MALCOLM C. A. WHITE

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https://malcolmw.github.io/homepage

PERSONAL STATEMENT

My research interests span the spectrum of computational methods in seismology—from observational problems, like elastic-wave-phase detection; to forward problems, like modeling propagating wavefronts; and inverse problems, like locating earthquakes—and how to synthesize these to investigate structural and mechanical properties of the Earth's subsurface.

TECHNICAL STRENGTHS

Computer Languages	Python, C/C++, Fortran, Mathematica, Bash
Software & Tools	LaTeX, Antelope, GnuCash, Excel

EDUCATION

University of Southern California — *August 2016 - Present*
PhD in Earth Sciences — Overall GPA: 3.6/4.0
Department of Earth Sciences

Carleton University — *September 2007 - May 2013*
BSc in Computational Geophysics — Honours
Department of Earth Sciences

EMPLOYMENT

2013 **Scripps Institution of Oceanography**—*La Jolla, California, USA*
Seismic Analyst

2011 **Pacific Geoscience Center**—*Sidney, British Columbia, Canada*
Research Assistant

2010 **Geological Survey of Canada**—*Ottawa, Ontario, Canada*
Research Assistant

GRADUATE COURSEWORK (SELECTED)

2020 **Advanced Mechanics**
Newtonian formulation of dynamics; Hamilton's principle; Lagrangian formulation; rigid body motion; Hamiltonian formulation; Hamilton-Jacobi theory; vibrations.

Advanced Seismology
Advanced methods of theoretical seismology for studying the generation of seismic waves from natural and artificial sources and the propagation through realistic earth models.

Selected Topics in Computational Physics
Algorithmic Techniques in Artificial Intelligence and Machine Learning

Numerical Analysis and Computation
Linear equations and matrices, Gauss elimination, error estimates, iteration techniques; contractive mappings, Newton's method; matrix eigenvalue problems; least-squares approximation, Newton-Cotes and Gaussian quadratures; finite difference methods.

2017 **Probability for Electrical and Computer Engineers**
Rigorous coverage of probability, discrete and continuous random variables, functions of multiple random variables, covariance, correlation, random sequences, Markov chains, estimation, and introduction to statistics.

Methods of Computational Physics
Introduction to algorithm development. Integration of ordinary differential equations; chaotic systems; molecular dynamics; Monte Carlo integration and simulations; cellular automata and other complex systems.

Introduction to Digital Signal Processing
Fundamentals of digital signal processing covering: discrete time linear systems, quantization, sampling, Z-transforms, Fourier transforms, FFTs and filter design.

2016 **Methods of Theoretical Physics**
Vector analysis; infinite, asymptotic Fourier series; complete sets; Dirac delta function; Fourier, Laplace transforms; Legendre functions; spherical harmonics; Sturm-Liouville theory; orthogonal polynomials; gamma-factorial function; complex variables.

TEACHING

2018 **The Nature of Scientific Inquiry**
Examination of the scientific process: what constitutes science; evolution of ideas about the nature of space, time, matter, and complexity; paradigm shifts in the biological and earth sciences. Lecture, 3 hours; laboratory, 2 hours.

Earthquakes
Causes of earthquakes and nature of large faults; earthquake hazard and risk; world's great earthquakes; understanding the Richter scale. Lecture, 3 hours; laboratory, 2 hours.

2017 **The Nature of Scientific Inquiry**

EDITORIAL REVIEW ACTIVITY

2020 **Public Library of Science (PLOS) One**—*Article reviewer*
Geophysical Journal International—*Article reviewer*

SOCIETIES

2020 **American Geophysical Union**
Seismological Society of America

SPEAKING ENGAGEMENTS

2020 **Detailed traveltime tomography and seismicity around the 2019 M7.1 Ridgecrest, CA, earthquake using dense rapid-response seismic data**
American Geophysical Union Annual Meeting

Seismic velocity structure of the Ridgecrest, CA region from traveltime tomography
United States Geological Survey—Earthquake Science Center Seminar

Hierarchical crustal traveltime tomography in Southern California: Insights and perspectives
University of Southern California—Lithospherics Dynamics Seminar

2019 **Microseismicity correlates strongly with velocity structure in the San Jacinto fault zoner**
American Geophysical Union Annual Meeting

Focal mechanisms of microseismicity in the San Jacinto fault-zone region of Southern California
Seismological Society of America Annual Meeting

Focal mechanisms of microseismicity in the San Jacinto fault-zone region of Southern California
Lamont-Doherty Earth Observatory—Seismology Student Workshop

Illuminating the San Jacinto fault-zone region of Southern California with a new earthquake catalog
Massachusettes Institute of Technology—Friday Informal Seminar Hour

2018 **Illuminating seismogenic structures in the San Jacinto Fault Zone**
Brown University—Geophysics Seminar

Seismicity in the San Jacinto fault zone: automatically deriving a decade-long catalog of earthquake hypocenters from scratch
University of Southern California—Lithospheric Dynamics Seminar

PEER-REVIEWED PUBLICATIONS

2021 **White, M. C. A.**, Fang, H., Catchings, R. D., Goldman, M. R., Steidl, J. H., & Ben-Zion, Y. (in prep.). Detailed traveltime tomography and seismicity around the 2019 M7.1 Ridgecrest, CA, earthquake using dense rapid-response seismic data.

2020 **White, M. C. A.**, Fang, H., Nakata, N., & Ben-Zion, Y. (2020). PyKonal: A Python package for solving the Eikonal equation in spherical and Cartesian coordinates using the Fast Marching Method. *Seismological Research Letters, 91*(4), 2378-2389. doi: 10.1785/0220190318

2019 **White, M. C. A.**, Ben-Zion, Y., & Vernon, F. L. (2019). A Detailed Earthquake Catalog for the San Jacinto Fault-Zone Region in Southern California. *Journal of Geophysical Research: Solid Earth, 124*, 6908–6930. doi: 10.1029/2019JB017641

2017 Burdick, S., Vernon, F. L., Martynov, V., Eakins, J., Cox, T., Tytell, J., ... van der Hilst, R. D. (2017). Model Update May 2016: Upper-Mantle Heterogeneity beneath North America from Travel-Time Tomography with Global and USArray Data. *Seismological Research Letters, 88*(2A), 319–325. doi: 10.1785/0220160186

2016 Ross, Z. E., Ben-Zion, Y., **White, M. C.**, & Vernon, F. L. (2016). Analysis of earthquake body wave spectra for potency and magnitude values: implications for magnitude scaling relations. *Geophysical Journal International, 207*(2), 1158–1164. doi: 10.1093/gji/ggw327

Ross, Z. E., **White, M. C.**, Vernon, F. L., & Ben-Zion, Y. (2016). An Improved Algorithm for Real-Time S -Wave Picking with Application to the (Augmented) ANZA Network in Southern California. *Bulletin of the Seismological Society of America, 106*(5), 2013–2022. doi: 10.1785/0120150230

2015 Ben-Zion, Y., Vernon, F. L., Ozakin, Y., Zigone, D., Ross, Z. E., Meng, H., ... Barklage, M. (2015). Basic data features and results from a spatially dense seismic array on the San Jacinto fault zone. *Geophysical Journal International, 202*(1), 370–380. doi: 10.1093/gji/ggv142

2014 Astiz, L., Eakins, J. A., Martynov, V. G., Cox, T. A., Tytell, J., Reyes, J. C., ... Vernon, F. L. (2014). The Array Network Facility Seismic Bulletin: Products and an Unbiased View of United States Seismicity. *Seismological Research Letters, 85*(3), 576–593. doi: 10.1785/0220130141