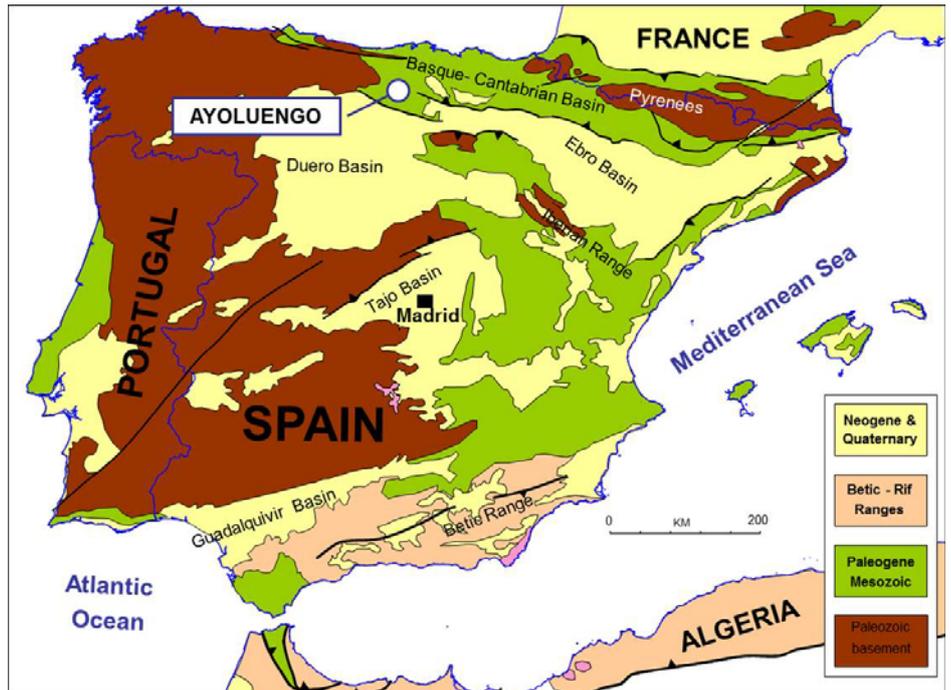


Figure 3: Simplified geological map of Spain



Figure 4: Recently inaugurated Oil Museum



The AAPG 2014 International Conference and Exhibition will incorporate AAPG's Regional Prospect and Property Expo, offering its own exploration themed presentations and exhibition area.

**14–17 September**

Istanbul Congress Center » Istanbul, Turkey

For the first time APPEX Regional will be joining the annual International Conference and Exhibition (ICE). APPEX is an exploration themed conference and exhibition, specifically dedicated to the E&P sector.

APPEX is a series of highly regarded Global Acquisition and Divestment (A&D) events, organised by the AAPG, bringing together upstream E&P principals, senior managers, business developers and new venture managers for an unmatched opportunity to network and do business with NOCs, Governments, financiers, global E&P deal-makers and decision-makers. Whether you are looking to buy, sell or farmout E&P deals, expand into new areas, find new partners, meet other industry movers and shakers, or just stay on top of the industry, APPEX is the place to be.

**Meet the right people:** The key forum for networking and international deal development, carefully designed to let you meet, discuss and negotiate deals with global decision makers.

**Buy and sell deals:** Connect with properties, prospects and clients from around the globe — find the next deal first.

**Hear what's going on:** Explore a programme of regional and topical speakers to keep you on top of worldwide trends and discovers; including finance forum, prospect forums, and the international pavilion.

**All under one roof:** Your one stop shop for global upstream opportunities.

Over two days, attendees at our 2014 Regional APPEX will explore current and future trends in international business, new oil and gas hotspots, and discover and debate dozens of upcoming prospects from countries specifically including:

Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Greece, Hungary, Israel, Iran, Iraq, Kazakhstan, Kosovo, Kyrgyzstan, Lebanon, Macedonia, Mongolia, Montenegro, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, plus some Mediterranean Countries (Cyprus, Italy, Algeria, Tunisia, Libya, Egypt, Jordan).

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.

*"We needed to get the senior decision makers from the biggest companies in the business to view our farmout opportunities; we met them at APPEX."*

*—Graham Heard, Exploration & Technical Director Northern Petroleum Plc*



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## PRELIMINARY SPEAKER PROGRAMME

### Monday, 15 September

11:00–11:10	APPEX Conference Chairman's Welcome — Mike Lakin
11:10–11:15	AAPG European President's Welcome — Keith Gerdes
11:15–11:20	AAPG President's Comments — Randi Martinson
<b>Session 1</b>	<b>Regional Forum Keynote Addresses</b>
11:20–11:50	Keynote Address from the Ministry of Energy and Natural Resources, Turkey
11:50–12:20	Challenges to Unlocking Prospective Frontier Plays Where East Meets West
12:20–12:40	Offshore Eastern Mediterranean Update
12:40–14:00	Lunch Break
<b>Session 2</b>	<b>Central &amp; Eastern Europe: Licensing &amp; Exploration</b>
14:00–14:20	Opportunities for New Acreage Acquisition in Eastern Europe
14:20–14:40	E&P Opportunities in Turkey
14:40–15:00	Overview of Panonian Basin Potential Past, Present & Future
15:00–15:10	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
15:11–15:21	(First Come/First Served)
15:22–15:32	
15:35–16:15	Refreshment Break
<b>Session 3</b>	<b>Development of the Caspian and Black Sea Region</b>
16:15–16:35	Deepwater Plays of the Black Sea.
16:35–16:55	Are There New E&P Opportunities Worth Chasing in the Caspian?
16:55–17:05	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
17:06–17:16	(First Come/First Served)
17:17–17:27	
17:00–18:30	End-of-Day Reception in the Exhibition Hall

### Tuesday, 16 September

08:30–09:00	Keynote Presentation
<b>Session 1</b>	<b>The Adriatic &amp; the East Mediterranean</b>
09:00–09:20	Offshore Oil and Gas Exploration in Croatia and Montenegro
09:20–09:40	Potential & Challenges to Opening the East Mediterranean
09:40–09:50	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
09:51–10:01	(First Come/First Served)
10:02–10:12	
10:15–11:00	Refreshment Break
<b>Session 2</b>	<b>Russia and Former Soviet Union</b>
11:00–11:20	The Hydrocarbon Potential of the Eastern (FSU) Republics
11:20–11:40	The Opportunity & Challenges for Independents in Russia & FSU
11:40–11:50	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
11:51–12:01	(First Come/First Served)
12:02–12:12	
12:15–13:15	Lunch Break



Session 3	New Plays and Regional Frontiers
13:30–13:50	The Political & Commercial Challenges to Seeking New Regional Frontiers
13:50–14:10	Unlocking the Complex Petroleum Geology & Prospectivity of Greece
14:10–14:30	Status of E&P & Future Potential of Iraq
14:30–14:40	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
14:41–14:51	(First Come/First Served)
15:00–15:40	Refreshment Break
Session 4	Unconventionals
15:40–16:00	Update to the Future Commercialization of Unconventionals in Poland?
16:00–16:20	Challenges to Commercialization of Central European Unconventional Potential
16:20–16:30	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
16:31–16:41	(First Come/First Served)
16:42–16:52	
16:53–17:03	
17:00–18:30	End-of-Day Reception in the Exhibition Hall

## Wednesday, 17 September

Session 1	Global Opportunity
10:00–10:20	The Influence of Fiscal Regimes on Global E&P Activity (Cost vs. Prospectivity)
10:20–10:40	The Challenges to Participating in the Future E&P of Africa
10:40–10:50	Prospect Forum: Presentation slots available to APPEX and International Pavilion exhibitors
10:51–11:01	(First Come/First Served)
11:02–11:12	
11:15–11:20	Chairman's Closing Remarks and Farewell
12:00–13:30	Exhibitor-Sponsored Luncheon in the Exhibition Hall





## Exhibition & Sponsorship

APPEX Regional 2014's exhibition, featuring within the AAPG ICE main exhibition (and therefore having an increased attendance of 2000+ this year), offers an exclusive opportunity for companies to cost effectively market and showcase their deals as well as their company and its international project expectations. In this targeted forum for networking and international deal development, you will have the opportunity to meet, discuss and negotiate deals with global decision makers from the majors to independents of all sizes, financiers, governments and NOC's.

All exhibiting prospect companies will have the opportunity to book a 10 minute speaking slot in the APPEX Regional conference.

All exhibition bookings include 2 full registration places with access to both APPEX Regional & the AAPG ICE Convention, as well as the APPEX Regional Icebreaker Reception. To feature in this exploration focused area of the show as an APPEX Regional Exhibitor please contact Fionn Devine at [fdevine@aapg.org](mailto:fdevine@aapg.org) or +44 207 434 1399. The International Pavilion of key NOC's & governments will be joined with APPEX Regional and will again play an important part in the conference.

## Pricing

Basic Stand Package – US \$545/m<sup>2</sup> (includes shell scheme wall panels, fascia board, carpet, lights & electrics).

Stand Package with furnishings – US \$560/m<sup>2</sup> (includes shell scheme wall panels, fascia board, carpet, lights & electrics, two chairs, table & waste basket).

All exhibition bookings include 2 full registration places with access to both APPEX Regional & the AAPG ICE Convention as well as 50 exhibition guest passes to distribute to clients and prospective customers.

## Sponsorship

As an APPEX Regional Sponsor (\$5000) you will benefit from:

- Your logo very prominently displayed on the entrance gateway to APPEX and the International Pavilion
- Your company logo on all APPEX Regional 2014 promotional material
- Your logo in the ICE/APPEX Programme Book (this will be distributed to all APPEX & ICE attendees on arrival).
- Your company logo on the APPEX website & ICE website with hyperlink to your company website
- Your company logo will be displayed in the conference room
- Logo on general ICE/APPEX sponsorship signage



## ICE 2014

AAPG and host organisation: Turkish Association of Petroleum Geologists invite you to join them for the AAPG International Conference and Exhibition — The Spirit Between Continents: Energy Geosciences in a Changing World. For the first time, ICE will be incorporated with AAPG Europe's APPEX, bringing together over 2,000 of the best professional geoscientists from around the world. The technical programme will provide the latest in science; not only regional plays, but also geological advances from around the world. The exhibition will be full of the latest in technology, products and services. Mark your calendars and watch for registration to open in the spring of 2014. Please visit [ice.aapg.org](http://ice.aapg.org) for more information.

## What people are saying about APPEX...

" APPEX Istanbul was a major success for EPI in respect to networking and as a result landed a substantial seismic QC land project in East Africa. EPI is very impressed by the calibre of the presenters and delegates that attended the show and it definitely met our expectations! "

Charles Czajkowski,  
Senior Business  
Development Manager,  
EPI Group

" The 10 minute presentations for the exhibitors, in combination with the relevant sessions at the Conference, is a good opportunity for exhibitors to present prospects to the participants. "

Mesut Atalay,  
General Manager,  
Yerbil Petroleum Ltd

" Once again, APPEX was the only place to be for E&P companies wanting to promote their assets to the international oil and gas community. APPEX has without question established itself as the premier international event for companies wishing to buy, sell and promote worldwide E&P deals and debate numerous upcoming prospects from around the globe. Great show, great speakers and superbly organised! "

Ian Blakeley  
Drillinginfo



## CALL FOR ABSTRACTS!

**"Tethys-Atlantic interaction along the European-Iberian-African plate boundaries"**

**18-19 May 2015, Lisbon, Portugal**

The Peri-Tethyan area hosts a number of large and smaller hydrocarbon provinces in platforms, rifts, foreland basins and the frontal parts of thrust belts. These hydrocarbon provinces are related to a wide range of source rocks occurring in Paleozoic, Mesozoic and Cenozoic series.

Western Tethys produced well developed Mesozoic rift-related basins, most of which were destroyed during the Alpine orogenic cycle and were overthrust by or incorporated into orogenic wedges. At the same time, to the West, a new rifting was giving birth to the Central Atlantic and later on to the North Atlantic, competing with the Western Tethys evolution. This trans-european geodynamically complex region hosts a number of highly diversified petroleum systems, with excellent exploration perspectives.

From the Black Sea to the Atlantic, a large number of companies are dealing with exploration within this geodynamic framework and different kinds of hydrocarbon discoveries are now a well-known reality. New areas, new plays and new opportunities are arising, as this this region is becomes increasingly important for Europe's energy demand.

This Conference aims to bring together people from Industry and Academia, from East-European to West-European countries, to analyze, discuss and launch perspectives for increased exploration in this attractive region.

### Conference Themes:

- Tertiary plays
- Unconventional plays
- Paleogeographic reconstructions
- Depletion & geological storage
- Atlantic margins
- Tethyan petroleum systems, proven and speculative
- Paleozoic source rocks and new plays
- Oblique margins & petroleum systems
- Basin inversion & petroleum systems
- Foreland Basins

### Scientific Committee

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- Ramón Salas (University of Barcelona)

To find out more or to submit an abstract please visit

[europeevents.aapg.org/Lisbon2015](http://europeevents.aapg.org/Lisbon2015)

### Other dates for the diary!

APPEX Global 2015, 3rd-5th March 2015, London

AAPG Imperial Barrel Awards, 19<sup>th</sup>-20<sup>th</sup> March 2015, Prague

3p Arctic 2015, 6<sup>th</sup> – 9<sup>th</sup> October 2015, St Petersburg, Russia

GTW – "Fractured Reservoirs: Geological, Geophysical and Engineering Tools to Crack Them", 16<sup>th</sup>-17<sup>th</sup> April 2015, Venice, Italy

For further information, visit [Europe.aapg.org](http://Europe.aapg.org) or contact us at

[Europe@AAPG.org](mailto:Europe@AAPG.org), +44 207 434 1399.





**Peter A. Ziegler**  
1928-2013



Peter Ziegler was born November 2 1928 in Winterthur near Zürich as one of the three sons of a medical doctor. All three became prominent geologists working in the petroleum industry during their carriers. In 1955 Peter joined the oil industry, right after finishing his PhD work in the Jura Mountains, having been one of the first students to be promoted by the newly appointed Prof. Trümpy in Zürich. After three years of fieldwork and well sitting in Israel, Madagascar and the Algerian Sahara for American and French oil companies he started his carrier with Shell in Canada. He married Yvonne Bohrer in 1960. Their two sons Markus and Christian were born in Edmonton where the young family lived until 1970. During these years, Peter was mostly active in exploration, covering large parts of western and arctic Canada. Six years of exploration in the thrust belt of the Cordillera, including helicopter-supported fieldwork, were followed by stratigraphic trap hunting as subsurface-geologist in the Alberta foreland basins where Ziegler chalked-up his first gas discoveries in the down-dip reef belt.

1970 Peter Ziegler was transferred to Shell International in the Netherlands where he supervised Shell's exploration activities in the North Sea area. As the North Sea success unfolded, Shell and its partners were rewarded with numerous important oil and gas discoveries, including the giant Brent, Statfjord, and Troll fields. Peter Ziegler's responsibilities as exploration adviser expanded stepwise to all Shell companies in Europe, then South America, and ultimately worldwide. During his last Shell-years between 1984 and his retirement in 1988 he acted as a Senior Exploration Consultant and team leader in Global Geology. It is most remarkable that even before 1984, while he was still active and responsible for exploration, he presented regional and large-scale compilations at various conferences and symposia. This prompted academia to propose to Shell to publish Ziegler's most famous Geological Atlas of Western and Central Europe in 1982 (a second edition was to be published in 1990), retracing the geological history, depositional environments and tectonics of Europe north of the Alps in greater detail than it had ever been done before. In 1986-87 the American Association of Petroleum Geologists sponsored Peter Ziegler to tour the USA and Canada as distinguished lecturer, speaking on the Evolution of the Arctic-North Atlantic and Western Tethys. The impact Peter had on colleagues in oil industry and academia likewise is unique and testifies his ability to synthesize large amounts of data and to address fundamental problems of geodynamics and basin evolution.

This was but a first step in Peter's academic career that fully took off after his retirement from Shell at the age of 60, when he moved to Binningen near Basel, the hometown of his wife Yvonne. He joined the Geological-Paleontological Institute at Basel University where he acted as a Titular Professor in Global Geology. At the same time he continued to lecture at the Vrije Universiteit Amsterdam, pursuing an engagement he had already during his years with Shell. Perhaps just as remarkable as his own research activity that led to well over 130 contributions in journals and books was his gift to cooperate, in many cases also to initiate and coordinate, international research projects: The International Lithosphere Program (1985-1994), EUROPROBE (1990-2002), the IGCP-369 Comparative evolution of Peri-Tethyan Rift Basins Project (1994-99), the TRANSMED Atlas Project (2000-04), and finally the transnational EUCOR-URGENT Project (1999-2008) that dealt with evolution and neotectonics of the Upper Rhine Graben that materially contributed to the development of the follow-up TOPO-EUROPE Project. One of Peter's perhaps most outstanding achievement during this second career of his was that he brought together professors and young scientists with great empathy and enthusiasm in order to freely exchange ideas amongst people with very different backgrounds and nationality. One example is his engagement in EUROPROBE (1990-2002) that offered the scientists from the new democracies in Central and Eastern Europe the unique opportunity to join the international scientific community after years of isolation behind the iron curtain; at the same time he opened up a large part of Europe for us westerners. A second example is the EUCOR-URGENT Project (1999-2008) that brought together scientists from 24 universities all over Europe and that trained about 40 PhD students and 20 post-docs. All this was possible thanks to Peter's ability to foster optimism and enthusiasm, and at the same time, to be very demanding with all scientists that participated.

Peter's outstanding scientific contributions and abilities to initiate cooperation between petroleum industry and academia, and later, to actively promote international cooperation led to numerous recognitions and honours. Peter Ziegler was awarded Honorary Doctor Degrees by the Moscow State University (1997) and the Technical University Delft (2001). He is recipient of the Fournier medal of the Belgian Geological Society, the van Waterschoot van der Gracht medal of the Royal Geological and Mining Society of the Netherlands, the William Smith medal of the Geological Society of London, the Neville George medal of the Geological Society of Glasgow, the Stephan Müller medal of the European Geosciences Union, the Leopold von Buch medal of the German Geological Society and the Leonidovici Kaptsa medal of the Russian Academy of Natural Sciences. From the American Association of Petroleum Geologists he received the Robert Dott sr. Memorial Award for the publication of Memoir 43, and a Special Commendation Award for his regional synthesis of the geological evolution of Europe and for being a lively catalyst of the dialogue among Earth Scientists. He was a member of the Royal Netherlands Academy of Sciences, the Polish Academy of Arts and Sciences, the Russian Academy of Natural Sciences and the Academia Europaea. He also was a life member of the Bureau of the International Lithosphere Program and an honorary member of the Geological Society of London, the European Union of Geoscientists, the Geological Society of Poland and the American Association of Petroleum Geologists.

Peter Ziegler was also well known for his critical and most independent mind. Hence, it is but logical that he engaged himself into the debate on climate change during the very last two or three years of his life contesting the Anthropogenic Global Warming concept. Those who worked with him will primarily remember him as an inspiring colleague who not only opened our minds to many aspects of science but who also fostered enthusiasm in achieving a common goal. Some of us, and certainly his family and close friends, not only lost a hard working but above all a warm-hearted personality. Peter passed away July 19 2013; we miss him.

*Stefan Schmid*



**Peter Lehner**  
1926 – 2013

Peter Lehner was born May 11<sup>th</sup>, 1926 in the Swiss Valais Mountains in the village of Zermatt, today a famous tourist resort. His father was head of the local post office. Peter followed elementary schools in Zermatt, went then to the High School in Engelberg and St. Maurice where he got his high school diploma. He pursued studies in geology at the University of Basel and finished then with a PhD thesis about the South Alpine sedimentary cover in the Ticino area. 1953 he joined Shell and stayed all of his career until retirement 1985 with this oil company. After field campaigns in New Guinea and Turkey, he worked as structural geologist in Wyoming (USA) and as project leader in a compilation of stratigraphic mapping in Canada and Alaska. 1964, Peter Lehner turned to offshore exploration, first in New Orleans, then, located in Houston, Texas, he became chief geologist for exploration in the Gulf of Mexico, leading the deep drilling project "Eureka" with the first deep drill holes in the Gulf. He presented his outstanding research results on an AAPG Distinguished Lecture Tour and was honoured 1969 with the Fellow Status of GSA and 1970 with the President's Award of AAPG for the best publication of the year (AAPG Bulletin 53/3, 1969). 1970, Peter Lehner went back to Europe and worked as head of the offshore research team in The Hague. For five years, he studied the continental margins of the Atlantic and the Pacific Oceans. These results were especially used for an essential contribution to the AAPG seismic Atlas. After 1975, he concentrated his research on Africa and the Far East. At the same time, he was Co-Editor of the AAPG Bulletin. 1985 he retired from Shell and came back to Switzerland, where he was giving lectures in Petroleum Geology at the Swiss Federal Institute of Technology Zürich and the Universities of Zurich and Berne.

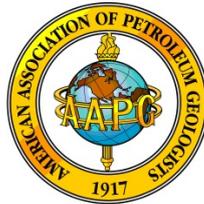
After his retirement from Shell, Peter Lehner, being 59, began a very new career. He changed from marine geophysics to geophysics of the continental crust. 1985, he was elected as program director of the "Swiss National Research Program 20 (NRP20) on the geological deep structure of Switzerland" and he was head of that program until its end in 1993. With great enthusiasm, he managed all the difficulties that were encountered during the seismic recording in the Swiss Alps at heights over 2000 m and in deeply eroded valleys. Everybody remembers his talks at the meetings of the Expert Group or at Meetings, where Peter Lehner presented the newest partially sensational results of the seismic profiling through the Swiss Alps. Seismic recording was executed in three traverses: East, Central/South and Western Traverse. On these traverses the Alpine crust was recorded down to the Moho; the main result of this research program is a double indentation of the European and the Adriatic/African plates, showing a "double crocodile structure".

From 1988 – 2005 Peter Lehner was president of the Swiss Association of Petroleum Geologists and Engineers (VSP). Under his leadership, the number of members increased significantly and the Annual Convention obtained a greater scientific value due to his connections to the Universities. It was also possible to continue with the publication of the Bulletin through a collaboration of VSP with the Engineer Geologists. At the end of his presidency, he declared this chair as the best job he ever had during his lifetime. The convention elected him as honorary member.

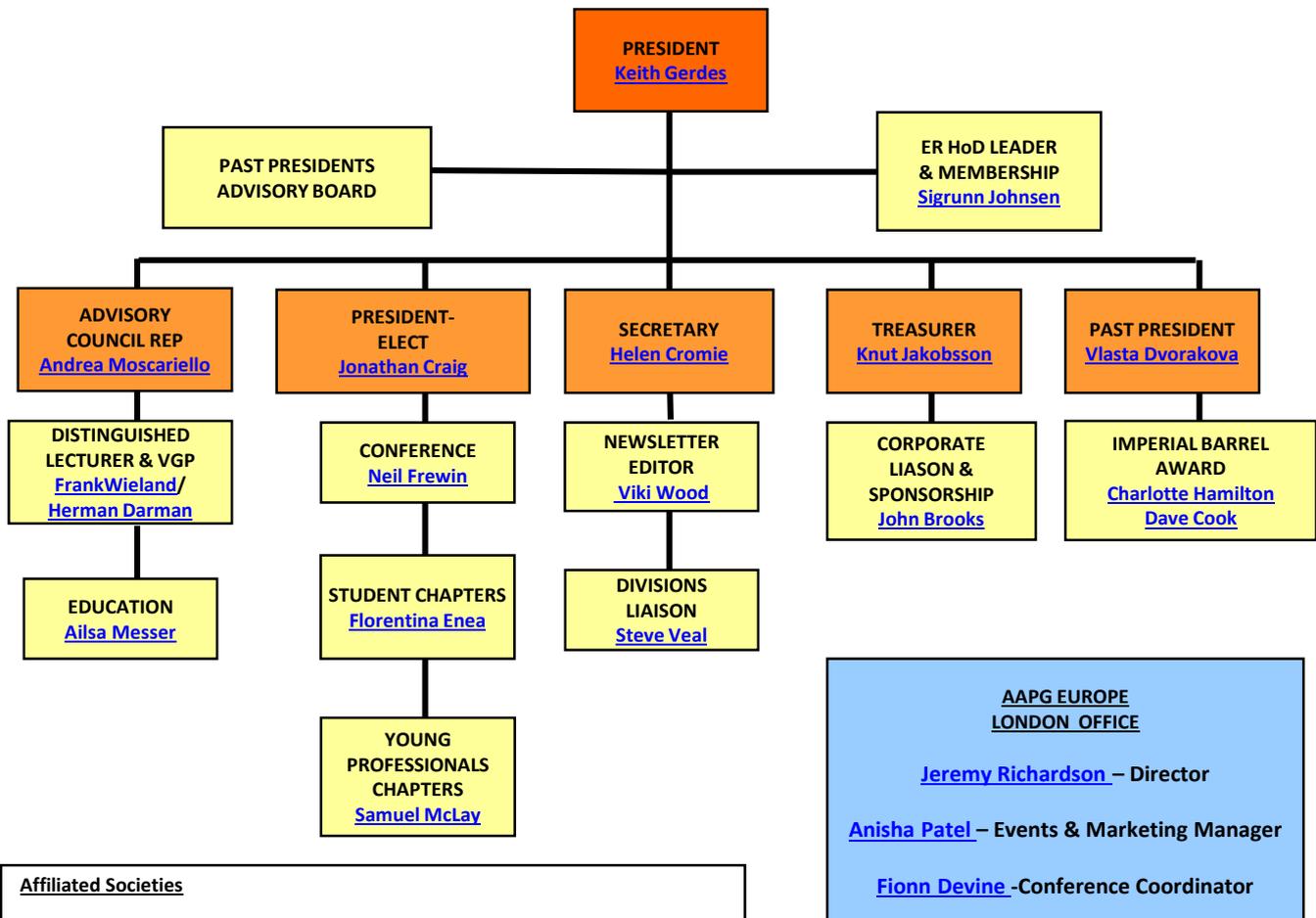
Besides his scientific research, Peter was an enthusiastic alpinist and discovered 1985 an old mercenary soldier at a level of 3000 m, who was lost in glacier ice for over 400 years. These findings from 1985 - 1989 were published with his sister as co-author. He managed during these years also the geoscientific part of the National Research Exhibition Heureka 1991. Together with his son Benedikt, he mapped, explored and interpreted the Piz Alv area in the Upper Engadine valley. With his last occupation, he came back to geological fieldwork from where he started his PhD and the first steps at Shell. Peter Lehner died on October 27<sup>th</sup>, 2013.

With Peter Lehner, we lost a great scientist of the Global and Swiss geology, who worked all his life for science, but we also lost a friend, a philosopher, a great man with a universal knowledge and different interests. We thank him for his contributions and friendship and we will always remember him.

Peter Heitzmann  
[heitzmann@bluewin.ch](mailto:heitzmann@bluewin.ch)  
March 2014



## EUROPEAN REGION



### Affiliated Societies

Asociación de Geólogos y Geofísicos Españoles del Petróleo (AGGEP) – SPAIN  
 Association of Petroleum Technicians and Professionals (AFTP) – FRANCE  
 Austrian Geological Society  
 Azerbaijan Society of Petroleum Geologists  
 Berufsverb and Deutscher Geologen, Geophysiker und Mineralogen e. V.  
 Bulgarian Geological Society  
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 Petroleum Exploration Society of Great Britain  
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 Scientific Council for Petroleum (Croatia)  
 Swiss Association of Energy Geocientists  
 Turkish Association of Petroleum Geologists  
 Association of Ukrainian Geologists