



GEODYNAMICS @ GRAZ

(Working Group Stüwe)

Annual Report 2008



Department for Earth Sciences
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1. GROUP MEMBERS

Kurt Stüwe

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

Jörg Robl (Postdoc 1.1.08 – 31.10.08)

Interest: Combining FEM modelling with landscape evolution models
Funded by: FWF Project P18341 (numerical models for Alps)
Contact: joerg.robl@uni-graz.at

Tamer Abu-Alam (PhD student 1.1.08 - 31.12.08)

Interest: Metamorphic Geology of the Wadi Feiran Belt, Sinai
Funded by: ÖAD
Contact: tamer.abu-alam@uni-graz.at

Tom Wagner (PhD student 1.1.08 – 31.12.08)

Interest: Neotectonics of orogen – basin transition in Styria
Funded by: GASS Doktorandenkolleg, supervised by: Stüwe, Fritz, Kurz
Contact: thomas.wagner@uni-graz.at

Emilie Bruand (PhD student 1.1.08 – 31.12.08)

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

Deta Gasser (PhD student 1.1.08 – 31.12.08)

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

Nicolas Legrain (PhD student 1.12.08 – 31.12.08)

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

Cornelia Roffeis (Masters student 1.1.08 – 23.4.08)

Interest: Barometric constraints on flattening of the Plattengneiss
Funded by: self supported
Contact: c.roffeis@gmx.at

Bachelorstudents:

Christian Stern: PROJECT: ArAr chronology of feldspar in Plattengneiss
 EMAIL: christian.stern@edu.uni-graz.at

Markus Kaspar: PROJECT: Contact Metamorphism Pohorje
 EMAIL: marku.kaspar@edu.uni-graz.at

Madelaine Hofstadler: PROJECT: Caledonian evolution east Greenland
 EMAIL: madeleine_hofstadler@msn.com

2. RESEARCH PROJECTS WITH FUNDING IN 2008

- Numerical Models for the Eastern Alps

Funding Institution: FWF Project P18341-GEO (PI Robl)
Covered time: 1.1.2008 - 31.10.2008
Total Funding: € 263.000 (€ 60.000 in 2008)
Activity: Postdoc Fellowship Robl, numerical simulation, code development.

- Metamorphic Evolution of Chugach Metamorphic Complex, Alaska

Funding Institution: FWF Project P19366-GEO (PI Stüwe)
Covered time: 1.1.2008 - 31.12.2008
Total Funding: € 285.000 (~ € 100.000 in 2008)
Activity: PhD funding Bruand / Gasser. First field season, write up of prelim work

- Dynamics of Carbonate Systems

Funding Institution: GASS Doktorandenkolleg (directly to Wagner)
Covered time: 1.1.2008 - 31.12.2008
Total Funding: PhD scholarship Wagner plus expenses (~ € 35000)
Activity: 2nd full year of PhD Wagner, field work, cosmogenic isotope labwork, numerics

- Metamorphic Evolution of Wadi Feiran, Sinai

Funding Institution: ÖAD
Covered time: 1.1.2008 - 31.12.2008
Total Funding: PhD scholarship Abu-Alam + Field support
Activity: 2nd field season (March 08), 2nd full year of PhD, microprobe work, 1st paper write

- TOPOALPS: 4D kinematics of the Neogene Eastern Alps

Funding Institution: ESF / FWF Project I-152 (PI Stüwe)
Covered time: 1.10.2008 - 31.12.2008
Total Funding: € 333.500 (€ 4.000 in 2008)
Activity: 1 month employment Legrain, project planning

3. SCIENTIFIC PUBLICATIONS

Articles in refereed journals:

- Robl, J., Stüwe K., Hergarten S., Evans L., 2008. Extension during continental convergence in the Eastern Alps: The influence of orogen-scale strike-slip faults. *Geology*, v. 36, p. 603-606.
- Robl, J., Stüwe K., Hergarten S., 2008. Channel profiles around Himalayan river anticlines: Constraints on their formation from digital elevation model analysis. *Tectonics* v. 27, TC3010, doi:10.1029/2007TC002215,
- Schuster R., Stüwe K., 2008. Permian metamorphic event in the Alps. *Geology*, v. 36, p. 963-966.
- Robl, J., Hergarten S., Stüwe K., 2008. Morphological analysis of the drainage systems in the Eastern Alps. *Tectonophysics*, v. 460, p. 263-277.
- Stüwe K., Robl, J., Hergarten S., Evans L., 2008. Modelling the influence of horizontal advection, deformation, 3 and late uplift on the drainage development in the India-Asia 4 collision zone. *Tectonics* doi:10.1029/2007TC002186.

Abstracts and Conference Presentations with publication year 2007:

EGU

Bruand E., Stüwe K., Proyer A., Powell R., 2008. Phase diagrams for the eclogites from Koralpe EGU General Assembly, Geophysical Research Abstracts. Vol. 10, EGU2008-A-09637

Roffeis C., Stüwe K., Powell R., 2008. Pressure gradients across the Plattengneiss Shear Zone. EGU General Assembly, Geophysical Research Abstracts. Vol. 10, EGU2008-A-08744

Robl, J., Stüwe K., Hergarten S., 2008. Channel Profiles Around Himalayan River Anticlines: Constraints on their Formation? EGU General Assembly, Geophysical Research Abstracts. GM2.1. Vol. 10, EGU2008-A-06363

Robl J., Hergarten S., Stüwe K., Evans L., 2008. The Drainage System of the European Eastern Alps: Constraints on Formation and Implications on the Orogenic Evolution. EGU General Assembly, Geophysical Research Abstracts. GM2.2. Vol. 10, EGU2008-A-06399

Hergarten S., Robl J., Stüwe K., 2008. Crustal Deformation, River Anticlines and the Location of the Highest Mountains. EGU General Assembly, Geophysical Research Abstracts. GM1.5. Vol. 10, EGU2008-A-07978

PANGEO

Bruand E., Stüwe K., Proyer A., Powell R., 2008. Phase diagrams for the eclogites from Koralpe (Poster). *Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.)* 49/2008, p. 15.

Gasser D., Stüwe K., Fritz H., 2008. Geological profiles through the polyphase deformed Paleozoic of Graz. *Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.)* 49/2008, p. 29.

Stüwe K., Robl J., Hergarten S., 2008. Morphological Analysis of Drainage Systems in the Eastern Alps. *Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.)* 49/2008, p. 105-106

Stüwe K., Wagner T., Fritz H., Schreilechner M., Gross M., 2008. Uplift of the Styrian Basin: Caused by Crustal or Mantle Processes ? (Poster S3) Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.) 49/2008, p. 106.

Robl J., Stüwe K., Hergarten S., 2008. Are the Major Structures of the Eastern Alps Recorded in River Profiles ? (Talk S13) Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.) 49/2008, p. 89

Roffeis C., Stüwe K., Powell R., 2008. Pressure gradients across the Plattengneiss Shear Zone. Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.) 49/2008, p. 90

Abu-Alam T., Stüwe K., 2008. Metamorphic Evolution of the Wadi Feiran-Solaf Complex, Sinai / Egypt. Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.) 49/2008, p. 2

Wagner T., Fabel D., Stüwe K., Fritz H., Kurz W., 2008. Incision rates based on burial age dating of cave sediments along the Mur river in Austria and their correlation to the nearby landscape formation. Journal of Alpine Geology (Mitt. Ges. Geol. Berg.Öster.) 49/2008, p. 115

OTHER

Fiebig, M., Häuselmann, P., Stüwe, K., Audra, P., Fabel, D., Grasemann, B., Mihevc, A., Sahy, D., Wagner, T. 2008. Rates of valley incision in the European Alps approached by cosmogenic nuclides IUG Oslo abst.: 33IGC - 2008 1343457

Wagner T., Stüwe K., Fritz H., Kurz W., Fabel D., Häuselmann P., 2008. River Incision based on cave sediment analysis along the Eastern Alpine orogen – Pannonian Basin System transition zone. 16th International Karstological School. Karst Research Institute ZRC SAZU, Abst, p. 117-118.

AUSTRALIA:

Gibson H., Stüwe K., Seikel R., Fitzgerald D., Calcagno P., Argast D., McInerney P., Budd A., 2008. Forward prediction of spatial temperature variation from 3D geology models. Eastern Australian Basin Symposium EABS Extended Abstract 54 Session: Energy and Environment. September 2008

Gibson H., Stüwe K., Seikel R., Fitzgerald D., Calcagno P., Guillen A., McInerney P. 2008. Forward prediction of temperature distribution direct from 3D geology models. Australian Geothermal Energy Conference August 2008

Seikel R., Stüwe K., Gibson H., Reid P., Bendall B., Budd A., 2008. Forward prediction of spatial temperature variation from 3D geology Models. 20th International Geophysical Conference and Exhibition Adelaide, South Australia 22-25 February 2009

Public Relations Articles and activities:

- Frauen in der Technik FIT Tag
- Tag der offenen Tür (Spring and Fall)

4. TEACHING AND EDITING ACTIVITIES

EDITORIAL RESPONSIBILITIES

- Lecture Notes in Earth Science (Springer) (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., 2008 (eds.) Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark, vol., 137, 208 p.

EXTERNAL REFEREE WORK

- A total of 8 papers were reviewed for internationally refereed journal, 3 grant proposals evaluated, 2 promotion and 1 habilitation reviews were done by Stüwe in 2008

UNDERGRADUATE TEACHING

(only regular weekly course lecturing listed)

Einführende Exkursionen (2 days)
Kartierkurs (3 days)
Kristallingeologie (2 hours a week)
Lithosphärenprozesse (2 hours a week)
Geodynamics (1 hour a week)

5. ATTENDED CONFERENCES

- EGU Vienna
Time and Place: Wien 13.4.-18.4.08
Attended: Stüwe, Robl, Roffeis, Bruand

- PANGEO AUSTRIA
Time and Place: Wien 22.9.-24.9.08
Attended by: Stüwe, Bruand, Gasser, Abualam, Roffeis
Wagner

- 16th INTERNATIONAL KARST SCHOOL
Time and Place: Postojna 16.-21.6.08
Attended by: Wagner

6. SCIENTIFIC EXCHANGE

VISITORS TO RESEARCH GROUP IN 2008

In 2008 the following colleagues visited our research group in Graz:

- Prof. Ihor Bubniak (Univ of Lviv, Ukraine. 12.11.-15.12.2008)
- Prof. Stephan Matthai (Imperial College, London)
- Dr. P Häuselmann (Bern) field work caves 24.-27.1.08
- Prof. R. White (Mainz University)
- Prof. B. Carlson (Texas) with students E Hatley, E Kelly June 08

INVITED TALKS IN OTHER DEPARTMENTS

Stüwe: 28.1.08: Abenteuer mit Kindern Leoben Stadthalle, Dia Vortrag

Stüwe: 30.1.08: Landschafts Entwicklungen in Gebirgen
Ansichten vom Mt Everest und aus dem Computer BOKU Wien Seminar Vortrag

Stüwe: 16.4.08: Entstehung und Zukunft des Mittelmeeres. URANIA Graz

Stüwe: 20.11.08: Aspects of landscape evolution in the eastern Alps. Seminar talk Mainz university.

OTHER EVENTS IN 2008

- Prof. Bill Carlson visited our group in June 2008. His MSc student Elisabeth Hadley and her field assistant Eric Kelly subsequently stayed for 3 weeks in Graz to do field work for an EBSD project on the Plattengneiss shear zone.
- 2 Visits to Australia were made to implement a heat flow module for the software GEOMODELLER:
 1. 18.3.08 - 8.4.08: code development, project coordination, application of funding.
 2. 1.11.08 - 9.11.08: software presentation. Short course on geothermal modelling. During the short course the following presentations were given:
 - Stüwe: Principles of Heat Flow (2 hours)
 - Stüwe: Implementation in GEOMODELLER (30 minutes)
 - Stüwe: Computational speed / T-dependence of physical properties (30 minute)
 - Stüwe: advection theory (1 hour)
- A 2-day short course on using the modelling software GMT course was held by Jörg Robl 24.4. and 25.4.
- T. Wagner attended an OSL workshop in Innsbruck 3.3.-7.3.08
- D. Gasser, E. Bruand and K. Stüwe did the 1st full field season in Alaska for project P19366. Dr. Chris Carson from the geological survey of Australia joined us in the field for help and the field season operated in coordination with a project of T. Pavlis from El Paso and his students.
- T. Abu-Alam did the 2nd field season for his PhD in the time between 1.3.08-29.4.08 For this a € 750,- grant was obtained from HeinrichJörg Stiftung.
- A new project with the working title “Geological aerial photography Atlas of the Alps” was initiated together with Swiss photographer Ruedi Homberger. A 4 day flight across the Alps for preliminary photography was done in October 2008.
- A new group home page was finally implemented in December 2008.