

Interactions of climate and tectonics

Seminar info and schedule

For the autumn semester 2015 we'll focus our reading and discussions on the interactions of climate and tectonic processes. This discussion will start with considering their interactions at a global scale and likely move to case studies from individual orogens. Seminars will take place at 12-13.30 in room D501 of the Exactum. You may also want to see [more information about the general format of the seminar](#).

A tentative schedule of readings is below.

Date	Discussion leader(s)	Topic and papers
3.9.2015	n/a	Organizational meeting. Selection of seminar meeting time, suggested papers to discuss, ideas for other topics, etc.
10.9.2015	Jorina	<p>Global cooling and its relation to tectonics</p> <ul style="list-style-type: none"> M. E. Raymo and W. F. Ruddiman. Tectonic forcing of late cenozoic climate. <i>Nature</i>, 359(6391):117–122, 09 1992 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> None
17.9.2015	Eemu	<p>Carbon fluxes in the Himalaya</p> <ul style="list-style-type: none"> Becker, J. A., Bickle, M. J., Galy, A., & Holland, T. J. (2008). Himalayan metamorphic CO₂ fluxes: quantitative constraints from hydrothermal springs. <i>Earth and Planetary Science Letters</i>, 265(3), 616-629 Gaillardet, J., & Galy, A. (2008). Atmospheric science. Himalaya--carbon sink or source?. <i>Science</i>, 320(5884), 1727-8 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> Kerrick, D. M., & Caldeira, K. (1998). Metamorphic CO₂ degassing from orogenic belts. <i>Chemical Geology</i>, 145(3), 213-232 Evans, M. J., Derry, L. A., & FranceLanord, C. (2008). Degassing of metamorphic carbon dioxide from the Nepal Himalaya. <i>Geochemistry, Geophysics, Geosystems</i>, 9(4)
24.9.2015	Niclas	<p>Silicate weathering and CO₂ consumption - a modern view</p> <ul style="list-style-type: none"> Maher, K., & Chamberlain, C. P. (2014). Hydrologic regulation of chemical weathering and the geologic carbon cycle. <i>Science</i>, 343(6178), 1502-1504 Misra, S., & Froelich, P. N. (2012). Lithium isotope history of Cenozoic seawater: changes in silicate weathering and reverse weathering. <i>Science</i>, 335(6070), 818-823 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> Li, G., & West, A. J. (2014). Evolution of Cenozoic seawater lithium isotopes: Coupling of global denudation regime and shifting seawater sinks. <i>Earth and Planetary Science Letters</i>, 401, 284-293
1.10.2015	Lars	<p>Introduction to the snowball Earth hypothesis</p> <ul style="list-style-type: none"> Hoffman, P. F., Kaufman, A. J., Halverson, G. P., & Schrag, D. P. (1998). A Neoproterozoic snowball earth. <i>Science</i>, 281(5381), 1342-1346 Hoffman, P. F., & Schrag, D. P. (2000). Snowball earth. <i>Scientific American</i>, 282(1), 68-75 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> Hoffman, P. F., & Schrag, D. P. (2002). The snowball Earth hypothesis: testing the limits of global change. <i>Terra nova</i>, 14(3), 129-155.

8.10.2 015	Miro	<p>Challenges to the snowball Earth hypothesis and the snowball Earth's ocean</p> <ul style="list-style-type: none"> • Leather, J., Allen, P. A., Brasier, M. D., & Cozzi, A. (2002). Neoproterozoic snowball Earth under scrutiny: Evidence from the Fiq glaciation of Oman. <i>Geology</i>, 30(10), 891-894 • Ashkenazy, Y., Gildor, H., Losch, M., Macdonald, F. A., Schrag, D. P., & Tziperman, E. (2013). Dynamics of a Snowball Earth ocean. <i>Nature</i>, 495(7439), 90-93 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> • None
15.10. 2015	Guillem	<p>The hypothesis of coupling between climate, erosion and tectonics in orogens</p> <ul style="list-style-type: none"> • Beaumont, C., Fullsack, P., & Hamilton, J. (1992). Erosional control of active compressional orogens. In <i>Thrust tectonics</i> (pp. 1-18). Springer Netherlands. <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> • Koons, P. O. (1990). Two-sided orogen: collision and erosion from the sandbox to the Southern Alps, New Zealand. <i>Geology</i>, 18(8), 679-682.
19.11. 2015	Lars	<p>Modelling deep tectonics, fluvial activity, uplift, and erosion</p> <ul style="list-style-type: none"> • K. Ueda, S.D. Willett, T. Gerya & J. Ruh (2015). Geomorphological–thermo-mechanical modeling: Application to orogenic wedge dynamics. <i>Tectonophysics</i>, 659, p. 12-30.
3.12.2 015	Dave	<p>Interactions between climate, erosion and tectonics in the Himalaya</p> <ul style="list-style-type: none"> • Burbank, D. W., Blythe, A. E., Putkonen, J., Pratt-Sitaula, B., Gabet, E., Oskin, M., Barros, A., & Ojha, T. P. (2003). Decoupling of erosion and precipitation in the Himalayas. <i>Nature</i>, 426(6967), 652-655 • Wobus, C. W., Hodges, K. V., & Whipple, K. X. (2003). Has focused denudation sustained active thrusting at the Himalayan topographic front?. <i>Geology</i>, 31(10), 861-864 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> • Reiners, P. W., & Brandon, M. T. (2006). Using thermochronology to understand orogenic erosion. <i>Annu. Rev. Earth Planet. Sci.</i>, 34, 419-466
10.12. 2015	Lars	<p>Interactions between climate, erosion and tectonics in the Bolivian Andes, part I</p> <ul style="list-style-type: none"> • Whipple, K. X., & Gasparini, N. M. (2014). Tectonic control of topography, rainfall patterns, and erosion during rapid post–12 Ma uplift of the Bolivian Andes. <i>Lithosphere</i>, 6(4), 251-268 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> • Wobus, C., Whipple, K. X., Kirby, E., Snyder, N., Johnson, J., Spyropolou, K., ... & Sheehan, D. (2006). Tectonics from topography: Procedures, promise, and pitfalls. <i>Geological Society of America Special Papers</i>, 398, 55-74
17.12. 2015	Jorina	<p>Interactions between climate, erosion and tectonics in the Bolivian Andes, part II</p> <ul style="list-style-type: none"> • Gasparini, N. M., & Whipple, K. X. (2014). Diagnosing climatic and tectonic controls on topography: Eastern flank of the northern Bolivian Andes. <i>Lithosphere</i>, 6(4), 230-250 <p><u>Supplemental reading:</u></p> <ul style="list-style-type: none"> • Wobus, C., Whipple, K. X., Kirby, E., Snyder, N., Johnson, J., Spyropolou, K., ... & Sheehan, D. (2006). Tectonics from topography: Procedures, promise, and pitfalls. <i>Geological Society of America Special Papers</i>, 398, 55-74

Papers under consideration

General background

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Global climate and its relation to tectonics

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Snowball Earth

- [Sansjofre, P., Ader, M., Trindade, R. I. F., Elie, M., Lyons, J., Cartigny, P., & Nogueira, A. C. R. \(2011\). A carbon isotope challenge to the snowball Earth. *Nature*, 478\(7367\), 93-96](#)

Climate and erosional forcing of tectonics in orogens