

# MALCOLM C. A. WHITE

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<https://malcolmw.github.io/homepage>

## PERSONAL STATEMENT

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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

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<b>Computer Languages</b>	Python, C/C++, Fortran, Mathematica, Bash
<b>Software &amp; Tools</b>	L <sup>A</sup> T <sub>E</sub> X, Antelope, GnuCash, Excel

## EDUCATION

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<b>University of Southern California</b>	<i>August 2016 - Present</i>
PhD in Earth Sciences	Overall GPA: 3.6/4.0
Department of Earth Sciences	

<b>Carleton University</b>	<i>September 2007 - May 2013</i>
BSc in Computational Geophysics	Honours
Department of Earth Sciences	

## EMPLOYMENT

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2013	<b>Scripps Institution of Oceanography</b> — <i>La Jolla, California, USA</i> <i>Seismic Analyst</i>
2011	<b>Pacific Geoscience Center</b> — <i>Sidney, British Columbia, Canada</i> <i>Research Assistant</i>
2010	<b>Geological Survey of Canada</b> — <i>Ottawa, Ontario, Canada</i> <i>Research Assistant</i>

## GRADUATE COURSEWORK (SELECTED)

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2020	<b>Advanced Mechanics</b> Newtonian formulation of dynamics; Hamilton’s principle; Lagrangian formulation; rigid body motion; Hamiltonian formulation; Hamilton-Jacobi theory; vibrations.  <b>Advanced Seismology</b> Advanced methods of theoretical seismology for studying the generation of seismic waves from natural and artificial sources and the propagation through realistic earth models.
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### **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.

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## **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**

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## **EDITORIAL REVIEW ACTIVITY**

2020 | **Geophysical Journal International**—*Article reviewer*

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## **SOCIETIES**

2020 | American Geophysical Union  
Seismological Society of America

## SPEAKING ENGAGEMENTS

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- 2020 | **Seismic velocity structure of the Ridgecrest, CA region from traveltimes tomography**  
*United States Geological Survey—Earthquake Science Center Seminar*
- Hierarchical crustal traveltimes tomography in Southern California: Insights and perspectives**  
*University of Southern California—Lithospheric Dynamics Seminar*
- 2019 | **Microseismicity correlates strongly with velocity structure in the San Jacinto fault zone**  
*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**  
*Massachusetts 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

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- 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