

CURRICULUM VITAE: Guy Simpson

Senior Lecturer
Department of Earth Science
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PERSONAL INFORMATION

Name: Guy Simpson
Born: 16th August, 1970, New Zealand
Citizenship: New Zealand and Switzerland
Residence: Route des Tournettes 27A, CH-1255, Switzerland
Marital Status: Married with 3 children

RESEARCH INTERESTS

I am interested in the physics of Earth processes that I investigate mainly using simple mathematical models combined with targeted field studies. Domains of special interest include earthquakes, mountain building, deformation in fold and thrust belts and accretionary prisms, foreland basins, sediment routing systems and landscape evolution. I also work with others on diverse phenomenon including tsunamis, avalanches in granular media, volcanism, heat transfer in the crust and fluid flow in porous media.

ACADEMIC EXPERIENCE

2007-present University of Geneva - Department of Earth Science
Maître d'enseignement et de recherche (senior lecturer)

2002-2006 ETH Zürich - Department of Earth Science
Oberassistent (senior teaching and research scientist)

2000-2002 ETH Zürich - Department of Earth Science
Postdoctoral research associate

1998-2000 **Ecole Normale Supérieure and Institut Français du Pétrole, Paris**
Postdoctoral research associate and ATER (teaching assistant)

EDUCATION

2006 Habilitation in Natural Science (ETH Zurich)
1998 Doctor of Natural Science (ETH Zurich)
1994 Master of Natural Science (University of Otago)
1992 Bachelor of Natural Science with 1st class Honours (U. Otago)

INDUSTRY EXPERIENCE

1994 **Etheridge, Henley & Williams Geoscience Consultants, Australia**
Geological Consultant

1992 **BHP Petroleum, Melbourne, Australia**
Geological consultant

STUDENT SUPERVISION

- Raphael Normand (PhD, UNIGE, 2015-): Geomorphological and sedimentological signals of deformation in a silent subduction zone (Makran, Iran).
 - Caroline Calpini (MSc, UNIGE, 2014): Evaluation of risk associated with a tsunami on Lake Geneva.
 - Fabian Boujon (MSc, UNIGE, 2013): A numerical and experimental approach to understanding the dynamics of granular flows.
 - Mickael Heiniger (MSc, UNIGE, 2013): Simulation of dam breaks in Switzerland: analysis of risk.
 - Neda Ghazipour (PhD, UNIGE, 2012-2015): Study of the size and distribution of landslides in an active mountain belt: Lorestan and Fars area, Zagros, Iran.
 - Haseeb Zia (PhD, UNIGE, 2011-2015): Advance and application of a surface process model for the simulation of sediment routing systems.
 - Mortaza Pirouz (PhD, UNIGE, 2007-2013): The geometry and sedimentary record of tectonics in the Neogene Zagros foreland basin. working on the project 'Influence of wedge rheology on the development of foreland basin systems: Insights from the Zagros' (UNIGE, 2007-present).
 - Katja Petrini (Post-Doc, UNIGE, 2008-2011): Mechanisms and consequences of orogenic plateau formation: A study based on numerical modelling with application to the Anatolian plateau
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- Sonia Scarselli (PhD, ETH, 2004-2007): Interactions between deformation and sediment routing systems in active fold and thrust belts: an investigation in the Marche Apennines.
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COURSES TAUGHT

Current courses

- Geological maps and cross sections (100-level, 2007-)
- Mathematics for Earth Scientists (200-level, 2007-)
- Tectonics (300-level, 2007-)
- Geodynamics of Sedimentary Basins (400-level, 2013-)
- Data analysis with Matlab (400-level, 2009-)

Former courses

- Field mapping (100-level, ENS, 1999).
- Computer science and numerical techniques (100-level, ENS, 1999).
- Finite difference programming with applications in Earth Science (400-level, ETH, 2005-2007)
- Finite element programming with applications in Earth Science (400-level, ETH, 2005-2007)

Special 'once-off' courses

- Tectonics and sedimentation along an active plate boundary, New Zealand (400-level, 2 week field excursion, February 2012)
- Finite Element Modelling with applications to Structural Geology (Invited lecturer, G.Pialli School on Structural Geology, Perugia, 5-day block course, Sept. 2005).
- Advanced Landslide Analysis (collaborator for web based course, ETH, 2006-2008)

FUNDING

- 2014 - *Funding for a high performance PC*
Source: SchmidHeiny Foundation
PI: Guy Simpson (UNIGE)
Value: CHF 10,000

- 2014 - *Geomorphological and sedimentological signals of deformation in a silent subduction zone: An investigation of the Makran (Iran)*
Source: Swiss National Science Foundation
PI: Guy Simpson (UNIGE)
Value: CHF 234,744

- 2010-2014 *Advance and application of a surface process model for the simulation of sediment routing systems*
Source: Swiss National Science Foundation
PI: Guy Simpson (UNIGE)
Value: CHF 167,520

- 2008-2011 *Mechanisms and consequences of orogenic plateau formation: A study based on numerical modelling with application to the Anatolian plateau*
Source: Swiss National Science Foundation (EUROCORE TOPO-EUROPE program)
PI: Guy Simpson (UNIGE)
CoPI: Giovanni Bertotti (Univ. Amsterdam)
Value: CHF 269,146

- 2008 *Computer support*
Source: Commission d'informatique (UNIGE)
PI: Guy Simpson (UNIGE)
Value: CHF 3,633

- 2007-2012 *Influence of wedge rheology of the development of foreland basin systems: Insights from the Zagros (Iran)*
Source: Swiss National Science Foundation
PI: Guy Simpson (UNIGE)
CoPIs: Philip Allen (Imperial College, London), Abbas Bahroudi (Univ. Tehran)
Value: CHF 198,920

- 2007 *DS experiment: Two-dimensional modelling of the stress state in the Mount Terri Anticline*
Source: NAGRA
PI: Guy Simpson (UNIGE)
CoPIs: Tim Vietor (NAGRA) , Katja Petrini (UNIGE)
Value: CHF 16,000

- 2008 *DS experiment: Two-dimensional modelling of the stress state in the Mount Terri Anticline - continuation project*
Source: NAGRA
PI: Guy Simpson (UNIGE)
CoPIs: Tim Vietor (NAGRA), Katja Petrini (UNIGE)
Value: CHF 20,000

- 2004-2007 *Interactions between deformation and sediment routing systems in active fold and thrust belts: an investigation in the Marche Apennines*
Source: Swiss National Science Foundation
PI: Guy Simpson (UNIGE)
CoPIs: Philip Allen (Imperial College, London), Giorgio Minelli (Univ. Perugia)
Value: CHF 217,938

- 2006-2008 *The response of surface processes to variations in climate: cosmogenically-derived erosion rates in the Andes and numerical models*
Source: Swiss National Science Foundation
PI: Fritz Schlunegger (Univ. Bern)
coPIs: Guy Simpson (ETH), Rainer Wieler (ETH), Jan Kramers (Univ. Bern)
Value: CHF 463,064

- 2004 *Structural analysis and low-temperature thermochronometry across the Makran Accretionary prism*
Source: Middle East Basin Evolution (MEBE) Consortium
PI: Jean-Pierre Burg (ETH)
coPIs: Guy Simpson (ETH)
Value: 9000 Euro

PUBLIC OUTREACH

- 25.08.2016** Le Temps : La Péninsule, terre de séismes
- 24.08.2016** RTS Radio Television Suisse (19:30) : Interview on Italian earthquake
- 20.01.2016** Public lecture entitled: Tremblements de terre - retour vers le futur (Collège de Saussure)
- 25.04.2015** RTS Radio Television Suisse (19:30) : Interview on Nepal earthquake
- 1.12.2013** RTS Radio Television Suisse: L'oreille des kids - le tsunami
- 19.11.2012** New York Times - A Tsunami in Switzerland?
- 28.08.2012** The Economist - Lake Monsters
- 21.02.2012** The Christchurch Press, 'South Island could become quake school'

PUBLISHED BOOKS

G. Simpson (2017). *Practical Finite Element Modeling in Earth Science using Matlab*. John Wiley and Sons. Chichester. pp. 245.

PUBLICATIONS IN REFEREED JOURNALS

1. Chelle-Michou, C., B. Rottier, L. Caricchi, and **G. Simpson**, (2017) Tempo of magma degassing and the genesis of porphyry copper deposits. *Scientific Reports*, 7, 40566.
2. Caricchi, L., **G. Simpson**, U. Schaltegger (2016) Estimates of volume and magma input in crustal magmatic systems from zircon geochronology: the effect of modelling assumptions and system variables. *Frontiers in Earth Science*, 48, doi: 10.3389/feart.2016.00048.
3. Pirouz, M., **G. Simpson**, S. Casteltort, G. Gorin, A. Bahroudi (2016) Controls on the sequence stratigraphic architecture of the Neogene Zagros foreland basin. In: *Tectonic Evolution, Collision, and Seismicity of Southwest Asia: In Honor Manuel Berberian's Forty-Five Years of Research Contributions*, edited by R. Sorkhabi, *Geological Society of America Special Papers*, 525, doi.org/10.1130/2016.2525(12).
4. Ghazipour N. and **G. Simpson** (2016) Size distribution and controls of landslides in the Zagros mountain belt (Iran). In: *Tectonic Evolution, Collision, and Seismicity of Southwest Asia: In Honor Manuel Berberian's Forty-Five Years of Research Contributions*, edited by R. Sorkhabi, *Geological Society of America Special Papers*, 525, [https://doi.org/10.1130/2016.2525\(13\)](https://doi.org/10.1130/2016.2525(13)).
5. **Simpson, G.** (2015) Accumulation of permanent deformation during earthquake cycles on reverse faults. *Journal of Geophysical Research, Solid Earth*, 120, doi 10.1002/2014JB011442.
6. Kremer, K., M. Hilbe, **G. Simpson**, L. Decrouy, W. Wildi, S. Girardclos (2015) Reconstructing 4000 years of mass movement and tsunami history in a deep peri-Alpine lake (Lake Geneva, France-Switzerland), *Sedimentology*, doi: 10.1111/sed.12190.
7. Pirouz, M., **G. Simpson** and M. Chiaradia (2015) Constraint on foreland basin migration in the Zagros using Sr isotope stratigraphy. *Basin Research*, doi: 10.1111/bre.12097
8. **G. Simpson** (2014) Decoupling of foreland basin subsidence from topography linked to faulting and erosion. *Geology*, 14, doi: 10.1130/G35749.1.
9. Caricchi, L., **G. Simpson**, and U. Schaltegger (2014) Zircons reveal magma fluxes in the Earth's crust. *Nature*, 511, 457461, doi:10.1038/nature13532.
10. Spikings, R. and **G. Simpson** (2014) Rock uplift and exhumation of continental margins by the collision, accretion and subduction of buoyant and topographically prominent oceanic crust. *Tectonics*, 33, doi: 10.1002/2013TC003425.

11. Caricchi, L., C. Annen, J. Blundy, **G. Simpson** and V. Pinel (2014) Frequency and magnitude of volcanic eruptions controlled by magma injection and buoyancy. *Nature Geoscience*, 7, 126-130, doi: 10.1038/ngeo2041.
12. Kremer, K., F. Marillier, M. Hilbe, **G. Simpson**, D. Dupuy, B. JF Yrro, AM. Rachoud-Schneider, P. Corboud, B. Bellwald, W. Wildi, S. Girardclos (2014) Lake dwellers occupation gap in Lake Geneva (France-Switzerland) possibly explained by an earthquake-mass movement-tsunami event during Early Bronze Age. *Earth and Planetary Science Letters* 385, 28-39.
13. Kremer, K, **G. Simpson** and Girardclos, S. (2012) Giant Lake Geneva tsunami in AD 563. *Nature Geoscience* 5, 756757. doi:10.1038/ngeo1618.
14. **G. Simpson** and S. Castelltort (2012) Model shows that rivers transmit high-frequency climate cycles to the sedimentary record. *Geology* doi:10.1130/G33451.1.
15. Castelltort, S. and **G. Simpson** (2012) Le flux sédimentaire des montagnes aux bassins. *Géochronique* 124, 27-30.
16. Malatesta, L. C., S. Castelltort, S. Mantellini, V. Picotti, I. Hajdas, **G. Simpson**, A. Berdimuradov, M. Tosi, S. Willett (2012) Dating the Irrigation System of the Samarkand Oasis: A Geoarchaeological Study. *Radiocarbon* 54, 91-105.
17. **Simpson, G.** (2011) Mechanics of non-critical fold-thrust belts based on finite element models. *Tectonophysics* 499, 142-155.
18. Pirouz, M., **G. Simpson**, A. Bahroudi and A. Azhdari (2011) Neogene sediments and modern depositional environments of the Zagros foreland basin system. *Geological Magazine*, doi:10.1017/S0016756811000392.
19. Lacombe, O., B. Grasemann and **G. Simpson** (2011) Introduction: geodynamic evolution of the Zagros. *Geological Magazine* 148, 689-691.
20. **Simpson, G.** (2010) Formation of accretionary prisms influenced by sediment subduction and supplied by sediments from adjacent continents. *Geology* 38, 131134, doi: 10.1130/G30461.1.
21. **Simpson, G.** (2010) Influence of the mechanical behaviour of brittle-ductile fold thrust belts on the development of foreland basins. *Basin Research* 22, 139-156, doi:10.1111/j.1365-2117.2009.00406.x.
22. Castelltort, S., **G. Simpson** and A. Darrioulat (2009) Slope-control on the aspect ratio of river basins. *Terra Nova* 21, 265270, doi: 10.1111/j.1365-3121.2009.00880.x.
23. **Simpson, G.** (2009) Mechanical modelling of folding versus faulting in brittle-ductile wedges *Journal of Structural Geology* 31, 369-381, doi:10.1016/j.jsg.2009.01.011.
24. Densmore, A.L, P.A. Allen and **G. Simpson** (2007) Development and response of a coupled catchment-fan system under changing tectonic and climatic forcing. *Journal of Geophysical Research* 112, F01002, doi:10.1029/2006JF000474.

25. Scarselli, S., **G. Simpson**, P. A. Allen, G. Minelli, P. Hochuli, and L. Gaudenzi (2007) Association between Messinian drainage network formation and major tectonic activity in the Marche Apennines (Italy). *Terra Nova* 19, 74-81 10.1111/j.1365-3121.2006.00717.x.
26. Castelltort, S., and **G. Simpson** (2006) Growing mountain ranges and quenched river networks. *Comptes Rendus Geosciences* 338, 1184-1193. doi:10.1016/j.crte.2006.09.006.
27. **Simpson, G.** (2006) How and to what extent does the emergence of orogens above sea level influence their tectonic development? *Terra Nova* 18, 447-451.
28. Castelltort, S., and **G. Simpson** (2006) River spacing and drainage network growth in widening mountain ranges. *Basin Research* 18, 267-276.
29. **Simpson, G.** (2006) Modelling interactions between fold-thrust belt deformation, foreland flexure and surface mass transport. *Basin Research* 18, 125-143, doi: 10.1111/j.1365-2117.2006.00287.x.
30. **Simpson, G.** and S. Castelltort (2006) Coupled model of surface water flow, sediment transport and morphological evolution. *Computers and Geosciences* 32, 1600-1614.
31. **Simpson, G.** (2006) Influence of erosion and deposition on deformation in fold belts. In *Tectonics, climate, and landscape evolution* (Willett, S.D., Hovius, N., Brandon, M.T., and Fisher, D. eds.), Geological Society of America special paper 398, Penrose Conference Series, p. 267-281, doi: 10.1130/2006.2398(16).
32. Zeilinger G., F. Schlunegger, and **G. Simpson** (2005) The Oxaya anticline (northern Chile): A buckle enhanced by river incision? *Terra Nova* 17, 358-375.
33. **Simpson, G.** (2004) A dynamic model to investigate coupling between erosion, deposition and three-dimensional (thin-plate) deformation, *Journal of Geophysical Research, Earth Surface* 109, F02006, doi:10.1029/2003JF000078.
34. **Simpson, G.** (2004) The role of river incision in enhancing deformation, *Geology* 32, 341-344.
35. **Simpson, G.** (2004) Dynamic interactions between erosion, deposition and three-dimensional deformation in compressional fold-belt settings, *Journal of Geophysical Research* 109, doi:10.1029/2003JF000111.
36. **Simpson, G.** and F. Schlunegger (2003) Topographic evolution and morphology of surfaces evolving in response to coupled fluvial and hillslope sediment transport, *Journal of Geophysical Research* 108, doi:10.1029/2002JB002162.
37. **Simpson, G.**, Y. Guéguen and F. Schneider (2003) An analytical model for permeability evolution in microcracking rock, *Pure and Applied Geophysics*, 160, 999-1008.

38. F. Kober, F. Schlunegger, R. Wieler, S. Ivi-Ochs and **G. Simpson** (2002) Determination of erosion rates in a decoupled river and pediplane system in the Central Andes, Northern Chile. *International Symposium on Andean Geodynamics* 5, 347-349.
39. Schlunegger, F. and **G. Simpson** (2002) Possible erosional control on lateral growth of the European Central Alps. *Geology* 30, 907-910.
40. **Simpson, G.** (2001) Influence of compression-induced fluid pressures on rock strength in the brittle crust, *Journal of Geophysical Research* 106, 19465-19485.
41. **Simpson, G.** , Y. Guéguen and F. Schneider (2001) Permeability enhancement due to microcrack dilatancy in the damage regime, *Journal of Geophysical Research* 106, 3999-4016.
42. **Simpson, G.** (2000) Metamorphic vein spacing distributions: characterisation and origin of a vein spacing distribution from NW Sardinia, Italy, *Journal of Structural Geology* 22, 335-348.
43. **Simpson, G.** , A.B. Thompson and J.A.D. Connolly (2000) Phase relations, singularities and thermobarometry of metamorphic assemblages containing phengite, chlorite, biotite, K-feldspar, quartz and H₂O, *Contributions to Mineralogy and Petrology* 139, 555-569.
44. **Simpson, G.** (1999) Evolution of strength and hydraulic connectivity during dehydration: results from a microcrack model, *Journal of Geophysical Research* 104, 10467-10482.
45. **Simpson, G.** (1998) Dehydration-related deformation during regional metamorphism, NW Sardinia, Italy, *Journal of Metamorphic Geology* 16, 457-472.
46. **Simpson, G.** and T. Aslund (1996) Diorite and gabbro of the Dromedary mafic complex, South Victoria Land, Antarctica, *New Zealand Journal of Geology and Geophysics* 39, 403-414.
47. **Simpson, G.**, A.F. Cooper and R.J. Norris (1994) Late Quaternary evolution of the Alpine Fault Zone at Paringa, South Westland, New Zealand. *New Zealand Journal of Geology and Geophysics* 37, 49 - 58.