



GEODYNAMICS @ GRAZ

(Working Group Stüwe)

Annual Report 2022



Field work in the Red Sea district of Sudan

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<https://twitter.com/GeodynamicsG>

Overview:

As always, the following pages summarise what has happened in my research group in 2022 with particular emphasis – of course – on the things I have been involved in myself as supervisor, cooperation partner, co-author or on field trips. Aside from the successful things mentioned below, some three months of 2022 were occupied with writing a 2.5 mio Euro “doc.funds” project application to FWF – which was rejected late in the year. We may try, however, to revive this in 2023.....

10.1.2023 Kurt Stüwe



Figure 1: Always fun to to field work with students and colleagues: (a) The 2022 Neotectonics class at the Drachenhöhle. (b) With students at a break during field work. (c) with 2nd years during one of their first field trips. (d). Same thing: With 2nd year class. (e) With Jürgen Reinmüller during the “Geology for climbing guides” field trip in October. (f) ELEVATE cooperation partner Lukas Plan during the recovery of a large Garnet gneiss boulder from the Gaberl region.

GROUP MEMBERS

Postdoc

Simon Schorn (Postdoc - self funded)
Interest: Hydration processes of metamorphic rocks
All of 2021 (Selbst Antragsteller FWF)

PhD students

Gerit Gradwohl (PhD student)
Interest: Landscape evolution of the Eastern Alps
Until mid 2022 (FWF project ELEVATE)

Moritz Liebl (PhD student under Robl in Salzburg)
Interest: Glacial erosion modelling ELEVATE
Co-supervised by Stüwe, Graduated in Dec. 2022

Yating Zhong (PhD student under Tim Kusky in Wuhan)
Interest: Tectonic and metamorphic evolution of North China Craton
Co-supervised by Stüwe, in Graz since October 2022)

Masters Students:

Sarah Schaffer (MSc student)
Interest: Hydrogeology
All of 2022 (self supported, with G. Winkler as co-supervisor)

Sebastian Stumpf (MSc student)
Interest: Metamorphic field gradients of the Eoalpine Eastern Alps
All of 2022 (self supported, effective supervisor: Skrzypek)

Konstantin Hohmann (MSc student)
Interest: Neotectonics of the Fischbacher Alpen
Graduated Sept 2022 (self supported)

Bachelor Students:

Lukas Patscheider (BSc)
Interest: Augenstein Proviniez Studien

FUNDED RESEARCH PROJECTS

- Elevated Low Relief Landscapes in Mountain Belts: Active Tectonics or Glacial Reshaping? A Case Study in the Eastern Alps <http://elevate.sbg.ac.at/>
Funded by: FWF together with Robl/Salzburg (half of the funding in Graz)
- Co-PI on: Kirgizstan project (small project funded to Etienne Skrzypek by ASEAN Uni-net)



Figure 2: Movies and conferences: (a) Long term cooperation partners Stefan Hergarten and Jörg Robl at the Kaprun geomorphology conference in November. (b) With Sierd Cloetingh and Gabor Tari in Hungary in March. (c) Florian Höllerl, Rolf Herrmann and Lukas during filming ARTE documentary at the Rossloch Klettersteig. (d) PhD student Florian Dremel adviser Jörg Robl and Kurt at Kaprun conference. (e) Filming an ORF production on “energy in Austria” at the lithium mine in the Koralpe with Kirgis colleague Max and PhD students Pornchanit and Yating Zhong. (f) Playing with Foam at the annual “Barbara Feier” on Dec. 2nd.

SCIENTIFIC PUBLICATIONS 2022

Journal Articles and Book Chapters:

- Stüwe K., Robl J., Turab S.A., Sternai P., Stuart F.M., (2022). Feedbacks between sea-floor spreading, trade winds and precipitation in the Southern Red Sea Nature Communications 13:5405.
<https://doi.org/10.1038/s41467-022-32293-1>
- Schuster R., Stüwe K., 2022 Geological and tectonic setting of Austria in: Embleton- Hamman C. (Ed.). Landscapes and landforms of Austria. Springer International Publ., 978-3-030-92813-1 (ISBN) 496 pp.
- Brandstätter, J., Wagner, T., Stüwe, K., Wilhelmy, M., Winkler, G. (2022): Die Geologie der Steiermark. in Amt der Steiermärkischen Landesregierung (2022): Dynamische Waldtypisierung - Standörtliche Grundlagen und Anpassungsmaßnahmen an den Klimawandel, Band 1, Amt der Steiermärkischen Landesregierung, ABT10 Land- und Forstwirtschaft, Landesforstdirektion Graz, S. 31 - 38.

Abstracts and conference presentations:

- Stumpf, S., Skrzypek, E., Stüwe, K., Iglseider C. 2022. U/Pb age dating and petrology of the Ennstal Phyllite Zone (Eastern Alps) Pangeo
- Liebl, M., Robl, J., Hergarten, S., Stüwe, K., and Gradwohl, G.: Modelling the influence of fluvial and glacial erosion on mountain range relief using a stream-power approach, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-6121, <https://doi.org/10.5194/egusphere-egu22-6121>, 2022
- Gradwohl, G., Stüwe, K., Robl, J., Plan, L., Fabel, D., Stuart, F., Liebl, M., and Di Nicola, L.: Plio-/Pleistocene landscape evolution in the Eastern Alps: new insights from cosmogenic nuclide dating, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-9531, <https://doi.org/10.5194/egusphere-egu22-9531>, 2022.
- Dremel, F., Robl, J., von Hagke, C., and Stüwe, K.: Combining landscape evolution modelling and low T thermochronology to determine the driving forces of relief rejuvenation, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-11065, <https://doi.org/10.5194/egusphere-egu22-11065>, 2022.
- Stüwe K., Robl J., Plan L., Fabel D., Gradwohl G., Liebl M., Stuart F., 2022. The elevated low relief landforms of the Eastern Alps: Distribution and age constraints from cosmogenic nuclide dating Kaprun Abstract volume.

Public Relations Articles and Talks:

- Stüwe K. (2022). Speeddating. Barbara Feier 2.12.2022 Talk
- Stüwe K. (2022). Die Hebung der Alpen – Viel schneller als gedacht? Symposium Das Alter der Erde Akademie der Wissenschaften 3.11.2022.
- Stüwe K., (2022) Geologie für Bergführer Oktober 2022 2-Tage Kurs in Admont.
- Stüwe K., (2022) Zur Geschichte der Steirischen Landschaft. Public lecture. Pangeo 12.9.2022.



Figure 3: Hard working research group: (a) Derek Fabel, and Fin Stuart in supervision session with PhD student Gerit Gradwohl (7.5.-11.5.). (b) Postdoc Simon Schorn with MSc student Sebastian Stumpf and Ralf Schuster (BGA) in the field. (c) BSc student Lukas Patscheider collecting cave samples on the Krippenstein. (d) Sarah Schaffer measuring discharge. (e) Field work with Ralf Schuster. (f) Postdoc Simon Schorn with Marco Simic in his office. (g) PhD student Moritz Liebl with adviser Joerg Robl and Derek Fabel. (h) Kurt in his office.



Figure 4: Exciting field work trips in 2022: (a) Etienne Skrzypek in Kirgistan. (b) Kurt with Ali Sayed and other Sudanese geologists in front of Sudanese oil company offices in Khartoum. (c) Rustam and Max – our Kirgis colleagues during field work at about 3000 m elevation in the Makbal complex of Kirgistan. (d) Geology lecture in a mining camp in the Red Sea district of Sudan. (e) Yet another flat tire in Kirgistan. (f) Explaining shear sense indicators in the field in Sudan. (g) In the academy of Sciences in Bishkek, Kirgistan. (h) Sudanese colleagues in the field in northern Sudan.

INVOLVEMENT WITH TV PRODUCTIONS:

- ORF 3 Production (45 minutes): „Strom und Gas – wirklich alles knapp?“ Made by Florian Riedelsperger with Filming in the Weinebene Li-deposit
- ARTE production: „Steiermark im Wandel“ (45 minutes) by Hanns Kalkreuth. This involved filming at the Rossloch Klettersteig and flying across Steiermark and was show several times in several channels.
- ORF Nachrichten production on ELEVATE Project also filmed in the Rossloch Klettersteig.

FIELD TRIPS, VISITORS AND CONFERENCES

Lots of great field trips in 2022. Here is a selection:

- Kirgistan field trip (7.7.-16.7.) with Etienne Skrzypek. Structural mapping in Makbal complex
- Sudan field trip (1.2.-13.2.2022) “Aid”-trip with 20 Sudanese geologists in the Red Sea district of Sudan.
- Pangeo conference, “Geologie für Bergführer“ meeting in Admont
- German Geomorphology conference in Kaprun
- One day field trips with Ralf Schuster, Jacek Fin Stuart
- Several Movie-takes at Rossloch, Weinebene and others
- 2 Innsbruck trips for exams of the course I taught there in WS21/22
- E. Moulas, F. Stuart, Jacek, D. Fabel, D. Gasser, L. Plan and others visited during the year

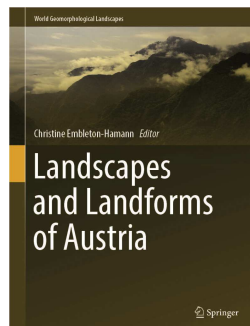


Figure 5: Left: Cover of a new Book we wrote the introductory chapter for. Right: The cover of the new Austrian Journal of Earth Science for 2022

TEACHING AND EDITING ACTIVITIES

EDITORIAL RESPONSIBILITIES:

- **Austrian Journal of Earth Science (Kurt Stuewe Editor)**

In 2022 we managed to crawl out of the AJES hole we were in in 2021 by publishing again a “normal” length issue, The journal now represents ALL Austrian Earth Science societies including ÖGG, ÖVG, ÖMG and ÖPG and we hope that this will be reflected by a flood of new submissions in future yea

TEACHING SUMMER TERM 2022 (most important courses only):

- Geologie von Österreich (Lehramt, Tutors: Sarah Schaffer, Maria Brandmayr)
- Geologie für USW (TU Graz)
- Neotectonics and tectonic geomorphology (MSc curriculum)
- Tectonics of Sedimentary Basins (Msc curriculum)
- Einführende Geländemethoden (BSc curriculum)

TEACHING WINTER TERM 2022/23 (most important courses only):

- Geodynamics of the Lithosphere (MSc curriculum)
- Tectonic Modelling (MSc curriculum)
- Erdwissenschaftliches Seminar (BSc curriculum with D. Hippler)
- Geologie der Erde (BSc curriculum with H. Fritz)
- First Year field trip (with Hauzenberger)

DOCTORATE SCHOOL OF EARTH SCIENCE:

- Kurt Stüwe is the Head of the Doctorate School of Earth Science at Graz University during all of 2022. See: <https://erdwissenschaften.uni-graz.at/de/doktoratsschule/>



Figure 6: Finished and new students: (a) Moritz Liebl at PhD graduation with Stefan Hergarten and Jörg Robl (14.12.2022). (b) PhD student Yating Zhong (co-supervised with Tim Kusky from Wuhan) trying to understand Gibbs Energy loops. (c) Konstantin Hohmann finally graduated with MSc in late summer (Dorothee Hippler, Christian Bauer). Sarah Schaffer at field work.