



GEODYNAMICS @ GRAZ

(Working Group Stüwe)

Annual Report 2010



Department for Earth Sciences
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1. GROUP MEMBERS

Kurt Stüwe

Interests: Tectonics, geodynamics, petrology, geomorphology
Funded by: Department staff; kurt.stuewe@uni-graz.at

Andreas Wölfler (Postdoc 1.1.10 - 31.12.10)

Interests: Neotectonics, Low-T Geochronology
Funded by: ESF FWF project I-152; andreas.woelfler@uni-graz.at

Tamer Abu-Alam (PhD student 1.1.10 - 30.09.10)

Interest: Metamorphic Geology of the Wadi Feiran Belt, Sinai
Funded by: ÖAD (1 month by ESF FWF project I-152); tamer.abu-alam@uni-graz.at

Tom Wagner (PhD student 1.1.10 – 18.10.10)

Interest: Neotectonics of orogen – basin transition in Styria
Funded by: ESF FWF project I-152 (til 15.3. then by S. Birk)
Contact: thomas.wagner@uni-graz.at

Emilie Bruand (PhD student 1.1.10 – 31.12.10)

Interest: metamorphism in S-Alaska, eclogite metamorphism
Funded by: FWF project 19366 (tectonic evolution of CMC, Alaska); emilie.bruand@uni-graz.at

Deta Gasser (PhD student 1.1.10 – 20.09.10)

Interest: Structure / geochron S-Alaska
Funded by: FWF project 19366 (tectonic evolution of CMC, Alaska); deta.gasser@uni-graz.at

Nicolas Legrain (PhD student 1.1.10 – 31.12.10)

Interest: Neotectonics, low-T geochron, Eastern Alps
Funded by: ESF FWF project I-152; nicolas.legrain@uni-graz.at

Angela Oswald (PhD student 1.10.10 – 31.12.10)

Interest: Neotectonics, low-T geochron, Sinai
Funded by: FWF project P22351-N22; angela.oswald@uni-graz.at

Wentian Liang (Postdoc student 1.12.10 – 31.12.10)

Interest: Granit tectonics, Paleomagnetism, China
Funded by: Eurasia – Pacific Uninet; wtliang@nwu.edu.cn

Hassan Abbas (MSc student 1.12.10 – 31.12.10)

Interest: Structural Geology, Wadi Mubarak, Egypt
Funded by: Erasmus Mundus Aktion 2 Programm; hassanabbas_aeg@yahoo.com

2. RESEARCH PROJECTS WITH FUNDING IN 2010

- Metamorphic Evolution of Chugach Metamorphic Complex, Alaska

Funding Institution: FWF Project P19366-GEO (PI Stüwe)
Covered time: 1.1.2010 - 30.9.2010
Total Funding: € 285.000 (~ € 100.000 in 2010)
Activity: PhD funding Bruand / Gasser. Complete PhD work

- Metamorphic Evolution of Wadi Feiran, Sinai

Funding Institution: ÖAD
Covered time: 1.1.2010 – 13.9.2010
Total Funding: PhD scholarship Abu-Alam
Activity: 3rd full year of PhD, write up thesis

- TOPOALPS: 4D kinematics of the Neogene Eastern Alps

Funding Institution: ESF / FWF Project I-152 (PI Stüwe)
Covered time: 1.1.2010 - 31.12.2010
Total Funding: € 333.500 (~ € 100.000 in 2010)
Activity: PhD Legrain, Postdoc Wölfler; analytical work

- Exhumation Mechanisms of the Najd Fault System

Funding Institution: FWF Project P22351 (PI Stüwe)
Covered time: 1.10.2010 - 31.12.2010
Total Funding: € 333.500 (~ € 50.000 in 2010)
Activity: PhD Angela Oswald, Postdoc, Abu-Alam

- Geologie der Alpen aus der Luft

Funding Institution: various government sponsors, industry
Covered time: 1.1.2010 - 31.12.2010
Total Funding: € 50.000
Activity: complete photography, draft figures, write text

3. SCIENTIFIC PUBLICATIONS

Articles in refereed journals:

- Gasser D., Stüwe K., Fritz H., (2010). Internal structural geometry of the Paleozoic of Graz. *International Journal of Earth Science* doi: 10.1007/s00531-0099-0446-0
- Stüwe K., Schuster R., (2010). Initiation of subduction in the Alps: Continent or ocean ? *Geology*, v. 38, p.175-178; doi: 10.1130/G30528.1
- Abu-Alam, T., Stüwe, K., Hauzenberger, C., (2010). Calc-silicates from Wadi Solaf region, Sinai, Egypt. *Journal of African Earth Sciences*, v. 58, p. 475-488, DOI 10.1016/j.jafrearsci2010.05.
- Wagner, T., Fabel, D., Fiebig, M., Häuselmann, P., Sahy, D., Xu, S., Stüwe, K., (2010). Young uplift in the non-glaciated parts of the Eastern Alps. *Earth and Planetary Science Letters*, v. 295, p. 159-169, DOI 10.1016/j.epsl.2010.03.
- Herman, F., Copeland, P., Avouac, J. P., Bollinger, L., Mahéo, G., Le Fort, P., Rai, S., Foster, D., Pêcher, A., Stüwe, K., Henry, P., (2010). Exhumation, crustal deformation, and thermal structure of the Nepal Himalaya derived from the inversion of thermochronological and thermobarometric data and modeling of the topography. *Journal of Geophysical Research*. DOI 10.1029/2008JB006126
- Bruand, E., Stüwe, K., Proyer, A., (2010). Pseudosection modelling for a selected eclogite body from the Koralpe (Hohl), Eastern Alps. *Mineralogy and Petrology*. DOI 10.1007/200710-009-0097-7
- Hergarten, S., Stüwe, K., Wagner, T., (2010). Age and Prematurity of the Alps derived from Topography. *Earth and Planetary Science Letters*. v. 297, p. 453–460, DOI 10.1016/j.epsl.2010.06.048
- Schuster R., Stüwe K., (2010). Die Geologie der Alpen im Zeitraffer. *Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark*, v. 140, p. 5-21.
- Gasser, D., Mancktelow, N., (2010). Brittle faulting in the Rawil depression: field observations from the Rezli fault zones, Helvetic nappes, Western Switzerland. *Swiss Journal of Geosciences*. DOI 10.1007/200015-010-0004-6
- Wölfler, A., Kurz, W., Danišik, M., Rabitsch, R., (2010). Dating of fault zone activity by apatite fission track and apatite (U-Th)/He thermochronometry: a case study from the Lavanttal fault system (Eastern Alps). *Terra Nova*. DOI 10.1111/j.1365-3121.2010.00943.x

Abstracts and Conference Presentations with publication year 2010:

EGU:

- Stüwe, K., Legrain, N., and Hergarten, S., (2010). Mapping out Paleo-Landscapes in the Non-Glaciated Part of the Alps: More Evidence for Young Uplift of this Part of the Alps. *Geophysical Research Abstracts*, Vol. 12, EGU2010-11297, EGU General Assembly 2010, Vienna Poster
- Abu-Alam, T., Stüwe, K., (2010). Polyhase Strain Caps Formation Mechanism. *Geophysical Research Abstracts*, Vol. 12, EGU2010-9069, EGU General Assembly 2010, Vienna Poster

- Wölfler, A., Kurz, W., Fritz, H., Stüwe, K., (2010). Constraints on lateral extrusion in the Eastern Alps and the linkage to Mediterranean plate tectonics. Geophysical Research Abstracts, Vol. 12, EGU2010-11096, EGU General Assembly 2010, Vienna Poster
- Bruand, E., Gasser, D., Stüwe, K., Beyssac, O., (2010). Metamorphism of the Chugach Metamorphic Complex, (Alaska). New pressure estimates question the ridge subduction context. Geophysical Research Abstracts, Vol. 12, EGU2010-12235, EGU General Assembly 2010, Vienna Poster
- Gasser, D., Bruand, E., Stüwe, K., Rubatto, D., Foster, D., Schuster, R., (2010). Exhuming Metamorphic Rocks: Constraints from Cooling of the Chugach Metamorphic Complex, southern Alaska. Geophysical Research Abstracts, Vol. 12, EGU2010-11742, EGU General Assembly 2010, Vienna Poster
- Hergarten, S., Stüwe, K., Wagner, T., (2010). Age and prematurity of the Alps. Geophysical Research Abstracts, Vol. 12, EGU2010-9409, EGU General Assembly 2010, Vienna Poster
- Wagner, T., Fabel, D., Fiebig, M., Häuselmann, P., Sahy, D., Xu, S., Stüwe, K., (2010). Young uplift in the Non-Glaciated Parts of the Eastern Alps. Geophysical Research Abstracts, Vol. 12, EGU2010-9516, EGU General Assembly 2010, Vienna Poster
- Kurz, W., Wölfler, A., Rabitsch, R., Genser, J., (2010). Reconstruction of fault zone evolution from $^{40}\text{Ar}/^{39}\text{Ar}$ white mica, zircon and apatite fission track, and apatite U/Th-He thermochronology: 65 million years of fault activity along the Lavanttal fault zone (Eastern Alps)? Geophysical Research Abstracts, Vol. 12, EGU2010-4048-1, EGU General Assembly 2010, Vienna Poster
- Bruand, E., Nicollet, C., Goncalves, P., Schwartz, S., Chamorro-Perez, E. (2010). Petrology of metagabbros and Schistes Lustrés through the Queyras accretionary wedge (Western Alps). EGU Conference

Pangeo Austria:

- Abu-Alam T., Stüwe K. (2010). Strain caps formation mechanism. Journal of Alpine Geology, Vol. 52, p. 79-80.
- Abu-Alam T., Grosch E. G., (2010). A thermodynamic activity-composition model for the Epidote group minerals and its petrological application. Journal of Alpine Geology, Vol. 52, p. 79.
- Abu-Alam T., Stüwe K. (2010). Proterozoic Evolution of the Najd Fault System. Pangeo Austria. Journal of Alpine Geology, Vol. 52, p. 80.
- Legrain N., Stüwe K. (2010). Evidence of young regional uplift in the non-glaciaded Easternmost Alps: the dissected relict landscape of the Styrian margins. Journal of Alpine Geology, Vol. 52, p. 64.
- Wagner, T., Fritz, H., Stüwe, K., Fabel, D., (2010). Pliocene to Pleistocene faulting at the transition between Alps and Pannonian Basin: Constraints from dating fault activity by the $^{26}\text{Al}/^{10}\text{Be}$ burial age method. Journal of Alpine Geology, Vol. 52, p. 249-250.
- Wölfler, A., Kurz, W., Fritz, H., Stüwe, K., (2010). A new view on lateral extrusion in the Eastern Alps and the linkage to Mediterranean plate tectonics. Journal of Alpine Geology, Vol. 52, p. 255-256.
- Wölfler, A., Stüwe, K., Legrain, N., Fritz, H., (2010). Late Neogene denudation rates in the Eastern Alps as determined by low temperature thermochronology. Journal of Alpine Geology, Vol. 52, p. 257-258.

Other

- Meixner, T., Gibson, H., Seikel, H., Fitzgerald, D., Stüwe, K., Lane, R., (2010). Stochastic temperature, heat flow and geothermal gradient modeling direct from 3D map of the Cooper Basin region, Central Australia SEG Conference

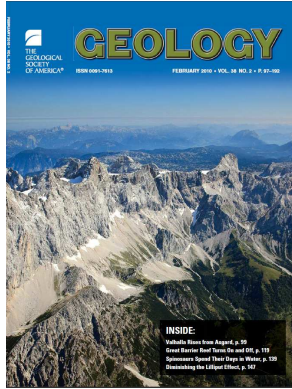
- Kurz, W., Wölfler, A., Handler, R., (2010). Cenozoic tectonic evolution of the Eastern Alps – A reconstruction basen on $^{40}\text{Ar}/^{39}\text{Ar}$ white mica, zircon and apatite fission track and apatite (U-Th)/He thermochronology. Bulletin of the Geological Society of Greece
- Kurz, W., Wölfler, A., Fritz, H., Stüwe, K., (2010) Time constraints and plate tectonic controls for lateral extrusion in the Eastern Alps. *Geologica Balcanica*
- Gasser, D., Bruand, E., Stuewe, K., Rubatto, D., Kloetzli, U., Foster, D. (2010). Determining the rates of geological processes in a large-scale metamorphic complex: a multi-method approach, Abstract V33E-03 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Bruand, E., Gasser, D., Stüwe, K. (2010) Ridge subduction context questioned by new pressure estimates in the Chugach Metamorphic Complex, (Alaska). Oral presentation, MSG Conference (Cambridge)

Talks:

- Stüwe, K., (2010). Das Wrangell St. Elias Gebirge in Alaska: Das wildeste Gebirge der Welt? Österreichischer Alpenverein, Leoben
- Stüwe K. (2010). On the topographic evolution of the Alps 15.10.2010 Glasgow
- Stüwe K. (2010). Geologie der Alpen aus der Luft Graz (Jahreshauptversammlung Naturwiss. Verein für Steiermark) 2.2..2010
- Stüwe K. (2010). Geologie der Alpen aus der Luft Wien 13.3.2010
- Wölfler, A., Kurz, W., Fritz, H., Stüwe, K., (2010). Lateral extrusion in the Eastern Alps and the linkage to Mediterranean plate tectonics. ETH Zürich.
- Bruand E., (2010) Participation to EURISPET Padova (2010). (European Intensive Seminars of Petrology) “High-temperature metamorphism and crustal melting”. Oral presentation on Metamorphism of the Chugach Metamorphic Complex
- Abu-Alam T., (2010) Participation to EURISPET Padova (2010). (European Intensive Seminars of Petrology) “High-temperature metamorphism and crustal melting”. Oral presentation on Metamorphism at Feiran

Public Relations Articles and activities:

- Geologische Führung über den Grazer Schlossberg; Schlossberg Familienfest 20. 06.
- GEOLOGY Cover Foto March Issue



- JOURNAL OF STRUCTURAL GEOLOGY Photo of the Month

Photograph of the Month

Mica porphyroclast from the Koralpe, Austria



Photograph Kurt Stüwe ©Kurt Stüwe

Mica porphyroclast in a deformed pegmatite from the Koralpe (road cutting near Lieboch), well known for hosting the eclogite type locality. Although it is experimentally known that mica is rheologically strong in response to normal stresses, this is rarely seen in practice, because of its extreme soft behaviour in response to shear stresses, in particular those normal to its crystallographic c-axis. In this example, the orientation of the c-axis is perfectly normal to the stretching lineation limiting its ability to dismember along cleavage planes and causing the mica to act as a rigid clast wrapping feldspars and quartz around it. The pegmatite is of Permian age, the deformation is at about 700 C and 15 kbar.

Please send comments to jsg@uni-mainz.de

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 Available online xxx

Journal of Structural Geology Photo of the month

4. TEACHING AND EDITING ACTIVITIES

EDITORIAL RESPONSIBILITIES

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

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., 2010 (eds.) Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark, vol., 137, 208 p.



VISITORS TO GROUP

- Prof. El Shafei (12.-14.9.2010) For: PhD defence Abu-Alam
- Prof. Terry Pavlis el Paso (18.9.-22.9.2010) For: PhD defence Gasser
- Prof Derek Fabel (16.10-18.10.2010) For: PhD defence Wagner

UNDERGRADUATE TEACHING

(only regular weekly course lecturing listed)

Einführende Exkursionen (2 days)
Kristallineologie (3 hours a week)
Lithosphärenprozesse (2 hours a week)
Geodynamics (1 hour a week)
Neotektonik (2 hours a week)