Ariane Ducellier

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Personal profile

Applied Scientist Professional and **PhD holder** with 10 years' experience designing **statistical models** and carrying out **scientific research** to solve real world problems. Proven track record in **framing research questions** and **conducting data-driven studies** that lead to practical solutions. I am now looking to leverage my data analysis, project management and cross-functional collaboration skills to **find solutions** that improve business operations.

Expertise

- Data Science: Machine Learning, Deep Learning, Time Series Analysis, Forecasting, Statistical Inference, Stochastic Modeling, Data Visualization, Optimization, Causal Inference, Raking and Survey Sampling.
- Programming: Python (Pandas, Pyspark, Scikit-learn, Pytorch, Dash), R (RStudio, tidyverse, Shiny), Git, SQL, Cloud computing (AWS).
- Designing data modeling pipelines from data collection to data analysis, model development, model parameters tuning, model evaluation and productionalization.
- Translating open-ended business problems into data metrics and mathematical modeling to tailor solutions for the greatest possible impact.
- Communicating insights from data analyses to stakeholders and technical and non-technical audiences.
- Staying up-to-date to the latest developments in the field and innovating to incorporate novel research techniques into products.

Professional experience

2023–Present **Postdoctoral researcher**, Institute for Health Metrics and Evaluation, Seattle, WA.

- Design and implement mathematical methods and computational algorithms to advance applications in global health modeling:
  - Develop methods to adjust data sample weights in contingency tables to align with specified marginal totals.
  - Contribute to the development of a modeling pipeline to estimate numbers and causes of deaths across time, demographic groups and geography.
- Communicate model results and the implications of modeling decisions to shareholders to support informed, data-driven decision-making.
- Maintain the team's computational codes and answer questions from users across IHME through office hours and help-desk tickets.
- Taught three quarter-long courses on data visualization with R.

2022–2023 **Applied Scientist**, Zillow, Seattle, WA.

Originally started as an academic intern (Summer 2021), then hired full-time.

- Designed data modeling pipelines from data collection to data analysis, model development, model evaluation and productionalization.
- Analyzed and interpreted datasets and developed statistical models and computational codes to forecast housing market trends, giving internal teams access to the latest data and insights for planning business operations as well as external communications.
- Delivered forecasts to stakeholders on a monthly basis, providing real-time data for decision making.
- Evaluated errors on statistical models, informing stakeholders of the uncertainty on the results.

2016–2022 **Research Assistant**, University of Washington, Seattle, WA.

- Executed research to understand slow earthquake phenomena and subduction zone processes. Results included 3 published articles in prestigious scientific journals within the field of Earth science and 3 presentations in high-level international conferences in data science.
- Performed statistical analysis and signal processing of large seismic datasets providing critical information about earthquake mechanisms.
- Conceived and taught labs on data science and machine learning for Earth and planetary systems, training students to perform their own research and meet academic requirements.
- Volunteered to teach a tutorial in a week-long workshop on geospatial data science to students, researchers and industry experts.

2006–2015 **Research Scientist**, The French Geological Survey, Orléans, France.

- Developed computational codes (C, MPI) to model seismic wave propagation.
- Created a computational code (C♯) for the vulnerability assessment of utility networks and buildings, providing critical data for proactive planning and building reinforcements.
- Leveraged graph models to forecast and mitigate network disruptions following natural disasters.
- Contributed to internal and external funding proposals.

Fall 2010 and Fall 2011 **Visiting Research Scientist**, Kyoto University, Kyoto, Japan.

- International collaboration with several Japanese researchers.
- Wrote global optimization codes (Fortran, OpenMP) for nonlinear inverse problems resulting in an innovative method to model earthquake ground displacement for civil engineering purposes.

Education

2016–2022 **PhD**, University of Washington, Seattle, WA.

- Earth & Space Sciences and Data Science.
- 3 published articles in prestigious scientific journals within the field of Earth science.
- 3 presentations in high-level international conferences in data science.

2018–2021 **Master of Science**, University of Washington, Seattle, WA.

- Statistics, Advanced Data Analysis.

2001–2004 **Master**, Universite Paris-Saclay, France.

- Executive Engineering and Applied Mathematics.

Publications

A. Ducellier, A. Hsu, P. Kendrick, B. Gustafson, L. Dwyer-Lindgren, C. Murray, P. Zheng, A. Aravkin - Raking mortality rates across cause, population group and geography with variance estimation. *Submitted to the Annals of Applied Statistics*.

G.F. Gil, A. Aravkin, E. DeGraw, A. Ducellier, M. Khalil, E.C. Mullany, E.M. O'Connell, A. Twalibu, E. Gakidou, L.S. Flor (2025) - Leveraging socioeconomic development for maternal health, breast cancer, and gynaecological cancers across 204 locations: a stochastic frontier analysis from the Global Burden of Disease Study 2023. *The Lancet Obstetrics, Gynaecology, & Women's Health*.

A. Ducellier, K.C. Creager, and D.A. Schmidt (2022) - Detection of slow slip events using wavelet analysis of GNSS recordings. *Bulletin of the Seismological Society of America*, 112(5):2408-2424.

A. Ducellier, and K.C. Creager (2022) - An eight-year-long low-frequency earthquake catalog for Southern Cascadia. *Journal of Geophysical Research: Solid Earth*, 127(4):e2021JB022986.

A. Ducellier, and K.C. Creager (2022) - Depth and thickness of tectonic tremor in the northeastern Olympic Peninsula. *Journal of Geophysical Research: Solid Earth*, 127(1):e2021JB022708.

T. Ulrich, C. Negulescu, and A. Ducellier (2015) - Using the discrete element method to assess the seismic vulnerability of aggregated masonry buildings. *Bulletin of Earthquake Engineering*, 13:3135–3150.

A. Ducellier, and H. Aochi (2015) - Importance of crustal structure and anelastic attenuation for estimating ground motion parameters by finite difference simulation. *Bulletin of Earthquake Engineering*, 13:1893–1911.

A. Ducellier, H. Kawase, and S. Matsushima (2013) - Validation of a new velocity structure inversion method based on horizontal-to-vertical (H/V) spectral ratios of earthquake motions in the Tohoku area, Japan. *Bulletin of the Seismological Society of America*, 103:958–970.

H. Aochi, A. Ducellier, F. Dupros, M. Delatre, T. Ulrich, F. De Martin, and M. Yoshimi (2013) - Finite difference simulations of seismic wave propagation for the 2007 Mw 6.6 Niigata-ken Chuetsu-Oki earthquake: Validity of models and reliable input ground motion in the near-field. *Pure and Applied Geophysics*, 170:43–64.

A. Ducellier, and H. Aochi (2012) - Interactions between topographic irregularities and seismic ground motion investigated using a hybrid FD-FE method. *Bulletin of Earthquake Engineering*, 10:773–792.

W. Imperatori, H. Aochi, P. Suhadolc, J. Douglas, A. Ducellier, and G. Costa (2010) - 2D versus 1D ground-motion modelling for the Friuli region, north-eastern Italy. *Bollettino di Geofisica Teorica e Applicata*, 51:43-56.