Adriano Pereira Almeida

Computer scientist · Professor · Researcher

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SUMMARY

I hold a PhD (2026) and an MSc (2021) in Applied Computing from the National Institute for Space Research (INPE), Brazil, with an emphasis on Artificial Intelligence, and a BSc in Computing from Centro Universitário Estácio da Amazônia (2018).

My research addresses deep learning modeling applied to severe weather events, with an emphasis on precipitation and lightning nowcasting. In my master's, I used neural networks to forecast cloud-to-ground lightning from radar data in the Amazon. In my PhD, I developed deep learning models for rainfall and lightning nowcasting, and investigated heterogeneous data integration, operational evaluation, and generalization strategies for these models.

I have been programming since 2014 and have experience in software design and development, relational and non-relational databases, data engineering and data science, and in developing machine learning and deep learning models in high-performance computing environments. In industry, I have worked as a machine learning engineer and data scientist.

RESEARCH INTERESTS

Precipitation nowcasting · Lightning nowcasting · Artificial intelligence · Deep learning · Computer vision · Data engineering and data science · Software architecture and engineering · Reproducible benchmarks · Computing applied to atmospheric, space, and environmental sciences

EDUCATION

2021–2026 **PhD in Applied Computing**
National Institute for Space Research (INPE) · São José dos Campos, SP
Thesis: Deep Learning Models for Lightning and Precipitation Nowcasting: Heterogeneous Data Integration, Operational Evaluation, and Generalization Strategies
Advisor: Alan James Peixoto Calheiros · Scholarship: CNPq

2019–2021 **MSc in Applied Computing**
National Institute for Space Research (INPE) · São José dos Campos, SP
Dissertation: Uso de redes neurais para previsão de descargas elétricas nuvem-solo a partir de dados de radar: um estudo de caso na Amazônia
Advisor: Alan James Peixoto Calheiros · Scholarship: CAPES

2014–2018 **BSc in Computing**
Centro Universitário Estácio da Amazônia · Boa Vista, RR
Capstone project: Aplicando a técnica de fatoração de matriz para recomendação de filmes e o uso de métricas para mensurar a acurácia das predições das notas
Advisor: Jonas Henrique Mendonça

PROFESSIONAL EXPERIENCE

2026–present **Assistant Professor**
Mackenzie Presbyterian University
School of Computing and Informatics, Alphaville campus.

2025–present **Data Engineer**
AmazonFACE
Pipelines for processing and managing the program's scientific data.

2022–2024 **Machine Learning Engineer**
2RP Net

2022 **Data Scientist**
Climatempo

2019–2026 **Graduate research fellow (MSc and PhD)**
INPE
CAPES and CNPq scholarships.

2017–2019 **Fullstack Developer**
Roraima State Public Defender's Office

RESEARCH PROJECTS

2025–present **AI-based nowcasting of precipitating systems using their life-cycle characteristics**
Uses a 20-year precipitation tracking dataset to develop machine learning nowcasting algorithms (up to 6 hours ahead), focused on the Amazon Basin. It builds on pyForTraCC, an updated version of INPE's ForTraCC algorithm, and is aligned with WMO initiatives on AI for nowcasting in early warning systems.
Lead: Alan J. P. Calheiros · Funding: CNPq

2024–present **IDeepS: image and data classification via deep neural networks for multiple domains**
Investigates which deep neural network models work best for remote sensing, astrophysics, and health, across classification and segmentation tasks. It brings together INPE, IEAv, UNIFESP, UFSCar, and UNESP, running on the SDumont supercomputer (LNCC).
Lead: Valdivino A. de Santiago Júnior

2022 **WETS: Weather Translator System 2.0**
A decision-support application that anticipates crew allocation from a categorization of weather risk, built for the distribution companies of the CPFL Group.
Lead: Gilca Palma

PUBLICATIONS

JOURNAL ARTICLES

1. **Almeida, A. P.**; Barbosa, H. M. J.; Garcia, S. R.; Gagne, D. J.; Zhou, K.; Kubota, T.; Ushio, T.; Otsuka, S.; Pfreundschuh, S.; Calheiros, A. J. P. A Regional Benchmark for Deep Learning-Based Hourly Precipitation Nowcasting in Latin America. *IEEE Access*, v. 14, p. 38306–38331, 2026. doi.org/10.1109/ACCESS.2026.3670767
2. **Almeida, A. P.**; Morales, C. A.; Leal Neto, H. B.; Cintineo, J.; Calheiros, A. J. P. Very Short-Term CG Lightning Probability Forecasting in the Amazon Basin Using Deep Learning Models. *Artificial Intelligence for the Earth Systems*, v. 5, p. 1–59, 2026. doi.org/10.1175/AIES-D-25-0008.1
3. Cuadros, E. T.; **Almeida, A. P.**; Carlesso, F.; Pareja-Quispe, D.; Guarnieri, F. L.; Dal Lago, A.; Gargaglioni, S. R.; Vieira, L. E. A. Assessment of Daytime Sky Quality and Atmospheric Refractive Index (C_n^2) Analysis at Pico dos Dias Observatory. *The Astrophysical Journal Supplement Series*, v. 281, p. 24, 2025. doi.org/10.3847/1538-4365/ae0a2a
4. Vásquez P., I. L.; Zeri, M.; Sánchez P., C. A.; **Almeida, A. P.**; Pareja-Quispe, D.; Rejas Ayuga, J. G.; Calheiros, A. J. P. Integration of Soil Moisture and Meteorological Data Using Deep Learning for Flash Drought Detection in Northeastern Brazil. *Earth Systems and Environment*, v. 9, p. 1–22, 2025. doi.org/10.1007/s41748-025-00929-z
5. de Sousa Afonso, J. M.; Pareja-Quispe, D.; Aparco-Lara, J.; Ihadua, I. M. T. J.; **Almeida, A. P.**; Pedra, G. U.; Gaspar, A. M. L.; da Silva Caetano, M.; Lins, M. C. C.; Segunda, E. C. T.; Vasco, N. A. A. Regionalization of Precipitation and Identification of the Onset and Cessation of the Rainy Season in Angola Using Satellite-Based Precipitation Estimates. *Earth Systems and Environment*, v. 9, p. 1–25, 2025. doi.org/10.1007/s41748-025-00872-z
6. Leal, H. B.; Calheiros, A. J. P.; Barbosa, H. M. J.; **Almeida, A. P.**; Sanchez, A.; Vila, D. A.; Garcia, S. R.; Macau, E. E. N. Impact of Multi-Thresholds and Vector Correction for Tracking Precipitating Systems over the Amazon Basin. *Remote Sensing*, v. 14, p. 5408, 2022. doi.org/10.3390/rs14215408

BOOK CHAPTERS

1. Pereira, F. D.; Toda, A.; Oliveira, E. H. T.; Cristea, A. I.; Isotani, S.; Laranjeira, D.; **Almeida, A. P.**; Mendonça, J. Can We Use Gamification to Predict Students' Performance? A Case Study Supported by an Online Judge. *Lecture Notes in Computer Science*, Springer, p. 259–269, 2020. doi.org/10.1007/978-3-030-49663-0_30

2. Muralikrishna, A.; Vieira, L. E. A.; Santos, R. D. C.; **Almeida, A. P.** Total Solar Irradiance Forecasting with Keras Recurrent Neural Networks. *Lecture Notes in Computer Science*, Springer, v. 12253, p. 255–269, 2020. doi.org/10.1007/978-3-030-58814-4_18

CONFERENCE PAPERS

1. **Almeida, A. P.**; Calheiros, A. J. P.; Peña, C. A. S. A Comparative Study of Deep Learning Models for Nowcasting Precipitation over South America. *XXVIII Encontro Nacional de Modelagem Computacional (ENMC)*, 2025. doi.org/10.29327/1453544.1270192
2. **Almeida, A. P.**; Calheiros, A.; Albrecht, R.; Machado, L.; Santos, R.; Leal Neto, H. B.; Souza, F. A distribuição espacial das descargas elétricas na região central da Bacia Amazônica e o uso da árvore de decisão em dados de radar meteorológico para sua classificação. *Workshop de Computação Aplicada à Gestão do Meio Ambiente e Recursos Naturais (WCAMA)*, SBC, p. 91, 2020. doi.org/10.5753/wcama.2020.11023
3. Leal Neto, H. B.; Calheiros, A. J.; Santos, R.; Quiles, M.; Muralikrishna, A.; **Almeida, A. P.**; Souza, F. Aplicação de Redes Neurais Recorrentes em séries temporais de estações meteorológicas para imputação de dados: uma abordagem sobre micro-estações meteorológicas na região Oeste do Pará. *Workshop de Computação Aplicada à Gestão do Meio Ambiente e Recursos Naturais (WCAMA)*, SBC, p. 171, 2020. doi.org/10.5753/wcama.2020.11031
4. Souza, F.; Bertoti, G.; Santos, R.; Muralikrishna, A.; Carlos, F.; **Almeida, A. P.**; Leal Neto, H. B. PlantAI: Aplicativo de classificação e localização de plantas em risco de extinção na Mata Atlântica. *Workshop de Computação Aplicada à Gestão do Meio Ambiente e Recursos Naturais (WCAMA)*, SBC, p. 1, 2020. doi.org/10.5753/wcama.2020.11014
5. **Almeida, A. P.**; Calheiros, A. J. P.; Muralikrishna, A.; Souza, F. C.; Leal Neto, H. B. Um Modelo Baseado em Redes Neurais Recorrentes para Previsão da Densidade de Descargas Elétricas na Região Sul do Brasil. *XXIII Encontro Nacional de Modelagem Computacional (ENMC)*, Palmas, TO, p. 372–380, 2020.

EXTENDED ABSTRACTS

1. Muralikrishna, A.; Vieira, L. E. A.; Santos, R.; **Almeida, A. P.** A Solar Spectral Irradiance Prediction Workflow Using a Recurrent Neural Network in a Reproducible and Replicable Approach. *30th Astronomical Data Analysis Software and Systems (ADASS)*, ASP Conference Series, v. 532, p. 243, 2022.
2. Leal Neto, H. B.; **Almeida, A. P.**; Calheiros, A. J. P. As dificuldades no rastreio de tempestades com uso de refletividade radar a partir de técnicas de geoprocessamento: Um estudo de caso sobre a região Amazônica. *XXI Brazilian Symposium on Geoinformatics (GEOINFO)*, São José dos Campos, SP, p. 252–257, 2020.

◆ TEACHING

Courses

Mackenzie Presbyterian University

Algorithms and Programming I · Computer Science · 2026/2

Algorithms and Programming II · Computer Science · 2026/2

Systems Programming I · Information Systems · 2026/2

Introduction to Software Engineering · Information Systems · 2026/2

Software Architecture · Computer Science · 2026/2

Short courses and workshops

Introduction to Data Science and Machine Learning · 2020 · with F. C. Souza, F. M. Carlos

Introduction to Spatial Data Analysis · 2019 · with F. C. Souza, F. M. Carlos, H. B. Leal Neto

Introduction to Programming · 2018 · with A. A. C. Freire, J. H. Mendonça

Introduction to Competitive Programming with Python · 2018 · with A. A. C. Freire

Introduction to Programming with Python · 2017, 2018 · with A. A. C. Freire

Getting Started with Competitive Programming in Python · 2017

Applied Informatics · 2016 · with A. A. C. Freire

◆ JOURNAL REVIEWING

npj Climate and Atmospheric Science (since 2026); *IEEE Access* (since 2026); *Weather, Climate, and Society* (since 2025); *Earth Systems and Environment* (since 2025); *Revista Brasileira de Meteorologia* (since 2024).