

Christopher Milliner

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Jet Propulsion Laboratory, California Institute of Technology

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UC Berkeley Postdoctoral Scholar with Roland Burgmann

2016-2017

EDUCATION

University of Southern California, Los Angeles, CA.

Geology

PhD., 2016

Advisor: Prof. James Dolan and Charlie Sammis

Imperial College of London, London, UK

Geology and Geophysics

M.Sci., 2010

UCLA - Year of international studies

2008-2009

AWARDS and ACHIEVEMENTS

2016 – \$607,000 three-year grant to NASA’s geodesy ROSES program: Earth Surface and Interior.

2016 – Recipient of three-year NASA Postdoc fellow – grant titled: “*Numerical Modeling of Geodetic Imaging*”

2015 – Gordon Conference Research award on Rock Deformation - \$1500

2015 – Technical assistant for Team-X at NASA, JPL for Earth Venture proposal, developing a new satellite sensor specifically for tectonic geodesy and earthquake geology.

2015 – Seismological Society of America - Outstanding Student Award for oral presentation.

2015 – \$20,000 SCEC grant - Air2Lidar3D – a new geodetic technique to measure coseismic near-field deformation in 3D for historic earthquakes that lack pre-event Digital Elevation Models.

2015 – STEM 2nd place winner USC graduate research competition - \$750.

2015 – Adam Fischer Research award - \$1500.

2015 – SCEC 5 proposal – special mention of research as example of method for future studies of fault zones and crustal deformation

2015 – Session Chair and organizer, AGU meeting: “*Characterization of fault zones from the surface through the seismogenic zone using field, geodetic, and seismological methods.*”

2015 – USC graduate research fellowship award

2011 – USC graduate merit scholarship award.

RESEARCH INTERESTS

Quantifying fault zone deformation – Understanding mechanics and processes of how faults release strain, including: off-fault damage patterns, co-seismic slip variation, post-seismic afterslip and viscoelastic relaxation in the upper mantle, and inter-seismic strain accumulation.

Field mapping and tectonic geomorphology – Field mapping and geomorphic analysis using topographic data to understand the nature of fault strain release from individual to multiple events over geologic time scales. Kinematics of plate motion, spatiotemporal variations in strain release and fault system interaction.

Rupture kinematics and numerical modeling - Finite-fault slip inversions of geodetic data to constrain slip at depth. Understanding the spatial complexity of co-seismic slip at depth and how this relates to fault structure, vital info for dynamic rupture simulations.

Development of geodetic techniques – Optical image correlation, InSAR, lidar differencing and GPS to measure tectonic surface deformation. Development of Air2Lidar3D, a new geodetic method using lidar and optical correlation to quantify, coseismic surface deformation patterns in 3D.

PUBLICATIONS

Milliner, C. W. D., K., Materna, B., Bürgmann, R., Fu, Y. (*in review*), Weighing Hurricane Harvey's Floodwaters Using GPS, *Science Advances*.

Donnellan, A., Parker, J., **Milliner, C. W. D.**, Farr, T., Glasscoe, M., Lou, Y., Zheng, Y., Hawkins, B., (2018) UAVSAR and Optical Analysis of the Thomas Fire Scar and Montecito Debris Flows: Case Study of Methods for Disaster Response using Remote Sensing Products. *Earth and Space Science*

Allam, A.A., Kroll, K.A., **Milliner, C.W.D.**, Richards-Dinger, K.B., (*submitted*) Effects of Fault Roughness on Coseismic Slip and Hypocenter Locations. *Journal Geophysical Research: Solid Earth*.

Milliner, C. W. D., Donnellan, A., Parker, J. (*in prep*), Rapid Mapping of Mudflow and Landslides using Daily Imagery from Planet Labs Dove Satellite Constellation, *Earth and Space Science*.

Milliner, C. W. D., Bürgmann, R., Teng, W., Inbal, A., Bekaert, D. (*in prep*), Resolving Kinematics of Early Afterslip: Implications for the Shallow Slip Deficit Problem, *Journal Geophysical Research: Solid Earth*.

Milliner, C. W. D., C. Sammis, A. Allam, J. Dolan, J. Hollingsworth, S. Leprince, and F. Ayoub (2016a), Resolving Fine-Scale Heterogeneity of Co-Seismic Slip and the Relation to Fault Structure, *Nature Scientific Reports*, 6, 27201. doi:10.1038/srep27109

Milliner, C. W. D., J. F. Dolan, J. Hollingsworth, S. Leprince, and F. Ayoub (2016b), Comparison of Coseismic Near-Field and Off-Fault Surface Deformation Patterns of the 1992 Mw 7.3 Landers and 1999 Mw 7.1 Hector Mine Earthquakes: Implications for Controls on the Distribution of Surface Strain, *Geophys.Res.Lett.*, 43, 10,115-10,124, doi:10.1002/2016GL069841.

Milliner, C. W. D., J. F. Dolan, J. Hollingsworth, S. Leprince, F. Ayoub, and C. G. Sammis (2015), Quantifying near-field and off-fault deformation patterns of the 1992 Mw 7.3 Landers earthquake, *Geochem. Geophys. Geosyst.*, 16, doi:10.1002/2014GC005693.

Xu, X., X. Tong, D. T. Sandwell, **C. W. Milliner**, J. F. Dolan, J. Hollingsworth, S. Leprince, and F. Ayoub (2016), Refining the Shallow Slip Deficit, *Geophysical Journal International*, 204, 1867-1886. doi: 10.1093/gji/ggv563

INVITED TALKS

“How do Fault Systems Release Strain? Insights Using Novel Geodetic Imaging Techniques” **2017 American Engineering Geologists -Inland Empire Chapter**. Colton, CA.

“Insights into the 2016 Mw 7.0 Kumamoto Event Using Geodetic Data: Observations of Complex Spatiotemporal Strain Release from Foreshocks, Aseismic Transients and a Multi-segment Co-seismic Rupture to Post-seismic Afterslip and Viscoelastic Relaxation.” **2017 USGS, Earthquake Science Center Seminars**. Menlo Park, CA.

“Quantifying Near-Field Deformation of Large Magnitude Strike-Slip Earthquakes using Optical Image Correlation: Implications for Empirical Earthquake Scaling Laws and Safeguarding the Built Environment.” **2016 AGU Fall meeting**, San Francisco, Calif, 16 Dec.

“Quantifying Near-Field Deformation of Large Magnitude Strike-Slip Earthquakes using Optical Image Correlation: Implications for Empirical Earthquake Scaling Laws and Safeguarding the Built Environment.” **Fault Displacement Hazard Workshop**, USGS Menlo Calif, 16 Dec, 2016.

“Comparison of off-fault deformation along the Mw 7.3 Landers and Mw 7.1 Hector Mine surface ruptures using optical image correlation”. **SoSAFE workshop SCEC annual meeting**. Palm Springs, Calif., Sep. 10. 2016.

“Near-Field Deformation Patterns of Large Magnitude Strike-Slip Earthquakes Using Sub-Pixel Correlation of High-Resolution Air Photos” **Gordon Conference on Rock Deformation**. Hanover, NH, 2016.

“Quantifying Near-Field Deformation Patterns of Large Magnitude Strike-Slip Earthquakes Using High-Resolution Air Photos.” **Seismological Society of America 2016 annual meeting**, Reno NV, 2016.

WORKSHOPS

2017 – Processing and Analysis of Terrestrial Laser Scanning, UNAVCO, Boulder, CO

2016 – Fault Displacement Hazards Workshop, USGS Menlo Park, CA.

2016 – SoSAFE: Project Successes and Future Challenges. SCEC annual meeting

2016 – Gordon Conference: Rock Deformation – Hanover, NH.

2015 – Caltech Software Carpentry – Computational workshop for geoscientists

2014 – Post-Earthquake Rapid Scientific Response Workshop, Palm Springs, CA, SCEC annual meeting

2013 – GMTSAR, InSAR processing workshop. Boulder, CO. UNAVCO

2013 – Lidar processing workshop, UC San Diego. UNAVCO

2012 – Advanced numerical crustal modeling workshop, Golden, CO. SCEC