QUENTIN
BRISSAUD - PHD

PROFILE

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LANGUAGES   French (native) English (fluent)
CITIZENSHIP   French
VISA   Eligible Green Card through mariage

EDUCATION

Research Master   2013 - 2014
PAUL SABATIER UNIVERSITY, TOULOUSE, FRANCE
Nonlinear dispersive and elliptic equations

Master degree in Engineering   2010 - 2014
INSA TOULOUSE, TOULOUSE, FRANCE
Optimization, CFD, Structural mechanics, Image processing, Data Assimilation and Wave theory

PhD degree   2014 - 2017
SSPA TEAM, ISAE, TOULOUSE, FRANCE
Numerical modeling of atmospheric waves due to Earth/Ocean/Atmosphere couplings and applications

TEACHING & SUPERVISION

2021 **Guest lecturer**
- University of Oslo - Master - DIgital processing
- Practical use of frequency and wavelet analysis in seismo-acoustic research - The Beirut catastrophe

2021 **Master student supervisor**
- University of Oslo - student in dIgital processing
- infrasound to enhance long-term weather forecasting

2018 - 2019 **PhD student mentor**
- seismo-acoustic wave propagation theory
- spectral element modeling
- depozit.isae.fr/theses/2020/2020_Martire_Leo_D.pdf

2015 - 2017 **Lecturer**
- University of Toulouse - Bachelor - 1st Year Mathematics
- Calculus - Taylor series, partial differential equations

2017 **Lecturer**
- University of Toulouse - Bachelor - 1-2 Year Math/Computer science
- Numerical integration, poly. interpolation, roots of eq.

2016 - 2017 **Master student supervisor**
- Research projects - students in aeronautical engineering
- Heating of the thermosphere by infrasound breaking
- Acousto-gravity waves in Venus' and Mars' atmosphere

SELECTED PUBLICATIONS

2021 **Q. Brissaud et al, The first detection of an earthquake from a balloon using its acoustic signature, GRL**
NASA press release https://go.nasa.gov/2YfNRiO
- First detection of a natural earthquake using balloon-borne infrasound data
- Seismic infrasound waves provide constraints on subsurface velocities

2021 **Q. Brissaud and E. Astafyeva, Near-real-time detection of co-seismic ionospheric disturbances using machine learning, GJI [in review]**
http://doi.org/10.1002/essoar.10507674.1
- First automatic machine learning based method to detect and associate co-seismic ionospheric disturbances
- This method enables the construction of ionospheric images in near-real-time for early warning applications

2021 **Q. Brissaud et al, Predicting infrasound transmission loss using deep learning, GJI [in review]**
https://bit.ly/3a3Db8Y
- Amplitudes predicted by parabolic equations can be accurately reproduced (error < 10 db) and quickly (0.05 s) through deep learning

2020 **Q. Brissaud et al, Extension of the Basin Rayleigh-Wave Amplification Theory to Include Basin-Edge Effects, BSSA**
- 1D theory to predict surface-wave amplification in basins is a good approximation for low velocity contrasts
- 1D theory + transmission coef. provide a good estimate of amplification in realistic basin structures

2018 **L. Martire, Q. Brissaud et al., Numerical simulation of the atmospheric signature of artificial and natural seismic events, GRL**
- Very shallow subsurface structures determine the directivity and amplitude of seismically-induced infrasounds
- High air-ground impedance contrasts lead to high SNR at airborne instruments

2017 **Q. Brissaud et al., Hybrid Galerkin numerical modelling of elastodynamics and compressible Navier–Stokes couplings: applications to seismo-gravito acoustic waves, GJI**
- Modeling of non-linear acoustic-gravity waves and linear seismic waves in Earth-atmosphere media with topography

2016 **R. Garcia, Q. Brissaud et al., Finite-difference modeling of acoustic and gravity wave propagation in Mars atmosphere: application to infrasounds emitted by meteor impacts, Space Science Review**
- Implementation of complex vibrational absorption processes
- At night, a near-surface waveguide enables long distance propagation of acoustic signals in flat regions

RESEARCH EXPERIENCE

Research scientist
since Sept 2020

NORSAR, Kjeller, Norway
Infrasound modeling, study of the Earth-atmosphere couplings, machine learning

Post-doc
2017 - 2020

CALTECH, PASADENA, USA
Advisers: Jennifer Jackson, Victor TSAI
Near-surface seismic modeling and study of the Earth-atmosphere couplings

RESEARCH INTERESTS

- Using seismic and acoustic records to constrain seismic sources and subsurface seismic velocities
- Exploring planetary interiors and surface sources with stratospheric balloons equipped with pressure sensors
- Building efficient near-real time tsunami early warning systems using GPS data
- Understanding relationships between basin characteristics and surface amplification
- Deep learning to model wave propagation and facilitate source inversions

AWARDS & FELLOWSHIPS

2020 Member Young Profesionnal Network CTBTO
2017 Caltech Seismolab fellowship
2017 Geophysical Journal International (GJI), Student Author Awards.

RECENT PRESENTATIONS

2021 **Invited presentation - Infrasound arrays as probes for atmospheric dynamics in polar regions**
- Security and preparedness in the changing north, Oslo

2021 **Invited presentation - What can the sound of earthquakes tell us about a planet's interior structure?**
- AGU 2021

2021 **Invited presentation - Probing the subsurface with infrasound**
- University of Oslo, Norway - Seismology group

2021 **Invited presentation - Near-real-time automatic detection of co-seismic ionospheric disturbances**
- JPL, Pasdena - GNSS Space Weather Science Meeting

2021 **Invited presentation - Balloons as geophysical probes**
- University of Nice, France - GeoAzur

OTHER PUBLICATIONS & PROJECTS

2021 **L Martire, R Martin, Q Brissaud, RF Garcia, SPECFEM2D-DG, an open source software modeling mechanical waves in coupled solid-fluid systems: the Linearised navier-stokes approach, GJI**
- Open-source release of a full-waveform modeling tool in coupled earth-atmosphere media

2021 **VH Lai, Z Zhan, Q Brissaud, O Sandanbata, MS Miller, Inflation and Asymmetric Collapse at Kilauea Summit during the 2018 Eruption from Seismic and Infrasound Analyses, JGR [in review]**
 https://doi.org/10.1029/2021JB022139
- Characterization seismic events at the Kilauea summit using particle motion, infrasound, and moment tensor inversion
- Near-field seismic observation is essential to resolve the isotropic contribution due to inflation of the reservoir

2021 **JB Muir, RW Clayton, VC Tsai, Q Brissaud, Parsimonious velocity inversion applied to the Los Angeles Basin, CA, JGR [in review]**
 https://doi.org/10.31223/X5F03K
- Deepening of the basin along the Elysian Park Fault system
- Steep LA basin sidewall and shallower sediments to the NE

2021 **Q. Brissaud et al., Using machine-learning to predict surface-wave amplification in sedimentary basins [in prep.]**
 https://bit.ly/3uAzWiU
- Random forests trained over synthetics provides an accurate nonlinear regression model for surface-wave amplification in basinsshorturl.at/dFQ19

2021 **A. Turquet, Q. Brissaud et al, Near and far-field seismo-acoustic analysis of mb 4.9 mining induced earthquake nearby Kiruna, Sweden [in prep.]**
 https://bit.ly/2ZMHTGh
- Random forests trained over synthetics provides an accurate nonlinear regression model for surface-wave amplification in basins

2019 **Q Brissaud and VC Tsai, Validation of a fast semi-analytic method for surface-wave propagation in layered media, GJI**
- highly discontinuous near-surface velocity profiles can be approximated by a combination of power-law scalings and the corresponding Green's functions can be derived anytically

2016 **Q Brissaud et al, Finite-difference numerical modelling of gravitoacoustic wave propagation in a windy and attenuating atmosphere, GJI**
- 3d modeling of acoustic and gravity waves in the atmosphere