

Lapo BOSCHI
Maitre de conférences (assistant professor)
Laboratoire iSTeP, UMR 7193 UPMC-CNRS
Université Pierre et Marie Curie
4, place Jussieu Case 129, T.46-00, Et.2
75252 Paris Cedex 05
Téléphone: +33(0)144275243
Email: lapo.boschi@upmc.fr
Internet: <http://hestia.istep.upmc.fr/~boschil/>

Employment

2012-present: lecturer (maître de conférences HDR), **iSTeP, Université Pierre et Marie Curie**.
2015-2017: invited researcher (délégation CNRS), équipe LAM, **institut d'Alembert, Université Pierre et Marie Curie**.
2011-2012: lecturer, Institut de Physique Théorique, **Université de Zürich**, Switzerland.
2003-2011: lecturer, Institute of Geophysics, **École Polytechnique Fédérale (ETH) de Zürich**, Switzerland.
2009: invited professor, **Institute de Physique du Globe de Paris**.
2001-2003: invited professor, Department of Physics, **Université de Naples Federico II**, Italy.
2001: chercheur post-doctorale, Department of Earth and Planetary Sciences, **Harvard University**, U.S.A.
1996-2001: research and teaching assistant, Ph.D. candidate, Department of Earth and Planetary Sciences, **Harvard University**, U.S.A.

Degrees

2017: Abilitazione Scientifica Nazionale, Professore Ordinario, 04/A4 (Geofisica)
2001: PhD, *Applications of linear inverse theory in modern global seismology*, Department of Earth and Planetary Sciences, Harvard University, USA
1998: Master's degree in geophysics - Department of Earth and Planetary Sciences, Harvard University, USA
1996: Bachelor's - Dipartimento di Fisica, Univ. di Bologna, Italy (110/110 con lode)

Summary of research contributions

As of today (August 2017), Lapo Boschi has published 74 research articles on peer-reviewed journals. Two articles are currently submitted for publication. His H-index is 21 according to ISI Web of Knowledge and 27 according to Google Scholar. Based on Google Scholar, his publications have been cited over 2600 times in the scientific literatures. A brief list of Lapo Boschi's main contributions follows:

1. in-depth analysis of the correlation (or lack thereof) between tomography models of the Earth's mantle derived by different techniques (Boschi and Dziewonski, 1999, cited >100

- times; Becker & Boschi, 2002, cited >300 times). This work contributed to clarify the long-wavelength structure of the mantle (interactions between subducting slab and transition zone; superplumes).
2. Evaluation, through seismic tomography, of the theory of mantle plumes (Boschi, Becker & Steinberger, 2007, 2008, cités ~60 times). This work resulted in a catalogue of hot-spots based on their deep (plumes) or shallow origin.
 3. Compilation of the currently densest available database of central European Rayleigh-wave phase and group dispersion, based on seismic ambient noise (Stehly *et al.*, 2009; Verbeke *et al.*, 2012).
 4. Implementation of an adaptive-tomography software package, allowing, in particular, to map seismic tomography based on joint inversions of surface- and body-wave data (Boschi & Ekström, 2002, cité ~90 fois; Schäfer *et al.*, 2011a et b; Auer *et al.*, 2014, already cited ~30 times).
 5. Tomographic/geodynamic study of the mantle underlying the Mediterranean Basin (Boschi *et al.*, 2004; Boschi *et al.*, 2010; Faccenna *et al.*, 2014, cited >40 times). These efforts contributed to clarify the role of mantle convection in developing and sustaining European topography (dynamic vs isostatic).
 6. In-depth evaluation of the discrepancy between *ray-theoretical* and *finite-frequency* tomography models (Peter *et al.*, 2007, 2009). We show that the resolution improvement achieved by the new methods is severely limited by data coverage, which is frequently inadequate.
 7. A detailed review article on the theory of seismic ambient noise, published on *Review of Geophysics* en 2015.
 8. Perception experiments (Pate *et al.*, 2015, 2017; Boschi *et al.*, 2017) on the benefits of acoustic display of seismology data with respect to much more widely used visual display (in the framework of L. Boschi's delegation CNRS at the musical acoustics laboratory, Institut d'Alembert, UPMC).

Teaching experience

Lapo Boschi contributes or has contributed to the following courses at **UPMC** (the first digit of the catalogue number indicates the year in the UPMC geosciences curriculum. MU=master's level):

- General geosciences (1T001)
- Geophysical methods (5UG20)
- History of ideas in the geosciences (3T062)
(http://hestia.istep.upmc.fr/~boschil/histoire_tectonique_2016.pdf)
- Introduction to the physics of the Earth (LT212)
- Introduction to statistics for the Geosciences (2T041)
- Informatics for the Geosciences (2T031)
- Numerical modeling in the Earth sciences (MU126)
- Physics of the Earth (4UG22) (http://hestia.istep.upmc.fr/~boschil/physique_globe_boschi1.pdf)
- Tectonics and geodynamics (LBP-NU502)
- Computer modeling and data analysis in geosciences (EPU-S8-GG3 – engineering department)

- AFFRODIT – Bringing down the borders between scientific disciplines (2HA01)

He is currently the **main lecturer** of the following UPMC courses:

- Math. methods for Earth sciences (2T301) (<http://hestia.istep.upmc.fr/~boschil/omc.html>)
- Earthquakes, waves and images (3T057) (<http://hestia.istep.upmc.fr/~boschil/ondes.html>)

At **ETH Zurich**, he has been the main lecturer of the courses:

- Global seismology (<http://hestia.istep.upmc.fr/~boschil/seismology/seismology.html>)
- Seismic tomography (<http://hestia.istep.upmc.fr/~boschil/tomography/tomography.html>)

L. Boschi is a contributor of **SEATREE**, a modular and user friendly software library designed to facilitate using solid earth research tools in the classroom: see my contributed programs *larry*, *Syn2D* and *larry3d*. (<http://geosys.usc.edu/projects/seatree/>)

Research grants awarded

Coordinator (European Training Network):

1. WAVES: Waves and Wave-Based Imaging in Virtual and Experimental Environments. Funded by the European Union. Approx. 3,000,000 Euro / 4 years (2015-2018).

Principal investigator:

2. New approaches to regional seismic tomography. Applications to seismic risk assessment in Campania, Italy. Funded by the Ministero Istruzione Università Ricerca, Italy. 143,000 Euro / 3 years (2002-2005).
3. Mutually consistent tomographic models of crust, upper mantle and the lithosphere-asthenosphere boundary region underneath Europe and the Mediterranean Basin. Funded by ETH Zürich. 162,000 Euro / 3 years (2008-2011).
4. New challenges in seismic mapping of the Earth's mantle: anisotropy, temperature, composition. Funded by the Swiss National Science Foundation (SNSF). 104,000 Euro / 2 years (2011-2013).

Co-investigator:

1. Seismological investigation using the SDS-net: (1) Regional surface-wave propagation, and (2) receiver-function analysis. Funded by the SNSF. 128,000 Euro / 4 years (2003-2007)
2. High-performance computing in global and earthquake seismology: linking innovative Earth tomography to earthquake physics and seismic hazard. Funded by ETH Zürich. 177,000 Euro / 3 years (2008-2011).
3. Global sealevel variations and isostatic postglacial readjustment; effects of the rheological properties of the Earth's mantle on the present rate of sealevel rise. Funded by the Ministero Istruzione Università Ricerca (PRIN2004), Italy. 78,000 Euro / 2 years (2004-2006).
4. The role of isostatic postglacial readjustment in global and Mediterranean sea level changes: new geophysical, geological, and archaeological constraints. Funded by the Ministero Istruzione Università Ricerca (PRIN2006), Italy. 86,000 Euro / 2 years (2006-2008).

5. PETAQUAKE (Large-Scale Parallel Nonlinear Optimization for High-Resolution 3D-Seismic Imaging). Funded by the High Performance and High Productivity (HP2C) platform, Switzerland. 214,000 Euro / 3 years (2010-2013).

Lead scientist (European Training Networks):

1. SPICE (Seismic wave propagation and imaging in complex media: a European network). Funded by the European Union. 345,000 Euro / 3 years (for the ETH) (2003-2007).
2. QUEST (quantitative estimation of Earth's seismic sources and structure, E.U. initial training network). Funded by the European Union. ~500,000 Euro / 3 years (for the ETH) (2009-2012).

Supervision of Ph.D. and master's students

- FRY Bill, Ph.D. ETH Zurich (Switzerland), *Surface wave tomography of the Mediterranean and central Europe: A new shear wave velocity model*, 01/01/2004-10/11/2007. Current position : senior researcher, GNS-science, Wellington, New Zealand.
- PETER Daniel, Ph.D. ETH Zurich (Switzerland), *Finite-frequency effects in global seismology : forward modeling and implications on tomographic imaging*. 01/06/2004-01/05/2008. Current position : senior researcher at ETH Zurich (Switzerland).
- SCHAEFER Julia, Ph.D. ETH Zurich (Switzerland), *Adaptively anisotropic tomography of the European upper mantle*, 01/01/2008-01/09/2011. Current position: Assistant Actuarial Analyst at HANNOVER RE (Germany).
- DELLA MORA Steve, Ph.D. ETH Zurich (Switzerland), *Beyond tomography: new insights in global seismic imaging*, 01/02/2008-01/02/2012. Current position : analyst at Zurich RE (UK)
- VERBEKE Julie, Ph.D. ETH Zurich (Switzerland). *High resolution anisotropic imaging of the Central European crust from phase and group velocities using ambient noise surface waves*, 01/01/2008-01/12/2011. Current position : Data analyst at CGG (France)
- WEEMSTRA Cornelis, Ph.D. ETH Zurich (Switzerland). *On the attenuation of the ambient seismic field*. 01/05/2010-01/10/2013. Current position : post-doc à l'Ecole Polytechnique de Delft (the Netherlands).
- COLOMBI Andrea, Ph.D. ETH Zurich (Switzerland). *Numerical seismology across the scale: from experimental acoustic to the core-mantle boundary*. 01/04/2010-01/04/2013. Current position: post-doc at Imperial College, London.
- KOROSTELEV Félicie, Ph.D., UPMC. *La lithosphere du point triple Aden-Afar-sud mer Rouge et du gole d'Aden: magmatisme et rupture continentale*. 01/09/2012-25/09/2015.
- AUER Ludwig, Ph.D., ETH Zurich (Switzerland). *Adaptive-resolution tomography to map anisotropy and composition heterogeneity in the entire mantle*, 01/11/2011-14/03/2016
- KAESTLE Emanuel, Ph.D. UPMC. *Tomographie et géodynamique de la lithosphere alpine*. 01/10/2014-01/10/2017 (expected).
- REINWALD Michael, Ph.D., UPMC. *Echolocation in marine mammals: acoustics experiments and numerical modeling*. 01/11/2015-01/11/2018 (expected).
- HEJAZI Aida, Ph.D., UPMC. *Green's function retrieval from noise correlation in multiple scattering media*. 01/12/2015-01/12/2018 (expected).

- CARANNANTE Simona, Master 2 Università di Napoli Federico II, *Velocità di fase delle onde sismiche di superficie: immagini tomografiche globali a risoluzione variabile* 01/01/2003-24/03/2004. Current position: researcher at INGV (Italy).
- DELCOR Laurianne, Master 2, UPMC. Categorization of seismic sources by auditory display. 01/03/2016-01/10/2016 (expected).
- JUHEL Kevin, Master 1, UPMC. *Sismologie et géodynamique : comparaison entre données sismiques et modèles géophysiques*. 21/04/2013-14/06/2013. Current position: Ph.D. candidate at IPG Paris.
- SAUTON Camille, Master 1 UPMC. Structure de la croûte Alpine: nouvelles contraintes sismiques. 2014.
- HUNZIKER Jürg Master 1 ETH Zürich. *The relative density-to-shear-velocity scaling in the uppermost mantle*. 01/04/2006-01/07/2006. Current position: post-doctoral fellow, TU-Delft (the Netherlands)
- ERMERT Laura Master 1 ETH Zürich. *Outer core heterogeneity?* 01/05/2011-01/09/2011. Current position: Ph.D. candidate at ETH.
- MEIER Men-Andrin Master 1 ETH Zürich. *Looking through the Earth's crust: the troubles of crustal correction* 01/01/2010-01/05/2010. Current position: Ph.D. candidate at ETH.

Major contributions to the early careers of excellent researchers

L. Boschi has been the thesis supervisor of eight Ph.D. students who graduated from ETH or ISTEP-UPMC between 2007 and 2017. Another student is expected to graduate from UPMC in September 2017, and two more in 2018. While some are pursuing careers in the industry (insurance, resources, technology), the following stayed in the academia as researchers. Three of them occupy tenured or tenure-track positions:

- FRY Bill, Ph.D. ETH Zurich, 2007, with a thesis on Surface wave tomography of the Mediterranean and central Europe: A new shear wave velocity model. Current position : senior researcher, GNS-science, Wellington (New Zealand).
- PETER Daniel, Ph.D. ETH Zurich. 2008, Finite-frequency effects in global seismology forward modeling and implications on tomographic imaging. Current position: assistant professor at KAUST (Saudi Arabia).
- WEEMSTRA Cornelis, Ph.D. ETH Zurich, 2013. On the attenuation of the ambient seismic field. 01/05/2010-01/10/2013. Current position: assistant professor at TU Delft (the Netherlands).
- COLOMBI Andrea, Ph.D. ETH Zurich, 2013. Numerical seismology across the scale: from experimental acoustic to the core-mantle boundary. 01/04/2010-01/04/2013. Current position: Marie-Curie fellow at Imperial College, London (U.K.).
- KAESTLE Emanuel, Ph.D. UPMC, 2017 (expected). As of October, 2017, Emanuel Kaestle will occupy an ATER (contractual teacher and researcher) position at UPMC.

Participation in Ph.D. thesis committees

1. Ph.D. thesis committee of Yilong QIN, IPGP and Université de Paris 7 (2008). Thesis: *SPICE benchmark pour méthodes tomographiques globaux et test des modèles tomographiques globaux*.

2. Ph.D. thesis committee of Marie MACQUET, Université J. Fourier, Grenoble (2015). Thesis: *Tomographie crustale des Pyrénées et des régions avoisinantes par corrélation de bruit*.
3. Ph.D. thesis committee of Aberrahmane HANED, IPGP (September 2016). *Tomographie globale a partir du bruit sismique longue-periode*.
4. Ph.D. thesis committee of Leonard SEYDOUX, IPGP and Institut Langevin (October 2016). Thesis: *Analyse et traitement de la matrice de covariance de données enregistrées sur des réseaux de stations sismiques*.

Professional activities

1. IASPEI delegate, Swiss National Committee for the IUGG (2011-2012).
2. Elected member of the board, Institut des Sciences de la Terre de Paris (2013-present).
3. Associate Editor for Geophysical Journal International (2016-present).
4. Science Officer of the European Geosciences Union (EGU) (2016-present).
5. ESC titular member, France (2016-present).
6. Board of the Doctoral Course in Earth Sciences, Univ. di Padova, Italy (2017-present)

Popular science

1. Article published in Italy by *La Voce* about the 2009 L'Aquila earthquake: *Il terremoto tra vera prevenzione e falsa fatalità* (<http://www.lavoce.info/archives/25622/il-terremoto-tra-vera-prevenzione-e-falsa-fatalita/>)
2. between June 2011 and April 2012 Lapo Boschi has conceived and hosted the radio show *The hard drive* (Radio LORA, Zürich), popularising the research conducted in the universities and research centers of the Zürich region: (<http://www.lora.ch/sendungen/aktuelle-sendungen?mode=2&terms=&list=The+Hard+Drive>).
3. Model SAVANI by Auer, Boschi et al. (2014) has been used as a teaching tool of the INGV ScienzAperta project (<http://www.scienzapertaingv.it/>).

Organisation of meetings and workshops

1. International workshop "On the Structure of the Mediterranean Upper Mantle", Università di Napoli Federico II, 28/2 – 1/3, 2002 (with P. Gasparini).
2. SPICE meeting at ETH Zürich, 1/3 – 2/3, 2007 (with P. M. Mai, D. Giardini)
3. 11th geodynamics workshop, Braunwald, Switzerland, June 28/6 – 3/7, 2009 (with F. Deschamps, B. Kaus, P. Tackley)
4. QUEST meeting in Zürich, 10/2 – 12/2, 2010 (with D. Giardini).
5. CECAM (Centre Européen de Calcul Atomique et Moléculaire) workshop on "Computational Mineral Physics: Applications to Geophysics", 31/8 – 3/9, 2010, Zürich (with H.-P. Bunge).

Referee for international research journals and funding agencies

Besides being associate editor for GJI, L. Boschi regularly acts as a referee to the following journals:

1. AGU Monographs
2. Annals of Geophysics
3. Bulletin of the Seismological Society of America
4. Earth and Planetary Science Letters
5. Geochemistry, Geophysics, Geosystems (G-cubed)
6. Geophysical Journal International
7. Geophysical Research Letters
8. IEEE Transactions on Image Processing
9. Journal of Geophysical Research
10. Lithos
11. Physics of the Earth and Planetary Interiors
12. Pure and Applied Geophysics
13. Science
14. Tectonophysics
15. Terranova

L. Boschi has reviewed over 10 research projects submitted to the National Science Foundation (U.S.), three research projects submitted to the Dutch NWO, two research projects submitted to the French ANR, one research project submitted to the German DFG, and one research project submitted to the Swiss National Foundation.

Invited talks

1. California Institute of Technology, July 2001.
2. ERMES Meeting, Ettore Majorana Centre, Erice (Italy), July 2002.
3. University of Oxford, April 2003.
4. ETH Zürich, July 2003.
5. Utrecht University, March 2004.
6. Institut de Physique du Globe, Paris, April 2005.
7. Lamont-Doherty Earth Observatory, Columbia University, September 2005.
8. Università di Ferrara, November 2005.
9. INGV Bologna, November 2005.
10. Instituto de Ciencias de la Tierra 'Jaume Almera', Barcelona, February 2006.
11. University of Cambridge, April 2006.
12. SEDI Meeting, Prague, July 2006.
13. SPICE Meeting, Cork (Ireland), July 2006.
14. University of Southern California, September 2006.
15. Stanford University, September 2006.
16. Université du Québec à Montréal, November 2006.
17. Università di Napoli Federico II, April 2007.
18. SPICE Meeting, Cargèse (France) May 2007.
19. University College, London, May 2007.
20. University of Leeds, October 2007.

21. GFZ Potsdam/Freie Universität Berlin, January 2008.
22. Lamont-Doherty Earth Observatory, Columbia University, July 2008.
23. Workshop “From Genome to Snowball Earth, Metazoan Evolution and Habitable Planets”, Tokyo, October 2008.
24. ENS Lyon, October 2008.
25. Università di Roma 3, November 2008.
26. Université de Montpellier, March 2009.
27. Institut de Physique du Globe, Paris, March 2009.
28. University of Liverpool, May 2009.
29. 11th Geodynamics Workshop, Braunwald (Switzerland), June 2009.
30. Orfeus Meeting, Utrecht, July 2009.
31. international conference "From Core to Crust: Towards an Integrated Vision of Earth's Interior", ICTP Trieste, July 2009.
32. Institut de Physique du Globe, Paris, September 2009.
33. Université de Strasbourg, October 2009.
34. University of Oxford, November 2009.
35. Università di Brescia, January 2010.
36. Université de Toulouse, March 2010.
37. Saint Louis University, U.S.A., May 2010.
38. CECAM Workshop “Computational mineral physics: Applications to geophysics”, Zürich, October 2010.
39. Université de Strasbourg, November 2010.
40. Ludwig-Maximilians Universität, München, February 2011.
41. ENS Paris, April 2011.
42. ISTEP, UPMC, April 2011.
43. Seismology of Earth and Stars workshop, Princeton University, May 2011.
44. University of Southern California, February 2012.
45. California Institute of Technology, February 2012.
46. Université de Lyon Claude Bernard, May 2012.
47. ENS, Paris, May 2012.
48. Workshop on Noise and Diffuse Wavefields, Neustadt (Germany), November 2012.
49. ETH Zürich, May 2013.
50. EPOS workshop, Erice (Italy) August 2013.
51. Rencontre RESIF, Yenne (France), October 2013.
52. Université de Kiel (Germany), July 2014.
53. Université de Copenhagen (Denmark), September 2014.
54. WAVES workshop, Pitlochry, Scotland, September 2015.
55. Università di Roma 3, February 2016.
56. Institut Jean Le Rond D'Alembert, UPMC, Paris, February 2016.
57. Université de Lausanne, June 2016.
58. TIDES Training School, Sesimbra, Portugal, September 2016.

59. Massachusetts Institute of Technology, Boston, November 2016.

60. Università di Padova, May 2017.

61. Summer School 'Ambient Noise Imaging and Monitoring', Cargese, France, June 2017.