

# Margarete A. Jadamec

Department of Earth and Atmospheric Sciences  
University of Houston  
Science and Research Building 1  
3507 Cullen Blvd, Room 312  
Houston, TX 77204

Office: Science & Research Bldg 1, Room 127A  
Tel: (713) 743-6510  
Email: [mjadamec@central.uh.edu](mailto:mjadamec@central.uh.edu)  
Web: <http://www.eas.uh.edu/people/faculty/margarete-jadamec>

## Research Areas

Rheology, Tectonics, and Lithospheric Deformation at Convergent Plate Boundaries  
Mantle Flow and Slab Window Processes in Subduction Zones  
Numerical Modeling of Geographically Referenced 3D Plate Boundaries  
3D Immersive Data Visualization in Virtual Reality Environments  
Alaskan Tectonics and Caribbean Tectonics

## Education

Ph.D. Geophysics, Univ. of California Davis, 2009 (Advisor: M. I. Billen)  
M.S. Geology, Univ. of Alaska, Fairbanks, 2003 (Advisor: W. K. Wallace)  
B.S. Geology and Geophysics, Honors Scholar, Univ. of Connecticut, 1999 (Advisor: J. Crespi)

## Academic Appointments

Assistant Professor, Dept. of Earth and Atmospheric Sciences, Univ. of Houston, 2014-*present*  
Postdoctoral Research Associate, Dept. of Geological Sciences, Brown Univ., 2013-2014  
NSF Postdoctoral Research Fellow, Dept. of Geological Sciences, Brown Univ., 2011-2013  
Postdoctoral Research Fellow, School of Mathematical Sciences, Monash Univ., Dec. 2008-2011

## Academic Awards and Honors

Outstanding Reviewer, Earth and Planetary Science Letters (2015)  
Technology in Teaching Award *Nomination*, For Course GEL 220, Brown University (2014)  
[Best Science Paper](#), Extreme Science and Engineering Discovery Environment (XSEDE12) (2012)  
[Best Conference Paper](#), Extreme Science and Engineering Discovery Environment (XSEDE12) (2012)  
National Science Foundation Earth Science Postdoctoral Fellow (2011-2013)  
Graduate Award for Engineering or Computer-related Applications, University of California, Davis (2006)  
Graduate Block Grant Fellowship, Graduate School, University of California, Davis  
Cordell Durrell Research Award, Dept. Earth and Planetary Sciences, Univ. of California, Davis (2004)  
Cordell Durrell Research Award, Dept. Earth and Planetary Sciences, Univ. of California, Davis (2003)  
Graduate Research Grant, Geological Society of America (2003)  
Thesis Completion Fellowship, Graduate School, University of Alaska, Fairbanks (2002)  
Martin Van Couvering Award, American Association of Petroleum Geologists (2002)  
Jessie O'Bryan McIntosh Scholarship, University of Alaska, Fairbanks  
Graduate Research Award, ARCO Alaska/Phillips Petroleum Inc (2000)  
Provost Honors Thesis Scholarship, Honor's Program, University of Connecticut (1998)

## Grants Held

Numerical Modeling of Three-dimensional Subduction Driven Mantle Wedge Weakening and Plate-Mantle Decoupling, 2014–2016, *National Science Foundation*, NSF-EAR 1352879, PI: **Margarete A. Jadamec** (sole PI), \$144,999

Three-dimensional Subduction Models: Implications for Plate-Mantle Coupling and Length-scales of Seismic Anisotropy, 2013–2014, *National Science Foundation*, NSF-EAR 1316416, PI: **Margarete A. Jadamec** (sole PI), \$58,706

Role of Rheology and Water in Rapid Mantle Flow: 3D Numerical Models of the Costa Rica-Nicaragua Subduction Zone, 2011-2013, *National Science Foundation*, NSF-EAR PF 104954, PI: **Margarete A. Jadamec** (sole PI), \$170,000

3DALIVE: Applied Laboratory for Immersive Visualization Environments, 2009-2011, *3DALIVE joint facility between Monash University eResearch Centre, School of Mathematical Sciences, School of Geosciences, and CSIRO Australia*, Co-Founder and Co-PI, \$449,063

Geodynamic Framework for the Tectonic Trigger of Late Neogene Deformation in Southern Alaska 2006–2009, *National Science Foundation*, NSF-EAR Tectonics 0537995, Co-Author, \$229,961

Role of Rheology and Water in Rapid Mantle Flow: Three-dimensional Geodynamic Models of the Cocos-Nazca Subduction System, 2012-2013, *Extreme Science and Engineering Discovery Environment (XSEDE)* HPC Resource Allocation TG-EAR120010: PI: **Margarete A. Jadamec**, 500,000 SUs

Geodynamic Framework for the Tectonic Trigger of Late Neogene Deformation in Southern Alaska, 2008-2009, *TeraGrid HPC Roaming Resource Allocation*, TG-EAR080015N, Co-Author, 500,000 SUs

3D Thermo-Mechanical Models of Southern Alaska, 2008, *TeraGrid HPC Development Allocation* TG-EAR080006N, Co-Author, 30,000 SUs

## Postdocs and Students

### *Current*

Postdoc: Alberto Carballo, University of Houston, 2016–present

PhD Student: Kirstie Haynie, University of Houston, 2014–present

MS Student: Simin Gao, University of Houston, 2015–present

Undergraduate Thesis Student: Benjamin Chang, University of Houston, 2015–present

Undergraduate Researcher: Nikki Pham, GLADE REU, University of Houston, summer 2016

Undergraduate Researcher: Robby Gibler, University of Houston, 2016–present

### *Previous*

Postdoc: Julia MacDougall, University of Houston, 2014–2015 (now at Reviewed.com)

PhD Student: Wendy Sharples, Monash Univ., Graduated 2015, Co-Supervised with L. Moresi, (now at Julich Supercomputing Centre)

Undergraduate Honors Thesis: Ken McLean, Monash University, Co-Supervised with P. Durance

Undergraduate Researchers: David Willis, Monash University (now PhD student with Louis Moresi); Eamon Lai, Monash University; James Blythe, Monash University

## Teaching Experience

Instructor, *Physical Geology*, Dept. Earth & Atmospheric Sciences, Univ. Houston (2016)

Instructor, *Geodynamics*, Dept. Earth & Atmospheric Sciences, Univ. Houston (2015)

Instructor, *Geology Field Camp*, Dept. Earth & Atmospheric Sciences, Univ. Houston (2015)

Instructor, *Subduction Zone Dynamics*, Dept. Earth & Atmospheric Sciences, Univ. Houston (2015)

Instructor, *Solid Earth Seminar*, Dept. Earth & Atmospheric Sciences, Univ. Houston (2014)  
Viz Lab, *Physical Processes in Geology*, Dept. of Geological Sciences, Brown Univ. (2012, 2013)  
Instructor, *Earth Sciences Project*, School of Geosciences, Monash University, Australia (2010)  
Guest Lecturer, *Physical Geology*, American River College, Sacramento, CA (2006)  
Guest Lecturer, *Tectonics*, California State University, San Bernardino, CA (2006)  
Teaching Assistant, *Field Camp*, Dept. Earth & Planetary Sciences, Univ. of Calif., Davis (2003–2005)  
Teaching Assistant, *Physical Geol.*, Dept. Earth & Planetary Sciences, Univ. of Calif., Davis (2004–2005)  
Teaching Assistant, *Field Geology*, Dept. Earth & Planetary Sciences, Univ. of Calif., Davis (2003)  
Teaching Assistant, *Science, History, & People*, Dept. Earth & Planetary Sciences, Univ. of Calif., Davis  
Teaching Assistant, *Structural Geology*, Geology & Geophysics Dept. of , Univ. of Alaska, Fairbanks  
Teaching Assistant, *The Dynamic Earth*, Geology & Geophysics Dept., Univ. of Alaska, Fairbanks

## Computational Experience

High Performance Computing: Beowulf clusters (2004–present), TeraGrid/XSEDE (2007–*present*)  
3D Visualization Platforms: KeckCAVES (Active Stereo with Intersense Headtracking) (2004–*present*),  
3DALIVE (Infitec Dual Projection with Intersense Headtracking) (2009–2011),  
In-Office Visualization System (HD-TV with Razor Game Controller) (2012–*present*)  
Operating Systems: Unix, Linux, Ubuntu, Mac OS, Windows  
Languages: C, C++, MATLAB, HTML  
Contributed Software: SubductionGenerator (Open Source C/C++ Program)  
Open Source Software: LaTeX, GMT, CitcomCU, CitcomS, 3DVisualizer, Git Version Control  
Commercial Software: MATLAB, Adobe Illustrator, Microsoft Office, AutoCAD

## Academic Service

Computer Software Support Committee, Earth & Atmospheric Sciences, Univ. Houston (2016–present)  
Visualization Committee, CACDS, Univ. Houston (2016–present)  
AGU Fall Meetings Committee, Tectonophysics Section (2015–present)  
Mantle Convection Working Group, Computational Infrastructure for Geodynamics (2015–)  
Chair, Geophysics Curriculum Committee, Earth & Atmospheric Sciences, Univ. of Houston (2014–2015)  
Computational Infrastructure for Geodynamics, Univ. of Houston Member Rep. (2014–present)  
Computational Science Working Group, Computational Infrastructure for Geodynamics (2013–2015)  
Reviewer: Earth and Planetary Science Letters, Geology, Geophysical Research Letters, GeoResJ,  
Geosphere, G<sup>3</sup>, Journal of Geophysical Research, Nature Geosciences, Tectonics, NSF  
Panelist, Geology Club Professional Development Seminar, Brown University (2013)  
Featured Panelist, Women in Science and Engineering, Athena Science Challenge, Brown Univ. (2012)  
Co-Founder, 3DALIVE Immersive visualization facility, Monash University (2009–2011)  
Participant, Searching the Deep Earth Think Tank, Australian Academy of Sciences (2010)  
3DALIVE Steering Committee, eResearch Centre, Monash University (2009 – 2010)  
High Performance Computing Sub-committee, Monash University (2009 – 2010)  
Co-organizer, Department Seminars, Dept. Earth and Planetary Sciences, Univ. California, Davis (2006)  
Co-organizer, Graduate Seminars, Dept. Earth and Planetary Sciences, Univ. California, Davis (2005)  
Advisory Board, Women’s Center, University of Alaska, Fairbanks (2002)

## Journal Articles

- [19] \*Haynie, K. L., **M. A. Jadamec**. Tectonic drivers of the Wrangell-block forearc sliver: Insights from 3D geodynamic models. *Tectonics*, In Revision 2016.
- [18] Sundell, K. E., J. E. Saylor, **M. A. Jadamec**, T. J. Lapen, R. H. Styron, J. Cardenas Implications of flexural modeling of Altiplano stratigraphy on Paleogene paleoelevation of the Peruvian Western Cordillera. *Geology*, In Review 2016.

## Published - Peer Reviewed Papers

- [17] **Jadamec, M. A.** Insights on slab-driven mantle flow from advances in three-dimensional modelling. *Journal of Geodynamics*, doi:10.1016/j.jog.2016.07.004, In Press 2016.
- [16] \*Sharples, W. K., L. N. Moresi, M. Velic, **M. A. Jadamec**, D. A. May. [Simulating faults and plate boundaries with a transversely isotropic plasticity model](#). *Physics of the Earth and Planetary Interiors*, vol. 252, p. 77-90, doi:10.1016/j.pepi.2015.11.007, 2016.
- [15] **Jadamec, M. A.** [Slab driven mantle weakening and rapid mantle flow](#). in *AGU Geophysical Monograph Series, Subduction Dynamics*, Eds. G. Morra, D. A. Yuen, S. King, S-M. Lee, and S. Stein, AGU Wiley, vol. 211, doi:10.1002/9781118888865.ch7, 2016.
- [14] \*Sharples, W. K., L. N. Moresi, **M. A. Jadamec**, J. Revote. [Styles of rifting and fault spacing in numerical models of crustal extension](#). *Journal of Geophysical Research Solid Earth*, 120, doi/10.1002/2014JB011813, 2015.
- [13] \*Sharples, W. K., **M. A. Jadamec**, L. N. Moresi, F. A. Capitanio. [Overriding plate controls on subduction evolution](#). *Journal of Geophysical Research Solid Earth*, 119:6684-6704, 2014. [EOS Research Spotlight](#)
- [12] **Jadamec, M. A.** and W. K. Wallace. [Thrust-breakthrough of asymmetric anticlines: Observational constraints from surveys in the Brooks Range, Alaska](#). *Journal of Structural Geology*, 62:109-124, 2014.
- [11] **Jadamec, M. A.**, M. I. Billen, and S. M. Roeske. [Three-dimensional numerical models of flat slab subduction and the Denali fault driving deformation in south-central Alaska](#). *Earth and Planetary Science Letters*, 376:29–42, 2013. [NBC News](#), [iSGTW](#), [livescience](#), [CIG](#), [SIGMA XI](#)
- [10] Durance, P. M. J., **M. A. Jadamec**, T. J. Falloon, and I. A. Nicholls. [Magmagenesis within the Hunter Ridge Rift zone resolved from olivine-hosted melt inclusions and geochemical modelling, with insights from geodynamic models](#). *Australian Journal of Earth Sciences*, 59(6), 2012.
- [9] **Jadamec, M. A.**, M. I. Billen, and O. Kreylos. [Three-dimensional simulations of geometrically complex subduction with large viscosity variations](#). In *XSEDE '12 Proceedings of the 1st Conference of the Extreme Science and Engineering Discovery Environment: Bridging from the eXtreme to the campus and beyond*, pages 1–8. Association for Computing Machinery, 2012. [Best Conference Paper Award](#), [Best Science Paper Award](#)
- [8] Billen, M.I. and **M. A. Jadamec**. [Origin of localized fast mantle flow velocity in numerical models of subduction](#). *Geochemistry Geophysics Geosystems*, 13:Q01016, 2012.
- [7] Vančo, M., B. Hamann, O. Kreylos, M. Billen, and **M. Jadamec**. [Distance field computation for geological slab surface data sets](#). *Computing and Visualization in Science*, 14(4):143–156, 2012.
- [6] **Jadamec, M. A.** and M. I. Billen. [The role of rheology and slab shape on rapid mantle flow: Three-dimensional numerical models of the Alaska slab edge](#). *Journal of Geophysical Research*, 117(B02304), 2012.
- [5] **Jadamec, M. A.** and M. I. Billen. [Reconciling surface plate motions and rapid three-dimensional flow around a slab edge](#). *Nature*, 465:338–342, 2010. [Discovery News](#), [Nature Editor's Summary](#)

- [4] Kellogg, L. H., G. W. Bawden, T. Bernardin, M. Billen, E. Cowgill, B. Hamann, **M. Jadamec**, O. Kreylos, O. Staadt, and D. Sumner. [Interactive visualization to advance earthquake simulation](#). *Pure and Applied Geophysics*, 165:621–633, 2008.
- [3] Billen, M. I., O. Kreylos, B. Hamann, **M. A. Jadamec**, L. H. Kellogg, O. Staadt, and D. Y. Sumner. [A geoscience perspective on immersive 3D gridded data visualization](#). *Computers & Geosciences*, 34(9):1056–1072, 2008.
- [2] **Jadamec, M. A.**, D. L. Turcotte, and P. Howell. [Analytic models for orogenic collapse](#). *Tectonophysics*, 435:1–12, 2007.
- [1] Kreylos, O., G. W. Bawden, T. Bernardin, M. I. Billen, E. S. Cowgill, R. D. Gold, B. Hamann, **M. Jadamec**, L. H. Kellogg, O. G. Staadt, and D. Y. Sumner. [Enabling scientific workflows in virtual reality](#). In K. Hong Wong, G. Baciú, and H. Bao, editors, *Proceedings of ACM SIGGRAPH International Conference on Virtual Reality Continuum and Its Applications 2006 (VRCIA 2006)*, pages 155–162, New York, 2006. ACM Press.

\*Indicates PhD student supervised. Blue text links to articles.

## Technical Reports

- [3] M. Anderson, K. Miller, S. Beck, and **M. Jadamec**. [Workshop Report: Modern and Ancient Basement Arches and the Connection to Flat Slab Subduction](#). EarthScope inSights Fall Newsletter, 2014.
- [2] **M. A. Jadamec**, M. Hough, J. Revote, and L. Moresi. 3D-ALIVE Training Manual. Monash University, e-Research Centre, 2011. [Monash University News](#)
- [1] **M. A. Jadamec**, O. Kreylos, and M. I. Billen. 3DVisualizer version 1.0 user’s manual for desktop environments. Annual Report 08-01, UC Davis KeckCAVES, 2008.

## Media Coverage of Research

EOS Research Spotlight, March 2015: [Overriding Plate’s Properties Affect Subduction](#)

iSGTW Feature Article, Oct. 2013: [3D Tectonic Modeling Answers Age-old Geology Question](#)

CIG Research Highlight: [Computational Infrastructure for Geodynamics Fall 2013 Newsletter](#)

NBC News: [Mount McKinley-Why the tallest mountain in US is where it is](#)

livescience, Aug. 2013: [US Tallest Mountain’s Surprising Location Explained](#)

SIGMA XI SmartBrief Top Story: [Computer Models Offer Insight into Mount McKinley’s Formation](#)

YouTube Video: [Flat Slab Subduction, Denali Fault, and Mountain Building in the Central Alaska Range](#)

International Innovation Report: [Constructing the Costa Rica-Nicaragua Subduction Zone in 3D](#)

XSEDE, July 2012: [Best Conference Paper and Best Science Paper at XSEDE12](#)

Monash University News, July 2010: [3D Technology to Drive Research Breakthroughs](#)

Nature Editor’s Summary, May 2010: [Rapid Action at Subduction Zones](#)

Discovery News Article: [Earth’s Mantle in Overdrive Under Alaska](#)

## Meetings and Meeting Sessions Organized

*Computational Geosciences and Data Visualization*, GSA South Central Section Meeting (2016)

*Revisiting the Tectonics, Regional Structure, and Geodynamics of Alaska and the North Pacific*, AGU Fall Meeting (2015)

*Slabs in Earth’s Mantle: Where Do They Go & How Do They Interact with the Mantle*, AGU Fall Meeting (2015)

*An Updated View on Caribbean Tectonics*, GSA National Meeting (2015)

*Geophysical Observations and Models of Subduction*, AGU Fall Meeting (2013)

*Solvers in CitcomCU and CitcomS Workshop*, University of California, Davis (2013)

## Conference Talks

CIDER Meeting, Kavli Institute for Theoretical Physics, Santa Barbara, CA, 2016  
CIG Interdisciplinary Directions in Computational Geophysics Meeting, Panelist, Davis, CA 2016  
Geological Society of America South-Central Meeting, Baton Rouge, LA, 2016  
Geological Society of America National Meeting, Baltimore, Maryland, 2015  
European Geosciences Union General Assembly, Vienna, Austria, 2015, *Invited*  
Society for Industrial and Applied Mathematics (SIAM) Annual Meeting, Chicago, IL, 2014, *Invited*  
Computational Infrastructure for Geodynamics Mantle Convection Meeting, Banff, Canada, 2014, *Invited*  
Basement Cored Uplifts and Flat Slab Subduction Workshop, Tuscon, AZ, 2014, *Keynote*  
American Geophysical Union Fall Meeting, San Francisco, CA, 2013  
Meeting of the Americas, American Geophysical Union, Cancun, Mexico, 2013  
EarthScope National Meeting, Raleigh, NC, 2013, *Invited*  
EarthCube Workshop for Modeling in the Geosciences, Boulder, CO, 2013, *Invited*  
Geological Society of America Annual Meeting, Raleigh, North Carolina, 2012  
Bridging the Gap Between the Geosciences and Mathematics, Statistics, and Computer Science, Princeton Center for Theoretical Science, Princeton, NJ, 2012  
Geophysics of Slab Dynamics Conference, Jeju Island, South Korea, 2012, *Invited*  
Extreme Science and Engineering Discovery Environment, XSEDE12, Chicago, IL, 2012, *Best Conference Paper and Best Science Paper*  
Gordon-Kenan Research Seminar, Interior of the Earth, Mt. Holyoke College, MA, 2011, *Invited*  
EarthScope National Meeting, Austin, TX, 2011  
EarthScope National Meeting Alaska Planning Workshop, Austin, TX, 2011, *Invited*  
American Geophysical Union Fall Meeting, San Francisco, CA, 2010  
Tectonics Symposium, Norwegian Academy of Science and Letters, Oslo, Norway, 2010  
American Geophysical Union Fall Meeting, San Francisco, CA, 2009  
OzViz Visualization Conference, Melbourne, Australia, 2009  
Australian Synchrotron Facility, Clayton, Australia, 2009, *Invited*  
Geodynamics of the Australian Plate Research Meeting, Melbourne, Australia, 2009, *Invited*

## Departmental Seminars

Departmental Seminar, Dept. of Earth Science, Rice University, 2016  
Departmental Seminar, Dept. of Earth and Planetary Sciences, Northwestern University, 2016  
Departmental Seminar, Department of Geosciences, University of Texas, Dallas, 2015  
Departmental Seminar, Dept. Earth and Atmospheric Sciences, University of Houston, 2015  
Departmental Seminar, Department of Physics, University of Louisiana, Lafayette, 2014  
Departmental Seminar, Department of Terrestrial Magnetism, Carnegie Institution for Science, 2014  
Department Colloquium, Dept. Earth and Atmospheric Sciences, University of Houston, 2014  
Departmental Colloquium, Dept. of Geology, University of Illinois, Urbana-Champaign, 2013  
Solid Earth Group Brown Bag, Dept. of Geosciences, Princeton University, 2013  
Structure and Tectonics Lunch, Dept. Earth and Planetary Sciences, University of California Davis, 2013  
Departmental Seminar, Dept. of Earth and Planetary Sciences, Northwestern University, 2013

Lunchtime Seminar, Center for Integrative Geosciences, University of Connecticut, 2013  
Departmental Seminar, Dept. of Geosciences, Pennsylvania State University and  
Frontiers of Cyberscience Lecture, Institute for CyberScience, Pennsylvania State University, 2013  
Earth and Planetary Science Seminar, Dept. of Earth and Planetary Sciences, Harvard University, 2013  
Brownbag Seminar, Dept. of Geology and Geophysics, Yale University, 2012  
Departmental Seminar, Graduate School of Oceanography, University of Rhode Island, 2012  
Solid Earth Dynamics Lunch Bunch, Dept. of Geological Sciences, Brown University, RI, 2011  
Seminar, Simula Research Laboratory, Oslo, Norway, 2010  
Departmental Seminar, School of Geosciences, Monash University, Australia, 2010  
e-Research Exemplars and Discussion Forum, Monash University, Australia, 2010  
Departmental Seminar, School of Earth Sciences, University of Melbourne, Australia, 2009  
Departmental Seminar, School of Geosciences, Monash University, Australia, 2009  
Departmental Seminar, Dept. Earth and Planetary Sciences, University of California, Davis, USA 2008

## **Additional Training, Supervising, and Formal Athletic Activities**

### *Additional Teaching and Supervisory*

New Faculty Scholars Program, University of Houston (2014–2015)  
Research Supervisor Accreditation, Level 1, Monash University, AUS (2009)  
Wilderness First Responder, Wilderness Medical Associates (2000)  
Resident Assistant, Department of Residential Life, University of Connecticut (1997–1999)

### *Diversity & Women in STEM*

Mentoring Program (Mentee), ADVANCE Regional Mentoring Network, University of Houston (2016)  
Mentoring & Supervising women in STEM (1 Postdoc, 2 PhD students, 1 MS, 1 Undergrad) (2012–pres.)  
Featured Panelist, Women in Science and Engineering, Athena Science Challenge, Brown Univ. (2012)  
Advisory Board, Women's Center, University of Alaska, Fairbanks (2002)

### *Additional Field Experience*

GPS Field Campaign, Volunteer, USGS, NE Basin and Range (2003)  
GPS Field Campaign, Assistant, Helicopter Supported, Univ. of Alaska, Kenai Peninsula, AK (2002)  
Geologic Mapping, Researcher, Helicopter Supported, Univ. of Alaska, Brooks Range, AK (2001, 2002)

### *Formal Athletic Competitions*

Downhill Mountain Bike Racing, Victoria State Series, Int. Mountain Bicycling Assoc., AUS (2009–2010)  
Downhill Mountain Bike Racing, USA Cycling, Expert Class (2007-2008)  
Downhill Mountain Bike Racing, USA Collegiate MTB National Championships, Banner Elk, NC (2007)  
Dual Slalom Mountain Bike Racing, USA Collegiate MTB National Championships, Banner Elk, NC (2007)  
Western Collegiate Cycling Team, Cal. Aggies (Mountain Biking), Univ. of California, Davis (2005–2007)  
Equinox Marathon, (Mostly trail, greater than 3000 ft elevation change), Fairbanks, AK (2001)  
Equinox Marathon Relay Team, (Mostly trail, greater than 3000 ft elevation change), Fairbanks, AK (2000)