Philipe Ambrozio Dias

Curriculum Vitae

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Education

2016–2020 **Doctor of Philosophy in Electrical and Computer Engineering**, *Marquette University*, Milwaukee, WI (USA).

2014–2015 **Master of Science in Electrical and Computer Engineering***, *Federal University of Technology (UTFPR)*, Curitiba (Brazil).

2013–2014 **Master of Science in Information Technology***, *Mannheim University of Applied Sciences (HS Mannheim)*, Mannheim (Germany).

2007–2013 **Bachelor of Engineering in Electronics Engineering**, *Federal University of Technology (UTFPR)*, Curitiba (Brazil).

* Double Masters Degree obtained as result of a partnership between both universities.

Research Experience

2022– present **R&D Associate in Machine Learning and Computer Vision**, Oak Ridge National Laboratory (ORNL).
- Design of AI-based workflows for automated analysis of satellite imagery at large-scales. Technical activities include deep learning model architecture design, training of large (foundation) models using high-performance computing (HPC) resources, as well as model deployment at large-scale to map structures of interest across entire countries. Technical leadership coordinating data curation, annotation, and evaluation protocols. Applications include building footprint extraction, building damage assessment, land-use/land-cover characterization from satellite imagery;
- Research on Generative AI for forecasting future patterns of land-use/land-cover;
- Participation on research proposals targeting funding agencies internal as well as external to ORNL.

2021– 2022 **Postdoctoral Research Associate in Machine Learning and Computer Vision**, Oak Ridge National Laboratory (ORNL).
- Investigation of domain adaptation, semi-supervised learning, object counting and uncertainty estimation techniques for analysis of remote sensing imagery;
- Research on scalable, explainable, and trustworthy AI methods for geospatial domains;

2016-2020 **Graduate Research Assistant** *Support from Department of Agriculture (USDA)*, Marquette University (USA).
- Application of deep learning techniques for automated quantification of multispecies fruit flowers from imagery;
- Research & Development of semi-automated tools for for image annotation, as well as refinement of segmentation masks and uncertainty estimation of outputs provided by deep neural networks;

Spring 2019 **Visiting Research Assistant (Erasmus+).** University of Genoa (Italy)
- Application of deep learning and uncertainty estimation techniques for automated Gaze Estimation from imagery capturing assisted living environments (healthcare-related).

Summer 2017	**Visiting Research Assistant.** University of Genoa (Italy)
	• Deep learning techniques for image segmentation towards smart environments for assisted living.
2013-2014	**Working Student.** *Partial support from* INEOS Köln GmbH, HS Mannheim (Germany).
	• Changes in the design of an In-Situ Microscope (ISM) and development of an image processing algorithm for quantification of filamentous bacteria in activated sludge plants.

Industry Experience

| 2009-2011 | **System Analyst.** Global Village Telecom (GVT), Curitiba - Brazil |

Honors & Awards

2024	**Director's Team Award for Research Accomplishments in the Excellence in Science and Technology category.** *UT-Battelle Awards (ORNL),* Oak Ridge, TN
2024	**Team Award for Research Accomplishments in the Excellence in Science and Technology category.** *UT-Battelle Awards (ORNL),* Oak Ridge, TN
2019	**Outstanding Research Assistant Award (EECE Department).** *Marquette University,* Milwaukee, TN
2018	**Forward Thinking "Jump Start" Award.** *Marquette University,* Milwaukee, TN
2016-2017	**Opus College of Engineering Research Leaders Fellowship.** *Marquette University,* Milwaukee, TN

Computer skills

C/C++, Python, MATLAB, Shell, JavaScript/HTML

PyTorch, Keras, TensorFlow, Caffe, Horovod

Linux, LaTeX, Git/GitLab, Docker, scikit-learn, OpenCV, GeoPandas, Slurm

Sample Codes: coviss.org/codes

Languages proficiency

Portuguese: Mother tongue (5/5)

English: Primary fluency (5/5)

Spanish: Professional (4/5)

Italian: Professional (3/5)

German: Professional (3/5)

Publications

• 763 citations, h-index=10, i10-index=10. Citation statistics are from Google Scholar (Jan/2025).

Book Chapters

| 2024 | Yang, H. L.; **Dias, P.A.**; Arndt, J.; Wohlgemuth, J.; Potnis, A.; Lunga, D. (2024).*Benchmarking and end-to-end considerations for GeoAI-enabled decision-making.* In Advances in Machine Learning and Image Analysis for GeoAI, pp. 93-114. Elsevier, 2024, doi: 10.1016/B978-0-44-319077-3.00011-0. |

2023
(Cited 2x)
Dias, P.A.; Kobayashi-Carvalhaes, T.; Walters, S.; Frazier, T.; Woody, C.; Guggilam, S.; Adams, D.; Potnis, A.; Lunga, D. *GeoAI for Humanitarian Assistance.*. In Handbook of Geospatial Artificial Intelligence, pp. 260-286. CRC Press, 2024, doi: 10.1201/978100330842313.

Journal Papers

2024
(Cited 1x)
Stipek, C.; Hauser, T.; Adams, D.; Epting, J.; Brelsford, C.; Moehl, J.; **Dias, P.**; Piburn, J; and Stewart, R.; *Inferring building height from footprint morphology data*. Nature Scientific Reports, 14(1), p.18651.

2023
(Cited 11x)
Her, P.; Manderle, L; **Dias, P.A.**; Medeiros, H.; Odone, F. *Uncertainty-Aware Gaze Tracking for Assisted Living Environments*. IEEE Transactions on Image Processing, vol. 32, pp. 2335-2347, 2023, doi: 10.1109/TIP.2023.3253253.

2022
(Cited 13x)
Dias, P.A.; Lunga, D.; Tian, Y.; Newsam, S.; Tsaris, A.; Hinkle, J. *Model Assumptions and Data Characteristics: impacts on Domain Adaptation in Building Segmentation*. IEEE Transactions on Geoscience and Remote Sensing, vol. 60, pp. 1-18, 2022, Art no. 5410118, doi: 10.1109/TGRS.2022.3175387.

2019
(Cited 145x)
Primpke, S.; **Dias, P.A.**; Gerdts, G. *Automated identification and quantification of microfibres and microplastics*. Analytical Methods, 11(16), pp. 2138-2147.

2018
(Cited 144x)
Dias, P.A.; Tabb, A.; Medeiros, H. *Multispecies Fruit Flower Detection Using a Refined Semantic Segmentation Network*. IEEE Robotics and Automation Letters, 3(4), pp.30033010.

2018
(Cited 255x)
Dias, P.A.; Tabb, A.; Medeiros, H. *Apple flower detection using deep convolutional networks*. Computers in Industry, 99, pp.17-28.

2016
(Cited 32x)
Dias, P.A.; Dunkel, T.; Fajado, D.A.; de Leon Gallegos, E.; Denecke, M.; Wiedemann, P.; Schneider, F.K; Suhr, H. *Image processing for identification and quantification of filamentous bacteria in in situ acquired images*. Biomedical Engineering OnLine, 15(1), pp.64.

2015
(Cited 10x)
Dunkel, T.; **Dias, P.A.**; Leon, E.; Tacke, V.; Schielke, A.; Hesse, T.; Sierra, D.A.F.; Suhr, H.; Wiedemann, P.; Denecke, M. *In situ Microscopy as a tool for the monitoring of filamentous bacteria: a case study in an industrial activated sludge system dominated by M. parvicella*. Journal of Water Science and Technology

Conference Papers

2024
Dias, P.; Tsaris, A.; Bowman, J.; Potnis, A.; Arndt, J.; Yang, H.L.; Lunga, D. *OReole-FM: successes and challenges toward billion-parameter foundation models for high-resolution satellite imagery* 32nd ACM International Conference on Advances in Geographic Information Systems (SIGSPATIAL 24) 2024, doi: 10.1145/3678717.3691292.

2024
Hänsch, R.; Arndt, J.; **Dias, P.**; Potnis, A.; Lunga, D.; Petrie, D.; Bacastow, T. *Introducing SpaceNet 9 - Cross-modal Satellite Imagery Registration for Natural Disaster Responses*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2024, pp. 234-238, doi: 10.1109/IGARSS53475.2024.10640611.

2024
(Cited 2x)
Arndt, J.; **Dias, P.**; Potnis, A.; Lunga, D. *Towards Diverse and Representative Global Pretraining Datasets for Remote Sensing Foundation Models*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2024, pp. 2723-2728, doi:10.1109/IGARSS53475.2024.10642466.

2024
Dias, P.; Arndt, J.; Urban, M.; Lunga, D. *Conditional Experts for Improve Building Damage Assessment Across Satellite Imagery View Angles*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2024, pp. 1741-1745, doi:10.1109/IGARSS53475.2024.10640461.

2024
(Cited 5x)
Tsaris, A., **Dias, P.**; Potnis, A.; Yin, J.; Wang, F.; Lunga, D. *Pretraining BillionScale Geospatial Foundational Models on Frontier*. IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW) 2024, pp. 1036-1046, doi:10.1109/IPDPSW63119.2024.00174

2023
(Cited 6x)
Dias, P.; Potnis, A.; Guggilam, S.; Yang, L.; Tsaris, A.; Medeiros, H.; Lunga, D. *An Agenda for Multimodal Foundation Models for Earth Observation*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2023, pp. 1237-1240, doi: 10.1109/IGARSS52108.2023.10282966

2023
(Cited 3x)
Urban, M.; Moehl, J.; **Dias, P.**, Tuccillo, J.; Reith, A.; Sims, K.; Walters, S.; Arndt, J.; Potnis, A.; Lunga, D. *Towards Rapid Response Updates of Populations at Risk*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2023, pp. 907-910, doi:10.1109/IGARSS52108.2023.10282319

2023
Potnis, A.; Lunga, D.; **Dias, P.**; Yang, L.; Arndt, J.; Bowman, J.; *Scaling Automatic Vector Data Alignment to Satellite Imagery*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2023, pp. 1676-1679, doi: 10.1109/IGARSS52108.2023.10282686

2023
(Cited 1x)
Potnis, A.; Lunga, D.; Sorokine, A.; **Dias, P.**; Yang, L.; Arndt, J.; Bowman, J.; Wohlgemuth, J. *Towards Geospatial Knowledge Graph Infused Neuro-Symbolic AI for Remote Sensing Scene Understanding*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2023, pp. 1400-1403, doi: 10.1109/IGARSS52108.2023.10281958

2022
(Cited 3x)
Dias, P.A.; Lunga, D. *Embedding Ethics and Trustworthiness for Sustainable AI in Earth Sciences: Where do we begin?"*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2022, pp. 4639-4642, doi: 10.1109/IGARSS46834.2022.9883030.

2022
(Cited 3x)
Lunga, D.; **Dias, P.A.** *Advancing Data Fusion in Earth Sciences*. IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2022, pp. 5077-5080. doi:10.1109/IGARSS46834.2022.9883176

2021
(Cited 1x)
Tsaris, A.; Hinkle, J.; Lunga, D.; **Dias, P.A.** *Distributed Training for High Resolution Images: A Domain and Spatial Decomposition Approach*. International Conference for High Performance Computing, Networking, Storage, and Analysis (SC21).

2021
(Cited 2x)
Her, P.; Manderle, L; **Dias, P.A.**; Medeiros, H.; Odone, F. *Keypoint-based gaze tracking*. International Conference on Pattern Recognition (ICPR), Lecture Notes in Computer Science, vol. 12662, pp.144-155. doi:10.1007/978-3-030-68790-8_12.

2021
Dias, P.A., Medeiros, H., Lunga, D., Singh, N., and Devarakonda, R. *Semi-automated Design of Artificial Intelligence Earth Systems Models*. DOE White Papers to Advance an Integrative Artificial Intelligence Framework for Earth System Predictability. Web. doi:10.2172/1769777

2020
(Cited 45x)
Dias, P.A.; Malafronte, D.; Medeiros, H.; Odone, F. *Gaze Estimation for Assisted Living Environments*. Winter Conference on Applications of Computer Vision (WACV).

2019 **Dias, P.A.**; Shen, Z.; Tabb, A.; Medeiros, H. *FreeLabel: A Publicly Available Annotation Tool based on*
(Cited 21x) *Freehand Traces*. Winter Conference on Applications of Computer Vision (WACV).

2018 **Dias, P.A.**; Medeiros, H. *Semantic segmentation refinement by Monte Carlo region growing of high*
(Cited 36x) *confidence detections.*. Asian Conference on Computer Vision (ACCV).

Events organized

06/2024 **Co-organizer of the "Geospatial Computer Vision and Machine Learning for LargeScale Earth Observation Data"**, *Tutorial at the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2024*.

01/2024 **Chair of the "1st Workshop on Computer Vision for Earth Observation (CV4EO) Applications"**, *Workshop at the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2024*.

Invited Talks/Panels

11/2024 **Invited talk to State of Tennessee's AI Advisory Council to talk on Artificial Intelligence for Disaster Relief Efforts**, *State of Tennessee Artificial Intelligence (AI) Advisory Council Meeting on November 20, 2024*

05/2024 **Invited speaker at the "Generative AI and GIScience" panel at the "Evaluating the Science of Geospatial AI" conference** , *Organized by Center for Geographic Analysis at Harvard University*.

02/2024 **Invited speaker at the "Large Language Models" panel at the SOS26 conference** , *Organized by the Association for High-Speed Computing with a program developed by Sandia National Laboratories, Oak Ridge National Laboratory, and the Swiss National Supercomputing Center*.

06/2023 **Invited speaker at the "AI Foundations" panel at the Trillion-Pixel GeoAI Challenge Workshop 2023**, *Organized by the Oak Ridge National Laboratory*.

07/2022 **Human-machine collaboration for reusable and scalable models for remote sensing imagery analysis**, *Manuscript presented at the ICML 2022 Workshop on Human-Machine Collaboration and Teaming*.

11/2021 **Addressing generalization and scalability challenges in satellite imagery analysis using NVIDIA GPUs and Deep Learning**, *Invited talk at the NVIDIA GPU Technology Conference (GTC)*, Featured in Route-fifty (former GCN)/ACM news.

10/2021 **Towards generalizable and scalable AI-methods for remote sensing image analysis**, *Invited talk (colloquium) at the Department of Electrical and Computer Engineering*, Marquette University.

07/2019 **Lecture on Image Segmentation Networks and Uncertainty Estimation**, *Part of "Deep Learning: a hands-on introduction" course organized by Machine Learning Genoa Center (MaLGa)*, University of Genoa.

12/2018 **Towards automated bloom intensity estimation: (un)supervised learning, datasets and annotation tool for fruit flower segmentation** , *Invited talk at webinar organized by the Agricultural Robotics and Automation technical committee*, IEEE Robotics and Automation Society.

03/2018   **(Un)supervised Learning for Fine Image Segmentation: Applications in Flower Detection and Activity of Daily Living Analysis**, *Invited talk (colloquium) at the Department of Electrical and Computer Engineering*, Marquette University

Invited Peer Reviews & Program Committees

Journals:

Biomedical Engineering OnLine (Springer Nature)

Computer and Electronics in Agriculture (Elsevier)

Biosystems Engineering (Elsevier)

IEEE Transactions on Pattern Analysis and Machine Intelligence

IEEE Robotics and Automation Letters (RA-L)

IEEE Transactions on Geoscience and Remote Sensing

IEEE Geoscience and Remote Sensing Letters

ACM Transactions on Spatial Algorithms and Systems

International Journal of Geographical Information Science (Taylor & Francis)

International Journal of Applied Earth Observation and Geoinformation (Elsevier)

IEEE Transactions on Agrifood Electronics

Conferences:

IROS 2018, 2019

ICSC 2019

ICRA 2019, 2020

WACV 2020

SMC 2021

IGARSS 2023, 2024

Funding agencies:

Reviewer of a project proposal in the field of remote sensing following an invitation by the Belgian Science Policy Office

Program Committees:

13th IEEE International Conference on Semantic Computing (IEEE ICSC 2019)

CARE2020 Workshop at International Conference on Pattern Recognition (ICPR)

KDD2021 Workshop on Data-driven Humanitarian Mapping

GeoSearch2021 International Workshop on Searching and Mining Large Collections of Geospatial Data at ACM SIGSPATIAL Conference

KDD2022 Workshop on Data-driven Humanitarian Mapping

EarthVision 2022 Workshop in conjunction with the Computer Vision and Pattern Recognition (CVPR) 2022 Conference

Institutional Services, Mentorships & Assistantships (TA)

2023-2024   **Geospatial Sciences & Human Security Division representative in Postdoctoral Engagement Committee (PEC) at Oak Ridge National Laboratory (ORNL)**

- PEC members serve as points of contact within their divisions for questions and discussion and support ORNL in postdoc engagement, program evaluation, and hiring process advisement

Summer 2024	**Mentorship of Graduate Student from the GRO Program at ORNL**.
	• 12-week mentoring of an intern student selected through the Graduate Research at ORNL (GRO) Internship Program. Student was mentored on topics of generative Artificial Intelligence (AI), distributed computing, and forecasting of geospatial data (land cover).
Summer 2021	**Mentorship of summer intern from the NNSA MSI Program** at ORNL
	• Two-month mentoring of an intern student selected through the National Nuclear Security Administration Minority Serving Institutions (NNSA MSI) Internship Program. Student was mentored on topics of basic machine-learning/AI, and literature review on eXplainable AI (XAI).
Summer/Fall 2018	**Mentoring of undergraduate student**, *Computer Vision and Sensing Systems (COVISS) Lab*, Marquette University.
	• Guided undergraduate student for development of a user-interface for an image annotation tool.
Fall 2018	**Linear Systems (TA), Digital Circuits Lab (TA)**, Marquette University.
Spring 2018	**Digital Electronics (TA), Algorithms (TA)**, Marquette University.

Professional Memberships

2018-present	**Institute of Electrical and Electronics Engineers (IEEE)**, *Professional Member*.
2021-present	**Association for Computing Machinery (ACM)**, *Professional Member*.

References

Dr. Dalton Lunga, *Oak Ridge National Laboratory*, Geospatial Science and Human Security Division (GSHS), GeoAI group leader.
Supervisor. Contact: lungadd@ornl.gov; +1 (865) 574-8444

Dr. Henry Medeiros, *Marquette University*, Department of Electrical and Computer Engineering (EECE).
PhD Supervisor. Contact: henry.medeiros@marquette.edu; +1 (414) 288-7080

Dr. Francesca Odone, *University of Genoa*, Machine Learning Genoa Center (MaLGa). Collaborator and co-advisor for PhD (Erasmus+ period at the University of Genoa). Contact: francesca.odone@unige.it; +39 010 353 6667

Dr. Amy Tabb, *U.S. Department of Agriculture (USDA)*, Research Agricultural Engineer. Collaborator/co-advisor for PhD. Contact: Amy.Tabb@ars.usda.gov; +1 (304) 725-3451 ext. 386

Dr. Hajo Suhr, *Mannheim University of Applied Sciences*, Institute for Digital Technique. Master's Thesis Supervisor. Contact: h.suhr@hs-mannheim.de; +49 0621-292-6557