

JEAN PAUL AMPUERO

Assistant Professor of Seismology, California Institute of Technology

Professional Preparation

Université Paris VII Denis Diderot	Physics	B.S. 1997
U. Paris VII – Inst. de Physique du Globe de Paris	Geophysics	M.S. 1998
U. Paris VII – Inst. de Physique du Globe de Paris	Geophysics	Ph.D. 2002
Dissertation title: <i>A physical and numerical study of earthquake nucleation</i>		
Advisor: Jean-Pierre Vilotte		
Princeton University	Post-doctoral Researcher	10/2002-10/2004
Swiss Federal Institute of Technology, ETH Zurich	Post-doctoral Researcher	11/2004-12/2006

Appointments

Assistant Professor, California Institute of Technology (05/2008-present)
Visiting Research Fellow, Earthquake Research Institute, University of Tokyo (10/2007-03/2008)
Research Associate, Swiss Federal Institute of Technology, ETH Zurich (01/2007-04/2008)

Publications, with links to preprints (PDF) and online versions (DOI)

See also <http://www.gps.caltech.edu/~ampuero/publications.html>

- [33] C. Pelties, J. de la Puente, J.-P. Ampuero, G. Brietzke and M. Kaeser (2012), *Three-dimensional dynamic rupture simulation with a high-order Discontinuous Galerkin method on unstructured tetrahedral meshes*, J. Geophys. Res., doi:10.1029/2011JB008857, in press. [PDF](#) [DOI](#)
- [32] V. Tsai, B. Minchew, M. Lamb and J.-P. Ampuero (2012), *A physical model for seismic noise from sediment transport by rivers*, Geophys. Res. Lett., doi:10.1029/2011GL050255, in press. [PDF](#) [DOI](#)
- [31] Y. Huang and **J.-P. Ampuero** (2011), *Pulse-like ruptures induced by low-velocity fault zones*, J. Geophys. Res., in press, doi:10.1029/2011JB008684. [PDF](#) [DOI](#)
- [30] Y. Kaneko and **J.-P. Ampuero** (2011), *A mechanism for preseismic steady rupture fronts observed in laboratory experiments*, Geophys. Res. Lett., 38, L21307, doi:10.1029/2011GL049953. [PDF](#) [DOI](#)
- [29] T. Yamaguchi, M. Morishita, M. Doi, T. Hori, H. Sakaguchi and **J.-P. Ampuero** (2011), *Gutenberg-Richter's law in sliding friction of gels*, J. Geophys. Res., in press, doi:10.1029/2011JB008415. [PDF](#) [DOI](#)
- [28] O. Lengline, R. Toussaint, J. Schmittbuhl, J. Elkhoury, **J.-P. Ampuero**, K. T. Tallakstad, S. Santucci and K. J. Maloy (2011), *Average crack-front velocity during subcritical fracture propagation in a heterogeneous medium*, Phys. Rev. E, 84, 036104. [PDF](#) [DOI](#)
- [27] L. Meng, A. Inbal and **J.-P. Ampuero** (2011), *A window into the complexity of the dynamic rupture of the 2011 Mw 9 Tohoku-Oki earthquake*. Geophys. Res. Lett., 38, L00G07, doi:10.1029/2011GL048118. [DOI](#) [PDF](#) [Auxiliary material](#) [Animation S1](#) [Animation S2](#)
- [26] Y Kaneko, **J.-P. Ampuero** and N. Lapusta (2011), *Spectral-element simulations of long-term fault slip: Effect of low-rigidity layers on earthquake-cycle dynamics*, J. Geophys. Res., 116, B10313, doi:10.1029/2011JB008395. [PDF](#) [DOI](#)

- [25] Harris et al. (2011), *Verifying a computational method for predicting extreme ground motion*, Seis. Res. Lett., 82 (5), 638-644, doi:10.1785/gssrl.82.5.638. [PDF](#) [DOI](#)
- [24] O. Lengline, J. Schmittbuhl, J. E. Elkhoury, **J.-P. Ampuero**, R. Toussaint and K. J. Maloy (2011), *Downscaling of fracture energy during brittle creep experiments*, J. Geophys. Res., 116, B08215, doi:10.1029/2010JB008059. [PDF](#) [DOI](#)
- [23] M. Simons, S. E. Minson, A. Sladen, F. Ortega, J. Jiang, S. E. Owen, L. Meng, **J.-P. Ampuero**, S. Wei, R. Chu, D. V. Helmberger, H. Kanamori, E. Hetland, A. W. Moore, and F. H. Webb (2011), *The 2011 magnitude 9.0 Tohoku-Oki earthquake: mosaicking the megathrust from seconds to centuries*, Science, 332, 1421-1425, doi:10.1126/science.1206731. [PDF](#) [DOI](#)
- [22] K. Ariyoshi, T. Matsuzawa, **J.-P. Ampuero**, R. Nakata, T. Hori, Y. Kaneda, R. Hino and A. Hasegawa (2011), *Migration process of very low-frequency events based on a chain-reaction model and its application to the detection of preseismic slip for megathrust earthquakes*, Earth, Planets and Space, in press, doi:10.5047/eps.2010.09.003. [PDF](#) [Abstract](#) [DOI](#)
- [21] A. Rubin and **J.-P. Ampuero** (2009), *Self-similar slip pulses during rate-and-state earthquake nucleation*, J. Geophys. Res., 114, B11305, doi:10.1029/2009JB006529. [PDF](#) [DOI](#)
- [20] Y. Ben-Zion and **J.-P. Ampuero** (2009), *Seismic radiation from regions sustaining material damage*, Geophys. J. Int., 178 (3), 1351-1356, doi:10.1111/j.1365-246X.2009.04285.x. [PDF](#) [DOI](#)
- [19] J. De La Puente, **J.-P. Ampuero** and M. Kaeser (2009), *Dynamic rupture modeling on unstructured meshes using a discontinuous Galerkin method*, J. Geophys. Res., 114, B10302, doi:10.1029/2008JB006271. [PDF](#) [DOI](#)
- [18] V. Lyakhovskiy, Y. Hamiel, **J.-P. Ampuero** and Y. Ben-Zion (2009), *Nonlinear damage rheology and wave resonance in rocks*, Geophys. J. Int., 178 (2), 910-920, doi:10.1111/j.1365-246X.2009.04205.x. [PDF](#) [DOI](#)
- [17] K. Ariyoshi, T. Hori, **J.-P. Ampuero**, Y. Kaneda, T. Matsuzawa, R. Hino and A. Hasegawa (2009), *Influence of interaction between small asperities on various types of slow earthquakes in a 3-D simulation for a subduction plate boundary*, Gondwana Research, 16 (3-4), 534-544, doi:10.1016/j.gr.2009.03.006. [PDF](#) [DOI](#)
- [16] R. A. Harris et al. (2009), *The SCEC/USGS dynamic earthquake-rupture code verification exercise*, Seism. Res. Lett., 80 (1), 119-126, doi:10.1785/gssrl.80.1.119. [PDF](#) [DOI](#)
- [15] H. Perfettini and **J.-P. Ampuero** (2008), *Dynamics of a velocity strengthening region: implications for slow earthquakes and postseismic slip*, J. Geophys. Res., 113 (B9), B09411, doi:10.1029/2007JB005398. [PDF](#) [DOI](#)
- [14] Y. Kaneko, N. Lapusta and **J.-P. Ampuero** (2008), *Spectral-element modeling of spontaneous earthquake rupture on rate and state faults: Effect of velocity-strengthening friction at shallow depths*, J. Geophys. Res., 113 (B9), B09317, doi:10.1029/2007JB005553. [PDF](#) [DOI](#)
- [13] J. Ripperger, P. M. Mai and **J.-P. Ampuero** (2008), *Variability of near-field ground motion from dynamic earthquake rupture simulations*, Bull. Seism. Soc. Am., 98 (3), 1207-1228, doi:10.1785/0120070076. [PDF](#) [DOI](#)

- [12] **J.-P. Ampuero** and Y. Ben-Zion (2008), *Cracks, pulses and macroscopic asymmetry of dynamic rupture on a bimaterial interface with velocity-weakening friction*, *Geophys. J. Int.*, 173 (2), 674-692, doi:10.1111/j.1365-246X.2008.03736.x. [PDF](#) [DOI](#)
- [11] **J.-P. Ampuero** and A. M. Rubin (2008), *Earthquake nucleation on rate-and-state faults : aging and slip laws*, *J. Geophys. Res.*, 113, B01302, doi:10.1029/2007JB005082. [PDF](#) [DOI](#)
- [10] M. Haney, R. Snieder, **J.-P. Ampuero** and R. Hofmann (2007), *Spectral element modeling of fault-plane reflections arising from fluid pressure distributions*, *Geophys. J. Int.*, 170 (2), 933-951, doi:10.1111/j.1365-246X.2007.03437.x. [PDF](#) [DOI](#)
- [9] L. Boschi, **J.-P. Ampuero**, D. Peter, P. M. Mai, G. Soldati, D. Giardini (2007), *Petascale computing for future breakthroughs in global seismology*, *Phys. Earth Planet. Int.*, 163 (1-4), 245-250, doi:10.1016/j.pepi.2007.02.011. [PDF](#) [DOI](#)
- [8] A. M. Rubin and **J. P. Ampuero** (2007), *Aftershock asymmetry on a bimaterial interface*, *J. Geophys. Res.*, 112, B05307, doi:10.1029/2006JB004337. [PDF](#) [DOI](#)
- [7] J. Ripperger, **J.-P. Ampuero**, P. M. Mai and D. Giardini (2007), *Earthquake source characteristics from dynamic rupture with constrained stochastic fault stress*, *J. Geophys. Res.*, 112, B04311, doi:10.1029/2006JB004515. [PDF](#) [DOI](#)
- [6] G. Hillers, P. M. Mai, Y. Ben-Zion and **J.-P. Ampuero** (2006), *Statistical properties of seismicity of fault zones at different evolutionary stages*, *Geophys. J. Int.*, 169 (2), 515-533. doi:10.1111/j.1365-246X.2006.03275.x. [PDF](#) [DOI](#)
- [5] R. Madariaga, **J.-P. Ampuero** and M. Adda-Bedia (2006), *Seismic radiation from simple models of earthquakes*, "[Radiated Energy and the Physics of Earthquakes](#)", AGU Monograph; A. McGarr, R. Abercrombie, H. Kanamori and G. di Toro, Eds. [PDF](#)
- [4] **J.-P. Ampuero**, J. Ripperger and P. M. Mai (2006), *Properties of dynamic earthquake ruptures with heterogeneous stress drop*, "[Radiated Energy and the Physics of Earthquakes](#)", AGU Monograph; A. McGarr, R. Abercrombie, H. Kanamori and G. di Toro, Eds. [PDF](#)
- [3] A.M. Rubin and **J.-P. Ampuero** (2005), *Earthquake nucleation on (aging) rate-and-state faults* *J. Geophys. Res.*, 110, B11312, doi:10.1029/2005JB003686. [PDF](#) [DOI](#)
- [2] **J.-P. Ampuero** and F.A. Dahlen (2005), *Ambiguity of the moment tensor*, *Bull. Seism. Soc. Am.*, 95 (2), 390-400, doi:10.1785/0120040103. [PDF](#) [DOI](#)
- [1] **J.-P. Ampuero**, J.-P. Vilotte and F.-J. Sánchez-Sesma (2002), *Nucleation of rupture under slip dependent friction law: simple models of fault zone*, *J. Geophys. Res.*, 107 (B12), 2324, doi:10.1029/2001JB000452. [PDF](#) [DOI](#)

Submitted papers

A. A. Gabriel, **J.-P. Ampuero**, L. A. Dalguer and P. M. Mai, *The transition of dynamic rupture styles in elastic media under velocity-weakening friction*, submitted to *J. Geophys. Res.* [PDF](#)

Y. Huang, L. Meng and J.-P. Ampuero, *A dynamic model of the frequency-dependent rupture process of the 2011 Tohoku-Oki earthquake*, submitted to Earth, Planets and Space, special issue "The 2011 Tohoku Earthquake" [PDF](#)

L. Meng, J.-P. Ampuero, Y. Luo, W. Wu and S. Ni, *Apparent frequency-dependent source properties induced by artifacts in teleseismic back-projection*, submitted to Earth, Planets and Space, special issue "The 2011 Tohoku Earthquake" [PDF](#)

O. Lengline, J. E. Elkhoury, G. Daniel, J. Schmittbuhl, R. Toussaint, **J.-P. Ampuero** and M. Bouchon, *Interplay of seismic and aseismic deformations during earthquake swarms: an experimental approach*, submitted to Earth Plan. Sci. Lett. [PDF](#)

L. Meng, **J.-P. Ampuero**, A. Sladen and H. Rendon, *Source properties of the 2010 M7 Haiti earthquake revealed by high-resolution seismic array analysis at regional distance*, submitted to J. Geophys. Res. [PDF](#)

R. Michel, **J.-P. Ampuero**, J.-P. Avouac, N. Lapusta, S. Leprince, D.C. Redding and S. Somala, *A Geostationary Optical Seismometer, Proof of Concept*, submitted to IEEE Transactions on Geoscience and Remote Sensing. [PDF](#)

Recent awards

Faculty Early Career Development (CAREER) award by NSF Geophysics Program for a project entitled "Integrating earthquake physics and source imaging while engaging the Hispanic community" (2011)

Synergistic activities

- Co-leader of the Fault and Rupture Mechanics focus group of the Southern California Earthquake Center.
- Associate Editor for Journal of Geophysical Research.
- Leader of the Earthquake Dynamics working group in the European Research and Training Network SPICE (Seismic wave Propagation and Imaging in Complex media, 2004-2008).
- Development, support, training and maintenance of SEM2DPACK, an open source software for the simulation of earthquake rupture and wave propagation based on the spectral element method.
- Fostering earthquake hazards awareness in the Hispanic community and media.

Current graduate students:

Lingsen Meng, Yihe Huang, Surendra Somala, Yingdi Luo, Asaf Inbal (Caltech)
Percy Galvez and Alice Gabriel (ETH Zurich)

Former graduate students co-advised:

Johannes Ripperger (ETH Zurich)

Former postdocs sponsored:

Jean Elkhoury (UC Irvine), Gregor Hillers (LGIT Grenoble) and Javier Ruiz (Universidad de Chile)