



John Naliboff

Assistant Professor

Department of Earth and Environmental Science

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Curriculum Vitae

Education

2006-2009 **Ph.D.**, Geology, University of Michigan, Ann Arbor, MI
2003-2005 **M.S.**, Geology, University of California, Davis, CA
1999-2003 **B.S.**, Geology, University of California, Davis, CA

Professional Experience

2020- **Assistant Professor**, Department of Earth and Environmental Science, New Mexico Institute of Mining and Technology, Socorro, New Mexico.
2018-2020 **Assistant Research Scientist**, Computational Infrastructure for Geodynamics, Department of Earth and Planetary Sciences, University of California, Davis
2016-2018 **Assistant Project Scientist**, Computational Infrastructure for Geodynamics, Department of Earth and Planetary Sciences, University of California, Davis
2013-2015 **Postdoctoral Researcher**, Geodynamics Teams, Geological Survey of Norway
2010-2013 **Postdoctoral Scholar and Lecturer**, Department of Earth and Planetary Sciences, University of California, Davis.

Principal Research Interests

Lithospheric Deformation Processes

- ◆ Long-term tectonic plate evolution
- ◆ Fault and plate boundary mechanics through seismic cycle time scales
- ◆ Links between observed lithospheric deformation and global convective flow
- ◆ Multiphysics coupling between solid deformation and fluid transport
- ◆ Regularization techniques for brittle failure with adaptively refined meshes
- ◆ Novel statistical comparisons between computational and natural data sets

Computational Geodynamics

- ◆ Development of open-source community software for solid Earth deformation
- ◆ Community training and support for use and development of open-source software and High Performance Computing resources
- ◆ Development of educational resources for computational Earth Science applications.

Grants

Current **Collaborative Research: Development and Application of a Framework for Integrated Geodynamic Earth Models** (co-Principal

Investigator), Funding Source: NSF (Frontier Research in Earth Science), New Mexico Institute of Mining and Technology Award Amount: \$355,780, Duration: 5 years.

- Current* **Linking Surface Deformation to Slab-Mantle Flow in the Cascadia Subduction Zone through 3D Dynamic Models** (collaborator), Funding Source: NSF (Geoprisms). *This proposal supports a postdoctoral scholar for 2 years at UC Davis (Dr. Menno Fraters, PI), who is funded to visit NMT during the course of the project. My role as a collaborator included co-development of the proposed research framework and assistance in writing of the proposal.
- In Review **From oblique rifting to transform margin** (co-Principal Investigator), Funding Source: Petrobras, Requested Funding over 5 years: \$420,000.
- In Review* **High-Resolution 2-D modeling of the Cascadia subduction zone: testing hypotheses about the effects of slab and overriding plate structure on upper-crustal deformation and earthquake recurrence models** (co-Principal Investigator). Funding Source: United States Geologic Survey. *This proposal would provide funding for a USGS Mendenhall postdoctoral fellow, who would I would help supervise remotely and during periodic visits to NMT.
- 2011-2013 **Postdoctoral Fellowship: 3D numerical models of the dynamic generation of outer rise faults***, NSF: Marine Geology and Geophysics, University of California at Davis. Award Amount: \$179,947. *This grant was written by J.B. Naliboff, with editorial feedback from M.I. Billen, but submitted by M.I. Billen due to administrative requirements.

Publications

- Rajaonarison, T.A., Stamps, D.S., and Naliboff, J.B. (In Review). Role of Lithospheric Buoyancy Forces in Driving Deformation in East Africa.
- Gouiza, M. and **Naliboff, J.B.** (In Review), Rheological inheritance controls the formation of segmented rifted margins in cratonic lithosphere.
- Naliboff, J.B.**, Glerum, A. Brune, S., Péron-Pinvidic, G., and Wrona, T. (2020), Development of 3-D Rift Heterogeneity Through Fault Network Evolution. *Geophys. Res. Lett.*, 47, e2019GL086611.
- Peron-Pinvidic, G., and **Naliboff, J.B.** (2020), The exhumation detachment factory, *Geology*, 48(6), 635-639.
- Naliboff, J.B.**, Buiter, S.J.H., Péron-Pinvidic, G., Osmundsen, P.T., and Tetrault, J. (2017), Complex fault interaction controls continental breakup. *Nature Comm.*, 8(1179).
- Zwann, Z.H., Schreurs, G., **Naliboff, J.B.** and Buiter, S.J.H. (2016) Insights Into the Effects of Oblique Extension on Continental Rift Interaction from 3D Analogue and Numerical Models. *Tectonophysics*, 693, 239-260, doi:10.1016/j.tecto.2016.02.036.
- Naliboff, J.B.** and Buiter, S.J.H. (2015), Rift reactivation and migration during multiphase

extension. *Earth Planet. Sci. Letts.*, 421, 58-67, doi:10.1016/j.epsl.2015.03.050.

Naliboff, J.B., Billen, M.I. and Gerya, T. (2013), Dynamics of outer rise faulting in oceanic-continental subduction systems. *Geophys. Geochem. Geosyst.*, doi: 10.1002/ggge.20155

Naliboff, J.B., Lithgow-Bertelloni, C., Ruff, L. and de Koker, N. (2012) The effect of lithospheric thickness and density structure on Earth's stress field. *Geophys. J. Int.*, 88(1), 1-17, doi:10.1111/j.1365-246X.2011.05248.x.

Naliboff, J.B., Conrad, C.P. and Lithgow-Bertelloni, C. (2009), Modification of the lithospheric stress field by lateral variations in plate-mantle coupling. *Geophys. Res. Lett.* 36, L22307, doi:10.1029/2009GL040484.

Naliboff, J.B. and Kellogg, L.H. (2007), Can large increases in viscosity and thermal conductivity preserve large-scale heterogeneity in the mantle? *Phys. Earth Planet. Inter.* 161, 86-102.

Naliboff, J.B. and Kellogg, L.H. (2006), Dynamic effects of a step-wise increase in thermal conductivity and viscosity in the lowermost mantle. *Geophys. Res. Lett.* 33, L12S09, doi:10.1029/2006GL025717.

Proceedings and Notes

Naliboff, J.B. (2009), Dependence of the Stress Field on Plate-Mantle Coupling and Lithospheric Structure, *Ph.D. Thesis University of Michigan* signed by C.R. Lithgow-Bertelloni (co-chair), L.J. Ruff (co-chair), R.A. Lange and S. El-Tawil.

Naliboff, J.B. (2005), Exploring the Geodynamical Effects of Changes in Viscosity and Thermal Conductivity in the Deep Lower Mantle, *M.S. Thesis U.C. Davis* signed by L.H. Kellogg (chair), M.I. Billen, Q. Yin, and D.L. Turcotte.

Naliboff, J.B. and Kellogg, L.H. (2005), Mixing in a convecting viscous fluid: applications to the Earth's mantle. In: Bathe, K.J. (Ed.), *Proceedings of the Third MIT Conference on Computational Fluid and Solid Mechanics*. Elsevier B.V., Amsterdam, 783-786.

Conference Abstracts

Rajaonarison, T.A., **Naliboff, J.B.**, and Stamps, S. (2019), The relationship between lithospheric structure and observed deformation centered on the Eastern Branch of the East Africa Rift System, Abstract T33F-0414 presented at 2019 American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13.

Heister, T., **Naliboff, J.B.**, and Thieulot, C. (2019), Towards robust shear band angle and width in visco-plastic rheology, Abstract T51C-16 presented at 2019 American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13.

Gouiza, M., and **Naliboff, J.B.** (2019), Numerical Investigation of Continental Extension in Heterogeneous Cratonic Lithosphere, Constrained by Observations From the Labrador Sea, Abstract T33G-0438 presented at 2019 American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13.

- Naliboff, J.B.**, Bennett, S., and Oskin, M. (2019), Numerical simulations of fault behavior during the transition from orthogonal to oblique extension, Abstract T33F-0415 presented at 2019 American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13.
- Naliboff, J.B.**, Brune, S. and Hake., T. (2018), Quantitative analysis of distributed normal faulting patterns in 3D thermal-mechanical simulations of continental rifting, Abstract T13F-0295 presented at 2018 American Geophysical Union Fall Meeting, Washington DC, District of Colombia, December 10-14.
- Naliboff, J.B.**, Glerum, A. and Brune, S. (2017), High-resolution 3D simulations of continental extension, presented at 2018 Canadian Geophysics Union Meeting, Niagara Falls, Ontario, Canada, June 10-14.
- Naliboff, J.B.**, Glerum, A. and Brune, S. (2017), 3D numerical simulation of multiphase continental rifting, Abstract T51C-0481 presented at 2017 American Geophysical Fall Meeting, New Orleans, Louisiana, December 11-15.
- Naliboff, J.B.**, Brune, S. (2016), Application of the open-source mantle convection code ASPECT to long-term tectonic simulations, Abstract DI23A-2586 presented at 2016 American Geophysical Fall Meeting, San Francisco, United States, December 12-16.
- Naliboff, J.B.**, Brune, S. (2016), Application of the open-source mantle convection code ASPECT to long-term tectonic simulations, Abstract DI23A-2586 presented at 2016 American Geophysical Fall Meeting, San Francisco, United States, December 12-16.
- Naliboff, J.B.**, Billen, M.I., Gerya, T. and Faccenda, M. (2015), Plate interface strength and the flexural rigidity of subducting oceanic plates, Abstract T14B-01 presented at 2015 American Geophysical Fall Meeting, San Francisco, United States, December 13-18.
- Naliboff, J.B.**, Buitter, S., Le Pourhiet, L., May, D. (2015), The effects of extensional inheritance on transtensional deformation patterns (Invited), Abstract T54C-01 presented at 2015 American Geophysical Fall Meeting, San Francisco, United States, December 13-18.
- Naliboff, J.B.**, Buitter, S. (2015), Evolution of crustal faulting during the transition from orthogonal to oblique continental extension, Abstract EGU2015-6226 presented at 2014 European Geophysical Union Meeting, Vienna, Austria, April 12 - 17.
- Naliboff, J.B.**, Billen, M.I., Gerya, T. and Faccenda, M. (2014), 2D numerical simulations of outer rise faulting in the Tonga subduction system, Abstract T51B-4611 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.
- Naliboff, J.B.**, and Buitter, S.J.H. (2014), Evolution of lithospheric deformation during multiphase extension, Abstract EGU2014-10482 present at 2014 European Geophysical Union Meeting, Vienna, Austria, April 28 - May 2.
- Naliboff, J.B.**, Billen, M.I. and Gerya, T. (2012), Abstract presented at 2012 Fall Meeting, AGU, San Francisco, Calif., Dec.
- Naliboff, J.B.** and Billen, M.I. (2010), Preliminary models of normal fault development in subduction zones: lithospheric strength and outer rise deformation, Abstract DI31A-1940 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.

- Naliboff, J.B.**, Lithgow-Bertelloni, C. and Conrad, C.P. (2008), Models of intraplate stresses in the North and South American plates. *Eos Trans. AGU*, 89(23), Jt. Assem. Suppl., Abstract S34A-05.
- Lithgow-Bertelloni, C., **Naliboff, J.B.**, Conrad, C.P. and de Koker, N. (2007), Mantle-lithosphere coupling and the state of stress of the lithosphere, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract T13G-07.
- Naliboff, J.B.** and Lithgow-Bertelloni, C. (2007), Uncertainty in the Relationship Between Lithospheric Structure and the Surface Stress Field. *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract T21B-0595.
- Harris, A.C., **Naliboff, J.B.**, Prytulak, J., Vanacore, E., Cooper, K.M., Hart, S. and Kellogg, L.H. (2006), Quantifying Mixing and Scales of Heterogeneity in 2-D Numerical Models of Chaotic Mantle Mixing. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract U21A-0801.
- Naliboff, J.B.**, and Lithgow-Bertelloni, C. (2006), The role of gravitational potential energy in the Marian lithospheric stress field. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract P31C-0158.
- Naliboff, J.B.** and Kellogg, L.H. (2005), Dynamical effects of increases in viscosity and thermal conductivity in the lowermost 1000 km of the mantle. *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract S41C-1018.
- Naliboff, J.B.** and Kellogg, L.H. (2004), The Effects of Increased Thermal Conductivity and Viscosity on Mixing Rates and Convection Patterns in the Deep Lower Mantle. *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract U41A-0732.
- Naliboff, J.B.**, Kellogg, L.H. and Turcotte, D.L. (2003). Exploring the effect of variable material properties at depth on deep mantle convection. *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract S21E-0373.

Teaching Experience

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| 2019 | Natural Hazards (undergraduate), <i>Instructor¹</i> |
| 2016 | Volcanology, Summer Field Course (undergraduate), <i>Instructor¹</i> |
| 2013 | Natural Hazards (undergraduate), <i>Instructor¹</i> |
| 2013 | The Earth, Introductory Geology (undergraduate), <i>Instructor¹</i> |
| 2012 | The Earth, Introductory Geology (undergraduate), <i>Instructor¹</i> |
| 2011 | Active Tectonics, Summer Field Course (undergraduate), <i>Instructor¹</i> |
| 2011 | The Earth, Introductory Geology (undergraduate), <i>Instructor¹</i> |
| 2010 | Natural Hazards of California, Freshman Seminar (undergraduate), <i>Instructor¹</i> |
| 2005 | Active Tectonics, Summer Field Course (undergraduate), <i>Teaching Assistant¹</i> |
| 2004 | Introductory Geology (undergraduate), <i>Teaching Assistant¹</i> |
| 2004 | Mineralogy (undergraduate), <i>Teaching Assistant¹</i> |
| 2004 | Field Volcanology, Summer Field Course (undergraduate), <i>Teaching Assistant¹</i> |

2004 **Metamorphic Petrology** (undergraduate), *Teaching Assistant*¹
¹Department of Earth and Planetary Sciences, University of California, Davis.

Invited Presentations

2019 Unraveling the evolution of continental breakup through geodynamic simulation, University of California Davis (September)
2019 Unraveling the evolution of continental breakup through geodynamic simulation, Utah State University (September)
2018 Coupling of Tectonic and Surface Processes, Boulder, Colorado (April). Methods, challenges and uncertainty in modeling tectonic processes.
2017 IMAGinING RIFTING, Pontresina, Switzerland (September). Propagating and complex fault interaction – a numerical modeling perspective.
2015 American Geophysical Union Fall Meeting (December). The effects of extensional inheritance on transtensional deformation patterns.
2015 Department of Earth Science and Engineering, Imperial College, London (November). Geodynamic modeling of lithospheric deformation and its application to continental rifting.
2015 Basin Research Group, Imperial College, London (June). Rift reactivation and migration during multiphase extension.
2009 Department of Geology, Utah State University, Logan, Utah (May). Uncertainty in the relationship between lithospheric structure, mantle flow and the observed stress field.
2008 American Geophysical Union Joint Assembly Meeting, Fort Lauderdale, FA (May). Models of intraplate stresses in the North and South American plates.
2005 Department of Geology, Istanbul Technical University, Istanbul, Turkey (December). Exploring the Effects of Electronic Transitions Deep in the Earth's Mantle.

Organized Workshops and Training Courses

2020 ASPECT Virtual Hackathon (August 4-17)
2020 CIG Tectonics Community Science Workshop (July 27-30)
2020 CIG Virtual Tectonics Modeling Tutorial (July 20-24)
2020 ASPECT Virtual Users Meeting (January 20-24)
2020 ASPECT Numerical Modelling Workshop (January 7, University of Oslo)
2020 2020 CIG Webinar Series
2019 2019 CIG Webinar Series
2019 ASPECT Hackathon (May 21- June 1, Heber City, Utah).
2019 Introduction to Modeling Lithospheric Deformation with ASPECT (April 1st, Utah State University).
2018 Canadian Geophysical Union (June). An Introduction to Modeling Lithospheric Dynamics (Session CIG_02).
2016 Geological Society of America (September). Introduction to Numerical Modeling of Lithospheric Deformation in Matlab.

2015 Basin Research Group, Imperial College, London (June). Numerical modeling of lithospheric processes with Matlab.