

RICHARD ALLEN

Director, Berkeley Seismology Lab

Class of 1954 Professor, Dept. of Earth & Planetary Science, UC Berkeley

<http://rallen.berkeley.edu/> | rallen@berkeley.edu

Professional Appointments

University of California, Berkeley, CA

Professor, Dept. of Earth and Planetary Science	2012-present
Director, Berkeley Seismological Laboratory	2011-present
Chair, Dept. of Earth and Planetary Science	2015-2018
Associate Professor, Dept. of Earth and Planetary Science	2008-2012
Assistant Professor, Dept. of Earth and Planetary Science	2005-2008

Google, Visiting Faculty	2019-present
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Harvard University, Visiting Scholar	2018-2019
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ETH Zürich, Institut für Geophysik, Switzerland, Visiting Professor	2011
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Institut de Physique du Globe de Paris, France, Visiting Professor	2010
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University of Wisconsin-Madison, Dept. of Geology and Geophysics Assistant Professor of Geology and Geophysics	2002-2004
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California Institute of Technology, Seismological Laboratory Texaco Prize Postdoctoral Research Fellow in Geophysics	2001
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Education

Princeton University, Dept. of Geosciences	Ph.D. 2001
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University of Durham, UK, Dept. of Geological and Geophysical Sciences	M.Sc. 1995
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University of Cambridge, UK, Natural Sciences	B.A. 1994
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Research Interests

My research group studies large-scale tectonic processes, and short-timescale earthquakes. Current projects include:

- **Subduction zone dynamics.** The biggest earthquakes and volcanoes are the products of large-scale mantle convection at convergent points known as subduction zones. We integrate seismological imaging techniques to constrain structure and infer dynamics in **Cascadia, Alaska** and **Japan**.
- **Real-time seismology.** New techniques allow rapid characterization of earthquakes using seismic and geodetic data. We now apply these methods to provide earthquake early warning algorithms being implemented as "**ShakeAlert**" in the U.S. and around the world.
- **Massive distributed sensing systems.** Data drives all of this work, and we are using private smartphones to detect and analyze earthquakes. "**MyShake**" is our global smartphone seismic network to which 1 million citizen scientists have already contributed.

Teaching and Outreach

Engaging with students and the public increases awareness of science, develops the next generation of scientists, and provides new insights. Current activities include:

- “**Earthquakes in your backyard**” is an introductory-level class at UC Berkeley focusing on the science, engineering and societal aspects of earthquakes. Taught each year to 450 students, the class enrolls about 5% of all Berkeley undergrads.
- **Public talks and seminars** on topics of earthquakes, hazard, risk, mitigation and ongoing research efforts in the solid Earth science in the Bay Area, across the U.S., and internationally.
- **Media articles and documentaries** provide exposure to our research for millions of readers and viewers. Our work has been covered in hundreds of publications around the world including the *New York Times*, *London Times*, *Los Angeles Times*, *San Francisco Chronicle*, *Scientific American*, *National Geographic*, *Time*, *Newsweek*, *Der Spiegel*, CNN, BBC, NBC, CBS, ABC, FOX News, NPR, Al Jazeera, NOVA, and the Discovery Channel.

Advisory Activities

Testimony and briefings for legislatures, legislators and senior government officials:

- **California Governor Gavin Newsom**: Public alerting across the state.
- **White House**: Earthquake Resiliency Summit; Office of Science and Technology Policy.
- **U.S. House of Representatives**: Committee on Transportation and Infrastructure, Subcommittee on Economic Development, Public Buildings, and Emergency Management; Committee on Natural Resources, Subcommittee on Energy and Mineral Resources.
- **California State Senate**: Government Organization and Natural Resources Committees.
- Michelle Bachelet, Former **President of Chile**.
- Floyd Kvamme, Co-Chair of **President Bush's Council of Advisors on Science and Technology**.
- James Lee Witt, **Director of the Federal Emergency Management Agency**.
- Jack Gibbons, **Science Advisor to President Clinton**.

Advising on the use of current real-time earthquake information:

- **Private organizations**, including: Google, Apple, Boeing, Chevron, Genentech, Hewlett Packard, Lam Research, Life Technologies, Intel, Microsoft, PG&E, Red Cross, So. Cal Edison.
- **Government agencies**, including: Bay Area Rapid Transit (BART), California Dept. of Water Resources, CalEMA, CalTrans, California Seismic Safety Commission, City of San Francisco.

Professional Service

Chair, National Academies, Committee on Seismology and Geodynamics, 2015–2019.
Chair, U.S. Earthquake Early Warning Science R&D Committee, 2006–2016.
Chair, Ocean-Bottom Seismometer Instrumentation Pool, IRIS Oversight Committee, 2015.
Principal Organizer, 3rd International Conference on Earthquake Early Warning: Implementing Earthquake Alerts. Berkeley, California, Sep 3-5, 2014.
Member, Cascadia Initiative Expedition Team deploying seafloor instruments, 2011-2015.
Chair, International Earthquake Early Warning Advisory Committee, Geological Institute of Israel. 2012-2013.
Chair, National Science Foundation, Amphibious Array Steering Committee, 2009-2012.
Chair, IRIS PASSCAL Standing Committee. 2009-2011. Member 2008-2011.

Honors and Awards

- Class of 1954 Professor, UC Berkeley 2017
- National Science Foundation, GeoPRISMS Distinguished Lecturer 2015
- Tel Aviv University, Yuval Ne'eman Distinguished Lecturer 2014
- Noyce Prize for Excellence in Undergraduate Teaching, UC Berkeley 2008
- Hellman Faculty Research Award, UC Berkeley 2006

Patents

MyShake: Smartphone-based earthquake early warning systems. Licensed to Google 2019.

Selected Publications

[Google Scholar](#) page. Complete list and reprints available: <http://rallen.berkeley.edu/pub>.

Allen, R.M., Q. Kong, R. Martin-Short (2020). The MyShake Platform: A Global Vision for Earthquake Early Warning. *Pure Appl. Geophys.* **177**, 1699–1712 [doi: 10.1007/s00024-019-02337-7](https://doi.org/10.1007/s00024-019-02337-7).

Kong, Q., R. Martin-Short, R.M. Allen (2020). Towards Global Earthquake Early Warning with the MyShake Smartphone Seismic Network. *Seismo. Res. Lett.* **Part 1** - Simulation platform and detection algorithm. <http://doi.org/10.1785/0220190177>. **Part 2** - Understanding MyShake performance around the world. <https://doi.org/10.1785/0220190178>

Strauss, J.A., Q. Kong, S. Pothan, S. Thompson, A. Mejia, S. Allen, S. Patel, R.M. Allen (2020). MyShake Citizen Seismologists help launch dual-use seismic network in California. *Front. Commun.* **5**:32. <https://doi.org/10.3389/fcomm.2020.00032>.

Hawley, W. B., & Allen, R. M. (2019). The fragmented death of the Farallon plate. *Geophysical Research Letters*, **46**, 7386–7394. <https://doi.org/10.1029/2019GL083437>.

Allen, R.M., D. Melgar (2019). Earthquake Early Warning: Advances, Scientific Challenges, and Societal Needs. *Ann. Rev. Earth & Planet Sci.*, **47**, <https://doi.org/10.1146/annurev-earth-053018-060457>.

- Kong, Q., S. Patel, A. Inbal, R.M. Allen (2019). MyShake: Detecting and characterizing earthquakes with a global smartphone seismic network. *Seismo. Res. Lett.*, **90**, 1937-1949, [doi: 10.1785/0220190097](https://doi.org/10.1785/0220190097).
- Kong, Q., A. Inbal, R.M. Allen, Q. Lv, A. Puder (2018). Machine Learning Aspects of the MyShake Global Smartphone Seismic Network. *Seismo. Res. Lett.*, <https://doi.org/10.1785/0220180309>.
- Martin-Short, R., Allen, R., Bastow, I. D., Porritt, R. W., & Miller, M. S. (2018). Seismic imaging of the Alaska subduction zone: Implications for slab geometry and volcanism. *Geochemistry, Geophysics, Geosystems*, **19**. <https://doi.org/10.1029/2018GC007962>.
- Allen, R.M., E.S. Cochran, T. Huggins, S. Miles, D. Otegui (2017), Quake warnings, seismic culture, *Science*, **358**, 1111, <https://doi.org/10.1126/science.aar4640>.
- Ruhl, C.J., D. Melgar, R. Grapenthin, and R.M. Allen (2017), The value of real-time GNSS to earthquake early warning, *Geophys. Res. Lett.*, **44**, 8311-8319, <https://doi.org/10.1002/2017GL074502>.
- Hawley, W.B., R.M. Allen, M.A. Richards, (2016), Tomography reveals buoyant asthenosphere accumulating beneath the Juan de Fuca plate, *Science*, **353**, 1406-1408, <https://doi.org/10.1126/science.aad8104>.
- Kong, Q., R.M. Allen, L. Schreier, Y.-W. Kwon, (2016), MyShake: A smartphone seismic network for earthquake early warning and beyond, *Sci. Adv.*, **2**, e1501055, <https://doi.org/10.1126/sciadv.1501055>.
- Martin-Short, R., R.M. Allen, I.D. Bastow, E. Totten and M.A. Richards, (2015), Mantle flow geometry from ridge to trench beneath the Gorda–Juan de Fuca plate system, *Nature Geoscience*, **8**, 965-968, <https://doi.org/10.1038/NGEO2569>.
- Grapenthin, R., I. Johanson, and R.M. Allen, (2014), The 2014 Mw 6.0 Napa earthquake, California: Observations from real-time GPS-enhanced earthquake early warning, *Geophys. Res. Lett.*, **41**, <https://doi.org/10.1002/2014GL061923>.
- Allen, R.M. (2013). Seconds count. *Nature* **502**, 29-31, <https://doi.org/10.1038/502029a>.
- Obrebski, M., R.M. Allen, F. Pollitz, S.-H. Hung, (2011). Lithosphere-asthenosphere interaction beneath the western United States from the joint inversion of body-wave traveltimes and surface-wave phase velocities, *Geophys. J. Int.* **185**, 1003-1021, <https://doi.org/10.1111/j.1365-246X.2011.04990.x>.
- Allen, R.M. and A. Ziv, (2011). Application of real-time GPS to earthquake early warning, *Geophys. Res. Lett.*, **38**, L16310, <https://doi.org/10.1029/2011GL047947>.
- Allen, R.M., P. Gasparini, O. Kamigaichi, M. Bose (2009) The Status of Earthquake Early Warning around the World: An Introductory Overview, *Seismo. Res. Lett.*, **80**, (5) p682-693, <https://doi.org/10.1785/gssrl.80.5.682>.
- Brudzinski, M. and R.M. Allen, (2007). Segmentation in Episodic Tremor and Slip All Along Cascadia, *Geology*, **35** (10) 907-910, <https://doi.org/10.1130/G23740A.1>.
- Olson, E.L., and R.M. Allen, (2005). The deterministic nature of earthquake rupture. *Nature*, **438**, 212-215, <https://doi.org/10.1038/nature04214>.
- Allen, R.M., H. Kanamori, (2003). The potential for earthquake early warning in southern California. *Science*, **300** (5620) 786-798, <https://doi.org/10.1126/science.1080912>.
- Ritsema, J., R.M. Allen, (2003). The elusive mantle plume, *Earth Planet. Sci. Lett.*, **207**, 1-12, 2003.