



AFRICAARRAY NEWSLETTER

Volume 1, Issue 4

July 2009

Welcome to the 4th edition of the AfricaArray newsletter. AfricaArray is first and foremost an educational initiative to support postgraduate students, so it gives us great pleasure to highlight here the first AfricaArray students to complete M.Sc. and Ph.D. degrees. Many other students also are making good progress toward completing their degrees, and we look forward to them joining the growing ranks of AfricaArray alumni!

As we progress through the 4th year of the AfricaArray seismic network, the number of stations continues to grow as does the network's geographical reach. The network now has a solid presence in West Africa, and data are available in near-real time from some stations in eastern and southern Africa recently upgraded with cellular telemetry or Internet hookups.

Thanks to the dedicated effort by many AfricaArray partners, we anticipate another successful year as we continue expanding and upgrading of the AfricaArray network and the graduation of a new cohort of students.

Andy Nyblade and Paul Dirks,
Co-Directors, AfricaArray

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AfricaArray Science Achievements: Discovering New Features of the African Crust and Upper Mantle

The scientific contributions by AfricaArray students, postdocs, faculty and associates this year has indeed been impressive!

Nineteen papers have been published or accepted for publication, four papers are in review, three technical reports to sponsors have been completed, 12 invited talks have been given at universities, government institutions and international meetings, and more than 30 contributed technical papers have been presented at international conferences.

Later this year, many of these papers will be published in a special AfricaArray issue of the *South African Journal of Geology* (see p. 3) edited by Ray Durrheim, Paul Dirks and Andy Nyblade.

To provide a more in-depth perspective on the scope of the research being done by AfricaArray students and postdocs, we have excerpted below abstracts from three studies.

1) Kgaswane, E.M., A. Nyblade, J. Julia, P. Dirks, R. Durrheim, and M. Pasyanos, Shear Wave Velocity Structure of Southern African Crust: Evidence for Compositional Heterogeneity within Archaean and Proterozoic Terrains, *Journal of Geophysical Research*, in review.

The nature of the lower crust across the southern African shield has been investigated by jointly inverting receiver functions and Rayleigh wave group velocities for 89 broadband seismic stations

located in Botswana, South Africa and Zimbabwe. For large parts of both Archean and Proterozoic terrains, the velocity models obtained from the inversions show shear wave velocities > 4.0 km/s below ~ 20 -30 km depth, indicating a predominantly mafic lower crust.

However, much of the Kimberley terrain and adjacent parts of the Kheis Province and Witwatersrand terrain in South Africa, as well as for the western part of the Tokwe terrain in Zimbabwe, shear wave velocities of < 3.9 km/s are found below ~ 20 -30 km depth, indicating an intermediate-to-felsic lower crust. The crust in these areas is also slightly (~ 5 km) thinner than in areas where the lower crust has a mafic composition. The areas of intermediate-to-felsic lower crust in South Africa coincide with regions where Ventersdorp rocks have been preserved, suggesting that the more evolved composition of the lower crust, as well as the shallower Moho, may have resulted from crustal reworking and extension during the Ventersdorp tectonomagmatic event at c. 2.7 Ga.

2) Brandt, M., S. Grand, A. Nyblade, and P. Dirks, Upper Mantle Seismic Structure beneath Southern Africa – Constraints on the Buoyancy Supporting the African Superswell, *Journal of Geophysical Research*, in review.

We present new one-dimensional (1-D) shear (SH) wave velocity models of the upper mantle

beneath southern Africa obtained from waveform inversion of triplicated seismic phases.

The seismic waveform data produced by $M_w=5.9$ and $M_w=5.8$ earthquakes located near Lake Tanganyika in East Africa were recorded by passive arrays sampling eastern-, central- and western southern Africa. The velocity beneath the Kalahari craton (eastern- and central southern Africa) is similar to other shields except for slightly slower velocities from 130 km to 200 km depth. The difference may be due to higher temperatures or a decrease in Mg# due to metasomatism or some combination of the two. For a difference solely due to a temperature anomaly slightly less than half the unusually high elevation of the Kalahari can be explained by shallow lithosphere buoyancy, but a change in Mg# of only 1 implies little to no shallow buoyancy. We determine a thickness of 250 km for the mantle transition zone below the whole of southern Africa which is similar to the global average, but the velocity gradient is steeper than in standard global models (PREM and IASPEI) for the transition zone. We also find larger velocity jumps across both the 410 and 660 km discontinuities.

Our results indicate upwelling from the "African Superplume" may affect the mantle transition zone although an alternative explanation is that the transition zone shear wave seismic structure

in global reference models needs to be refined.

3) Hansen, S., A. Nyblade, J. Julia, P. Dirks, and R. Durrheim, (2009), Low Velocity Zone Structure Beneath the Kaapvaal Craton from S-wave Receiver Functions, *Geophysical Journal International*, doi: 10.1111/j.1365-246X.2009.04178.

The southern African Plateau is marked by anomalously high elevations, reaching 1–2 km above sea level, and there is much debate as to whether this topography is compensated by a lower mantle source or by elevated temperatures in the upper mantle.

In this study, we use S-wave receiver functions (SRFs) to estimate the lithospheric thickness and sublithospheric mantle velocity structure beneath the Kaapvaal craton, which forms the core of the Plateau. To fit the SRF data, a low-velocity zone (LVZ) is required below a <160-km-thick lithospheric lid, but the LVZ is no thicker than <90 km. Although the lid thickness obtained is thinner than that reported in previous SRF studies, neither the lid thickness nor the shear velocity decrease (<4.5%) associated with the LVZ is anomalous compared to other cratonic environments.

Therefore, we conclude that elevated temperatures in the sublithospheric upper mantle contribute little support to the high elevations in this region of southern Africa.

Papers in Press for the AfricaArray special issue of the South African Journal of Geology

Amponsah, P.E., B. K. Banoeng-Yakubo, G. F. Panza, and F. Vaccari, Deterministic seismic ground motion modeling of the greater Accra metropolitan area, south-eastern Ghana.

Dugda, M., A. Nyblade and J. Julia, S-wave velocity structure of the crust and upper mantle beneath Kenya in comparison to Tanzania and Ethiopia: Implications for the formation of the East African and Ethiopian plateaus.

Gwavana, O., and R.T. Ranganai, The geology and structure of the Masvingo greenstone belt and adjacent granite plutons from geophysical data, Zimbabwe craton.

Hansen, S., A. A. Nyblade, and J. Julia, Estimates of crustal and lithospheric thickness in sub-Saharan Africa from S-wave receiver functions.

Julia, J., A. Nyblade, R. Durrheim, L. Linzer, R. Gok, W. Walter, S. Spottiswoode, and P. Dirks, A Wadati filter for mine-induced seismicity.

Kim, S., C. Baag, and A. Nyblade, Crustal velocity structure of Rukwa rift zone in the western branch of East African rift system.

Mavonga, G.T. and R.J. Durrheim, Probabilistic seismic hazard assessment for the Democratic Republic of Congo and surrounding areas, western rift valley of Africa.

Mulibo, G. D., and A. Nyblade, The 1994-1995 Manyara and KwaMtoro earthquake swarms: Variations in the depth extent of seismicity in northern Tanzania.

Okal, E.A., H.M Fritz, and A. Sladen, 2004 Sumatra-Andaman tsunami surveys in the Comoro Islands and Tanzania and regional tsunami hazard from future Sumatra events.

Okal E.A., and C. Hartnady, The South Sandwich Islands earthquake of 27 June 1929: Seismological study and inference on tsunami risk for the South Atlantic.

Tugume, F., and A. Nyblade, The depth distribution of seismicity at the northern end of Rwenzori Mountains: Implications for heat flow in the western rift, Uganda.

Papers published or in press 2008-2009 (not in the AA special issue)

Bastow, I.D., A. Nyblade, G.W. Stuart, T.O. Rooney, and M.H. Benoit, (2008), Upper mantle seismic structure beneath the Ethiopian hotspot: Rifting at the edge of the African low velocity anomaly, *Geochemistry, Geophysics, and Geosystems* (G-cubed), doi:10.1029/2008GC002107.

Hansen, S., A. Nyblade, J. Julia, P. Dirks and R. Durrheim, (2009), Low velocity zone structure beneath the Kaapvaal craton from S-wave receiver functions, *Geophysical Journal International*, doi: 10.1111/j.1365-246X.2009.04178.

Huerta, A., A. Nyblade, and A. Reusch, (2009), Mantle transition zone structure beneath Kenya and Tanzania: More evidence for a deep-seated thermal upwelling in the mantle, *Geophysical Journal International*, doi:10.1111/j.1365-246X.2009.04092.

Julia, J., A. Nyblade, R. Durrheim, L. Linzer, R. Gok, P. Dirks, and W. Walter, (2009), Source mechanisms of mine-related seismicity, Savuka Mine, South Africa, *Bull. Seis. Soc. Am.*, in press.

Kgarume, T.E., S.M. Spottiswoode and R.J. Durrheim, (2009), Statistical properties of mine tremor aftershocks, *Pure and Applied Geophysics*, in press.

Nyblade, A., P. Dirks, R. Durrheim, S. Webb, M. Jones, G. Cooper, G. Graham, (2008) AfricaArray: Developing a Geosciences Workforce for Africa's Natural Resource Sector, *The Leading Edge*, vol. 27, pages 1358-1361.

Singh, M., A. Kijko, and R. Durrheim, (2009), Seismotectonic models for South Africa: Synthesis of geoscientific information, problems, and the way forward, *Seismological Research Letters*, 80,71- 80.

Spottiswoode, S.M., R.J. Durrheim and I. Saunders, (2009), Mining-related earthquakes in South Africa: Induced, triggered or tectonic? *Pure and Applied Geophysics*, in press.

Update on AfricaArray Seismic Network

Over the past year, significant progress has been made in operating, maintaining, upgrading and expanding both the AfricaArray permanent network and three project-specific temporary networks.

AfricaArray Permanent Network

The permanent seismic network has grown to 36 stations spanning 16 countries, including three in West Africa (Cameroon, Nigeria and Ghana). New stations also have been added in Ethiopia, Ghana, Nigeria, and Rwanda. The stations in Nigeria belong to the Nigerian National Network of Seismological Stations (NNNSS) and are operated by the Centre for Geodesy and Geodynamics within the National Space Research and Development Agency, located at Toro. The NNNSS will grow to seven stations when completed by the end of 2009.

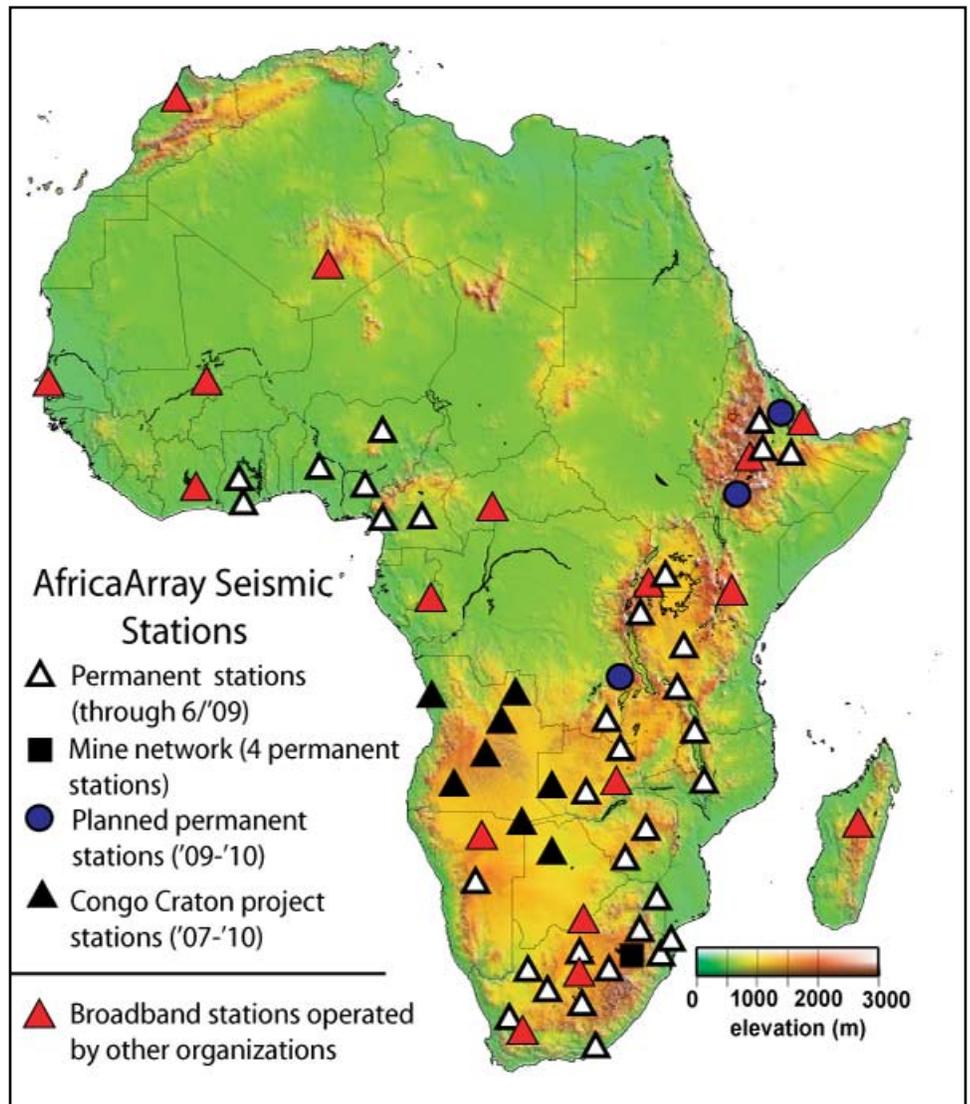
The stations in Ghana belong to the seismic network operated by the Geological Survey Department in Accra. AfricaArray has provided data loggers and sensors to refurbish these stations. The stations in Rwanda and Ethiopia are new stations built by the Rwanda Geological Survey and Addis Ababa University, respectively, using equipment provided by AfricaArray.

In the coming year and with continued support from the U.S. National Science Foundation, we anticipate upgrading the data loggers at many of the AfricaArray stations, and where possible, installing cell modems or Internet hookups to gain access to the data in near-real time.

AfricaArray temporary networks

1) Congo craton project:

The temporary network for this project includes eight stations, shown on the map above, in

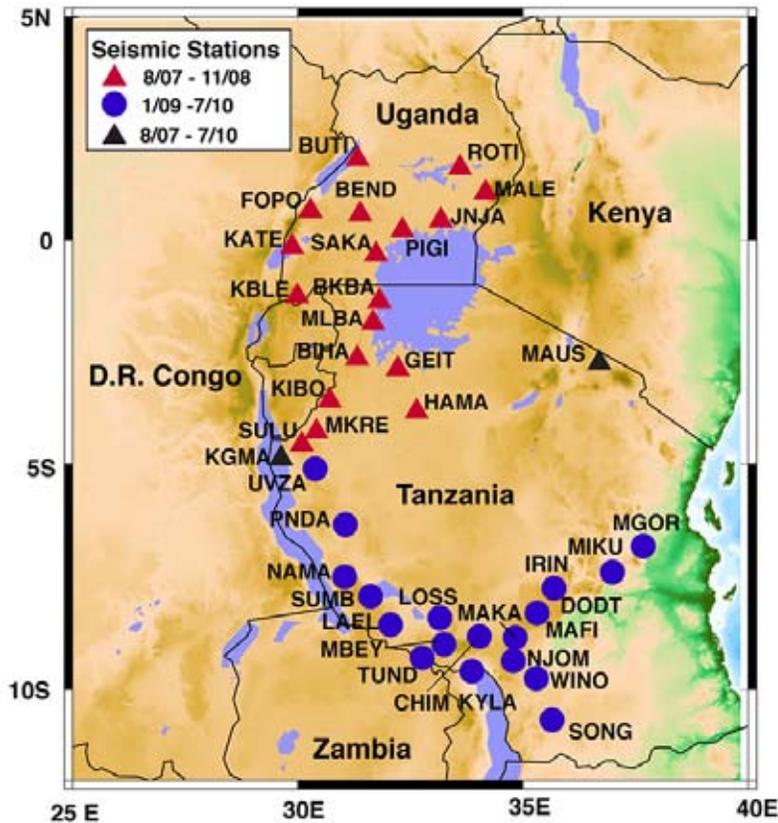


Angola that are part of the Angola national seismic network, and one each in Zambia (Mongu), Botswana (Maun), Namibia (Rundu) and Angola (Lucapa) operated by AfricaArray. It is anticipated that most of the stations will become part of the permanent seismic network upon completion of the project in 2010. This project is supported by BHP Billiton, De Beers, and Rio Tinto.

2) Mine network, Carletonville, South Africa:

Four stations were installed in 2006-2007 around three gold mines in the Carletonville mining region in South Africa as part of a project funded by the U.S. Department of Energy to study mining related seismicity. The stations have recently been upgraded by the Council for Geoscience and are now part of the permanent AfricaArray network. The location of the mine network is shown with a solid square on the map.

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3) Uganda-Tanzania network:
 The AfricaArray network in Uganda and Tanzania has been deployed in two stages. From August 2007- November 2008, 20 stations were deployed, as shown on the map (left), in Uganda and northwestern Tanzania along the western branch of the East African Rift System. In December 2008 and January 2009, the stations were moved to new locations in western and southern Tanzania. Equipment for the project has been provided by the IRIS PASSCAL program, and financial support by the U.S. National Science Foundation. The stations will be removed in July and August, 2010.

| | |
|---|-------------------|
| New stations in permanent network: | |
| Kigali, Rwanda | Ankober, Ethiopia |
| Ife, Nigeria | Kaduna, Nigeria |
| Nsukka, Nigeria | Shai Hills, Ghana |
| Kukurantumi, Ghana | |

2009 Summer Field Course

The AfricaArray International Geophysics Field School is the only one of its kind in Africa and every year hosts participants from a variety of African countries, Europe and the U.S. This year we welcomed participants who originated from Botswana, Cameroon, Democratic Republic of Congo, Ethiopia, Germany, Madagascar, Namibia, Nigeria, Swaziland, South Africa, Uganda, Ukraine, United Kingdom, U.S., and Zimbabwe. This was quite a cultural experience!

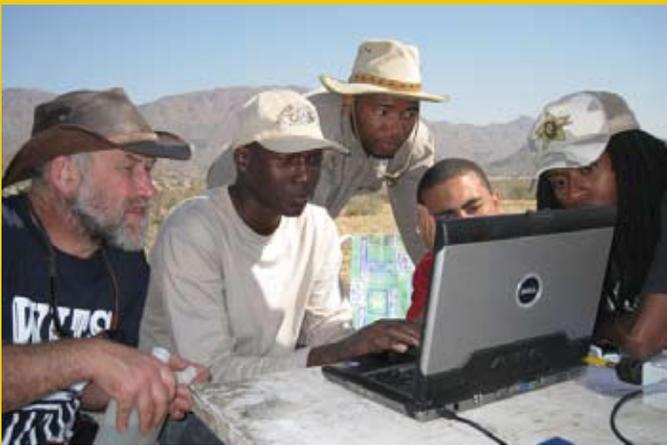
The field school format is based on a two-tier training system. Graduate students who have previously attended the field camp as students return as instructors. This gives the graduate students teaching, supervision and practical logistics experience in a setting supervised by more senior staff.

The program is divided into three phases. In the first phase, students are introduced to the geology of the region and then design geophysical surveys to solve specific problems. In this phase, they must also estimate the cost of their survey. In the second phase, students travel to the eastern Bushveld Complex and collect and process a variety of geophysical data. In the third and final phase, they interpret and integrate the data into final reports.

A highlight this year was a visit to the new Smokey Hills open cast platinum mine in the eastern Bushveld Complex.

The field school was hosted at the University of the Witwatersrand and the Anglo Platinum Driekop exploration camp. This year's focus was to untangle a

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web of intersecting dykes to determine if there was undisturbed ground between the dykes that might host mineable resources in addition to determining the dip of the host lithologies. The methods we employed included magnetics, gravity, resistivity, refraction seismic, dGPS, EM31 and ground penetrating radar.

Finally, we cannot run the field school without our very generous sponsors. Anglo American and Anglo Platinum continued their generous support of equipment, logistics and accommodation. Under the "Projects of Special Merit," the Society of Exploration Geophysics Foundation awarded the field school a generous grant of \$14,000! This money was used to fund participants from outside of South Africa (Madagascar, Zimbabwe, Nigeria, and Uganda). That

funding relieved a substantial burden on local students, who often struggle to pay the field school expenses. The U.S. participants were funded through a generous NSF/PIRE grant. Additional sponsors included the Council for Geoscience, AfricaArray, CSIR, Geosoft, Penn State and Wits. We thank you all!

Photos from 2008 Field Course



Our Sponsors

We gratefully acknowledge our supporters, a diverse number of public and private partners, that include:

- Anglo American
- African Rainbow Minerals
- Anglo Gold Ashanti
- Anglo Platinum
- Belgium Technical Cooperation Agency
- BHP Billiton
- BP
- Council for Geoscience (South Africa)
- Council for Scientific and Industrial Research (South Africa)
- DeBeers
- Department of Energy (U.S.)
- Department of Minerals and Energy (South Africa)
- Department of Science and Technology (South Africa)
- ExxonMobil
- Geosoft
- Great Northern
- ISS International
- London Bullion Market Association
- Marathon Oil
- Mineral Education Trust Fund (South Africa)
- National Science Foundation (U.S.)
- National Research Foundation (South Africa)
- Pennsylvania State University
- Rio Tinto
- Royal Museum for Central Africa (Belgium)
- Schlumberger
- SEG Foundation
- Sonangol
- Total, and Total Professors Association
- University of the Witwatersrand
- University of Texas

A complete listing of partners can be found on the AfricaArray Web site

www.africaarray.org

This past year the first AfricaArray M.S. and Ph.D. students completed their degrees. We congratulate them and share with you a few details about their research results.



Stephen Coomber -- Masters Degree, University of the Witwatersrand
Country: South Africa
Thesis Title: Gravity modeling in the western Bushveld Complex, South Africa, using integrated geophysical data
Advisor: Sue Webb
Sponsor: Anglo Platinum, National Research Foundation, University of the Witwatersrand and SEG Foundation

Stephen used the gravity method to investigate a sector of the western Bushveld Complex, south of the Pilaesberg intrusion, where there are valuable PGE deposits in the Merensky Reef and UG2. To map the disposition of the Merensky Reef, Stephen inverted gravity data, with modeling constraints provided by borehole information and seismic reflection data. After graduation, Stephen first worked for AngloAmerican in South Africa and then joined Electromagnetic Geoservices in Trondheim, Norway.



Mark Hamilton -- Ph.D. Degree, University of the Witwatersrand
Country: South Africa
Thesis Title: Electrical and seismic anisotropy of the lithosphere with the focus on central southern Africa
Advisor: Alan Jones, Sue Webb
Sponsor: Dublin Institute for Advanced Studies; Southern African Magnetotelluric Experiment (SAMTEX)

For his Ph.D. thesis, Mark investigated electrical anisotropy in the southern Africa lithosphere using magnetotelluric (MT) data recorded by the Southern African MT Experiment (SAMTEX). He compared the electrical anisotropy with seismic anisotropy inferred from an SKS shear-wave splitting study in the same region. Mark concluded that the causative region for the seismic anisotropy in the lithospheric mantle has either a correspondingly weak electrical anisotropic signature, or is more prominent at greater lithospheric depths than indicated by MT sounding. After graduation, Mark joined Electromagnetic Geoservices in Trondheim, Norway.

Gabriel Daudi Mulibo - Masters Degree, The Pennsylvania State University
Country: Tanzania
Thesis Title: The origin of earthquake swarms along the eastern branch of the East African rift system in Tanzania
Advisor: Andrew Nyblade
Sponsor: National Science Foundation; The Pennsylvania State University



In his thesis, Gabriel Mulibo investigated seismicity within two earthquake swarms in northern Tanzania, recorded by the 1994-1995 Tanzania Broadband Seismic Experiment through event relocation, modelling of regional depth phases and examination of focal mechanisms. His results show a strong correlation between the orientation of the swarms, the orientation of nodal planes in focal mechanisms, and the strike of nearby extensional structures, suggesting that events in these swarms are consistent with slip on rift faults. Gabriel is continuing his postgraduate studies and is investigating the seismic velocity structure of the East Africa lithosphere for his Ph.D.



Stephanie Scheiber -- Masters Degree, University of the Witwatersrand
Country: South Africa
Advisor: Peter LaFemina, Sue Webb
Thesis Title: Geodetic investigation of Torfajokull volcano, Iceland

Stephanie participated in a research programme investigating the magma plumbing system of the silicic central volcano Torfajokull in southern Iceland. Geodetic

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surveys have been carried out at sites around the volcano every year since 2000. Her MSc project involved the processing and 3-D modeling of this GPS data in an attempt to gain insight into the inner workings of this volcano. After graduation, Stephanie wanted to experience a different culture and moved to South Korea to teach English.

Fred Tugume -- Masters Degree,
The Pennsylvania State University
Country: Uganda
Thesis Title: The depth distribution of seismicity at the northern end of the Rwenzori Mountains: Implications for heat flow in the western rift, Uganda
Advisor: Andrew Nyblade
Sponsor: National Science Foundation; The Pennsylvania State University



For his M.Sc. thesis, Fred used data from a 6-month deployment of seismic stations around the northern end of the Rwenzori Mountains to investigate the depth extent of seismicity and its implications for heat flow in the western branch of the East Africa rift system in Uganda. Fred found that the number of earthquakes increases with depth, peaking at 16 km and falling sharply by 22 km. Strength envelope models indicate that heat flow in the range of 54 mWm⁻² to 66 mWm⁻² is required to explain this result, which is similar to heat flow in other mobile belts in East Africa away from major rift valleys. Fred is continuing with his postgraduate studies (Ph.D.) by using data from a recent seismic deployment in Uganda to investigate seismicity in the Western branch of the rift system and crustal structure.

New AfricaArray Staff



Antonia (Toni) Mooney, who joined the AfricaArray team in September 2008, has financial and administrative responsibilities for the AfricaArray program at Penn State. Mooney has served as an administrative assistant at Penn State for 12 years. She has extensive knowledge and experience working with undergraduates, graduates, staff and faculty. She can be reached at aqm3@psu.edu.

B.Sc. (Honours) students (2009)

Ashley Anthony, South Africa
Phetsile Dlamini, Swaziland
Bufelo Lushetile, Namibia
Andreas Runone, Namibia
Oleg Brovko, South Africa
Alain Kemgne, Cameroon
David Ngobeni, South Africa
Keoagile Tshitlho, Botswana

Current M.Sc. Students

Mayshree Bejaichund (Singh), South Africa, Wits
Sponsor: National Research Foundation, Council for Geoscience
Thesis: Assessing the potential for earthquake generated ground motion
Thesis Advisors: Paul Dirks, A.K. Kijko

Michelle Grobbelaar, South Africa, Wits
Sponsor: National Research Foundation, Council for Geoscience
Thesis: Blast measurements and interpretation
Thesis Advisors: Arthur Cichowicz, Ray Durrheim

Marinda Havenga, South Africa, Wits
Sponsor: Council for Geoscience
Thesis: A structural analysis of the geophysical relationship between linear features and plug-like bodies of sheets 2229ab and 2229ad in the Limpopo Province, South Africa
Thesis advisors: Sue Webb, Jay Barton

Celeste Johnson, South Africa, Wits
Sponsor: National Research Foundation
Thesis: Wavelet and semblance analysis of geophysical borehole data from the Bushveld Complex
Thesis advisors: Sue Webb, Gordon Cooper, Fabio Frescura

Thabang Kgarume, South Africa, Wits
Sponsor: Council for Scientific and Industrial Research, National Research Foundation
Thesis: Hazard posed by aftershocks of mine tremors
Thesis Advisors: Steve Spottiswoode (CSIR), Ray Durrheim

David Khosa, South Africa, Wits
Sponsor: Dublin Institute for Advanced Studies and Southern African Magnetotelluric Experiment (SAMTEX)
Thesis: Electromagnetic imaging of the southern African lithosphere
Thesis advisor: Alan Jones

Lesiba Ledwaba, South Africa, Wits
Sponsor: Impala Platinum
Thesis: Seismic damage mechanism at Impala platinum mines
Thesis advisors: Steve Spottiswoode (CSIR), Ray Durrheim

Leticia Loots, South Africa, Wits
Sponsor: Council for Geoscience and Inkaba Ye Afrika
Thesis: Processing and interpretation of a reflection seismic profile across the Cape Fold Belt
Thesis advisors: Michael Weber (GFZ, Germany), Ray Durrheim

Musa Manzi, South Africa, Wits
Sponsor: Gold Fields
Thesis: Interpretation of 3D vibroseis data from the Carletonville

goldfield, Witwatersrand Basin
Thesis Advisors: Ray Durrheim, Kim Hein

Azangi Mangongolo, D.R. Congo, Wits
Sponsor: AA Congo Craton Project, BHP Billiton, De Beers and Rio Tinto
Thesis: 3-D surface wave tomography of the SW block of the Congo craton
Thesis advisors: Andy Nyblade, Ray Durrheim

Kudzanayi Mgodzi, Zimbabwe, Wits
Sponsor: Geological Survey of Norway
Thesis: Tectonic setting of the sedimentary basins in Africa
Thesis advisors: Paul Dirks, Guy Charlesworth

Isaac Mulamba, D.R. Congo, Wits
Sponsor: AA Congo Craton Project, BHP Billiton, DeBeers and Rio Tinto
Thesis: Crustal structure in southwestern Africa
Thesis Advisors: Andy Nyblade and Ray Durrheim

Richard Munyai, South Africa, Wits
Sponsor: National Research Foundation
Thesis: Structural controls and 3-D geometry of gold mineralization at Consort Gold Mine and along the northern margin of the Archaean Barberton Greenstone Belt, Barberton
Thesis Advisor: Paul Dirks

Stewart Rouse, U.S., Penn State
Sponsor: National Science Foundation, Penn State
Thesis: Sn and Pn velocity structure of the Ethiopian upper mantle
Thesis advisor: Andy Nyblade

Pieter-Ewald Share, South Africa, Wits
Sponsor: Southern African Magnetotelluric Experiment, CSIR, National Research Foundation
Title: MT investigations in southern Africa
Thesis advisors: Alan Jones, Sue Webb

Jose Maria Wanassi, Angola, Wits and Agostinho Neto University
Sponsor: AA Congo Craton Project, BHP Billiton, De Beers and Rio Tinto
Thesis: Seismicity and seismic hazard in Angola
Thesis Advisors: Andy Nyblade, Paul Dirks and Ray Durrheim

Current Ph.D. Students

Aubrey Adams, U.S., Penn State
Sponsor: National Science Foundation
Thesis: Seismic velocity structure of the upper mantle in eastern and southern Africa from Rayleigh wave tomography
Thesis advisor: Andy Nyblade

Nada Ahmed, Sudan, Wits
Sponsor: Schlumberger
Thesis: Crustal structure of Sudan
Thesis advisors: Andy Nyblade, Ray Durrheim

Binyam Beyene, Ethiopia, Wits
Sponsor: U.S. Department of Energy

Thesis: Source mechanism of mine induced earthquakes from Carletonville Mining District, South Africa, using amplitude-spectra moment tensor inversion
Thesis advisors: Ray Durrheim, Jordi Julia

Martin Brandt, South Africa, Wits, University of Texas-Austin
Sponsor: National Science Foundation and Council for Geoscience
Thesis: Imaging the African Superplume using AfricaArray broadband seismic data
Thesis advisors: Steve Grand (U. Texas), Gordon Cooper, Ray Durrheim

Zibusiso Gumede, South Africa, Wits
Sponsor: National Research Foundation
Thesis: Interpretation techniques for potential field methods in Africa
Thesis advisors: Gordon Cooper, Ray Durrheim

Eldridge Kgaswane, South Africa, Wits
Sponsor: National Science Foundation and Council for Geoscience
Thesis: Crustal and upper mantle structure in southern Africa from modeling receiver functions and surface wave dispersion
Thesis advisors: Andy Nyblade, Paul Dirks, Jordi Julia

Tarzan Kwadiba, Botswana, Wits
Sponsor: Botswana Geological Survey, the Kellogg Foundation, and National Science Foundation
Thesis: Determination of the structure of the southern African lithosphere by the tomographic inversion of body wave arrival times
Thesis advisors: Ray Durrheim, David James (CIW)

Gabriel Daudi Mulibo, Tanzania, Penn State
Sponsor: Penn State and National Science Foundation
Thesis: Seismicity and lithospheric structure in Tanzania
Thesis advisor: Andy Nyblade

Angela Reusch, U.S., Penn State
Sponsor: National Science Foundation
Thesis: Upper mantle structure beneath Cameroon and the origin of the Cameroon volcanic line
Thesis advisor: Andy Nyblade

Getachew Ebuy Tedla, Ethiopia, International Training Center, Enschede University
Sponsor: International Training Center
Thesis: Gravity and African tectonics
Thesis advisor: Mark van der Meijde

Fred Tugume, Uganda, Penn State
Sponsor: Penn State and National Science Foundation
Thesis: Crust and upper mantle structure of the western branch of the East African rift system
Thesis advisor: Andy Nyblade

Georges Mavonga Tuluka, D.R. Congo, Wits
Sponsor: Belgium Technical Cooperation Agency
Thesis: Geohazard assessment for Democratic Republic of Congo and the surrounding areas, western rift valley of Africa
Thesis advisor: Ray Durrheim

AfricaArray Diversity Programmes in Africa, U.S.

AfricaArray is committed to enhancing the diversity of the geosciences workforce and is pioneering programmes both within Africa and the U.S. to provide new opportunities for students from diverse backgrounds. Supporting these innovative efforts is a broad coalition of industry, government and academic partners that understand the value and necessity of diversifying the geosciences for today's global environment.

Through AfricaArray, the University of the Witwatersrand is working to increase the number of both black undergraduate and black postgraduate students in the geosciences. A key initiative has been the expansion of the University's geophysics field school, which is part of the B.Sc. Honours curriculum, to students interested in geophysics from across the African continent. The University also has created the first South African Research Chair with responsibility for training the next generation of post-graduate students. Industry is helping to increase diversity, too. The Schlumberger Foundation, for example, has provided support for three women (two postdocs and one Ph.D. student) to study seismology, and the BHP Billiton Foundation, through a faculty development programme, has provided support for several Ph.D. students, including a number of women.

In the U.S., the primary focus is on creating a preeminent and sustainable pipeline program for increasing the representation of underrepresented minority students within the geosciences. The centerpiece of the program is an educational alliance between North Carolina Agriculture and Technical State University, Penn State University, Fort Valley State University, University of Texas El Paso, and California State University Northridge. The program will contribute to the establishment of an Earth Systems Science Institute at North Carolina Agriculture and Technical State University, and will, by 2014, graduate up to 25 students per year with B.S. degrees in science, technology, engineering and mathematics fields. The students will be prepared to matriculate into geoscience graduate programs across the U.S., and they will be able to compete for student support such as stipends provided by most research institutions.

About this Newsletter

The purpose of this newsletter is to provide a forum for AfricaArray partners to communicate noteworthy achievements, progress on educational and research activities, and other news that is of broad interest to the community. Andy Nyblade and Paul Dirks serve as editors for the newsletter, and articles for inclusion in future issues of the newsletter should be directed to them.

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