

ERIC CALAIS

Professor, Ecole normale supérieure, Department of Geosciences, Paris, France

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BRIEF BIOGRAPHY

Eric Calais is Professor of Geosciences at the Ecole normale supérieure in Paris, France, member of the French National Academy of Sciences, and Senior Fellow of the *Institut Universitaire de France*. He graduated from the Ecole Normale Supérieure (St Cloud, France), received a MS at the University of Bretagne Occidentale (Brest, France) in 1988, and a PhD at the University of Nice (France) in 1991. He was postdoctoral researcher at Scripps Institution of Oceanography (U.C. San Diego) until 1995, research scientist at the CNRS (Nice, France) until 2001, then professor of geophysics at Purdue University (USA) where he remained until 2012. He was nominated University Faculty Scholar at Purdue University in 2005. He received the Jacob-Fallot-Jérémine award from the French Academy of Sciences in 2008 and the Frank Press award from the Seismological Society of America in 2012.

E. Calais' research interests concern the kinematics and dynamics of active tectonic processes. His main tools are space geodesy, in particular the Global Positioning System (GPS), and mechanical modeling of lithospheric deformation. He led many field experiments worldwide – incl. Caribbean, Asia, east Africa — to study active deformation processes at spatial and temporal scales ranging from individual earthquakes or volcanic events to the deformation of plate margins or the motion of tectonic plates. He also uses GPS as an atmospheric remote sensing tool for tropospheric water vapor with applications to meteorology and climate. He pioneered the use of GPS to detect ionospheric perturbations triggered by earthquakes, volcanoes, and man-made explosions.

E. Calais co-authored 170 publications in top-tier peer-reviewed journals (h-index=51, ~7500 citations as of October 2019, Scopus and ISI WoS), has given over 60 invited lectures and seminars, and contributed to more than 150 presentations at national and international meetings. He has supervised 21 graduate students and teaches geodesy and geophysics at the undergraduate and graduate level.

E. Calais was Head of the Geosciences department at Ecole normale supérieure and Director of the “Yves Rocard Research Laboratory¹” from 2013 to 2018. He was Chief Editor for *Geophysical Research Letters*² from 2009 to 2014. He chaired the UNAVCO Board of Directors (2005-2008), the Scientific Council of the European Institute for Marine Studies at the Univ. of Brest, France (2008-2012), the Scientific Advisory board of Institute for Earth Science in Grenoble, France (2016-2019), and is a member of the Board of the Côte d’Azur Observatory. E. Calais was elected on the Board of Directors of the Seismological Society of America in 2011. He has been serving on many national and international committees and review panels. He has been convener, organizer, or program committee member for more than 20 international scientific meetings.

E. Calais has served as expert-consultant in seismic hazard and risk reduction for the World Bank, the International Development Bank, the United Nations Development Program, and the European Union. He co-chaired the United Nations Haiti Earthquake Task Force after the devastating January 2010 earthquake. He served as scientific advisor to the United Nations in Haiti from 2010 to 2012, where he advocated and applied disaster risk reduction practices in the country’s reconstruction.

¹Joint research venture partnering ENS Paris, the CNRS, and the French Nuclear Energy Commission (CEA) for collaborative research on the earthquake deformation cycle and rock-fluids interactions.

²2013 impact factor 4.428, ranks #9 among 129 titles in Multidisciplinary Geosciences

ACTIVITIES AS U.N. SCIENCE ADVISOR IN HAITI, 2010–2012

E. Calais had been conducting active research on seismic hazard in Haiti for close to 10 years when the January 12, 2010, earthquake struck the capital region of Port-au-Prince, causing more than 300,000 casualties and an economic cost of 10 billion dollars, close the country’s annual GDP.

Shortly after a scientific field visit in the days following the earthquake to determine its source mechanism and impact on future hazard in the region, E. Calais was appointed co-chair of the United Nations Haiti Earthquake Task Force, whose mission was to advise the U.N. and its partners in Haiti on the scientific aspects of the response and recovery issues that the country was facing. In July 2010, he was appointed for two years as Scientific Advisor for the U.N. and placed within the Haiti National System for Risk Management where he served under the Minister of the Interior with the mission of integrating seismic risk reduction in the reconstruction agenda.

During his tenure in Haiti, E. Calais led the design of a roadmap for seismic risk reduction, officially approved by the government of Haiti after a long participative process. The document establishes guidelines and best practices to understand the hazard level and reduce vulnerability of infrastructures, population, and economy. It became an essential document to raise awareness on seismic hazard and risk reduction into the policy agenda. Several of its recommendations have been implemented such as the development of a seismic monitoring network, the training of construction professionals, or the integration of seismic risk reduction into urban planing.

E. Calais initiated support to a national seismic network, which now consists of 7 broadband stations and 10 accelerometers. He fostered international collaboration and technical support to the network within the Caribbean area. He fostered scientific interactions between young Haitian scientists and the international community by providing support for visits abroad and participation in international conferences. He developed and obtained funding for a seismic zonation project for all major cities, and for a 10 M\$ seismic risk reduction project in northern Haiti. He initiated multi-hazard risk reduction plans for urban areas based on the analysis of hazard, exposure, vulnerability, with community involvement. The goal was to deliver costed solutions directly applicable in land-use planning, understandable and usable by the population and local governments. This project has now expanded into a large urban risk reduction program within UNDP.

E. Calais continues being involved in Haiti in support of the development of research and higher education projects related to seismic risk reduction. He published his experience in Haiti in a book entitled “*Science and conscience in the aftermath of the Haiti earthquake*”³ (in French).

³Science et conscience dans la post-urgence du séisme d’Haïti, L’Harmattan Eds, Paris, March 2017.

PERSONAL DATA

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Phone: +33 (0)1 44 32 22 51, Email: eric.calais@ens.fr
<http://www.geologie.ens.fr/ecalais/>
Born September 15, 1964, Paris, France.
French citizen.

EDUCATION

Ph.D., 1991, University of Nice, France, in Earth Sciences.
M.Sc., 1988, University of Brest, France, in Earth Sciences (DEA).
Agrégation, 1987, (French high-level general education diploma) in Earth Sciences, Valedictorian.
B.S., 1986, Ecole Normale Supérieure (St Cloud) and Paris VI University, in Earth Sciences.

POSITIONS HELD

2012 – Present: Professor of Geophysics, Ecole Normale Supérieure, Paris, France.
2010 – 2012: Scientific Advisor for the United Nations, Haiti ⁴.
2007 – 2012: Professor of Geophysics, Purdue University, IN, USA.
2001 – 2007: Associate Professor of Geophysics (tenure in 2004), Purdue University, IN, USA.
1995 – 2001: Research Scientist (“*Chargé de Recherche*”), CNRS, Nice, France.
1994 – 1995: Research Fellow, Scripps Inst. of Oceanography, San Diego, CA, USA.
1992 – 1994: Post-doctoral Fellow, Scripps Inst. of Oceanography, San Diego, CA, USA.
1991 – 1992: Military service, French air force.
1988 – 1991: Research Assistant (“*Assistant Normalien Doctorant*”), University of Nice, Nice, France.

AWARDS, HONORS, RECOGNITIONS

Member of the French National Academy of Sciences (2017).
Senior Fellow, Institut Universitaire de France (2016).
Holmes Lecturer, Syracuse University (2013).
Frank Press award, Seismological Society of America (2012).
Co-chair of the United Nations “Haiti Seismic Task Force” (2010).
Member of the U.S. National Committee for Geodesy and Geophysics, National Academy of Sciences.
Congressional briefing on the Haiti earthquake (01/12/2010) to the U.S congress.
Invited Professor, Institut de Physique du Globe, Paris (2009).
Invited Professor, the University of Brest, France (2008).
Jacob-Fallot-Jérémine award, French Academy of Sciences (2008).
Chief Editor for *Geophysical Research Letters* (since 2009).
Chair of the UNAVCO board of director (2005-2008).
University Faculty Scholar, Purdue University (2005).
Most cited journal article for *Geophysical Journal International* in 2003.
NATO Postdoctoral Fellow (1992-1993).

⁴Under UNDP, working for the government of Haiti to integrate seismic risk reduction in the country’s post-earthquake reconstruction.

POSTDOCS AND GRADUATE STUDENTS

Current Graduate Students: P. Prevost, PhD “*An improved Earth model using seasonal loads in GNSS time series*”, A. Bougrine, PhD, “*Present-day deformation in Algeria from continuous GPS measurements*” (with the Centre de Recherche en Astronomie, Astrophysique et Gophysique, Algiers, Algeria), E. Danzansan, PhD, “*Current tectonics and seismic hazard in Mongolia*” (with the Institute for Astronomy and Geophysics, Ulan Batar, Mongolia), Juan Ignacio Blas, PhD, “*Dynamics of microplate motions during the seismic cycle*” (with G. Iaffaldano, Univ. Copenhagen).

Ph.D. graduated: O. Lesne (Univ. Nice, research scientist at ACRI S.A., France), J.M. Nocquet (Univ. of Nice, research scientist at CNRS, Nice, France), M. Vergnolle (Univ. of Nice, research scientist at CNRS, Nice, France), J.Y. Han (Purdue Univ., professor at National Taiwan University), T. Dauterman (Purdue Univ., research scientist at the German Space Agency), S. Tabrez (co-advised with A. Freed, research scientist at AIR Worldwide, Boston), D.S. Stamps (Purdue Univ., assistant professor at Virginia Tech), E. Saria (Purdue Univ., professor at Ardhi University, Dar es Salaam, Tanzania), K. Chanard (ENS, research scientist at the French Geodetic Agency (IGN)), R. Douilly (Purdue Univ., assistant professor at Univ. California Riverside), S. Smithe (Purdue Univ., assistant professor at the Haiti State University), D. Walwer (ENS, postdoctoral researcher at University of Lyon, France).

M.S. graduated: S. Hartig-Vey (Univ. Nice), L. Galisson (Univ. Strasbourg), Y. Mazabraud (Univ. Nice), A. Aufranc (Univ. Strasbourg), S. Menet (ENSAIS Strasbourg), F. Vincent (Univ. Nice), Y. Song (Purdue), A. Aryal (Purdue), L. Dong (Purdue), L. Bennati (Purdue), T. Bowling (Purdue), D. Walwer (ENS Paris), C. Roy (ENS Paris).

Postdoctoral researchers: Elenora van Rijsingem (2019-Present); Lavinia Tunini (2017-Present); Henri Leclère (2017-2019, currently researcher at ETH Zurich); A. Poupardin (2015-2016, currently Assistant Professor at ENSTP, France); T. Craig (2013-2015, currently Lecturer at Univ. of Leeds, U.K.); F. Xie (2006-2008, currently assistant Professor at Univ. of Houston, TX); D. Manaker (2006-2007, currently researcher at British Petroleum, Houston, TX); M. Ueno (2000-2001, currently researcher at CNRS Géosciences Azur, Nice, France); M. Ge (1998-2000, currently researcher at GFZ, Potsdam, Germany).

SERVICE (RECENT ONLY)

2016 – present: Chair, Scientific Committee for “Physics and Chemistry of the Earth Environment” of the French Institute of Research for Development (IRD).

2017 – present: Chair, Scientific Advisory Board of the Earth Science Institute (ISTerre), Grenoble, France.

2014 – 2019: Member, French Space Agency (CNES) Committee for Scientific Programs (CPS).

2013 – 2018: Director, “Yves Rocard Joint Research Laboratory” (joint research venture between ENS Paris, CNRS, and the French Atomic Energy Commission).

2013 – 2018: Head, Department of Geosciences, Ecole Normale Supérieure.

2015 – 2017: Member, American Geophysical Union Honors committee.

2013 – 2017: Member, French National Panel on the Response to Earthquake and Volcanic Events.

2011 – 2017: Member, Seismological Society of America Board of Directors, Audit committee Chair.

2011 – 2013: Member, U.S. National Committee for Geodesy and Geophysics, Nat. Acad. of Sciences.

2006 – 2014: Chair, Scientific Council of the European Institute for Marine Studies (IUEM) ⁵.

⁵www.univ-brest.fr/IUEM

OTHER PROFESSIONAL ACTIVITIES

Editor of Scientific Journals: Editor in Chief for Geophysical Research Letters, 2009-2014; Editor for Geophysical Research Letters, 2004-2008; Associate Editor for Geophysical Research Letters, 2002-2004.

Journal Reviewer: Nature, Science, J. Geophys. Res., Geophys. Res. Letters, Geology, Earth and Planetary Sci. Lett., Tectonophysics, Bull. Geol. Soc. America, Pure and Applied Geophysics, Geophysical Journal International, J. of Geodesy, Annales Geophysicae.

Proposal reviewer: National Science Foundation (Geophysics, Tectonics, Continental Dynamics), NASA, Geol. Society of America, Swedish Research Council, CNES (French Space Agency), CNRS (French National Science Foundation), French Ministry for Research (ANR).

Expert-consultant for the Interamerican Development Bank (IDB), the European Union, The World Bank, the United Nations Development Program (UNDP), Lettis & Associates, Inc. (seismic source characterization for hazard analysis), South African Council for Geosciences.

Session Organizer at International Conferences: EGS meeting 1998, AGU Fall meeting 2000, AGU Spring meeting 2002, AGU/Western Pacific conference 2004, AGU Fall meeting 2004, AGU Fall meeting 2005, IUGG meeting 2007, AGU Spring meeting 2009, EGU General Assembly 2009, 2015, AGU Fall meeting 2009, 2010, 2012.

Panel Member for the NASA Solid Earth and Interior program (proposals), the USGS Earthquake Hazards Program (proposals), the Institut Européen Universitaire de la Mer (IUEM, France – external review), Georgia Tech School of Earth and Atmospheric Sciences (external review), French Institute for Marine Research (IFREMER, external review), Univ. of Grenoble Geophysics program (external review), GeoForschung Zentrum (GFZ) Potsdam (external review).

Academic Search Committees: University of Cambridge (U.K.) Chair of Geophysics (2019), Ecole normale supérieure prof. position in geophysics (2017), Univ. of Nice-Sophia Antipolis assistant prof. position in active tectonics (2016), Univ. of Nice-Sophia Antipolis prof. position in tectonics (2015), Univ. of Grenoble prof. position in tectonics (2013), Univ. of Paris VII (IPGP) assistant professor position in space geodesy (2010), Purdue Univ. assist. prof. in planetary sciences (2010), Purdue Univ. Dept Head search committee (Chair, 2009), Purdue Univ. distinguished prof. in planetary sciences (2009), Purdue Univ. assist. prof. in seismology (Chair, 2005), Purdue Univ. assist. prof. in tectonics (Chair, 2004), Purdue Univ. Dept Head search committee (2004), Purdue Univ. assist. prof. in geodynamics (2003), Univ. of Montpellier assist. prof. in geophysics (2000).

Professional Associations: American Geophysical Union, European Geophysical Society, International Association of Geodesy, Seismological Society of America.

SELECTED RECENT PUBLICATIONS

Total number of publications = 170, 7500 citations, average citations per article = 41, h-index = 51 (source Scopus, October 2019). For a complete publication list:

<http://www.geologie.ens.fr/~ecalais/publications/>.

Leclère, H., and E Calais, A Parametric Analysis of Fault Reactivation in the New Madrid Seismic Zone: the Role of Pore-Fluid Overpressure, **J. Geophys. Res.**, 124, 10,630-10,648, 2019.

Koptev, A., T. Gerya, E. Calais, S. Leroy, and E. Burov, Afar triple junction triggered by plume-assisted bi-directional continental break-up, **Scientific Reports**, 1–7, DOI: 10.1038/s41598-018-33117-3, 2018.

Craig, T.J., Chanard, K., and Calais E., Hydrologically-driven Seismicity in the New Madrid Seismic Zone, **Nature Communications**, 8:2143, doi: 10.1038/s41467-017-01696-w, 2017.

Calais, E., T. Camelbeeck, S. Stein, M. Liu and T.J. Craig, A New Paradigm for Large Earthquakes in Stable Continental Plate Interiors, **Geophys. Res. Letters**, 43, doi:10.1002/2016GL070815,

2016.

- Koptev, A., E. Calais, E. Burov, S. Leroy, and T. Gerya, Contrasted continental rifts in East Africa via plume-craton interaction, **Nature Geoscience**, 1-5, doi:10.1038/ngeo2401, 2015.
- Calais, E., A. Freed, G. Mattioli, F. Amelung, S. Jónsson, P. Jansma, S.H. Hong, T. Dixon, C. Prépetit, and R. Momplaisir The January 12, 2010, Mw 7.0 earthquake in Haiti: context and mechanism from an integrated geodetic study, **Nature Geosciences**, doi 10.1038/NGEO992, 2010.
- Hamling, I.J., T.J. Wright, E. Calais, L. Bennati, and E. Lewi, Stress transfer between thirteen successive dyke intrusions in Ethiopia, **Nature Geosciences**, doi 10.1038/NGEO967, 2010.
- Calais, E., A.M. Freed, R. Van Arsdale, and S. Stein, Triggering of New Madrid Seismicity by Late Pleistocene Erosion, **Nature**, 466, doi: 10.1038/nature09258, 2010.
- Calais, E., and S. Stein, Space geodetic evidence for time-variable deformation in the New Madrid seismic zone, **Science**, 323, 10.1126/science.1168122, 2009.
- Calais, E., N. d'Oreye, J. Albaric, A. Deschamps, D. Delvaux, J. Deverchere, C. Ebinger, R.W. Ferdinand, F. Kervyn, A.S. Macheyeki, A. Oyen, J. Perrot, E. Saria, B. Smets, D.S. Stamps, and C. Wauthier, Aseismic strain accommodation by dyking in a youthful continental rift, East Africa, **Nature**, Vol 456, doi: 10.1038/nature07478, 2008.
- Calais, E., G. Mattioli, C. DeMets, J.M. Nocquet, S. Stein, A. Newman, and P. Rydelek, Tectonic Strain in the Interior of the North American Plate? **Nature**, 438, doi: 10.1038/nature04428, 2005.

SELECTED RECENT INVITED LECTURES AND SEMINARS

Selected Invited Presentations at International Conferences

- U.S. Congressional Briefing on the 2010 Haiti earthquake, May 2010.
- American Association for the Advancement of Science (AAAS) annual conference, January 2011.
- Multidisciplinary Center for Earthquake Engineering Research (MCEER) seminar series, March 2011.
- Clinton-Bellerive Commission on the Reconstruction of Haiti, July 2011.
- Asian Seismological Commission, 9th Assembly, Ulan Baatar (Mongolia), September 2012.
- UNESCO Expert Meeting on Regional Tsunamis, Port-au-Prince, Haiti, July 2013.
- Royal Astronomical Society workshop on Earthquake Science and Mitigation, London, February 2014.
- Académie Royale des Sciences d'Outre Mer de Belgique, Bruxelles, May 2016.
- Académie des Sciences, Intersection des applications des Sciences, Paris, May 2016.
- Academia dei Lincei, the Resilience of Art Cities to Natural Catastrophes, Rome, October 2016.
- ENS-ENA colloquium, Paris, March 2017.
- Geological Society of America, 2017 Annual Meeting, Denver, Colorado, October 2017.
- European Seismological Commission, 2018 Annual Meeting, Malta.
- UNESCO Expert Meeting on Regional Tsunamis, Fort-de-France, Martinique, March 2019
- International Space Science Institute, Bern, Switzerland, April 2019. Caribbean Science and Innovation Meeting, Guadeloupe, October 2019.

Selected Invited Academic Seminars

- Oxford University, U.K., Earth Sciences Seminar Series, February 2014.
- University Paris VI, Geosciences Department Seminar Series, February 2014.
- University of Montpellier, Earth Sciences Department Seminar Series, January 2015.
- Cambridge University, U.K., Bullard Labs Seminar Series, March 2015.
- University of Utrecht Geophysics Seminar Series, The Netherlands, March 2015.
- University of Nantes, Geosciences Seminar Series, March 2015.

Total (Pau, France), Geophysics Research Seminar, January 2016.
Seismological Society of America, 2017 Annual Meeting.
Geological Society of America, 2017 Annual Meeting.
WEGENER Meeting, Grenoble, September 2018.
Los Alamos National Laboratory Colloquium Series, December 2018.
Natural Resources Canada, Québec Office, December 2018.
Centre Européen de Recherche et d'Enseignement des Géosciences (CEREGE), June 2019.
8th International Symposium of Andean Geodynamics (ISAG), Quito, Ecuador, September 2019.

SELECTED CLASSES TAUGHT

Undergraduate level: Geodynamics, Geophysics, Geophysics field course (a Moho cross-section in the southern French Alps), Tectonics of the Western US, Earth Observation from Satellites.

Graduate level: GPS Geodesy, Gravity and Geopotential, Kinematics of Active Crustal Motions, Precise Geopositioning, principles and applications, Active Tectonics, Seminars in Tectonics, Maps and Graphs with GMT, Marine Geophysics (study abroad course in collaboration with Univ. of Brest, France).