

# RICHARD ALLEN

Director, Berkeley Seismological Laboratory;

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

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## Professional Appointments

*University of California, Berkeley*

Chair, Dept. of Earth and Planetary Science 2015-present

Professor, Dept. of Earth and Planetary Science 2012-present

Director, Berkeley Seismological Laboratory 2011-present

Associate Professor, Dept. of Earth and Planetary Science 2008-2012

Assistant Professor, Dept. of Earth and Planetary Science 2005-2008

*ETH Zürich, Institut für Geophysik, Switzerland*

Visiting Professor 2011

*Institut de Physique du Globe de Paris, France*

Visiting Professor 2010

*University of Wisconsin-Madison, Dept. of Geology and Geophysics*

Assistant Professor of Geology and Geophysics 2002-2004

*California Institute of Technology, Seismological Laboratory*

Texaco Prize Postdoctoral Research Fellow in Geophysics 2001

## Education

*Princeton University, Dept. of Geosciences* Ph.D. 2001

*University of Durham, UK. Dept. of Geological and Geophysical Sciences* M.Sc. 1995

*Cambridge University, UK. Natural Sciences* B.A. 1994

## 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 and Earth structure. **"MyShake"** is our global smartphone seismic network to which over 250,000 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 300 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:

- **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: Boeing, Chevron, Genentech, Google, 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 Academy of Sciences, Committee on Seismology and Geodynamics, 2015–present.

Chair, Earthquake Early Warning, US Science Research & Development Committee, 2006–2016.

Chair, Ocean-Bottom Seismometer Instrumentation Pool, IRIS Oversight Committee, 2015.

Principal Organizer, 3<sup>rd</sup> 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 2017-2022
- National Science Foundation, GeoPRISMS Distinguished Lecturer 2014-2015
- 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

## Selected Publications

Complete list and reprints available at: <http://rallen.berkeley.edu/pub>

Allen, R.M., E.S. Cochran, T. Huggins, S. Miles, D. Otegui (2017), Quake warnings, seismic culture, *Science*, **358**, 1111, [doi: 10.1126/science.aar4640](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, [doi: 10.1002/2017GL074502](https://doi.org/10.1002/2017GL074502).

Hawley, W.B., R.M. Allen, M.A. Richards, Tomography reveals buoyant asthenosphere accumulating beneath the Juan de Fuca plate, *Science*, **353**, 1406-1408, [doi: 10.1126/science.aad8104](https://doi.org/10.1126/science.aad8104), 2016.

Martin-Short, R., R. M. Allen, I.D. Bastow, (2016), Subduction geometry beneath south-central Alaska and its relationship to volcanism, *Geophys. Res. Lett.*, **43**, 9509-9517, [doi: 10.1002/2016GL070580](https://doi.org/10.1002/2016GL070580).

Kong, Q., R. M. Allen, L. Schreier, (2016), MyShake: Initial Observations from a Global Smartphone Seismic Network, *Geophys. Res. Lett.*, **106**, 9369-10, [doi: 10.1002/2016GL070955](https://doi.org/10.1002/2016GL070955).

- Kong, Q., R.M. Allen, L. Schreier, Y.-W. Kwon, MyShake: A smartphone seismic network for earthquake early warning and beyond, *Sci. Adv.*, **2**, e1501055, [doi: 10.1126/sciadv.1501055](https://doi.org/10.1126/sciadv.1501055), 2016.
- Martin-Short, R., R.M. Allen, I.D. Bastow, E. Totten and M.A. Richards, Mantle flow geometry from ridge to trench beneath the Gorda–Juan de Fuca plate system, *Nature Geoscience*, **8**, 965–968, [10.1038/NGEO2569](https://doi.org/10.1038/NGEO2569), 2015.
- Grapenthin, R., I. Johanson, and R.M. Allen, The 2014 Mw 6.0 Napa earthquake, California: Observations from real-time GPS-enhanced earthquake early warning, *Geophys. Res. Lett.*, **41**, [10.1002/2014GL061923](https://doi.org/10.1002/2014GL061923), 2014.
- Allen, R.M. Seconds count. *Nature* **502**, 29–31, [10.1038/502029a](https://doi.org/10.1038/502029a), 2013.
- Allen, R.M., Transforming Earthquake Detection? *Science* **335**, 297–298, [10.1126/science.1214650](https://doi.org/10.1126/science.1214650), 2012.
- Obrebski, M., R.M. Allen, F. Pollitz, S.-H. Hung, 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, [10.1111/j.1365-246X.2011.04990.x](https://doi.org/10.1111/j.1365-246X.2011.04990.x), 2011.
- Allen, R.M. and A. Ziv, Application of real-time GPS to earthquake early warning, *Geophys. Res. Lett.*, **38**, L16310, [10.1029/2011GL047947](https://doi.org/10.1029/2011GL047947), 2011.
- Allen, R.M., Seconds before the big one, *Scientific American*, 74–79, April 2011.
- 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, [10.1785/gssrl.80.5.682](https://doi.org/10.1785/gssrl.80.5.682), 2009.
- Brudzinski, M. and R.M. Allen, Segmentation in Episodic Tremor and Slip All Along Cascadia, *Geology*, **35** (10) 907–910, [10.1130/G23740A.1](https://doi.org/10.1130/G23740A.1), 2007.
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- Allen, R.M., H. Kanamori. The potential for earthquake early warning in southern California. *Science*, **300** (5620) 786–798, [10.1126/science.1080912](https://doi.org/10.1126/science.1080912), 2003.
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- Allen, R.M., G. Nolet, W.J. Morgan, K. Vogfjord, B.H. Bergsson, P. Ertendsson, G.R. Foulger, S. Jakobsdottir, B.R. Julian, M. Pritchard, S. Ragnarsson, and R. Stefansson, Imaging the mantle beneath Iceland using integrated seismological techniques, *J. Geophys. Res.*, **107**, 2325, [10.1019/2001JB000595](https://doi.org/10.1019/2001JB000595), 2002.