

KOUADIO KOUAO LAURENT, PhD

Computational Geophysicist | Scientific Software Developer

Yamoussoukro, Côte d'Ivoire (Open to relocation) | Email: etanoyau@gmail.com, lkouao@csu.edu.cn | Web: lkouadio.com |
GitHub: earthai-tech | ORCID: 0000-0001-7259-7254

Last updated: October 13, 2026

RESEARCH PROFILE

I develop data-driven and physics-guided methods for subsurface characterization, monitoring, and risk forecasting, with a focus on electromagnetic (EM) observations, geophysical inversion, and trustworthy machine learning. My recent work spans hydro-geophysics, environmental anomaly detection, and spatiotemporal forecasting (e.g., land subsidence), supported by open-source scientific software and reproducible pipelines.

Keywords: EM/CSAMT/AMT | geophysical inversion | anomaly detection | physics-guided ML | uncertainty quantification | hydro-geophysics | land subsidence forecasting | natural hazards | mineral exploration | scientific software

ACADEMIC APPOINTMENTS

Lecturer-Researcher (Geophysics & AI for Earth Systems), Institut National Polytechnique Félix Houphouët-Boigny (INP-HB), Yamoussoukro, Côte d'Ivoire	Sep 2026–Present
Faculty Researcher (AI in Geophysics), School of Geosciences and Info-Physics, Central South University, Changsha, China	Jun 2024–May 2026
Project Lead (AI for Geophysics Research), Hunan Key Laboratory of Nonferrous Resources and Geological Hazards Exploration, Changsha, China	Nov 2023–May 2026
Postdoctoral Fellow (Geophysicist; Developer of Intelligent Tools), School of Geosciences and Info-Physics, Central South University, Changsha, China	Jul 2022–Apr 2024

EDUCATION

MS in Computer Science (OMSCS), Georgia Institute of Technology, Atlanta, GA, USA In progress; expected graduation 2029.	Sep 2026–Present
PhD in Geophysics, School of Earth Sciences, Zhejiang University, Hangzhou, China Grade: A+ (Summa Cum Laude).	May 2022
MSc in Geophysics (STRM), Université Félix Houphouët-Boigny (UFHB), Abidjan, Côte d'Ivoire Grade: A+.	Jul 2015
BSc-equivalent in Geosciences/Geology (MST), Université Félix Houphouët-Boigny (UFHB), Côte d'Ivoire	2013
DEUG in Chemistry–Biology–Geology, Université Félix Houphouët-Boigny (UFHB), Côte d'Ivoire	2009

HONORS & AWARDS

Best Report Certificate, 10th International Conference on Environmental & Engineering Geophysics (ICEEG) Chinese Geophysical Society.	May 2023
Session Chair Certificate, SEG International Workshop on Gravity, Electrical & Electromagnetic Methods and Their Applications (GEM) Shenzhen, China.	May 2024
Conference Participation Certificate, International Conference on Intelligent Computing and Next Generation Networks (ICNGN) Bangkok, Thailand.	Nov 2024

SELECTED FUNDING & CONTRACTS

- **Special Project on the Comprehensive Application and Research for the Hydrogeological Exploration of the Maorling Gold Mine, Dafang Mining Area, Guiyang County, Hunan Province**
Code: HKF202400367 | Amount: 1,810,000 CNY | Period: 2024-01–2024-12
- **Application and Research on TEM for Water Intrush Advanced Prediction in Zijing Mountain Tunnel of Ling-Dao Expressway, Hunan Province**
Code: HFW202400329 | Amount: 1,030,000 CNY | Period: 2023-11–2026-06
- **Geophysical Exploration and Technical Research of Geothermal Resources in the Greater Bay Area and Surroundings**
Code: HFW202300068 | Amount: 1,000,000 CNY | Period: 2022-01–2024-12
- **Special Project on Wide-Area Electromagnetic Geothermal Exploration in Nansha District, Guangzhou City**
Code: HFW202400329-2 | Amount: 823,000 CNY | Period: 2023-12–2025-06
- **Special Survey and Evaluation for Land Subsidence in the Guangdong–Hong Kong–Macao Greater Bay Area (Pearl River Delta Section)**
Code: HFW202300136 | Amount: 580,000 CNY | Period: 2023-03–2023-12
- **3D Forward and Inverse Modeling of Transient Electromagnetic Method in Mines (NSFC)**
Code: 42374093 | Amount: 520,000 CNY | Period: 2024-01–2027-12
- **Hydrogeological Survey of the Manganese Ore Area in Huayuan County**
Code: HFW202300669 | Amount: 440,000 CNY | Period: 2023-01–2024-05
- **2024 Special Survey and Evaluation Project for Land Subsidence in the Guangdong–Hong Kong–Macao Greater Bay Area (Pearl River Delta Section)**
Code: HFW202400270 | Amount: 400,000 CNY | Period: 2024-03–2024-12

OPEN-SOURCE SOFTWARE

- **GeoPrior-v3** — Physics-guided scientific Python framework for geohazard forecasting and risk-oriented interpretation; land subsidence via GeoPriorSubsNet v3, with uncertainty quantification and a roadmap toward landslides.
geoprior-v3.readthedocs.io • github.com/earthai-tech/geoprior-v3 • pypi.org/project/geoprior-v3
- **k-diagram** — Polar diagnostics package for forecast uncertainty—coverage, calibration, and severity (CAS)—to make probabilistic models interpretable.
github.com/earthai-tech/k-diagram • k-diagram.readthedocs.io/en/latest • pypi.org/project/k-diagram
- **hwm** — Adaptive Hammerstein–Wiener Modeling Toolkit: scikit-learn-friendly API for regression/classification/time-series system modeling (nonlinear + linear blocks).
github.com/earthai-tech/hwm • hwm.readthedocs.io • pypi.org/project/hwm
- **gofast** — All-in-one ML utilities designed to streamline data science workflows: preprocessing, modeling, evaluation, and tooling.
github.com/earthai-tech/gofast
- **watex** — Machine learning for groundwater exploration: integrates DC resistivity (ERP/VES), EM, geology, and ML for well siting, yield prediction, and EM denoising.
github.com/earthai-tech/watex • watex.readthedocs.io • pypi.org/project/watex
- **hydro-learn** — Workflows to reduce hydrogeological data-collection costs, guide drilling locations, and predict well water content using ML.
github.com/earthai-tech/hydro-learn
- **pyCSAMT (v2)** — Python toolbox for AMT/CSAMT: end-to-end processing, SEG-EDI/Zonge compatibility, and 2D/3D inversion workflows.
pycsamt.org • github.com/earthai-tech/pyCSAMT • pypi.org/project/pycsamt
- **kalfeat** — Fast detection of geo-electrical features: ML pipeline to predict groundwater flow rate from geology and DC resistivity; supports drilling-site selection.
github.com/earthai-tech/kalfeat • kalfeat.readthedocs.io

INTELLECTUAL PROPERTY

Computer Software Copyright: Attention-Mechanism-Based Probabilistic Forecasting Software (BAK_PF) V1.0

Sep 2026

National Copyright Administration of China | Registration No. 2026SR0928621 | Certificate No. 18142902 | Sole copyright holder.

Chinese Invention Patent Application: Computer-Implemented Method, System, and Storage Medium for Generating Physics-Constrained Forecast Inputs and Performing Closure-Consistent Forecasting of Urban Land Subsidence

Apr 2026

Filed 2026-04-07 | Sole inventor | Status: pending.

INITIATIVES

- **WATER4ALL for Africa** — Using AI and crowdsourced data to improve the success rate of water borehole drilling across Africa. (Status: Phase 1)
water4all-africa.org
- **Africa FireShield Initiative** — Developing an AI-powered early warning system to predict and mitigate wildfire risks in Africa. (Status: Conceptual)

SELECTED PUBLICATIONS

- Liu, R.; Liu, Y.; Jiang, S.; Yang, G.; Kouadio, K. L. (2026). A low-cost method for planar localization of leakage points in closed landfills. *Waste Management*. doi:10.1016/j.wasman.2026.115834
- Kouadio, K. L.; Liu, R.; Loukou, K. G. H.; Liu, W.; Qing, Z.; Liu, Z. (2026). A diagnostic framework for interpreting spatiotemporal probabilistic forecasts. *Environmental Modelling & Software*. doi:10.1016/j.envsoft.2026.107052
- Loukou, K. G. H.; Kouame, L. N.; Kouadio, K. L. (2026). Electrical Imaging and 3D Modeling of a Discontinuous Aquifer: Insights from Toumbakro, Bouaké, Côte d'Ivoire. *Geology, Geophysics and Environment*. doi:10.7494/geol.2026.52.1.5
- Kouadio, K. L.; Liu, J.; Liu, W.; Liu, R. (2025). A mixture learning strategy for predicting aquifer permeability coefficient K. *Computers & Geosciences*. doi:10.1016/j.cageo.2024.105819
- Kouadio, K. L. (2025). k-diagram: Rethinking Forecasting Uncertainty via Polar-Based Visualization. *Journal of Open Source Software*. doi:10.21105/joss.08661
- Liu, R.; Jiang, S.; Ou, J.; Kouadio, K. L.*; Xiong, B. (2024). Multifaceted anomaly detection framework for leachate monitoring in landfills. *Journal of Environmental Management*. doi:10.1016/j.jenvman.2024.122130
- Liu, J.; Liu, W.; Allechy, F. B.; Zheng, Z.; Liu, R.; Kouadio, K. L.* (2024). Machine learning-based techniques for land subsidence simulation in an urban area. *Journal of Environmental Management*. doi:10.1016/j.jenvman.2024.120078
- Kouadio, K. L.; Liu, J.; Liu, R.; Boukhalfa, Z. (2024). An Integrated Approach for Sewage Diversion: Case of Huayuan Mine, Hunan Province, China. *Geophysics*. doi:10.1190/geo2023-0332.1
- Kouadio, K. L.; Liu, J.; Liu, R.; Wang, Y.; Liu, W. (2024). K-Means Featurizer: A Booster for Intricate Datasets. *Earth Science Informatics*. doi:10.1007/s12145-024-01236-3
- Kouadio, K. L.; Liu, J.; Kouamelan, S. K.; Liu, R. (2023). Ensemble Learning Paradigms for Flow-Rate Prediction Boosting. *Water Resources Management*. doi:10.1007/s11269-023-03562-5
- Kouadio, K. L.; Liu, J.; Liu, R. (2023). watex: machine learning research in water exploration. *SoftwareX*. doi:10.1016/j.softx.2023.101367
- Kouadio, K. L.; Liu, R.; Malory, A. O.; Liu, W.; Liu, C. (2023). A novel approach for water reservoir mapping using controlled-source audio-frequency magnetotelluric in Xingning area, Hunan Province, China. *Geophysical Prospecting*. doi:10.1111/1365-2478.13385
- Kouadio, K. L.; Loukou, N. K.; Coulibaly, D.; Mi, B.; Kouamelan, S. K.; Gnoleba, S. P. D.; Zhang, H.; Xia, J. (2022). Groundwater Flow-Rate Prediction from Geo-Electrical Features using Support Vector Machines. *Water Resources Research*. doi:10.1029/2021WR031623
- Kouadio, K. L.; Liu, R.; Mi, B.; Liu, C. (2022). pyCSAMT: An alternative Python toolbox for groundwater exploration using controlled-source audio-frequency magnetotelluric. *Journal of Applied Geophysics*. doi:10.1016/j.jappgeo.2022.104647
- Kouadio, K. L.; Xu, Y.; Liu, C.; Boukhalfa, Z. (2020). Two-dimensional inversion of CSAMT data and three-dimensional geological mapping for groundwater exploration in Tongkeng Area, Hunan Province, China. *Journal of Applied Geophysics*. doi:10.1016/j.jappgeo.2020.104204

Full list: ORCID 0000-0001-7259-7254 (* corresponding author).

SELECTED TALKS & PRESENTATIONS

- “AI in GEM — What’s Next?” — International Workshop on Gravity, Electrical & Magnetic Methods and Their Applications (GEM 2024) — Shenzhen, China — May 2024 (Session chair & speaker)
- “Groundwater Reservoir Mapping via a Pseudo-Stratigraphic Approach” — 11th International Conference on Environmental and Engineering Geophysics (ICEEG 2024) — Beijing, China — Jun 2024 (Speaker)
- “Geothermal AI 2.0” — 2nd China Forum on Geothermal Frontiers — Beijing, China — Oct 2024 (Speaker)
- “Multifaceted Anomaly Detection in Landfills Using ERT Data” — Annual Meeting of Chinese Geosciences Union (CGU) — Xiamen, China — Oct 2024 (Speaker)
- “Adaptive Hammerstein–Wiener Model for Intelligent System Modeling” — 3rd International Conference on Intelligent Computing and Next Generation Networks (ICNGN 2024) — Bangkok, Thailand — Nov 2024 (Speaker)
- “10th International Conference on Environmental and Engineering Geophysics (ICEEG 2023)” — ICEEG — Beijing, China — Jun 2023 (Presenter)
- “Annual Meeting of Chinese Geosciences Union (CGU)” — CGU — Zhanjiang, China — Oct 2023 (Presenter)
- “Reservoir Modeling with MRST; Open-source Sequence & Chronostratigraphy Toolkit; Wavelets for AI-assisted Seismic Interpretation” — MATLAB Energy Conference — Online — Jan 2020 (Speaker)
- “Using Set Column Values for Data Processing in Origin” — OriginLab Web Seminar — Online — Jan 2020 (Speaker)

- “Potential and Challenges of Applying AI/ML in Geoscience” — SEG–AAPG Workshop — Abu Dhabi, UAE — Jan 2020 (Speaker)
- “9th Annual Conference for the Development & Utilization of Geothermal Energy” — Conference — Beijing, China — Mar 2020 (Speaker)
- “Annual Meeting of Chinese Geosciences Union (CGU)” — CGU — Beijing, China — Oct 2019 (Presenter)

TEACHING & MENTORING

Institut National Polytechnique Félix Houphouët-Boigny (INP-HB), Yamoussoukro	Sep 2026–Present
Geophysics and AI for Earth systems; computational geoscience; supervision of student projects.	
Central South University	Jun 2024–May 2026
AI/ML applications in geophysics; reproducible workflows; mentoring student projects.	
École Internationale Tertiaire – NTIC (Abidjan, Côte d’Ivoire)	Sep 2015–May 2018
Geophysics & Physics (BTS Mines, Geology and Petroleum); Fluid Mechanics/Physics (Civil Engineering).	

PROFESSIONAL EXPERIENCE (INDUSTRY)

Geophysicist, Research & New Development Manager, International Business and Services Plus (IBS+), Abidjan, Côte d’Ivoire	Jun 2015–Feb 2018
Geophysicist Technician (Contract), Fugro Geoconsulting SAS, France	Jun 2017–Aug 2017
2D/3D ERT + seismic refraction for hydroelectric dam prospecting.	
Geophysicist Intern, BERGE (Geological & Environmental Research Office), Yamoussoukro, Côte d’Ivoire	Oct 2014–May 2015

SERVICE & PROFESSIONAL MEMBERSHIPS

- **Journal reviewer (verified on ORCID):** Engineering Applications of Artificial Intelligence (2 reviews); Journal of Computational Science (3); Journal of Applied Geophysics (1).
- **Technical Program Committee Member** — 4th International Conference on Intelligent Computing and Next Generation Networks (ICNGN 2025) — Singapore — Dec 2025
- **Session Chair** — SEG International Workshop on Gravity, Electrical & Electromagnetic Methods and Their Applications (GEM 2024) — Shenzhen, China — May 2024
- Society of Exploration Geophysicists (SEG) — Member (since 2023)
- International Association for Mathematical Geosciences (IAMG) — Member (since 2024)
- Association for the Advancement of Artificial Intelligence (AAAI) — Member (since 2024)

TECHNICAL SKILLS

- **Programming:** Python (expert); JavaScript/R (intermediate); C++ (basic).
- **Data & ML:** NumPy, Pandas, scikit-learn, TensorFlow/Keras, PyTorch; anomaly detection; forecasting & uncertainty diagnostics.
- **Software engineering:** API design, packaging & docs, pytest, GitHub Actions (CI), reproducibility-first workflows.
- **Geophysics & geospatial:** CSAMT/AMT/AFMT; ERT; inversion/interpretation; ArcGIS; Oasis montaj; Res2DInv; WingLink; Surfer; OriginLab.
- **Containers & environments:** Docker (basic), Jupyter.

LANGUAGES

- French — Native
- English — Professional working proficiency