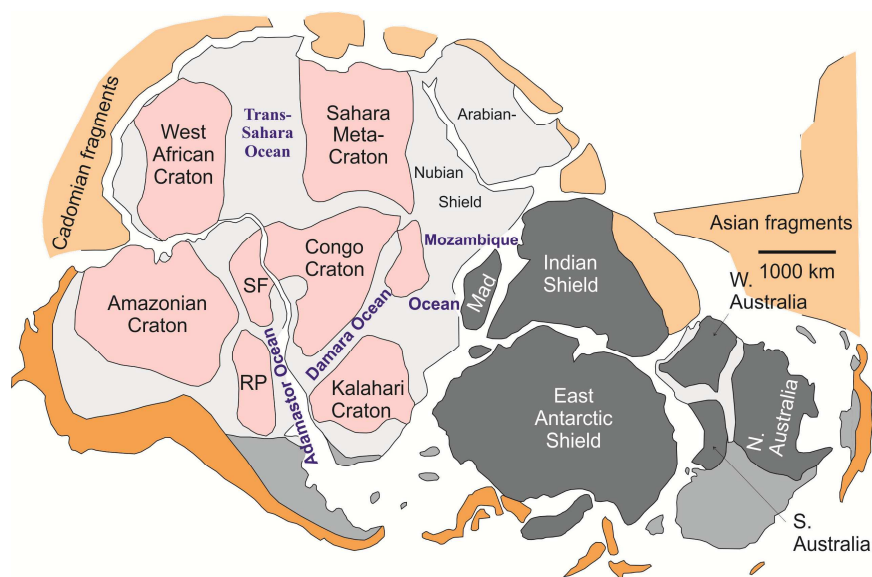




GEODYNAMICS @ GRAZ

(Working Group Stüwe)

Annual Report 2013



Department for Earth Sciences

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2013 January several of us visited the Colloquium of African Geology in Addis Ababa and associated field trips. In February Kurt Stüwe and Martin Regelsberger made a field trip to Eastern Chad to the Darfour and Dar Sila regions. Spring was filled with the EGU conference, a lot of field work with Bachelor and MSc supervision as well as with several field trips in connection with TV productions, predominantly for Servus TV, for example a trip to the Bosnian pyramids near Sarajevo. Also during spring we had Farid Makroum from Egypt visit our research group for several months.

In September there was the Alpine Workshop in Schladming, the Winkler Hermaden Symposium in Kapfenstein and in November most of our working group went to Saudi Arabia (together with Prof. Fin Stuart from Glasgow) for the final field trip from our FWF project of the last 3 years as well as a first field trip to study the uplift history of the Saudi Arabian Great Escarpment - the project of the new PhD student in the group: Syed Turab. During the year 2 FWF project applications were written (one together with Deta Gasser of Trondheim, the other with Joerg Robl of Salzburg as PI), one of which was rejected again in December. We still hope for funding with the project of Robl... Elena Sizova started in the group as a Lise Meitner fellow and Nicolas Legrain finally finished his PhD. Several manuscripts were written in 2013, but not so many were published. One of the PR projects of the year was the re-furbishing of the show cases in front of the department and the acquisition of a marble globe from Vienna airport authority.

1. GROUP MEMBERS

Postdoctoral Research Staff:

Tamer Abu-Alam (full time Postdoc 1.1.13 – 31.12.13)
Interest: Metamorphic Geology of the Arabian-Nubian Shield
Funded by: FWF P22351-N22; tamer.abu-alam@uni-graz.at

Elena Sizova (full time Postdoc 24.6.13 – 31.12.13)
Interest: Numerical Modelling of subduction and TTG formation
Funded by: Lise-Meitner Grant FWF elena.sizova@uni-graz.at

PhD students:

Syed Ali Turab (PhD student 16.1.2013 - 31.12.2013)
Interest: Uplift history of passive margins
Funded by: Scholarship by HEC Pakistan ; syed.ali-turab@edu.uni-graz.at

Angela Oswald (PhD student 1.1.13 – 31.12.13)
Interest: Neotectonics, low-T geochron, Sinai
Funded by: FWF project P22351-N22 until 24.6.13; angela.oswald@uni-graz.at

Mahmoud Hassan (PhD student 1.1.13 – 31.12.13)
Interest: Metamorphic Geology of Sinai
Funded by: self supported by PAROWN Austria-Egypt ; mahmoud.hassan@uni-graz.at

Nicolas Legrain (PhD defense: 1. October 2013)
Interest: Landscape evolution of the Koralpe region

Masters Students:

Gustav Hanke (MSc student 1.1.12 – 31.12.12)
Interest: Neotectonics, low-T geochronology, Sinai

Thomas Nigl (MSc student started: spring 2013)
Interest: Neotectonics Mürz drainage system

Christian Aufreiter (MSc student: all 2013)
Interest: Satellite image interpretation Sudan

Florian Dertnig (MSc student started: spring 2013)
Interest: Karstification and uplift of the Kalkspitze region

Felix Rauschenbusch (MSc student started: spring 2013)
Interest: Shear zone development in northern Sudan

Simon Schorn (MSc student started: spring 2013)
Interest: Shear zone development in northern Sudan

Angela Brand (MSc student started: fall 2013)
Interest: Age of shear zones in the Eastern Alps

Mohammed Osman (MSc student in mining engineering in Leoben)
Interest: course work /funded by SPmining scholarship administered thru Stüwe

Bachelors Students:

Sandra Petersmann Augenstein Provenance studies (Abschluss: 2.12.13)
Christoph Kralj Numerical Modelling Eastern Alps (Abschluss: 12.12.13)

Andrea Höfler Augenstein Provenance studies (dabei seit 2012)

Jürgen Lammer-Stecher Augenstein Provenance studies (dabei seit 2012)

Andreas Ploder Augenstein Provenance studies (dabei seit 2012)

Christian Aufreiter Augenstein Provenance studies (dabei seit 2012)

Sascha Speil Menhir Statistik Oststeiermark (dabei seit spring 2013)

Kati Steinbauer Menhir Statistik Oststeiermark (dabei seit spring 2013)

Andreas Landler Menhir Statistik Oststeiermark (dabei seit spring 2013)

Susanne Roskogler Hochschwab Structural Geology (dabei seit spring 2013)

Erich Regelsberger Drautal Terrassen (dabei seit spring 2011?)

Ines Korbuly Drautal Terrassen (dabei seit spring 2010?)

Marlene Löberbauer Murztal Geomorphologie (dabei seit spring 2013)

2. RESEARCH PROJECTS WITH FUNDING IN 2013

- Exhumation Mechanisms of the Najd Fault System

Funding Institution: FWF Project P22351 (PI Stüwe)

Covered time: 1.1.2013 - 31.12.2013

Total Funding: spent in 2013: € 80.000,- (total funding: €333.500)

Activity: This project is in its 3rd and final year. Several manuscripts were written.

- Alfred Wegener Memorial Expedition

Funding Institution: Austrian Academy of Sci., Eduard Suess (PI: Piller & Stüwe)

Covered time: 1.1.2012 - 31.12.2012

Total Funding: spent in 2013: € 10.000 (total funds: € 50000)

Activity: This project is to fund the Alfred Wegener expedition to Greenland in 2014.

- Geological Research in Africa

Funding Institution: SPmining to Stüwe

No new funding occurred for this project in 2013, but remaining funds from the previous year were spent to support student and to fund field and analytical work

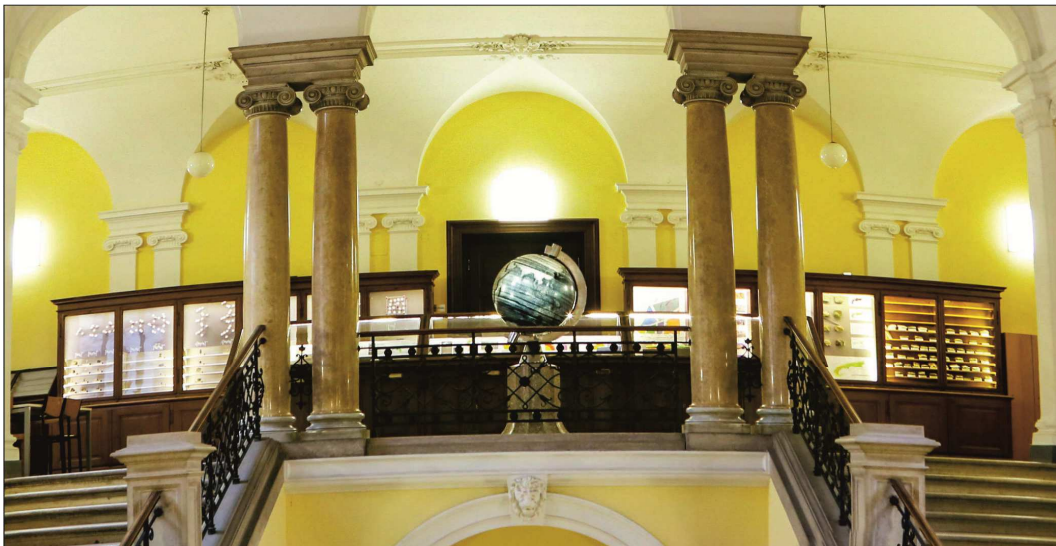


Figure 1: This solid marble globe was obtained for the Earth science Department from the Vienna airport authority as a permanent loan in connection with our efforts to refurbish the exhibition in the front hall of the department.



Figure 2: The research group in action: Clockwise from top left: Christoph Hauzenberger and Kurt Stüwe in the lab during the filming for a documentary on the Styrian megalith culture. Florian Dertnig in the Leibnitz Römersteinbruch with the "sword of Galgano". Florian Dertnig at a cave near the Summit of Steirische Kalkspitze. Film crew filming the Bosnian pyramid of the sun near Sarajevo. PhD field work shop in Mittersil. Bachelor students Sascha Speil, Andreas Landler and Kati Steinbauer measuring up Styrian megaliths.

3. SCIENTIFIC PUBLICATIONS

Articles of group in refereed journals:

- Hassan, M., Abu-Alam, T.S., Stüwe, K., Fowler, A. & Hassan, I. (2013): Metamorphic Evolution of the Sa'al-Zaghra Complex in the Northern Arabian-Nubian Shield: Evidence for Tectonism During Mesoproterozoic Rodinia Break-up? *Precambrian Research* doi.org/10.1016/j.precamres.2013.11.013.
- Ghoneim, M.F., Heikal, M.S., El Dosuky, B.T., Abu-Alam, T.S. & Sherif, M.I. (2013): Neoproterozoic granites of Sharm El-Shiekh area, Egypt: mineralogical and thermobarometric variations. *Arabian Journal of Geosciences* doi.10.1007/s12517-013-1182-0.
- Abu-Alam, T.S., Santosh, M., Brown, M. & Stüwe, K., (2013): Gondwana collision. *Mineralogy and Petrology*, 107, 631-634.

Abstracts and conference presentations with publication year 2012:

EGU-POSTERS:

- Stüwe K., Robl J., Hergarten S. (2013). What happened 5 million years ago in the Alps ? Session TS4.8/GM3.8 Poster B149
- Robl J., Stüwe K., Hergarten S. (2013). New Base Levels in the Eastern Alps Session TS4.8/GM3.8 Poster B150
- Wölfler A., Glotzbach C., Dunkl I., Fügenschuh B., Stüwe K., (2013) Thermal modelling of a low-angle detachment fault: The Katschberg normal fault (Eastern Alps) European Geosciences Union General Assembly, EGU2013-5118. (Poster)
- Oswald A., Stüwe K., Hanke G., (2013) A geomorphic analysis of Sinai's drainage pattern. Evidence for interpreting the distribution of uplift? European Geosciences Union General Assembly, EGU2013-3286 (Poster)
- Hanke G., Enkleman E., Stüwe K., Oswald A., (2013) U-Th/He dating of the Cenozoic Uplift of Sinai. European Geosciences Union General Assembly, EGU2013-2765 (Poster)
- Abu-Alam, T.S. & Grosch, E. (2013): Metamorphic Evolution of the Main Collisional Suture Zone Between East and West Gondwana. European Geosciences Union General Assembly, EGU2013-9643.
- Grosch, E., Abu-Alam, T.S., McLoughlin, N. & Vidal, O. (2013): Alteration of Mid-Archean oceanic lithosphere, Barberton greenstone belt (South Africa): Insights into fluid-rock interaction processes from metamorphic and geochemical constraints. European Geosciences Union General Assembly, EGU2013-3567.
- Grosch, E., Abu-Alam, T.S. & Frimmel, H. (2013): Metamorphic constraints on crustal evolution between the Archean Grunehogna Craton and the Pan-African to Mesoproterozoic Maud Belt, Western Dronning Maud Land, Antarctica. European Geosciences Union General Assembly, EGU2013-3603.
- Hassan, M., Abu-Alam, T.S. Stüwe, K. & Klötzli, U. (2013): Indirect dating of deformation: a geochronological study from the Pan African Ajaj shear zone, Saudi Arabia. European Geosciences Union General Assembly, EGU2013-9422.
- Abu-Alam, T.S., Hassan, M., Stüwe, K., Meyer S. & Passchier, C. (2013): Exhumation of Mid-Crustal Rocks in the Arabian-Nubian Shield. The Baladaya Complex of Saudi Arabia. European Geosciences Union General Assembly, EGU2013-9703.
- Abu-Alam, T.S., Grosch, E. & Abd El Monsef, M. (2013): Pan-African shear zone-hosted gold mineralization in the Arabian-Nubian shield. European Geosciences Union General Assembly, EGU2013-9893.

- Abu El-Ela, A., Hamdy, M., Abu-Alam, T.S., Hassan, A. & Gamal El Dien, H. (2013): Westward prograding metamorphism in mantle peridotites from the Eastern Desert of Egypt: clues to the subduction polarity of the Arabian Nubian Shield intra-oceanic arc ophiolite. European Geosciences Union General Assembly, EGU2013-14028.
- Meyer S., Passchier, C., Abu-Alam, T.S. & Stüwe, K. (2013): Oblique core complexes: strike slip accommodated extensional structures in the Nadj fault system, Arabian shield. European Geosciences Union General Assembly, EGU2013-12149.

EGU TALKS

- Abu-Alam, T.S. & Stüwe, K. (2013): Sub-horizontal channel flow: an exhumation mechanism during the Gondwana collision. European Geosciences Union General Assembly, EGU2013-9778.
- Hergarten S., Stüwe K., Robl J., (2013) Generalized Swath Profiles. European Geosciences Union General Assembly, EGU2013-2608. (Talk)

OTHER CONFERENCE CONTRIBUTIONS:

- Abu-Alam, T.S., Stüwe, K. & Hassan, M. (2013): Nomenclature of the metamorphic rocks of the Arabian-Nubian Shield. 24th Colloquium of African Geology (CAG24) - Addis Ababa, Ethiopian (8-14 January, 2013). (Talk)
- Abu-Alam, T.S., Hassan, M., Stüwe, K. & Kadi, K. (2013) Multistage tectonism during Gondwana collision: Baladiyah Complex, Saudi Arabia. *Mitteilungen der Österreichischen Mineralogischen Gesellschaft* 159, P 32. (Talk)
- Nantasin, P., Hauzenberger, C., Richoz, Abu-Alam, T.S. & Wathanakul (2013) Contact aureole of the Sri Sawat granite, Kanchanburi province, western Thailand. *Mitteilungen der Österreichischen Mineralogischen Gesellschaft* 159, P 100. (Poster)
- Ghoneim, M.F., El Dosuky, B.T., Heikal, M.S., Abu-Alam, T.S. & Sherif, M.I. (2013): Neoproterozoic granites of Sharm El-Shiekh area, Egypt: mineralogical and geobarometric variations. *Mineralogical Magazine*, 77(5), P 1162. (Poster)
- Stüwe K., Abu-Alam T., Robl J., Ehlers K., (2013) Tectonic background to the economic potential of the Arabian Nubian Shield. 24th Colloquium of African Geology (CAG24) - Addis Ababa, Ethiopian (8-14 January, 2013). (Talk)
- Stüwe K., Robl J., (2013) Remote Sensing Surveys for entire countries. The services on www.africageology.org. 24th Colloquium of African Geology (CAG24) - Addis Ababa, Ethiopian (8-14 January, 2013). (Poster)
- Wölfler A., Glotzbach C., Dunkl I., Stüwe K., Fügenschuf B., (2013) 3D thermo-kinematic modelling of a crustal-scale low-angle normal fault: the Katschberg detachment, Eastern Alps. *Alpine Workshop*
- Stüwe K., Robl J., Hergarten S., Legrain N., (2013) What Happened 5 Million Years Ago in the Alps ? 11th Alpine Workshop, Schladming (Poster).
- Robl J., Hergarten S., Stüwe K., Salcher B., (2013) Base level changes and landscape response in the Eastern Alps: Tectonics versus Climate. 11th Alpine Workshop, Schladming (Talk)
- Meyer S.E., Passchier C., Abu-Alam T., Stüwe K., (2013) Qazaz dome: a strike-slip accommodated core complex in the Nadj fault system, Arabian shield. *AGU Fall meeting*

Public Relations Articles, talks and activities:

- Stüwe K. (2013) Geologie der Alpen aus der Luft. Public Lecture Schladming, Do 12.9.2013
- Stüwe K. (2013) Tektonische Gliederung des Steirischen Vulkanlandes Winkler Hermaden Symposium, Kapfenstein Freitag 13.9. öffentlicher Vortrag
- Achtung Forschung was an open day organised by the University of Graz in October. A film was made and an exhibition produced fro the day.

In 2013 we were involved in several TV productions, predominantly 3 Films from a series of Phenomania

- **Tore zur Unterwelt** is a film made by Peter Beringer for EPO Film productions. It involved Heinz Kush and Kurt Stüwe and several filming trips to eastern Styria. Some filming was also done on the Pasterze glacier and in the laboratories at Graz University.
- **Bosnische Pyramiden** is a film made by Alfred Schwarzenberger. The Film involved a 1-week long field trip to the Sarajevo region.
- **Das Schwert des Galgano** is a film made by EPO Film productions. It involved Florian Dertnig to make s slot into limestone on top of the Dachstein and late filming in the Römersteinbruch near Leibnitz.

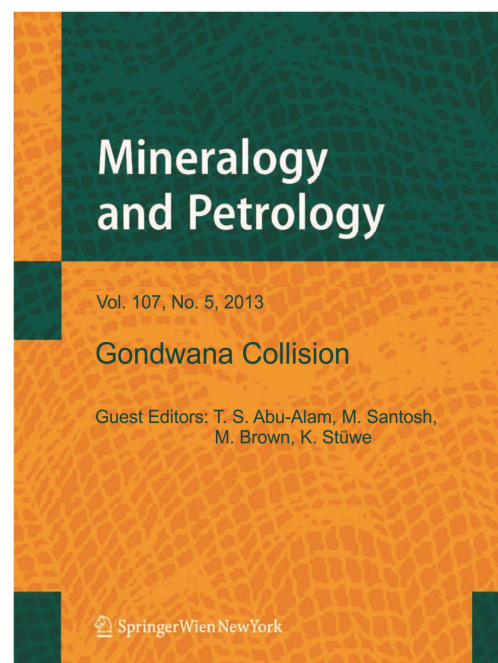


Figure 3: Two volumes published in our research group in 2013. At left, the annual volume of the *Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark*. At right: *Special Issue of Mineralogy and Petrology* edited by Tamer Abu-Alam as the leading guest editor.



Figure 4: The research group in action: Clockwise from top left: Artisanic miners in Chad in Dar Sila region seen during field work in February; Susanne Rosskogler during fieldwork on the Hochschwab in June; Mahmoud Hassan operating the Wilfley Table; Field trip to the Blue Nile gorge in Ethiopia in January; Elena Sizova at her desk in Graz.



Figure 5: The research group in action: Clockwise from top left: Field work on the Great Escarpment of Saudi Arabia in November. With Hombi during aerial photography for a new book on Styria. Mahmoud Hassan punishing rocks. Syed Ali-Turab in the field in Saudi-Arabia. Thomas Nigl and Marlene Löberbauer collecting sediments in the Mürz valley. Tamer Abu-Alam and Mahmoud Hassan on the microprobe.

4. TEACHING AND EDITING ACTIVITIES

EDITORIAL RESPONSIBILITIES

- Lecture Notes in Earth Science (Springer) (Chief Editor)
- Mitteil. des Naturwiss. Vereins für Steiermark (Editor: Earth Sci.)

EDITORIAL BOARD MEMBERSHIPS

- Journal of Metamorphic Geology (editorial board member)
- Journal of the Virtual Explorer (editorial board member)
- Journal of Asian Earth Science (editorial board member)
- Austrian Journal of Earth Science (editorial board member)

EDITED JOURNAL VOLUME

- Drescher A., and Stüwe K., 2013 (eds.) Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark, vol., 143, 272 p



Figure 6: Left: Poster for the public talk at the Alpine Workshop in chladming in September. Right: Award to a map published in 2012 on Jetty Peninsula in Antarctica, published by the Australian Geological Survey

UNDERGRADUATE TEACHING

(only regular weekly course lecturing listed)

- *Einführende Exkursionen (2 days)*
- *Kristallingeologie (3 hours a week)*
- *Lithosphärenprozesse (2 hours a week)*
- *Geodynamics (1 hour a week)*
- *Neotektonik (2 hours a week)*
- *Geologische Exkursionen 2*
- *Petrologische Exkursionen 2*

FIELD TRIPS, VISITORS TO GROUP AND OTHER ACTIVITIES

- 8.1.2013-18.1.2013 Addis Ababa / Ethiopia
- 10.2.2013-20.2.2013 Chad field work
- April: EGU
- 10.11.2013-20.11.2013 Saudi Arabia field work
- May 2013 Bosnian pyramids
- June 2013 Field workshop with PhD students
- May and June 2013 Farid Makroum visited from Egypt
- July Stephane Betoudi visited from Chad
- October 1st Fin Stuart from Glasgow visited (Nicolas PhD defense)