Mathurin Dongmo Wamba

PhD in Geophysics

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Scientific Profile

I conducted research in optimization problems, signal processing, and Machine learning during my Ph.D. at the Institut de Physique du Globe de Paris (IPGP), and my postdoctoral position at Princeton University (USA). I processed millions of Seismic Data for subsurface imaging. My research also involves complex mathematical, statistical, and numerical modeling. I have strong skills in computation, data processing, and data analysis. My ongoing project at the University of Bern (Switzerland) involves monitoring environmental processes such as föehn-like strong wind, submarine landslides, and methane gas release, using a combination of seismological data, Hydrodynamics data, and meteorological Observations. You can visit my Github page (wamba github). I am also working on weather prediction using Quantum Machine Learning (Qauntum Machine Learning wamba's Kaggle). **I have the capability to tackle any Data Science topic**.

Skills

- Scientific programming: Python, Bash, C, Fortran, MATLAB
- Operating systems: Linux, Windows, Android, IOS
- Clusters for parallel computing: NERSC, XSEDE, TIGER, CINES, S-CAPAD, CPU and GPU programming.
- Other software : SeisComP, Geopsy, Vim, Latex, Atom, GitHub
- Signal processing
- Statistical analysis.
- Machine Learning
- Quantum Computing
- Data simulation: 1D & 3D Earth models, using normal-mode summation and the spectral-element or finite element method
- Data Visualization: SAC, 3D visualization using Python, Mayavi, Paraview.
- Seismic Imaging: Earth imaging using seismic surface and body wave & geological interpretation
- Weather, Hydrodynamics Data Processing and Machine Learning.
- Highly skilled in Mathematics, Statistics, Physics, and Computational methods.
- Inverse Problem, Optimization, Information theory.
- Multilingual: English, French, German (learning)

Professional Experience

- 2024 – Present: **Advanced Postdoctoral in Data Science** University of Bern/Institute of Geological Sciences, Bern, Switzerland (Unibe website).
- 2021 – 2023 : **Presidential Postdoctoral Research Associate**. Princeton University, Princeton, NJ (Princetion Geosciences).
- 2019–2020 : **Lecturer at the Collège de France (college-de-france website) under Prof. Barbara Romanowicz**.
- 2017–2020: **Contribution to Master's tomography course at the Institut de Physique du Globe de Paris**. I organized practical Data Science classes and guided Master's students in computing synthetic seismic signals using both the spectral element method and the finite element method (ipgp-website).
- 2016–2020 : PhD candidate at the Institut de Physique du Globe de Paris (ipgp-website).

Experience with Several Projects

2024-Present **Monitoring environmental process (Switzerland)**. Consists of using several sets of data collected from Ocean bottom seismomters, hydrophones, Acoustic Doppler profilers (ADCP), and repeated multibeam bathymetry in Switzerland.

2021-2023 **MERMAID** (Mobile Earthquake Recording in Marine Areas by Independent Divers), consists of hydrophones installed in the Pacific Ocean around French Polynesia.

2016-2020 **RHUM-RUM** (Réunion Hotspot and Upper Mantle-Réunions Unterer Mantel), consists of ocean-bottom seismometers (OBSs) installed in the Indian Ocean around La Réunion.

2014 **PRECASEM, lead by Paterson,Grant & Watson limited, Toronto**

In this project, airborne geophysical data collected in central Africa were used to make a mining map of the latter area.

Education

2016–2020 **PhD Geophysics**, Institut de Physique du Globe de Paris (IPGP)

Thesis **Advisors:**, *Barbara Romanowicz (University of California at Berkeley & Collège de France)*, Jean-Paul Montagner (University of Paris/IPGP)

2015–2016 **Master of Geophysics**, Institut de Physique du Globe de Paris, France

2011–2012 **Physicist**, École Normale Supérieure, Bambili, Cameroon

2008–2010 **Master of Physics**, University of Dschang, Cameroon

2005–2008 **Bachelor of Physics**, University of Dschang, Cameroon

2017 Travel grant to attend TIDES (Time-Dependant Seismology) workshop, at the University of Oxford, UK.

2022 Travel grant to attend SAGE/GAGE Community Science Workshop in Pittsburgh, PA

Professional Development

Princeton University, USA

2022 Training on Diversity, Equity, and Inclusion in the Universities environment, this training was dedicated to Presidential postdoctoral fellows.

2022 Google training, devoted to Princeton's researchers, on cloud computing and machine learning.

Conference Presentations

Nov 2024 **SGM (Swiss Geoscience Meeting), Basel, Switzerland**

Dec 2023 **AGU (American Geophysical Union), Fall Meeting, San Francisco, USA**

Regional Tomography of Indian and Pacific Oceans.

Dec 2022 **AGU (American Geophysical Union), Fall Meeting, Chicago, USA**

Toward Regional Tomography of Mantle Plumes by Full Waveform Inversion: Targeting French Polynesia.

Apr 2022 **EGU (European Geosciences Union), General Assembly, Vienna, Austria**

Plume conduits rooted at the core-mantle boundary beneath La Réunion hotspot.

Dec 2019 **AGU (American Geophysical Union), Fall Meeting in San Francisco, USA**

Seismic imaging of the mantle plumes beneath La Réunion hotspot by full waveform inversion.

Apr 2019 **EGU (European Geosciences Union), General Assembly in Vienna, Austria**

Cartography of the mantle plumes beneath la Reunion hotspot.

Dec 2018 **AGU (American Geophysical Union), Fall Meeting in Washington, D.C, USA**

Tomography of Earth's mantle plumes beneath the Indian Ocean by waveform inversion.

Aug 2017 **TIDES (Time-Dependant Seismology), Conference in University of Oxford, UK**

Anisotropy Tomography of Earth's mantle plumes by full waveform inversion.

Mar 2017 **Congrès des doctorants, Institut de physique du Globe de Paris**

Comparision of 3D and 1D synthetics sesimograms to the real data.

Mar 2018 **Congrès des doctorants, Institut de Physique du Globe de Paris**

Tomography of Indian Ocean.

Aug 2018 **CIDER, University of Santa Barbara, USA**

Tomography of La Réunion mantle plume by waveform inversion.

Publications

(Submit.) **M. D. Wamba**, Katrina Kremer, D.Bouffard and A.Shynkarenko, Foehn-induced lacustrine seismic waves: Switzerland's Lake Lucerne (**Nature Communication**)

(In prep.) **M. D. Wamba,** and Karim Nchare, Sustainable source of geothermal energy in East Africa from the deep mantle.

2023 **M. D. Wamba,** F. J. Simons, & J. C. E. Irving, Evaluation of global tomographic mantle models of French Polynesia: towards incorporating hydroacoustic data into full-waveform inversion modeling. doi: 10.31223/X5ZH55

2023 I. A. Mofor, L. C. Tasse, G. B. Tanekou, **M. D. Wamba**, R. Kengne, A. Tchagna Kouanou, M. T. Motchongom, D. Afungchui, F. B. Pelap, T. C. Kofane. Dynamics of modulated waves in the spring-block model of earthquake with time delay. **European Physical Journal Plus**, doi: 10.1140/epjp/s13360-023-03863-z

2022 **M. D. Wamba,** J.-P. Montagner, & B. Romanowicz, Imaging deep mantle plumbing beneath La Réunion and Comores hotspots: vertical plume conduits and horizontal ponding zones. **Science Advances**, doi: 10.1126/sciadv.ade3723

2021 **M. D. Wamba**, J.-P. Montagner, B.Romanowicz, & G. Barruol, Multi-mode waveform tomography of the Indian ocean upper and mid-mantle around the Réunion hotspot. **J. Geophysical Research: Solid Earth**, doi: 10.1029/2020JB021490

2015 L. Y. Kagho, **M. W. Dongmo**, & F. B. Pelap, Dynamics of an earthquake under magma thrust strength. **Journal of Earthquakes**, doi: 10.1155/2015/434156

2014 F. B. Pelap, A. Fomethe, **M. W. Dongmo**, L. Y. Kagho, G. B. Tanekou, & Y. L. Makenne, Direction effects of the pulling force on the first order phase transition in a one block model for earthquakes. **Journal of Geophysics and Engineering**, doi: 10.1088/1742-2132/11/4/045007

M. W. Dongmo, L. Y. Kagho, F. B. Pelap, G. B. Tanekou, Y. L. Makenne, & A. Fomethe, Water effects on the first-order transition in a model of earthquakes. **International Scholarly Research Notices**, doi: 10.1155/2014/160378