

Week 1 Overview: Uplift, Tectonics and Geodynamics Overview

Isacks, B. L., 1988, Uplift of the Central Andean Plateau and bending of the Bolivian Orocline: *Journal of Geophysical Research*, v. 93, no. B4, p. 3211-3231.

Allmendinger RW , Jordan TE, Kay SM, Isacks BL (1997) The evolution of the Altiplano-Puna Plateau of the Central Andes. *Ann Rev Earth Planet Sci* 25:139–174

Lamb et al., 1997, Cenozoic evolution of the Central Andes in Bolivia and northern Chile *From* Burg, J.-P. & Ford, M. (eds), 1997, *Orogeny Through Time*, Geological Society Special Publication No. 121, pp.237-264.

Week 2 Motivations: Coupling of Climate, Topography and Tectonics

Lamb, S., and Davis, P., 2003, Cenozoic climate change as a possible cause for the rise of the Andes, *Nature*, v. 425, p. 792-797, doi: 10.1038/nature02049.

Montgomery, D. R., Balco, G., and Willett, S. D., 2001, Climate, tectonics, and the morphology of the Andes: *Geology*, v. 29, no. 7, p. 579-582, 10.1130/0091-7613(2001)029.

Weeks 3-7: Uplift History

Paleobotanical Evidence (week 3)

Gregory-Wodzicki, K. M., 2000, Uplift history of the Central and Northern Andes: A review: *Geological Society of America Bulletin*, v. 112, no. 7, p. 1091-1105, 10.1130/0016-7606(2000)112.

Forest et al., 1999, Paleoaltimetry incorporating atmospheric physics and botanical estimates of paleoclimate, *GSA Bulletin*, v. 111; no. 4; p. 497–511.

Forest, 2007, Paleoaltimetry: A Review of Thermodynamic Methods, *Reviews in Mineralogy & Geochemistry*, Vol. 66, pp. 173-193.

Graham, A., Gregory-Wodzicki, K. M., and Wright, K. L., 2001, Studies in neotropical paleobotany. XV. A Mio-Pliocene palynoflora from the Eastern Cordillera, Bolivia: Implications for the uplift history of the Central Andes: *American Journal of Botany*, v. 88, no. 9, p. 1545-1557, 10.2307/3558398.

Isotopic Records (week 4)

Garziona, C. N., Hoke, G. D., Libarkin, J. C., Withers, S., MacFadden, B., Eiler, J., Ghosh, P., and Mulch, A., 2008, Rise of the Andes: *Science*, v. 320, no. 5881, p. 1304-1307, 10.1126/science.1148615.

Title: Stable isotope evidence for multiple pulses of rapid surface uplift in the Central Andes, Bolivia

Author(s): Leier, A (Leier, Andrew); McQuarrie, N (McQuarrie, Nadine); Garzione, C (Garzione, Carmala); Eiler, J (Eiler, John)

Source: EARTH AND PLANETARY SCIENCE LETTERS **Volume:** 371 **Pages:** 49-58 **DOI:** 10.1016/j.epsl.2013.04.025 **Published:** JUN 2013

Garzione, C. N., Molnar, P., Libarkin, J. C., and MacFadden, B. J., 2006, Rapid late Miocene rise of the Bolivian Altiplano: Evidence for removal of mantle lithosphere: *Earth and Planetary Science Letters*, v. 241, no. 3-4, p. 543-556, 10.1016/j.epsl.2005.11.026.

Ghosh, P., Garzione, C. N., and Eiler, J. M., 2006, Rapid uplift of the Altiplano revealed through C-13-O-18 bonds in paleosol carbonates: *Science*, v. 311, no. 5760, p. 511-515, 10.1126/science.1119365.

Geomorphic Evidence (weeks 5-6)

Gubbels, T. L., Isacks, B. L., and Farrar, E., 1993, High-level surfaces, plateau uplift, and foreland development, Bolivian Central Andes: *Geology*, v. 21, p. 695-698.

Hoke, G. D., Isacks, B. L., Jordan, T. E., Blanco, N., Tomlinson, A. J., and Ramezani, J., 2007, Geomorphic evidence for post-10 Ma uplift of the western flank of the central Andes 18 degrees 30'-22 degrees S: *Tectonics*, v. 26, no. 5, Tc5021, 10.1029/2006tc002082.

Barke, R., and Lamb, S., 2006, Late Cenozoic uplift of the Eastern Cordillera, Bolivian Andes: *Earth and Planetary Science Letters*, v. 249, no. 3-4, p. 350-367, 10.1016/j.epsl.2006.07.012.

Thouret, J. C., Woerner, G., Gunnell, Y., Singer, B., Zhang, X., and Souriot, T., 2007, Geochronologic and stratigraphic constraints on canyon incision and Miocene uplift of the Central Andes in Peru: *Earth and Planetary Science Letters*, v. 263, no. 3-4, p. 151-166, 10.1016/j.epsl.2007.07.023.

Schildgen, T. F., Ehlers, T. A., Whipp, D. M., van Soest, M. C., Whipple, K. X., and Hodges, K. V., 2009a, Quantifying canyon incision and Andean Plateau surface uplift, southwest Peru: A thermochronometer and numerical modeling approach: *Journal of Geophysical Research-Earth Surface*, v. 114, F04014, 10.1029/2009jf001305.

Schildgen, T. F., Hodges, K. V., Whipple, K. X., Reiners, P. W., and Pringle, M. S., 2007, Uplift of the western margin of the Andean plateau revealed from canyon incision history, southern Peru: *Geology*, v. 35, no. 6, p. 523-526, 10.1130/g23532a.1.

Hoke, G. D., and Garzione, C. N., 2008, Paleosurfaces, paleoelevation, and the mechanisms for the late Miocene topographic development of the Altiplano plateau: *Earth and Planetary Science Letters*, v. 271, no. 1-4, p. 192-201, 10.1016/j.epsl.2008.04.008.

Geologic Evidence

Jordan, T. E., Nester, P. L., Blanco, N., Hoke, G. D., Davila, F., and Tomlinson, A. J., 2010, Uplift of the Altiplano-Puna plateau: A view from the west: *Tectonics*, v. 29, Tc5007, 10.1029/2010tc002661.

Schildgen, T. F., Hodges, K. V., Whipple, K. X., Pringle, M. S., van Soest, M., and Cornell, K., 2009b, Late Cenozoic structural and tectonic development of the western margin of the central Andean Plateau in southwest Peru: *Tectonics*, v. 28, Tc4007, 10.1029/2008tc002403.

2009 Review of Evidence (week 7)

Barnes, J. B., and Ehlers, T. A., 2009, End member models for Andean Plateau uplift: Self-organization in geological systems, v. 97, no. 1-4, p. 105-132, 10.1016/j.earscirev.2009.08.003.

Weeks 8-9: Influence of Climate Change on Uplift Proxies

Ehlers, T. A., and Poulsen, C. J., 2009, Influence of Andean uplift on climate and paleoaltimetry estimates: *Earth and Planetary Science Letters*, v. 281, no. 3-4, p. 238-248, 10.1016/j.epsl.2009.02.026.

Mulch, A., Uba, C.E., Strecker, M.R., Schoenberg, R., and Chamberlain, C.P., 2010, Late Miocene climate variability and surface elevation in the central Andes: *Earth and Planetary Science Letters*, v. 290, p. 173–182, doi:10.1016/j.epsl.2009.12.019.

Uba, C. E., Kley, J., Strecker, M. R., and Schmitt, A. K., 2009, Unsteady evolution of the Bolivian Subandean thrust belt: The role of enhanced erosion and clastic wedge progradation: *Earth and Planetary Science Letters*, v. 281, no. 3-4, p. 134-146, 10.1016/j.epsl.2009.02.010.

Uba, C.E., Strecker, M.R. & Schmitt, A.K. (2007) Increased sediment accumulation rates and climatic forcing in the central Andes during the late Miocene. *Geology* , 35, 979^ 982.

Jeffery et al., 2013, Quantifying the role of paleoclimate and Andean Plateau uplift on river incision, *JGR-ES*, v. 118, p. 852–871, doi:10.1002/jgrf.20055.

Lease and Ehlers, 2013, Incision into the Eastern Andean Plateau During Pliocene Cooling, *Science* 341, 774 (2013); DOI: 10.1126/science.1239132.

Weeks 10-14: Role of Climate in Andean Evolution

Climate-Topography-Erosion (weeks 10-11)

Bookhagen, B., and Strecker, M. R., 2012, Spatiotemporal trends in erosion rates across a pronounced rainfall gradient: Examples from the southern Central Andes: *Earth and Planetary Science Letters*, v. 327, p. 97-110, 10.1016/j.epsl.2012.02.005.

Carterrier et al, 2012, Slope and climate variability control of erosion in the Andes of central Chile, *Geology*, doi:10.1130/G33735.1.

Aalto, R., Dunne, T., and Guyot, J. L., 2006, Geomorphic controls on Andean denudation rates: *The Journal of Geology*, v. 114, p. 85-99.

Bookhagen, B., and Strecker, M. R., 2008, Orographic barriers, high-resolution TRMM rainfall, and relief variations along the eastern Andes: *Geophysical Research Letters*, v. 35, no. 6, L06403, 10.1029/2007gl032011.

Owen et al., 2011, The sensitivity of hillslope bedrock erosion to precipitation, *ESPL*, v. 36, p. 117-135.

Insel, N., Ehlers, T. A., Schaller, M., Barnes, J. B., Tawackoli, S., and Poulsen, C. J., 2010, Spatial and temporal variability in denudation across the Bolivian Andes from multiple geochronometers: *Geomorphology*, v. 122, no. 1-2, p. 65-77, 10.1016/j.geomorph.2010.05.014.

Safran, E. B., Bierman, P. R., Aalto, R., Dunne, T., Whipple, K., and Caffee, M., 2005a, Erosion rates driven by channel network incision in the Bolivian Andes: *Earth Surface Processes and Landforms*, v. 30, p. 1007-1024.

Climate-Topography-Tectonics Coupling (weeks 12-14)

Masek, J. G., Isacks, B. L., Gubbels, T. L., and Fielding, E. J., 1994, Erosion and tectonics at the margins of continental plateaus: *Journal of Geophysical Research*, v. 99, no. B7, p. 13,941-13,956.

Barnes, J. B., Ehlers, T. A., Insel, N., McQuarrie, N., and Poulsen, C. J., 2012, Linking orography, climate, and exhumation across the central Andes: *Geology*, v. 40, no. 12, p. 1135-1138, 10.1130/g33229.1.

Strecker, M. R., Alonso, R. N., Bookhagen, B., Carrapa, B., Hilley, G. E., Sobel, E. R., and Trauth, M. H., 2007, Tectonics and climate of the southern central Andes: *Annual Review of Earth and Planetary Sciences*, v. 35, p. 747-787.

Thompson et al., 2010, Glaciation as a destructive and constructive control on mountain building, *Nature*, v. 467, doi: 10.1038/nature09365.

Sobel, E. R., Hilley, G. E., and Strecker, M. R., 2003, Formation of internally drained contractional basins by aridity-limited bedrock incision: *Journal of Geophysical Research-Solid Earth*, v. 108, no. B7, 10.1029/2002jb001883.

Schlunegger, F., Norton, K. P., and Zeilinger, G., 2011, Climatic Forcing on Channel Profiles in the Eastern Cordillera of the Coroico Region, Bolivia: *Journal of Geology*, v. 119, no. 1, p. 97-107, 10.1086/657407.

Burmudez et al., 2012, Strong tectonic and weak climatic control on exhumation rates in the Venezuelan Andes, *Lithosphere*, v. 5, p. 3-16, doi: 10.1130/L212.1.

Norton, K., and Schlunegger, F., 2011, Migrating deformation in the Central Andes from enhanced orographic rainfall: *Nature Communications*, v. 2, 584, 10.1038/ncomms1590.

Horton, B. K., 1999, Erosional control on the geometry and kinematics of thrust belt development in the Central Andes: *Tectonics*, v. 18, no. 6, p. 1292-1304.

McQuarrie, N., Ehlers, T. A., Barnes, J. B., and Meade, B., 2008b, Temporal variation in climate and tectonic coupling in the central Andes: *Geology*, v. 36, no. 12, p. 999-1002, 10.1130/g25124a.1.

Weeks 15: Geodynamics – Mechanics of Uplift

Ouimet, W. B., and Cook, K. L., 2010, Building the central Andes through axial lower crustal flow: *Tectonics*, v. 29, Tc3010, 10.1029/2009tc002460.

Subducted Slabs and Drainage reversal:

G. E. Shephard^{1*}, R. D. Müller¹, L. Liu^{2†} and M. Gurnis²
NATURE GEOSCIENCE | VOL 3 | DECEMBER 2010, DOI: 10.1038/NGEO1017

J. Figueiredo^{1,2*}, C. Hoorn³, P. van der Ven², and E. Soares²
Geology, July 2009; v. 37; no. 7; p. 619–622; doi: 10.1130/G25567A.1

Title: What drives orogeny in the Andes?

Author(s): Sobolev, SV (Sobolev, SV); Babeyko, AY (Babeyko, AY)

Source: GEOLOGY **Volume:** 33 **Issue:** 8 **Pages:** 617-620 **DOI:** 10.1130/G21557 **Published:** AUG 2005

Week 16?: Controls on Exhumation, Erosion and Sediment Flux

Gillis, R. J., Horton, B. K., and Grove, M., 2006, Thermochronology, geochronology, and upper crustal structure of the Cordillera Real: Implications for Cenozoic exhumation of the central Andean plateau: *Tectonics*, v. 25, no. 6, Tc6007, 10.1029/2005tc001887.

Ege, H., Sobel, E. R., Scheuber, E., and Jacobshagen, V., 2007, Exhumation history of the southern Altiplano plateau (southern Bolivia) constrained by apatite fission track thermochronology: *Tectonics*, v. 26, no. 1, Tc1004, 10.1029/2005tc001869.

Safran, E. B., Blythe, A., and Dunne, T., 2006, Spatially variable exhumation rates in orogenic belts: An Andean example: *Journal of Geology*, v. 114, no. 6, p. 665-681, 10.1086/507613.

Deformation, Tectonics, Volcanism

Horton, B. K., 2005, Revised deformation history of the central Andes: Inferences from Cenozoic foredeep and intermontane basins of the Eastern Cordillera, Bolivia: *Tectonics*, v. 24, no. 3, Tc3011, 10.1029/2003tc001619.

Elger, K., Oncken, O., and Glodny, J., 2005, Plateau-style accumulation of deformation: Southern Altiplano: *Tectonics*, v. 24, 10.1029/2004TC001675.

Lamb, S., 2000, Active deformation in the Bolivian Andes, South America: *Journal of Geophysical Research-Solid Earth*, v. 105, no. B11, p. 25627-25653, 10.1029/2000jb900187.

Mosolf, J. G., Horton, B. K., Heizler, M. T., and Matos, R., 2011, Unroofing the core of the central Andean fold-thrust belt during focused late Miocene exhumation: evidence from the Tipuani-Mapiri wedge-top basin, Bolivia: *Basin Research*, v. 23, no. 3, p. 346-360, 10.1111/j.1365-2117.2010.00491.x.

Oncken, O., Hindle, D., Kley, J., Elger, K., Victor, P., and Schemmann, K., 2006, Deformation of the central Andean upper plate system—Facts, fiction, and constraints for plateau models, *The Andes*, Springer, p. 3-27.

Victor, P., Oncken, O., and Glodny, J., 2004, Uplift of the western Altiplano plateau: Evidence from the Cordillera between 20 degrees and 21 degrees S (northern Chile): *Tectonics*, v. 23, no. 4, Tc4004, 10.1029/2003tc001519.

Worner, G., Uhlig, D., Kohler, I., and Seyfried, H., 2002, Evolution of the West Andean Escarpment at 18 degrees S (N. Chile) during the last 25 Ma: uplift, erosion and collapse through time: *Tectonophysics*, v. 345, no. 1-4, p. 183-198, 10.1016/s0040-1951(01)00212-8.

Title: A geomorphological approach to determining the Neogene to Recent tectonic deformation in the Coastal Cordillera of northern Chile (Atacama)

Author(s): Riquelme, R (Riquelme, R); Martinod, J (Martinod, J); Herail, G (Herail, G); Darrozes, J (Darrozes, J); Charrier, R (Charrier, R)

Source: TECTONOPHYSICS **Volume:** 361 **Issue:** 3-4 **Pages:** 255-275 **DOI:** 10.1016/S0040-1951(02)00649-2 **Published:** JAN 23 2003