



**Geological Society of Africa  
Bulletin of the North Region  
21/09 (December issue 17<sup>th</sup> December 2009)**



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## 1. IMPROVEMENTS IN GSAf

### 1.1 State of GSAf

Article about the state of the GSAf published in Episodes (Vol 23 Nr 3)

### *News from the Geological Society of Africa* *August 2009*

The Geological Society of Africa (GSAf; <http://www.geologicalsocietyofafrica.org>) has great pleasure to report to *Episodes* on its various activities undertaken during the last six months.

#### **The newly elected GSAf Council Members (2008 – 2012)**

The executive board members of the Geological Society of Africa (GSAf) composed of the President, Secretary General, Treasurer and Information Manager were elected during the 13<sup>th</sup> meeting of the Society held during the 22<sup>nd</sup> Colloquium of African Geology, on the 6<sup>th</sup> November 2008, in Hamamet (Tunisia). The rest of the board members were nominated and elected in January 2009 by a committee composed by the new and previous executive board members of GSAf including Professor Muhongo, Regional Director, ICSU Regional Office for Africa. The newly elected board members are:

#### **President**

Prof. Aberra Mogessie (Ethiopia/Austria)

#### **Secretary General**

Dr. Hassina Mouri (Algeria/South Africa)

#### **Assistant Secretary General**

Mr. Jude E.Ogala (Nigeria)

#### **Treasurer**

Prof. Dr. Eckart Wallbrecher (Austria)

#### **Editor/Information Officer**

Dr. Peter Zawada (South Africa)

#### **Vice Presidents**

Dr. Hassan. Helmy (Egypt) – NA

Prof. Lopo Vasconcelos

(Mozambique) – (SA):

Dr. Joseph Kokonyangi (DR Congo) – (CA)

Dr. Asfawossen Asrat (Ethiopia) – (EA)

Dr. Gbenga Okunlola (Nigeria) – (WA)

#### **Councillors**

Dr. Abdelkader Saadallah

(Algeria/Norway) – NA

Dr. Benjamin Mapani (Namibia) – SA

Dr. Moloto A-Kenguemba Gaetan

(CAR) – CA

Mrs. Monica Omulo (Kenya) – EA

Dr. Daniel. K. Asiedu (Ghana) – WA

#### **Past President**

Prof. F. Toteu (Cameroon)

#### **GSAf Activities 2009**

The official activities of the new board members of the Geological Society of Africa started in February 2009. Since then, several activities were undertaken in order to achieve the objectives of the society.

Among the activities where the Geological Society of Africa council members were involved during the last few months are the following:

-AEGOS kick off meeting and launching conference, held in Cape Town, 6-9 February 2009: The AEGOS project, coordinated by BRGM (French Geological Survey), aims at designing a pan-African infrastructure of interoperable data and user-oriented services to strengthen the sustainable development of georesources in Africa. Further information can be found in the website at: [www.brgm.fr/brgm/aegos](http://www.brgm.fr/brgm/aegos).

The Geological Society of Africa was represented by the Secretary General Dr Hassina Mouri from the University of Johannesburg (South Africa). Dr Mouri served on the Advisory board panel of the launching conference of AEGOS.

This representation has enabled to exchange ideas and discuss the future modalities of cooperation between the GSAf, AEGOS partners and CIFEG (International Centre for Training and Exchanges in Geosciences) representatives. Moreover, it has been stressed and strongly recommended that the GSAf should be involved in the various geosciences activities taking place on the African continent. Since one of the objectives of the GSAf is the **“Promotion and advancement of the geological sciences in Africa by encouraging and supporting geosciences research, education and training**, we strongly supported the AEGOS application to the European Union in order to extend the project into the Portuguese speaking countries of Africa (Angola, Mozambique, Cape Verde, S. Tomé and Príncipe and Guinea Bissau). The GSAf will work in close association with CIFEG in order to implement the AEGOS project in all African countries included in its program. In the end Dr Mouri delivered a talk thanking AEGOS organisers and partners for the opportunity given to GSAf to be represented during this meeting and ensuring them about the commitment of the society to help in this important initiative.

-The 37<sup>th</sup> IGCP-Scientific Board meeting at UNESCO in Paris was represented by the President of the GSAf Prof Aberra Mogessie from the University of Graz, Austria. Prof. Mogessie was invited by the organisers of the IGCP meeting to attend the closed session of the IGCP Scientific

Board meeting on February 19, 2009 and gave a presentation on the structure and objectives of the Geological Society of Africa (GSAf). Prof. Mogessie also had a chance for a personal discussion with a number of officials from the UNESCO Directorate of Natural Sciences (Dr. N. Ishwaran, Dr. R. Missotten, Dr. M. Patzak); President of the IUGS (International Union of Geological sciences, Prof. A. Riccardi); the Executive Director of IYPE (International Year of Planet Earth, Prof. Ed de Mulder) including its Board members, and UNESCO regional office representatives from Cairo office (Africa, Dr. M. Al-Aawah); Montevideo (Latin America; Dr. D. Gorfinkiel); Indonesia (Asia; Dr. G. Arduino) and representatives of CIFEG (Dr. F. Pinar & Dr. J. Rolet), France. This was a very good opportunity for a personal contact, which helped to strengthen the working relationships between these different organisations and the Geological Society of Africa. In addition, it also helped to present the functions of the Geological Society of Africa and its objectives. During the open session of this meeting held on 20.02.2009, a large number of delegates representing National IGCP Committees and different branches of International and Intergovernmental institutions involved in the Geosciences were present. One of the items on the agenda for this open session was "New UNESCO initiative on Earth Science Education in Africa" led by Miss Sarah Gaines, UNESCO office Paris. The result of the meeting was very positive, as the Geological Society of Africa was considered and approved to be the main organizational partner to launch and implementation of this new UNESCO initiative. A number of workshops are planned to be organised during 2009 in order to launch this program. The GSAf will be an active partner along with UNESCO, IUGS and CIFEG and these workshops will be organized before the end of 2009 in different regions of Africa such as: in Luanda (Angola) Cape Town (South Africa) Assuit (Egypt) and Dakar (Senegal).

The tentative program involves the following points:

1. develop a status update of the state of earth science education in Africa
2. produce a clear map that identifies centers of expertise, centers needing assistance and educational gaps.
3. continue identifying partners and their roles in the initiative.
4. document existing actions or programs and identify the relationships with the initiative.
5. agree, at an academic level, on the type and role of earth sciences in the local educational systems.
6. support and provide details on the goal of the initiative.
7. use the workshop events as opportunities to raise the visibility of the importance and the relevance of the earth sciences for Africa.

\_ IYPE (International Year of Planet Earth activity):

On February 26, 2009 an IYPE delegation led by the Executive Manager (Prof. Ed de Mulder) including Prof. Félix Toteu (Former GSAf President and representative of the 16 IYPE African National Committees), Mr. Mauricio Fernandes, from the IYPE Development Committee and representative of the Latin America National Committees Board, visited Angola on the invitation of the Prime Minister of Angola. On February 27, 2009, a Memorandum of Understanding between the newly established (nr 80) National Committee for IYPE in Angola and the IYPE Corporation was signed in Luanda. Among the IYPE (or IYPE-related) projects agreed to be undertaken in Angola, is a feasibility study for the establishment of the African Forum on Sustainable Development, to be held every two years in the next decade, starting in 2010.

The ambition of the Forum is to discuss Earth-related challenges on the environment and to present solutions for Sustainable Development in Africa.

\_ An IYPE meeting of STI leaders and National Committee Chairs (Africa) was held in Pretoria, South Africa from 18-19 May, 2009 led by Prof Sospeter Muhongo (ICSU office). The GSAf was represented by the Secretary General Dr. Hassina Mouri who gave a general presentation on the objectives of the society, its activities and interest to work with the IYPE for the benefit of African Earth Science communities. Followed by a presentation by Prof Lopo Vasconcelos, GSAf Vice President, Southern Africa Region, on IYPE National Committee -Mozambique.

\_ Furthermore, several other internal activities were also undertaken, such as:

- Continuous "virtual" discussions amongst the council members of the GSAf were held since the council members were elected. The regular discussions dealt mainly with increasing the membership of the Society and membership fees and advertising the objectives of the Society to as many Geoscientists as possible within and outside Africa.
- Redesigning and reactivation of the Society's website, which has been undertaken by the President of the GSAf (Prof. A. Mogessie) and the webmaster (Mr. George Stegmuller), Institute of Earth Sciences, University of Graz, Austria. The Society would like to acknowledge Prof. Nasser Ennih, past Secretary General of the GSAf and other Moroccan colleagues for extending the use of their server for our website and for their help during the reactivation of the website. The advice and support of the Secretary General Dr. Hassina Mouri was very significant and is gratefully acknowledged.

- Active reporting by some council members (North, South and East Africa) on various regional activities. This was done in the form of "Regional News Bulletins". Dr. Abdelkader Saadallah (Northern Africa councillor of GSAf), Prof. Lopo Vasconcelos (VP of GSAf Southern Africa) and Dr. Asfawossen Asrat (VP of GSAf Eastern Africa) as well as Dr. Okonlula (VP of GSAf Western Africa) are acknowledged for the Bulletins they are publishing in their respective regions.

- Compilation of a list of Earth Science units in African Universities by Prof. Lopo Vasconcelos, VP SA (a databank to be used for the UNESCO Earth Science Education in Africa initiative).

- Dr. Hassan Helmy, VP Northern Africa together with Prof. Aberra Mogessie (President of GSAf) are in-charge of organising the first council meeting of the society as well as organisation of UNESCO workshop in North Africa (in cooperation with the UNESCO Office, Cairo and the Department of Geology, Assuit University) to be held in Assuit, Egypt at the end of October 2009.

- Dr. Hassina Mouri is working in collaboration with Dr. Moctar Doucoure (AEON, University of Cape Town) and Prof. Félix Toteu (former President of GSAf) to organise the first UNESCO workshop in Southern African region to be held in Cape Town end of November 2009.

- In addition to the progress in the preparation of the next Colloquium of African Geology (CAG23) led by Dr Hassina

Mouri, to be held at the University of Johannesburg, South Africa from 8-14, January 2011. Further information will be posted soon on the website of the Geological Society of Africa as well as the CAG23 website.

#### **Acknowledgements**

Special thanks to Prof. Lopo Vasconcelos for his comments, which helped to improve this report, active members of the GSAf, affiliated institutions, council members, African and non-African universities and geological departments, governmental organisations, ICSU-ROA, IUGS, BRGM, CIFEG, AEGOS, AAWG, UNESCO and IYPE representatives for their continual support for the Geological Society of Africa.

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## **1. 2 In the website ([www.geologicalsocietyofafrica.org](http://www.geologicalsocietyofafrica.org)) you can find...**

The November issue of South Africa Bulletin where you can read about

### ***"Setenil de las Bodegas***

*Named after its once flourishing wineries - bodegas - Setenil is probably unique among the pueblos blancos, white villages, of Andalusia. Where most pueblos blancos were built on protective bluffs and pinnacles, this town grew out of a network of caves in the cliffs above the rio Trejo north-west of Ronda. Its blinding white houses seem to emerge from the rocks, and some have rock roofs and even olive groves on their roofs.*

*(<http://www.andalucia.com/province/cadiz/setenil/home.htm>)"*

And see photos of these nice houses "interbedded" within rocks layers...same as in the area of Biskra (Algeria)

## **1. 3 IYPE Closing Meeting Lisbon (Portugal) 19-22/11/2009**

Pr A. Mogessie, GSAf President, attended and reported:

*"Dear colleagues as you all know I have been invited by Prof. Eduardo de Mulder to attend the IYPE closing meeting in Lisbon, Portugal from Nov.19-22, 2009. The program of the meeting included the following:*

*November 19 late in the afternoon was registration and reception at the City Hall*

*November 20 -Opening ceremony including several conferences dealing with: Renewable Energy, Sustainable Land & Water Management*

*November 21 – Conference on Planet Earth, Meeting of International partners of the IYPE, Meeting of the National Committees of the IYPE; Meeting of young Earth Scientists and the most important for the GSAf “Meeting on Planet Earth Africa”.*

*The session on Africa dealt with the different presentations as given below  
Conference on Planet Africa*

*Time: 16 – 18 hrs*

*Place: Knowledge Pavillion, auditorium*

*Chair: Ambassador Mohammed Sheya*

*Rapporteur: Felix Toteu*

*16.00 Welcome by Chair*

*16.05 Tour de Table*

*16.10 IYPE and Africa (Sospeter Muhongo)*

*16.20 Presentations:*

*16.20: Earth Science Initiative in Africa (Sarah Gaines)*

*16.35: Geological Society of Africa and the legacy of the IYPE (Aberra Mogessie)*

*16.50: African Forum for Sustainable Development (Vladimir Russo)*

*17.05: African Alive Corridors Project (Felix Toteu)*

*17.20: Round Table*

*17.35 Open discussion*

*18.00 Closure (Chair)*

*Based on the discussion in the National IYPE meetings and informal discussions with a core group of the IYPE Board where I was also invited to attend, the conference decided to have a follow on program to replace the IYPE (whose mandate will end in June 2010) by an Institute of Planet Earth. The mission of the Institute of Planet Earth which is documented in the draft proposal states the following:*

*The Mission of the Planet Earth Institute is to inform the public how Earth scientific knowledge helps to make societies around the world healthier, safer and more prosperous and to excite the youth about the Earth.*

*Implementation of the mission is envisaged along three channels:*

*1. Through a wide variety of activities, including: Media, Publications and Science for public projects among others*

*2. Through a network of National Committees inspired by the 80 National IYPE Committees*

*3. Through International Partnerships, joint ventures and activity collaboration with organizations and companies that wish to share their aims and ambitions with those of the Planet Earth Institute.*

*In my informal discussions and in my presentation I have indicated that the GSAf welcomes the idea and will be actively involved in its establishment and in its future activities. The IYPE secretariat has documented the minutes of the discussion and this will be sent to all IYPE national committees and the other relevant organizations like the GSAf so that all partners suggest how the International Planet Earth should be established and how should it function etc. This process may take about three months. Before June 2010 there will be a meeting of all partners in UNESCO Paris and a decision will be made to launch the Institute of Planet Earth.”*

## 1. 4 Prof. Woodfork accepted to be a goodwill Ambassador of GSAf in USA

“Dear Professor Mogessie:

Thank you very much for your kind invitation to serve as a Goodwill Ambassador and the Representative of the Geological Society of Africa in the United States of America. I consider your invitation to be a high honor and great privilege which I gladly and enthusiastically accept...

Larry D. Woodfork

Chairman Board of Directors and Officers Corporation of the INTERNATIONAL YEAR OF PLANET EARTH and State Geologist Emeritus of West Virginia  
Independent Consulting Geologist  
Adjunct Professor of Geology, Marshall University”

“Dear Prof. Woodfork,

I am extremely happy and honored that you accepted my invitation to be a goodwill Ambassador and representative of the GSAf in the United States of America... Pr Aberra Mogessie”

## 2. BOOKS & ARTICLES

### 2. 1 Reservoirs Geomechanics (M. D. Zoback)

From Episodes Vol 32 Nr 3

## “Reservoir Geomechanics

By Mark D. Zoback

Cambridge University Press, Cambridge & New York (2007), 449 p. ISBN-978-0-521-77069-9

Reservoir Geomechanics is a very comprehensive book spanning all aspects of stress within the accessible earth. The topics presented are interdisciplinary and encompass the fields of rock mechanics, tectonophysics, structural geology and petroleum engineering. It is divided into three parts in which the basic principles, stress indicators and measuring techniques, and their applications in addressing the problems of wellbore stability, permeability of critically stressed faults and reservoir depletion in sedimentary basins are presented and discussed in detail along with some case studies

Part I (chapters 1-5) provides an overview of the key factors controlling the problems in petroleum geomechanics and topics that are useful for teaching rock mechanics and geomechanics. They include the fundamental principles of tectonic stress field; pore pressure and its variations with depth; relationship between pore pressure, effective stress and porosity; reservoir compartmentalization; constitutive laws governing rock deformation and principles of rock failure under compression, tension and shear; frictional strength of rocks, critically

stressed crust and the possible range of stress magnitudes; faults, fractures and fluid flow in rock at depth; earthquake focal mechanisms and their use; and empirical techniques for estimating rock strength from elastic moduli and porosity data obtained from geophysical logs.

Part II (chapters 6-9) begins with the introduction of concepts of stress indicators (wellbore failures), which include tensile *wall fractures* due to drilling, heavy mud weight and cooling, and *wellbore breakouts* due to compressive stress concentrations. It is followed by a detailed discussion of quality ranking of stress indicators; various techniques (ultrasonic borehole viewer, electrical imaging devices, open-hole hydraulic fracturing, extended leak-off tests or mini-frac and caliper log) for measuring stress orientation and calculating stress magnitude in deep wells (vertical as well as deviated); and treatment of in-situ stress interpretation taking into account the geological processes that control seismicity, crustal deformation and sedimentary basin formation. It contains a chapter in which global stress patterns and stress fields in

sedimentary basins are reviewed, and also methods for estimating and extrapolation of stress magnitudes to regional-scales using local stress field data. The discussion presented also highlights the fact that the stress magnitudes obtained in several deep boreholes and wells in crystalline rock as well as sedimentary basins are controlled by the frictional strengths of faults with coefficients of friction,  $\mu$ , between 0.6 and 1.0. It is an amazing result and found to be fully consistent with Coulomb's faulting theory and Byerlee's law developed on the basis of laboratory experiments on rock friction. Several *in situ* studies, the results of which are well documented in this book indicate that the upper part of the earth's crust (depth < 9 km) is in a state of frictional-failure equilibrium even in intra-plate areas; near hydrostatic pressures exist to great depth in intra-plate crust; and the faults that are critically stressed maintain the crust's high permeability as well as its ability to sustain higher differential stresses. In essence, it is a summary of the outstanding scientific contributions made by Prof. M.D. Zoback and his associates.

Part III (chapters 10-12) addresses the practical problems of wellbore instability arising during drilling and production phases of hydrocarbon reservoirs. The issues of excessive sand production; mud penetration and stress changes in depleting reservoirs are discussed in detail. The solutions that are based on the development and application of geomechanical models with various input parameters such as stress magnitudes; pore

pressure, rock strength, mud weight etc are presented along with the results of some case studies. Also, the utilization of Quantitative Risk Assessment (QRA) for predicting the probability of drilling successful wells in sedimentary basins is discussed and presented with some results.

The book includes many results and illustrations in colour from the recent works published by the author and others. A brief discussion of some relevant topics such as hydraulic fracturing for well stimulation treatment, and reservoir impoundment and its effect on increase of pore pressure and occurrence of earthquakes also should have been included in the book. The book contains few typographical errors, and some of the references do not contain all the names of the authors and instead were presented as A, B, *et al* in pages 423-443.

In summary, the book can serve as a valuable guide and practical reference to geoscientists and engineers working in petroleum and geothermal industries, and for research scientists engaged in stress measurements and their application to problems of faulting and fluid flow and seismicity in the earth's upper crust.

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## 2. 2 What Was Published in AAPG Bulletin

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For January, February & March already mentioned in GSAf Bulletin NAfrica # 9 (0909 issued on Mars 23<sup>rd</sup> 2009)

For April, May, June, July, August Go to GSAf Bulletin NAfrica # 18 (1809 issued on September 14<sup>th</sup> 2009)

### In September (V. 93 NO. 9)

#### [Petroleum geology of the giant Elm Coulee field, Williston Basin](#)

*Stephen A. Sonnenberg and Aris Pramudito*

[Three-dimensional modeling of a shoreface-shelf parasequence reservoir analog, Part 1. Surface-based modeling to capture high-resolution facies architecture](#)

*Richard P. Sech, Matthew D. Jackson, and Gary J. Hampson*

[Three-dimensional modeling of a shoreface-shelf parasequence reservoir analog, Part 2. Geologic controls on fluid flow and hydrocarbon recovery](#)

*Matthew D. Jackson, Gary J. Hampson, and Richard P. Sech*

[Hydrocarbon flow modeling in complex structures \(Mackenzie Basin, Canada\)](#)

*Karsten F. Kroeger, Rolando di Primio, and Brian Horsfield*

[Depositional facies analysis and modeling of the Judy Creek reef complex of the Late Devonian Swan Hills, Alberta, Canada](#)

*Y. Zee Ma, Andrew Seto, and Ernest Gomez*

**In October (V. 93 NO. 10)**

[Paleochannel sands as conduits for hydrocarbon leakage across faults: An example from the Wilmington oil field, California](#)

*Linji Y. An*

[Petroleum reservoir porosity versus depth: Influence of geological age](#)

*S. N. Ehrenberg, P. H. Nadeau, and O. Steen*

[Quantification of pore structure and its effect on sonic velocity and permeability in carbonates](#)

*Ralf J. Weger, Gregor P. Eberli, Gregor T. Baechle,  
Jose L. Massafferro, and Yue-Feng Sun*

[Gas geochemistry of the Mobile Bay Jurassic Norphlet Formation: Thermal controls and implications for reservoir connectivity](#)

*Paul J. Mankiewicz, Robert J. Pottorf, Michael G. Kozar, and Peter Vrolijk*

[Reconstructing morphological and depositional characteristics in subsurface sedimentary systems: An example from the Maastrichtian-Danian Ormen Lange system, Møre Basin, Norwegian Sea](#)

*Tor O. Somme, Ole J. Martinsen, and John B. Thurmond*

[Sandstone-Body Dimensions in a Lower Coastal-Plain Depositional Setting: Lower Williams Fork Formation, Coal Canyon, Piceance Basin, Colorado](#)

*Matthew J. Pranter, Rex D. Cole, Henrikus Panjaitan, and Nicholas K. Sommer*

**In November (V. 93 NO. 11)**

**SPECIAL ISSUE: AAPG-SPE-SEG HEDBERG RESEARCH CONFERENCE**  
**The Geologic Occurrence and Hydraulic Significance of Fractures in Reservoirs**

[AAPG-SPE-SEG Hedberg Research Conference on “The Geologic Occurrence and Hydraulic Significance of Fractures in Reservoirs”](#)

*Peter Hennings*

[Mechanical and fracture stratigraphy](#)

*Stephen E. Laubach, Jon E. Olson, and Michael R. Gross*



[Complex fracture development related to stratigraphic architecture: Challenges for structural deformation prediction, Tensleep Sandstone at the Alcova anticline, Wyoming](#)

*Christopher K. Zahm and Peter H. Hennings*

[Impact of interlayer slip on fracture prediction from geomechanical models of fault-related folds](#)

*Kevin J. Smart, David A. Ferrill, and Alan P. Morris*

[Mechanical stratigraphy and faulting in Cretaceous carbonates](#)

*Alan P. Morris, David A. Ferrill, and Ronald N. McGinnis*

[Crossing conjugate normal faults in field exposures and seismic data](#)

*David A. Ferrill, Alan P. Morris, and Ronald N. McGinnis*

[Paleostress analysis from image logs using pinnate joints as slip indicators](#)

*Alfred Lacazette*

[Fracture characterization at multiple scales using borehole images, sonic logs, and walkaround vertical seismic profile](#)

*Romain Prioul and Jeroen Jocker*

[Two-dimensional simulation of controls of fracture parameters on fracture connectivity](#)

*Kajari Ghosh and Shankar Mitra*

[Natural fracture characterization in tight gas sandstones: Integrating mechanics and diagenesis](#)

*Jon E. Olson, Stephen E. Laubach, and Robert H. Lander*

[Geomechanical wellbore imaging: Implications for reservoir fracture permeability](#)

*Colleen A. Barton, Daniel Moos, and Kazuhiko Tezuka*

[Predicting the regional distribution of fracture networks using the distinct element numerical method](#)

*Bronwyn A. Camac and Suzanne P. Hunt*

[Multivariate fracture intensity prediction: Application to Oil Mountain anticline, Wyoming](#)

*Jason A. McLennan, Patricia F. Allwardt, Peter H. Hennings, and Helen E. Farrell*

[Quantifying and predicting naturally fractured reservoir behavior with continuous fracture models](#)

*Creties Jenkins, Ahmed Ouenes, Abdel Zellou, and Jeff Wingard*

[Assisted history-matching for the characterization of fractured reservoirs](#)

*Arnaud G. Lange*

[Upscaling two-phase flow in naturally fractured reservoirs](#)

*Stephan K. Matthai and Hamidreza Maghami-Nick*

[Comparison of deterministic with stochastic fracture models in water-flooding numerical simulations](#)

*Mandefro W. Belayneh, Stephan K. Matthai, Martin J. Blunt, and Stephen F. Rogers*

**In December (V. 93 NO. 12)**

[Petroleum reservoirs within a spiculite-dominated depositional sequence: Cowley Formation \(Mississippian: Lower Carboniferous\), south-central Kansas](#)

*S. J. Mazzullo, Brian W. Wilhite, and I. Wayne Woolsey*

[Three-dimensional kinematic modeling of reversible fault and fold development](#)

*Natacha Gibergues, Muriel Thibaut, and Jean-Pierre Gratier*

**DISCUSSION & REPLY**

[Multiscale Stratigraphic Analysis of a Structurally Confined Submarine Fan: Carboniferous Ross Sandstone, Ireland](#)

Discussion: *Roger Higgs*

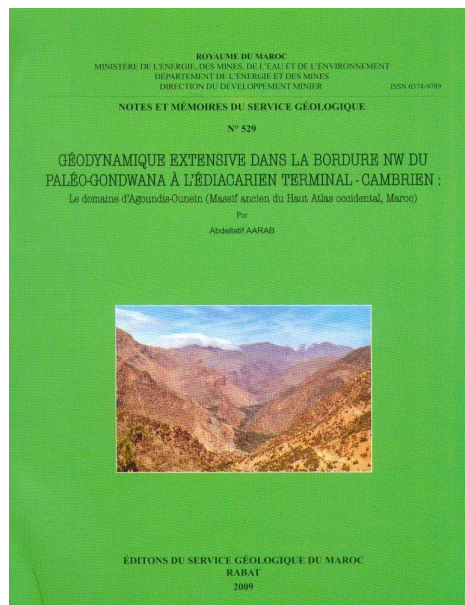
Reply: *D. R. Pyles*

**2. 3 Abstract Articles related to North Africa from AAPG Bulletin**

No Article related to North Africa Region published during this period

**2. 4 Géodynamique Extensive Dans la Bordure... (Maroc) (A Aarab)**

Merci a notre collègue Aarab Abdellatif qui nous a communiqué cette information



Au début du Paléozoïque, le Paléo-Gondwana connaît un événement extensif (rifting) dont les traces sont enregistrées dans sa bordure nord occidentale et plus

largement dans les domaines qui formaient les marges des océans Iapetus et Rhéique.

L'Agoundis-Ounein dans le massif ancien du Haut Atlas marocain, appartenait au Paléo-Gondwana, il constitue donc l'une des zones-témoins clés de l'évolution extensive ayant caractérisé la période de l'Ediacarien terminal - Cambrien. Les marqueurs de ce rifting, sont d'ordres sédimentaire, magmatique et structural.

Les formations sédimentaires du Cambrien inférieur sont marines, à calcaires et dolomies comportant des termes silteux. Ces dépôts sont contemporains d'un volcanisme basaltique syn-rift. Les laves sont tholéiitiques intra continentales, légèrement différenciées, avec un cachet alcalin vers le sommet de la pile lithostratigraphique. Les dépôts terminaux sont post-rift, de nature détritique, gréseuse et calcaire. Au

Cambrien moyen l'extension se poursuit, avec une sédimentation détritique et argileuse.

Cet ensemble est discordant sur des rhyolites édiacariennes, à cachet Ediacarien terminal-Cambrien inférieur. Ce dernier est caractérisé par des déformations pliques et cassantes.

Le rifting du massif ancien du Haut Atlas s'intègre dans un espace situé entre un domaine péri cratonique (l'Anti-Atlas) et un autre orogénique (la Meseta). Les marqueurs structuraux y indiquent, au Cambrien inférieur, un régime transtensif sur des failles senestres précoces, successivement actives sur une direction équatoriales puis selon une direction proche du NE-SW.

L'extension dans l'ensemble du Massif ancien du Haut Atlas se place donc dans le cadre d'un rifting global affectant l'ouest du Paleo-Gondwana. Ici, ce rifting a avorté à la fin du Cambrien sans atteindre le stade de l'océanisation.

L'Agoundis - Ounein se situait sur la marge passive nord occidentale du Paleo-Gondwana en rapport avec les masses péri gondwaniennes que formaient l'Ibérie et Cadomia. Cette marge devient mature et se développe plus à l'ouest (Avalonia, Meguma) et au NW (Ibérie). Sur le pourtour du Paleo-Gondwana, ces masses continentales formaient déjà au Néoprotérozoïque supérieur les zones limitrophes de l'Afrique du Nord Ouest.

Le groupe de l'Agoundis-Ounein par ses caractères géologiques appartient au cycle de rifting du début du Cambrien, sans aucun lien temporel avec les structures du cycle du Néoprotérozoïque

géochimique calco-alcalin rapporté au Panafricain tardif. Ces roches appartiennent au soubassement anté-

supérieur. Les termes supérieurs de ce dernier, situés après 550 Ma, traduisent des aires extensives relatives à l'installation d'une chaîne rhyolitique et andésitique tardi-panafricaine. Cette dernière est suivie par le développement d'une chaîne basaltique tholéitique intracontinentale, attribuée à l'Ediacarien terminal-Cambrien, à laquelle nous rattachons l'Agoundis-Ounein. Une discordance majeure sépare les deux cycles, dont nous pensons qu'elle n'est pas due aux simples basculements de blocs dans le soubassement.

La reprise hercynienne compressive dans le domaine de l'Agoundis-Ounein, réutilise les failles majeures. Deux phases compressives sont mises en évidence. La première est de direction méridienne donnant des plis amples équatoriaux. La seconde paroxysmale de direction EW à WNW-ESE, engendrant des plis méridiens à sub méridiens. Cette dernière phase est la plus intense avec des plis synchistes observés à l'ouest de l'Agoundis-Ounein. Le comportement des failles hercyniennes du domaine étudié montre un jeu dextre, dont le plus évident est celui lié à la phase paroxysmale équatoriale à sub équatoriale.

**Mots clés :** Paleo-Gondwana, Haut Atlas, Massif ancien, Agoundis-Ounein, Ediacarien, Cambrien, Rift, Extension, Tholéitique, Calco-alcalin

## 2. 5 Global Neoproterozoic petroleum systems: The Emerging Potential in North Africa

Author/Editor: J Craig, J Thurow, B Thusu, A Whitham & Y Abutarruma (Product Code: SP326)

<http://www.geolsoc.org.uk/gsl/publications/bookshop/page6245.html?page=1&perpage=5&rtmpage=2838&bookshopKeyword=&authorEditor=&publisher=&series=&publicationYear=&joinOperator=&filter=&filterValue=>

By Geological Society of London

**Description:** Worldwide, Neoproterozoic successions are major hydrocarbon producers. In North Africa, large basins with significant surface outcrops and thick sedimentary fills are widespread. These basins are now emerging as potential sources of hydrocarbons and are

attracting interest both from geological researchers and the oil and gas industry.

This volume focuses on recent developments in the understanding and correlation of North African basin fills and explores novel approaches to prospecting for source and reservoir rocks. The papers cover aspects of petroleum prospectivity and age-equivalent global petroleum systems, Neoproterozoic tectonics and palaeogeography, sequence stratigraphy, glacial events and global climatic models, faunal and floral evolution and the deposition of early source rocks.

The broader aim is to compare with, and learn from, well-studied Neoproterozoic successions globally, including major environmental change, the emergence of life, the global carbon cycle and implications for hydrocarbon exploration

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Late Proterozoic plate tectonics and palaeogeography: a tale of two supercontinents, Rodinia and Pannotia, C R Scotese

187Re–187Os geochronology of Precambrian organic-rich sedimentary rocks, B Kendall, R A Creaser & D Selby

Global Infracambrian petroleum systems: a review, K A R Ghori, J Craig, B Thusu, S Lüning & M Geiger

Neoproterozoic–Early Cambrian (Infracambrian) hydrocarbon prospectivity of North Africa: a synthesis, F Lottaroli, J Craig & B Thusu

Infracambrian hydrocarbon source rock potential and petroleum prospectivity of NW Africa, S Lüning, S Kolonic, M Geiger, B Thusu, J S Bell & J Craig

Infracambrian sediments in Libyan sedimentary basins, H Benshati, A Khoja & M Sola

Field-based investigations of an ‘Infracambrian’ clastic succession in SE Libya and its bearing on the evolution of the Al Kufrah Basin, D P Le Heron, J P Howard, A M Alhassi, L Anderson, A Morton & C M Fanning

Distribution of Infracambrian rocks and the hydrocarbon potential within the Murzuq and Al Kufrah basins, NW Africa, A Aziz & S Ghnia

Infracambrian petroleum play elements of the NE Taoudenni Basin (Algeria), A Rahmani, A Goucem, S Boukhallat & N Saadallah

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Late Cryogenian (Neoproterozoic) glacial and post-glacial successions at the southern margin of the Congo Craton, northern Namibia: facies, palaeogeography and hydrocarbon perspective, T Bechstädt, H Jäger, G Spence & G Werner

The 'Infracambrian System' in the southwestern margin of Gondwana, southern South America, J C Hlebszevitsch, I Gebhard, C E Cruz & V Consoli

### **3. FOR HYDROGEOLOGISTS**

#### **3. 1 Groundwater eNews Issue 40, 2009**

You can get the eNews issue 40 (2009) from the website (recently redesigned) of the IAH: <http://www.iah.org/default.asp>

“...is an international organisation for scientists, engineers and other professionals working in the fields of groundwater resource planning, management and protection. It was founded in 1956 and has grown, with the increasing social and environmental importance of groundwater, to a membership of more than 3800 members in more than 135 countries... We welcome into membership all those, from whatever country, discipline or level of technical knowledge, who want to improve their understanding of groundwater issues and support its better management. All members receive the same [member services](#)... IAH harnesses the research, knowledge, expertise and enthusiasm of its members to promote the professional management of groundwater as part of the integrated management of water resources... Our aims are to - Publish, Promote, Encourage, Sponsor, Co-operate...”

In the last issue you can read about:

[Improvements to IAH website](#)  
[Joint International Convention in Hyderabad](#)  
[Inaugural Young Earth Scientists Congress in Beijing](#)  
[New IAH Book on Groundwater Governance](#)  
[Conference Update](#)

#### **3. 2 Atlas of Water, 2<sup>nd</sup> Edition**

From SDI Africa, December Issue (<http://www.gsdi.org/newsletters> )

“...Atlas of Water, 2nd Edition (<http://www.earthscan.co.uk/?TabId=74791&v=468519> )  
The new edition of the Atlas of Water shows water distribution worldwide and reflects the latest thinking and emerging issues. It includes new maps on climate change, water for tourism, dam construction, biodiversity, and water management, commerce and legislation. With snapshots of especially vulnerable areas and major polluters as well the global picture, this is a resource for general readers as well as policy makers and students.

See: water shortage map ([http://www.earthscan.co.uk/Portals/0/PDFs/water\\_shortage.pdf](http://www.earthscan.co.uk/Portals/0/PDFs/water_shortage.pdf) ), water footprint map ([http://www.earthscan.co.uk/Portals/0/PDFs/water\\_footprint.pdf](http://www.earthscan.co.uk/Portals/0/PDFs/water_footprint.pdf) ), floods map (<http://www.earthscan.co.uk/Portals/0/PDFs/floods.pdf> )..."

#### **4. PhD, RESEARCH PROJECTS & POSITIONS**

##### **4. 1 PhD opportunity in Antarctic Crustal Research (USA)**

###### **Research Assistantship, crustal research in Antarctica, University of Minnesota-Duluth.**

"...NSF funding is available for PhD student(s) to study petrologic and isotopic evolution of the Archean-Proterozoic East Antarctic shield, including U-Pb, Hf and O isotope study of Paleozoic granites and Pleistocene glacial tills as samplers of ice covered crust. Isotopic analysis of zircon in granite can tell us about the crust from which granite was melted or with which it interacted, and petrologic, geochronological and isotopic analysis of igneous and metamorphic clasts in glacial deposits give a direct sampling of crust eroded by ice streams from the interior. Depending on their lithology, we can determine age, isotopic composition, chemical composition, P-T history, etc., for individual clasts. Together we hope to build a more complete picture of the age and composition of the East Antarctic lithosphere, which is important for understanding Antarctic crustal evolution, paleogeography of past supercontinents (Gondwana and Rodinia), and nature of the lithosphere that underlies the modern ice sheets. We will also develop more refined models for magmagenesis of a large granitic batholith system that underlies much of the modern Transantarctic Mountains. The project involves remote fieldwork in Antarctica and isotopic study abroad in collaboration with Mark Fanning (Australian National University) and Jeff Vervoort (Washington State University). We are looking for students who are hardy in the field, who are self-starters, and who excel in petrology. There is good opportunity to define a project that involves both petrology and isotope geochemistry. Preference will be given to students who have completed or are completing a MS degree, but it is not required. Familiarity with radiogenic or stable isotopes is helpful, but not required.

Students must apply to the PhD program at the University of Minnesota but will be resident on the Duluth campus ([www.d.umn.edu/geology/](http://www.d.umn.edu/geology/)).

Applications are due at the University of Minnesota **by Jan 8, 2010**.

Interested students should contact Dr. John W. Goodge,  
Professor Department of Geological Sciences  
University of Minnesota 1114 Kirby Dr. Duluth, MN 55812 USA  
Tel. 218-726-8486 Lab 218-726-7491  
Fax 218-726-8275 Email [jgoodge@d.umn.edu](mailto:jgoodge@d.umn.edu) Web <http://www.d.umn.edu/~jgoodge>"

##### **4. 2 Geoenergy Lectureship-senior Lectureship position, Durham (uk)**

"Salary: £36,532 - £52,086 per annum Non fixed-term, Full-time

The Department of Earth Sciences seeks an innovative scientist/reservoir engineer in the general field of geoenergy. We welcome applications from any sub-discipline of geoenergy, but are particularly interested in research activities relevant to future needs in energy, including clean coal and geothermal, petroleum and the sub-surface storage of waste materials (reservoir engineering, CO<sub>2</sub>, radionuclides). A clear potential to obtain substantial research funding from research councils and/or industry is essential. You will be expected to



undertake research of the highest international quality and to become involved in multidisciplinary research collaborations across Durham and external to the University. In particular, you will integrate with our 2 major energy research initiatives, the Centre for Research in Earth Energy Systems (CeREES), and the Durham Energy Institute (DEI). Other duties will include teaching on undergraduate courses and the supervision and training of postgraduate students.

The successful applicant will have knowledge and skills which provide the capacity and aptitude to work in a multi-disciplinary team and the capacity and aptitude for public engagement with key institutions and user groups.

We are a leading Earth Science Department with researchers and teachers of the highest international calibre. In the 2008 Research Assessment Exercise (RAE), 95% of our research was internationally recognised. To build on this success, we wish to expand our geoenery research profile. The Department has been extremely successful in establishing a research base in geoenery, centred around the Centre for Research in Earth Energy Systems (CeREES <http://www.dur.ac.uk/cerees/>) which is a critical part of the new Durham Energy Institute (DEI <http://www.dur.ac.uk/dei/>). It is anticipated that the successful candidate will take an active role in both of these initiatives.

We occupy a new, state-of-the-art building with bespoke research and teaching facilities. We have 28 academic staff and 70 Ph.D. students. Other major research units in the Department include: the Northern Centre for Isotopic and Elemental Tracing (NCIET) and the Centre for Terrestrial Laser Scanning (CeTLS). The Department hosts the NERC UK Ocean-Bottom Instrumentation Facility (OBIF) and is part of the University-wide Institute for Hazard and Risk Research (IHRR).

#### Our Research

The results from RAE08 revealed that 95% of the research submitted by Departmental staff was internationally recognised, with 70% at least internationally excellent (3\* and above) and 15% world leading, agenda-setting (4\*). Out of 42 institutions submitting to the Earth & Environmental Sciences unit of assessment, only 6 ranked higher using the (3\* + 4\*) criteria. The Department has recently appointed a Chair (Prof. Jon Glyas) and lecturer (Dr Simon Mathias) in Carbon Capture and Storage and has a range of research projects in this area (£0.9M). Our geoenery research activities generate £1M pa. We are rapidly expanding research capacity in this area and a CCS experimental laboratory is being developed. In addition to petroleum-related research we can lay particular claim to international research leadership in: High precision, small sample geochemistry – with specialisation in platinum group elements and isotopic microsampling; Fault reactivation, weakening and oblique tectonics; Marine geophysics of plate boundaries and margins;

#### Our Teaching

We teach a cohort of very well-qualified students in 5 undergraduate programmes: Geology BSc (Hons) Geoscience MSci (Hons) Earth Sciences BSc (Hons) Environmental Geosciences BSc (Hons) Geophysics with Geology BSc (Hons)

Admissions to Durham are highly sought after, and we typically register 80+ students each year into our program, while also participating in the University's prestigious Natural Sciences Programme. Teaching is organised as modules with teaching teams reflecting expertise, and teaching efforts monitored for equability through an annual workload algorithm. Early career staff are given reduced teaching loads.

The post is subject to standard probationary terms. Further information will be issued in the contract of employment.

Pension: Universities Superannuation Scheme (USS)

Holidays: 30 working days' holiday plus statutory holidays, and 4 'customary' holidays, normally allocated to the Christmas break

Contact for informal enquiries:

Professor Jon Gluyas  
+ 44 (0) 191 3342302  
[j.g.gluyas@durham.ac.uk](mailto:j.g.gluyas@durham.ac.uk)

Alternative Contact:  
Professor Graham Pearson  
44 (0)1913342324  
[d.g.pearson@durham.ac.uk](mailto:d.g.pearson@durham.ac.uk)

**Application Process:**

We prefer to receive applications on-line. Please attach your CV and a covering letter. Go to:  
<https://jobs.dur.ac.uk/>

We can post a vacancy details pack (including application form) to you, if you telephone our answering service on 0191 3346499 or e-mail [recruitment.team@durham.ac.uk](mailto:recruitment.team@durham.ac.uk)

Closing Date for Applications:  
05/02/2010

Shortlisting to take place: Mid February 2010

Interview Date: End March-April 2010

Prof Bob Holdsworth, NERC KE Fellow, Reactivation Research Group,  
Dept of Earth Sciences, University of Durham, Durham DH1 3LE, UK

Tel +44(0)1913342299

Fax +44(0)1913342301

e-mail (including jsg business): [R.E.Holdsworth@durham.ac.uk](mailto:R.E.Holdsworth@durham.ac.uk)

Web:

Dept: <http://www.dur.ac.uk/earth.sciences>

RRG - <http://www.dur.ac.uk/react.res/RRG> web

Geospatial Research Ltd (GRL) - [www.geospatial-research.com](http://www.geospatial-research.com)”

**4. 3 Numerical Structural Geologist Glasgow (UK)**

“...a vacancy in Midland Valley that may be of interest to some of you:

R&D Position: Numerical Structural Geologist

Midland Valley is Structural Geology software and consulting company and there is an exciting opportunity for a multi-disciplined individual to join our dynamic team. You will play a key role in the development of our core technology - structural geological restoration algorithms. You will undertake both software engineering and geological projects and will be expected to interact closely with specialists in our client companies.

Geological project work will focus on using new algorithms and developing workflows to solve problems for commercial clients in Oil and Gas, Mining and Sequestration sectors.

Requirements:

- . You will be a structural geologist with a PhD.
- . You will have an understanding of kinematic modelling
- . You will have a knowledge of geometric modelling, geomechanics, finite element, and discrete element modelling approaches
- . You will be fluent in C, C++ or equivalent
- . Experience of algorithm design and implementation to solve problems in related field
- . Excellent maths skills
- . Interested in problem solving and working as a team member
- . Excellent communication skills including fluency in English

Desirable:

- . Field work experience in deformed terrain
- . Fracture analysis and subsurface modelling

Responsibilities:



You will be a key R&D individual creating the next generation structural restoration algorithms You will be required to work on, and with, our structural geology modelling MoveTm products including programming, UI and design of algorithms. You will integrate with and work as part of the engineering team.

You will be expected to take an active role in promoting Midland Valley through technical publications, conferences, technical presentations and client visits. You will be expected to take an active role in the company and a flexible approach to working with a multi-disciplinary, multi-national team.

This position reports to the Development Team Leaders

Type: Permanent

Location: Glasgow with travel to overseas clients and locations as appropriate.

Salary: competitive salary and benefits

To apply please send a covering letter and CV to [Colin@mve.com](mailto:Colin@mve.com) ...”

#### 4. 4 Post-Doctoral position in experimental rock mechanics Rome (Italia)

“...We are seeking a highly motivated and experienced researcher for a Post-Doctoral position at the Istituto Nazionale di Geofisica e Vulcanologia (INGV) in Rome ([www.ingv.it](http://www.ingv.it)). A background in laboratory deformation experiments is desirable but not essential. The INGV monitors seismic and volcanic activity in Italy and was ranked the number one institution in volcanology and number three in seismology in terms of publication output during 2005 (worldwide enquiry by ISI Thomson). The INGV contains extensive laboratories, including world-class microscopic, geochemical and rock deformation facilities:

[http://www.roma1.ingv.it/laboratories/hp-ht-lab/high-pressure-high-temperature-laboratory-of-experimental-volcanology-and-geophysics/view?set\\_language=en](http://www.roma1.ingv.it/laboratories/hp-ht-lab/high-pressure-high-temperature-laboratory-of-experimental-volcanology-and-geophysics/view?set_language=en)

The successful applicant will join a large team of people with different backgrounds (structural geologists, geophysicists, physicists, engineers, experimentalists:

<http://roma1.rm.ingv.it/laboratori/laboratorio-hp-ht/usems/the-people>) working on a European Research Council Starting Grant Project entitled 填 ncovering the Secrets of an Earthquake: Multidisciplinary Study of Physico-Chemical Processes During the Seismic Cycle (USEMS, PI Giulio Di Toro). A summary of the USEMS project can be found at the end of this call. For further details

<http://roma1.rm.ingv.it/laboratories/hp-ht-lab/usems-project>

One goal of the project is to investigate rock properties during the seismic cycle in the upper crust, including the extreme deformation conditions typical of seismic slip (displacements up to 20 m, slip rates up to 10 m/s and normal stresses > 40 MPa). To achieve this goal, the successful applicant will take a leading role in developing and utilizing a new rock deformation apparatus recently installed at INGV. The apparatus is a rotary-shear apparatus called SHIVA (Slow to HIgh Velocity Apparatus):

<http://roma1.rm.ingv.it/laboratories/hp-ht-lab/laboratori/laboratorio-hp-ht/usems/the-shiva-apparatus>

that is designed to simulate seismic slip in the laboratory.

Applicants must have completed a PhD or expect to do so by 1 January 2010. The selection process for the position will commence on 31 December 2009. Salary and benefits for the applicant will be negotiated based on experience. The position will start commencing in March 2010 (or as soon as possible thereafter) and is expected to end in June 2013 (concomitant with the end of the USEMS project). Applicants without a PhD will be considered in very exceptional circumstances (i.e., sound knowledge of experimental techniques).

Applicants are invited to send the following material to Giulio Di Toro ([giulio.ditoro@ingv.it](mailto:giulio.ditoro@ingv.it)): <>

- 1) CV (4 pages max)
- 2) motivation letter (1 page max)
- 3) two recommendation letters..."

"...Summary of the USEMS project

Southern Europe and Turkey lie within the highest seismic risk areas in the world. Understanding the physico-chemical processes controlling earthquake generation is essential in seismic hazard assessment. Destructive earthquakes nucleate at depth (7-15 km), therefore monitoring active faults at the Earth's surface, or interpreting seismic waves, yields only limited information on earthquake mechanics. We propose to investigate earthquake processes by:

- 1) installing a new world class high velocity rock friction apparatus to perform experiments under deformation conditions typical of earthquakes;
- 2) studying fossil seismic sources now exhumed at the Earth's surface;
- 3) analyzing natural and experimental fault rock materials using a novel multidisciplinary approach involving state of the art techniques in microstructural analysis, mineralogy and petrology;
- 4) producing new theoretical earthquake models calibrated (and tightly constrained) by field observations, mechanical data from rock-friction experiments and analyses of natural and experimental fault rocks.

The integration of such a complementary data set shall provide a new insight into the mechanics of seismic faulting. The proposed study has additional implications for understanding other friction-controlled processes important in Earth sciences and hazard mitigation (e.g., rock landslides). Friction also has broad applications in the industry, including innovative but poorly understood production processes. Our experimental results will help to improve industrial milling techniques and investigate the mechanical-chemical transformations induced during milling. The latter is the basis of a new technique for the production of hydrocarbons and hydrogen from inorganic and organic materials..."

#### **4. 5 Assistant Professor Structural Geology and Tectonics, Golden (USA)**

"...Colorado School of Mines Department of Geology and Geological Engineering invites applications for an anticipated tenure-track Assistant Professor position in the field of Structural Geology and Tectonics to begin in August 2010. We seek an outstanding individual to boost the Department's reputation for cutting-edge research.

The Department has a strong tradition and international reputation in applied undergraduate and graduate education and offers an ABET accredited B.S. degree in geological engineering, as well as M.S., M.E. and Ph.D. degrees, with sub-disciplines of mineral exploration, petroleum, geological engineering, geohydrology, and geochemistry. The Department has 18 full-time faculty, 10 research

faculty, 5 supporting staff, and approximately 130 undergraduate majors and 140 graduate students. Programs are enhanced through close collaboration with the departments/divisions of Engineering, Mining Engineering, Petroleum Engineering, Geophysics, Chemistry and Geochemistry, and Environmental Science and Engineering. Information about the School and the Department can be found at <http://geology.mines.edu/>.

**Responsibilities:** The successful candidate will be expected to develop a strong and vibrant externally funded research program and establish an international reputation through publication, in addition to teaching at the undergraduate and graduate levels, directing graduate research and supervising thesis projects.

**Qualifications: Candidates must possess a doctoral degree in structural geology/tectonics or related discipline.** The successful candidate will have the demonstrated potential for high-quality research and scholarship. Research interests should complement and support existing campus programs, and candidates linking their **research in structural geology and tectonics to the evolution, exploration and development of mineral deposits are desired.** Applicants should demonstrate the potential for successful teaching and possess strong interpersonal and communication skills. **Preference will be given to applicants who can teach undergraduate and graduate courses in structural geology, tectonics, and structural aspects of mineral deposits.**

**Compensation:** Salary and benefits will be commensurate with qualifications and experience. Mines also provides an attractive benefits package including fully paid health insurance, dependent tuition benefits, parental leave policies and dependent care assistance through a flexible spending plan.

**How to Apply:** Applicants must send a letter of interest, a resume, a statement of teaching and research accomplishments and goals, and the names and contact information for a minimum of three references to: Colorado School of Mines, Human Resources Office, Search #**09-051100**, 1500 Illinois Street, Golden, CO 80401, Fax: (303) 384-2025.

Review of applications will begin by January 15, 2010.

*Mines is an EEO/AA employer and is committed to enhancing the diversity of its campus community. Women, minorities, veterans, and individuals with disabilities are encouraged to apply.*

Electronic applications are encouraged and will be accepted at [faculty.search@is.mines.edu](mailto:faculty.search@is.mines.edu). If using this method of application, please put the search number as indicated above (in bold) in the subject line to ensure that your materials are properly forwarded to the search committee..."

## 5. GEOSOURCES

### 5.1 Visit Lascaux (France) For Free

Pour une visite gratuite de la Grotte de Lascaux !

[http://www.lascaux.culture.fr/#/fr/02\\_00.xml](http://www.lascaux.culture.fr/#/fr/02_00.xml)

### 5.2 Free Software: 3D Structural and Geophysical Modelling Software for Teaching

"...The Task Group on Tectonics and Structural Geology of the IUGS (TecTask) is pleased to announce that the 3D Structural and Geophysical Modelling Software "Noddy" is now available at no cost to TecTask members (and membership is free!). For more information about Noddy, please visit the information page at the TecTask site <http://www.tectask.org...>"

### 5.3 Earth More Sensitive to Carbon Dioxide Than Previously Thought

Thanks to ScienceDaily (<http://www.sciencedaily.com> )

*ScienceDaily* (Dec. 7, 2009) — “In the long term, the Earth's temperature may be 30-50% more sensitive to atmospheric carbon dioxide than has previously been estimated, reports a new study published in *Nature Geoscience*...

<http://www.sciencedaily.com/releases/2009/12/091206162955.htm> ”

### 5.4 Geologic Time Scale: Eons and Eras

Thanks to Andrew (<http://geology.about.com/library/bl/time/blgeotimescale.htm?nl=1> )

“...All of geologic time, from the Earth's origin about 4600 million years ago to today, is divided into three eons. The first two eons, Archean and Proterozoic, and their seven eras are together informally referred to as [Precambrian time](#). The informal term "Hadean" refers to time before 4 billion years ago (Ga). See summaries of the [Archean Eon](#) and the [Proterozoic Eon](#)...”

### 5.5 The LME Concept

Thanks to The Encyclopedia of Earth (<http://www.eoearth.org> )

“...The concept of large marine ecosystems (LME) emerged from an American Association for the Advancement of Science Symposium in the mid 1980s concerning the variability and management of large marine [ecosystems](#)<sup>[1]</sup>. Dr. Kenneth Sherman of the United States (US) [National Oceanic and Atmospheric Administration's](#) (NOAA) National Marine Fisheries Service and Dr. Lewis Alexander of the University of Rhode Island pioneered the concept of LMEs. Sherman, Alexander, and several others around the world recognized that large areas of the [oceans](#) function as ecosystems, and that pollution from air, land, and water and [overexploitation](#) of living resources, along with natural factors, influence the varying productivity of these ecosystems...  
[http://www.eoearth.org/article/Large\\_marine\\_ecosystems](http://www.eoearth.org/article/Large_marine_ecosystems)”

### 5.6 “Earth On Fire”

Thanks to Geoportalen: <http://www.geoportalen.no/>

“...If you think that all volcanoes have to offer are fireballs, ash and noxious gas, let geologist and photographer Bernhard Edmaier educate you. His new book *Earth on Fire* is a fantastic showcase of geothermal phenomena around the world, from the well known to the not so well known, newscientist.com says... <http://www.newscientist.com/gallery/eoff/>”

### 5.7 Image of the Day: Erg Iabes Adrar (Algeria)

Thanks to NASA: <http://earthobservatory.nasa.gov/>

“...Vast, windswept plains of sand dunes (*ergs*), occasionally interrupted by rocky outcrops, stretch across much of [Algeria](#) in a giant C-shape. Except for exceedingly rare oases, these seas of sand are usually empty of life, including human civilization...

<http://earthobservatory.nasa.gov/IOTD/view.php?id=41476&src=ea-iotd>”

## 6. PETROLEUM GEOLOGY

Thanks to Petroleum Africa (<http://petroleumafrica.com/index.php> )

### **Egypt and Algeria NOCs to Establish JV Exploration Company**

“...December, 7<sup>th</sup> 2009 Egypt and Algeria are joining forces in an oil and gas venture. According to Mohamed Meziane, head of Algeria’s state-owned energy firm Sonatrach, the state-run firm is setting up an oil and gas joint venture with two Egyptian national companies.

“We could invest around maybe \$15 billion but it is not settled yet,” Meziane told Reuters in an interview. “We are in the way of preparing for the board meeting and the general assembly, which will decide on the amount and the policy of investment for the next year and five years coming.”

Sonatrach will also meet with Egyptian counterparts from state-owned firms Egyptian Natural Gas Holding Company (EGAS) and Egyptian General Petroleum Corporation (EGPC) to discuss setting up the joint venture. Sonatrach will hold a 50% stake in the new company, dubbed Selena, with EGPC and EGAS holding the remaining 50%.

"They will be in charge of exploration and production to find oil and gas in Egypt, Algeria and in third countries," Meziane said. Meziane said Selena was considering Africa and wherever opportunities arise. He also told Reuters that he was looking to establish the company, "as soon as possible."

The firm will alternate its presidency between Egypt and Algeria with offices in both countries. “If the president is Algerian then the vice president will be Egyptian ... and they will alternate every three or four years,” Meziane said...”

## 7. CALL FOR PAPERS: Special Publication African Earth History

Thanks to Dr. Douwe J.J. van Hinsbergen

“...Dear all,

This message is directed to those of you who work on Africa’s geology, geochemistry and geophysics. ..Two weeks ago, the ‘Out of Africa’ conference was held in Johannesburg, South Africa, honouring the 80th birthday of Kevin Burke, and the 60th birthday of Lew Ashwal. Associated with this conference, we invite contributions to a Special Publication of the Geological Society of London, with a working title of ‘Out of Africa: a synopsis of 3.8 Ga of Earth History’.

We invite contributions from all Earth Scientific disciplines, centered around four themes: 1) the origin and evolution of the African continental crust and lithosphere; 2) the plate tectonic evolution of Africa throughout Earth History, but especially since Pangea times; 3) lessons learned from modern geophysical observations and landscape evolution and 4) links between the African plate geology and the underlying shallow and deep mantle.

Approximately 20 contributions have been promised so far, and we foresee a significant volume relevant for all who work on African geology and geophysics. The Special Publications of the Geological Society are available online, and are listed in citation counters such as Scopus.

If you are interested in contributing, please contact one of the editors with a preliminary title and author list, preferably no later than December 20, 2009

Deadlines:

December 20, 2009: Preliminary title and author list

March 31, 2010: Submission deadline

December 31, 2010: Final manuscript submitted to Geological Society

Summer 2011: Publication

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With best regards, on behalf of all editors,

Dr. Douwe J.J. van Hinsbergen

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## **8. REMINDER: BE READY FOR CAG 23 at Johannesburg (South Africa)**

Thanks to Dr Hassina Mouri

“...Dear Colleagues and Friends:

On behalf of the LOC of the **23rd Colloquium of African Geology (CAG23)**, I would like to inform you that **CAG23** is officially planned and confirmed for **January 8-14/2011**. This will be followed by several excursions to various interesting and fascinating geological sites in the country. The CAG23 will be organised by the **University of Johannesburg (South Africa)** in cooperation with the University of Wits, the Geological Society of South Africa (GSSA), the Mineralogical Association of South Africa (MINSA) and the Nuclear Energy Corporation of South Africa (NECSA) under the auspices of the **Geological Society of Africa (GSAf)**. The event will take place at the Auckland Park Campus of the University of Johannesburg, while the opening ceremony will take place on the “**Soweto**” Campus located in the core of the historical city of “Soweto”. Please find attached an extended invitation. Further information and details on the event will be posted on the CAG website towards the end of August. Meanwhile if you need any information, please don't hesitate to contact me. We thank you in advance for your interest and we look forward to seeing you in South Africa during summer 2011. With best wishes...”

Dr Abdelkader Saadallah Board Member (C N Africa) of GSAf ([kader@saadgeo.com](mailto:kader@saadgeo.com)), Stavanger  
December 17<sup>th</sup> 2009