MARC RUBWURM

Assistant Professor at Wageningen University, Netherlands

Curriculum Vitae

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Positions - Overview

2023 - today Assistant Professor (Tenure Track) at Wageningen University, Netherlands Postdoc at École Polytechnique Fédérale de Lausanne (EPFL), Switzerland 2021 - 20232018 - 2022 Ph.D. Studies at Technical University of Munich (TUM), Germany 2011 - 2018 Geodesy and Geoinformation Studies at TUM (B.Sc; M.Sc.)

Academic Profiles & Links

Twitter/X twitter.com/MarcCoru Bluesky @marccoru.bsky.social

scholar.google.com/citations?user=MfGMG9wAAAAJ Google Scholar semanticscholar.org/author/Marc-Rußwurm/35469144 Semantic Scholar

> scival.com/overview/summary?uri=Customer/325017/Researcher/16873697 Scival

Recent Key Activities and Achievements

outstanding publication

The paper Geographic Location Encoding with Spherical Harmonics and Sinusoidal Representation Networks was acknowledged as spotlight (top 5%) at the International Conference of Learning Representations 2024 (ICLR)

workshop organization

I was the lead-organizer of the second Machine Learning for Remote Sensing (ML4RS) workshop at ICLR 2024 that attracted 72 paper submissions and raised 10k EUR in industry sponsoring that enabled travel support, paper and poster awards at the conference.

proposal coordination

I coordinated a MSCA Doctoral Network (HORIZON-MSCA-2024-DN-01) proposal titled Marine Litter Network (MLN) that involves 15 institutions across 13 European countries.

Academic Career

Academic Positions and Education

Sept '23 - today Assistant Professor

Wageningen University

Tenure Track Assistant Professor in Machine Learning and Remote Sensing: Research Interests: Time Series, Domain Shift, Transfer Learning, Crop Type Mapping, Marine Debris Detection

Sept '21 - '23 Postdoctoral Researcher

École polytechnique fédérale de Lausanne Environmental Computational Science and Earth Observation Laboratory: Research: Machine Learning and Earth Observation; Domain Shift and Transfer Learning. Self-supervised representation learning on globally distributed data.

Technical University of Munich 2018 – Feb 2022

Chair of Remote Sensing Technology:

Thesis: Data-driven Feature Learning with Discriminative Models for Satellite Time Series Ph.D. defense (23rd of Februrary 2022)

2015-June 2018 Technical University of Munich

Dr.-Ing. (Ph.D.)

Master of Science

Geodesy and Geoinformation (M.Sc): Machine Learning, Computer Vision, Deep Learning, Earth Observation, Remote Sensing, Photogrammetry. Thesis: Multi-temporal Land Cover Classification with Recurrent-Convolutional

Neural Networks

Cooperation: Bavarian Ministry of Food, Agriculture and Forestry (StMELF).

2011-2015

Technical University of Munich

Bachelor of Science

Geodesy and Geoinformation (B.Sc): Photogrammetry, Remote Sensing, Surveying, Cartography, Geo-informatics, Gravity Science, GNSS Science, and Land Management.

Thesis: Tri-ocular Image Rectfification and Photogrammetric Reconstruction

Research Stays and Academic Visits

Oct 2024

Visiting Scholar Focus Period 2024

Linköping, Sweden

3-week research stay at ELLIT Focus Period 2024 on Machine Learning for Climate Science. Seminar Talk titled Global Geographic Location Encoding with Implicit Neural (Geo)Representations

Visiting Researcher Palo Alto, USA Jan-Mar '20

Stanford University (Visit)

Lobell Lab and Sustainability and Al Lab

Few-Shot Meta Learning for the Remote Sensing context. Research received Best Paper Award at Earthvision 2020 worshop at CVPR

May '19 Short Visit OATML Oxford, UK

Oxford Applied Machine Learning Group (Visit) Visit (one-week). Participation in ESA project:

Multi-image super-resolution on Satellite Data. Presentation about Machine Learning and Earth Observation.

Visiting Researcher Vannes, France Oct '18-Feb '19

IRISA Institute (Visit)

Environment Observation with Complex Imagery:

Research stay. Early classifification of time series. Multi-objective optimization (optimize accuracy and earliness).

July-Aug 2018 Participant—Frontier Developments Lab

University of Oxford & European Space Agency

Kellogg College in Oxford, UK & ESRIN Φ-lab, Frascati near Rome, Italy. Deep multi-resolution satellite data-fusion for disaster relief. The Frontier Developments Lab is an research and commercial accelerator composed of teams with machine learning and Earth observation background.

Visiting Researcher June 2018

European Space Agency

European Space Research Institute (ESRIN) at Φlab

Presentation of multi-temporal EO research (link). Setup of deep learning infrastructure and framework outlines for the Frontier Developments Lab.

Invited Talks

Invited Talks - in-person

2024

Global Geographic Location Encoding with Implicit Neural (Geo)Representations. ELLIT Focus Period 2024, Linköping, Sweden. 2024-10-15

Global Geographic Location Encoding with Implicit Neural (Geo)Representations, Invited Speaker Research Visit at La Universidad Pública de Navarra, Spain. 2024-05-16.

Machine Learning Models across Geographies. Invited Speaker Geodätisches Kolloquium, Bonn, Germany. 2024-01-11

2023 Early Classification and Transfer Learning Challenges in Large-scale Crop Type Mapping. Time Series & Transfer Learning Workshop, Huawei Paris. Huawei Paris, France. 2023-10-19

> Marine debris detection with Sentinel-2 and Deep Segmentation Models. Visit Geoforschungszentrum GFZ Potsdam. 2023-05-17

> Learning from Earth Observation Tasks, Wageningen University. 2023-01-13. Interview Talk Assistant Professor

2022 Learning from Earth Observation Tasks. Invited talk LIU Linköping, Sweden. 2022-06-30

Invited Talks - online

- 2023 Meta-Learning across different geographies. Invited speaker ImageCLEF -GeolifeCLEF. 2023-09-19
- 2022 Meta-learning data-efficient Machine Learning Models for Diverse Earth Observation Problems. ESA ECMWF Workshop 2022.
- 2021 Data-Driven Vegetation Modeling and Understanding Representation Shift at Lastig Seminar Deep Learning for Earth Sciences organized by Loic Landrieu, IGN France

Early Classification for Agricultural Monitoring at ANR Seminar organized by Romain Tavenard, Univ Rennes 2

Podcast Inverviews

2024 "Meta-learning with Meteor" in Satellite Image Deep Learning Podcast by Robin Cole. YouTube

Scientific Leadership Positions

Research Community Engagement

Peer Review

Transactions on Geoscience and Remote Sensing (TGRS); Elsevier Remote Sensing of Environment (RSE); Geoscience and Remote Sensing Letters (GRSL): International Conference on Computer Vision (ICCV): Neural Information Processing Systems (NeurIPS):

Conference Program Committees/Reviewing EarthVision Workshop at CVPR (since 2021); MAChine Learning for EArth ObservatioN (MACLEAN) workshop at ECML/PKDD (since 2019); Machine Learning for Remote Sensing Workshops at ICLR (2023-2025); ISPRS Geospatial Week (2025); ESA-NASA International Workshop on Al Foundation Model for Earth Observation (2025)

Scientific Working Groups/Committees

International Scociety of Photogrammetry and Remote Sensing (ISPRS) Working Group II/5 Temporal Geospatial Data Understanding (link); International Associateion for Patter Recognition (IAPR) Thematic Committee 7 Remote Sensing & Mapping (link)

Grant/Stipend Reviewing Committees Deutscher Akademischer Austrausch Dienst (DAAD). IFI Program -Internationale Forschungsaufenthalte für Informatikerinnen & Informatiker (2025-2029); Deutsche Forschungsgemeinschaft (DFG)

PhD Examination Commettees

PhD Proposal Review Enzo Campomanes - ITC Twente (2024); Ph.D. Thesis Ámbar Pérez-García - University of Las Palmas de Gran Canaria (2024); PhD Upgrade Viva Weibin Chen - University College London (2025); PhD Thesis Maria Yli-Heikkilä - University of Helsinki (2025)

Awards

Personal Research Awards

June 2020 Best paper - Earthvision Workshop at Computer Vision and Pattern Recognition Workshop (2020) (link)

Oct. 2017 Best presentation - NVIDIA Deep Learning Workshop at Leibnitz Supercomputing Center (LRZ)

July 2017 Best paper - Earthvision Workshop at Computer Vision and Pattern Recognition Workshop (2017) (link)

Sept. 2016 Best presentation - Polish-National Remote Sensing Conference (link)

Research Award Nomination - Finalist

Oct. 2020 Two Nominations at IGARSS 2020 Best Student Paper Award (final 10 out if 250 submissions) with two papers: (Wang et al., 2020) ' and (Rußwurm et al., 2020)

> Nomination finalist for the Al-Newcomer award of German Informatics Society (GI) and the Federal Ministry of Education and Research (BMBF) in the category of natural sciences

Teaching

Course Coordination

2025 - ongoing

Nov. 2019

Deep Learning (GRS-34806). Co-coordination with Prof. loannis Athanasiadis. Professors Kootstra, Dick Ridder, Riccardo da Silva Torres involved in lecturing the course.

Lectures (recurring yearly)

2024 - ongoing

WU - Deep Learning (GRS-34806) - Lectures on Regularization in Deep Learning and Computer Vision Segmentation Models

WU - Machine Learning (FTE-35306) - Lecture on Random Forests and Decision Trees. (Youtube Video Recording)

2024 - ongoing (WU)

WU Advanced Earth Observation (GRS-32306) Lecture on Remote Sensing for Marine Applications. (Youtube Video Recording)

WU - Remote Sensing (GRS-20306) - Lecture on Principal Component Analysis

2022-2023

EPFL - Spatial Modeling for Earth Observation (EPFL ENV-408) - Lecture on Linear Regression for Environmental Science

Guest Lectures

2023

Mila/McGill Montréal, Canada. "Mapping crop type at large scale in Europe". Guest Lecture COMP767 CS/Mila/McGill by invitation from Prof. Rolnick (2023-02-15)

2022

University of Bonn, Germany. "Interpretable Machine Learning Examples in Marine Debris Detection and Crop Type Mapping". Invitation by Prof. Roscher (2022-10-19)

Exercises & Practicals

WU Machine Learning (FTE-35306) - Exercise on Random Forests and **Decision Trees**

2022-2023 (EPFL)

Image processing for Earth observation (EPFL ENV-540) - Exercises on Deep Learning for Remote Sensing (2023)

2018 (TUM)

Excercise Image understanding. Introduction to Deep Learning. TU Munich. Master level Geodesy and Geoinformation.

Project-based Learning

2024 - ongoing

WU - Deep Learning (GRS-34806) - I supervise two paper-reading days on ResNet and Vision Transformers, respectively. Students independently read the papers, submit questions with solutions on the paper to wooclap and we answer and discuss the questions together.

2025 - ongoing (WU)

WU Advanced Earth Observation (GRS-32306) 2-week research project on Sarghassum mapping. I pose an open question to students to investigate sargassum algae blooms, identify a research question (e.g., increase of quantity with climate factors?) and guide them to writing a 4-page research paper on their results.

Workshops, Tutorials & Seminar Talks

SSL4EO Summer School

Lecture on Deep Location Encoders and self-supervised learning on geographic data(workshop) (video)

IGARSS 2024

Time Series Tutorial: Understanding Dynamics with Advanced Time-Series Processing Techniques with Charlotte Pelletier, Dainius Masiliūnas, and Jan Verbesselt (link)

IGARSS 2023

Time Series lecture in the Tutorial for Machine Learning for Remote Sensing Tutorial with Ribana Roscher, Ronny Hänsch, Claudio Persello

ISPRS Congress 2022

Deep Learning for Satellite Time Series (Tutorial Session with Prof. Charlotte Pelletier)

Universal Teachning Qualification (UTQ) Courses

Oct 2025 (scheduled)

UTQ Design Course - Wageningen University UTQ Teaching Course - Wageningen University

UTQ Assess Course - Wageningen University

May 2025 (scheduled) Jan 2025

Sept 2024

UTQ Supervise Course - Wageningen University

University Teaching Qualification (UTQ) courses in the Netherlands are designed to prepare academic staff for effective teaching at higher education institutions and are part of the tenure track requirements. Each course requires 2-3 days in presence together with 1 day (8h) preparation.

List of Publications

Dissertation

2022

Rußwurm, M. (2022). Data-Driven Feature Learning with Discriminative Models for Satellite Time Series (Doctoral dissertation, Technische Universität München). Doctoral Defense on February 23rd 2022.

Book Chapter

2021

Rußwurm, M., & Körner, M. (2021). Recurrent Neural Networks and the Temporal Component, Deep Learning for the Earth Sciences. Editors Gustau Camp-Valls, Xiaoxiang Zhu, Devis Tuia.

Journal Articles

2025 (in review)

Kraft, B., Nelson, J. A., Walther, S., Gans, F., Weber, U., Duveiller, G., Reichstein, M., Zhang, W., Rußwurm, M., Tuia, D., Körner, M., Jung, M. On the Added Value of Sequential Deep Learning for Upscaling of Evapotranspiration

2025 (in prep.)

van Dalen, J., Asano, Y., Rußwurm, M.. SAMSelect: An Automated Spectral Index Search for Marine Debris using Segment-Anything

2024

Roscher, R., Rußwurm, M., Gevaert, C., Kampffmeyer, M., Dos Santos, J. A., Vakalopoulou, M., Hänsch, R., et al. Better, Not Just More: Data-centric Machine Learning for Earth Observation. IEEE Geoscience and Remote Sensing Magazine (2024).

Gabeff, V., Rußwurm, M., Tuia, D., Mathis, A. WildCLIP: Scene and Animal Attribute Retrieval from Camera Trap Data with Domain-adapted Vision-Language Models. International Journal of Computer Vision

Tollenaar, V., Zekollari, H., Pattyn, F., Rußwurm, M., Kellenberger, B., Lhermitte, S., Izeboud, M., Tuia, D., 2024. Where the White Continent is Blue: Deep Learning Locates Bare Ice in Antarctica. Geophysical Research Letters, 51(3)

Nguyen, T. A., Rußwurm, M., Lenczner, G., Tuia, D. Multi-temporal Forest Monitoring in the Swiss Alps with Knowledge-guided Deep Learning. Remote Sensing of Environment

Pisl, J., Rußwurm, M., Hughes, L., Lenczner, G., See, L., Wegner, J. D., Tuia, D. Mapping Drivers of Tropical Forest Loss with Satellite Image Time Series and Machine Learning. Environmental Research Letters

Rußwurm, M., Wang, S., Kellenberger, B., Roscher, R., Tuia, D. (2024). Meta-learning to address diverse Earth Observation Problems across Resolutions. Nature Communications Earth & Environment

2023

Rußwurm, M., Venkatesa, S. J., Tuia, D. (2023). Large-scale Detection of Marine Debris in Coastal Areas with Sentinel-2. Cell Iscience 26(12).

Rußwurm, M., Courty, N., Emonet, R., Lefèvre, S., Tuia, D., & Tavenard, R. (2023). End-to-end learned Early Classification of Time Series for in-season Crop Type Mapping. ISPRS Journal of Photogrammetry and Remote Sensing, 196, 445-456.

Frank, C., Rußwurm, M., Fluixa-Sanmartin, J., & Tuia, D. (2023). Short-term Runoff Forecasting in an Alpine Catchment with a Long Short-term Memory Neural Network. Frontiers in Water, 5, 1126310.

2020

Rußwurm, M., Körner, M., (2020). Self-attention for raw Optical Satellite Time Series Classification. ISPRS Journal of Photogrammetry and Remote Sensing, 169:421 - 435.

Tavenard, R., Faouzi, J., Vandewiele, G., Divo, F., Androz, G., Holtz, C., Payne, M., Yurchak, R., Rußwurm, M., Kolar, K., Woods, E., 2020. Tslearn, a Machine Learning Toolkit for Time Series Data. Journal of Machine Learning Research, 21(118), pp.1-6.

- 2018 Rußwurm, M., Körner, M.. Multi-Temporal Land Cover Classification with Sequential Recurrent Encoders, ISPRS International Journal of Geo-Information, 2018.
- 2015 Rußwurm, M., Moore, A.. "Visualising the project landscape": A Spatialisation describing Workload Attributes as Terrain, In Environmental Earth Sciences 2015, volume 74, pp. 7159-7172.

Machine Learning Conferences

- 2025 Klemmer, K., Rolf, E., Robinson, C., Mackey, L., Rußwurm, M. SatCLIP: Global, General-Purpose Location Embeddings with Satellite Imagery. To appear In Proceedings of the AAAI Conference on Artificial Intelligence
- 2024 Rußwurm, M., Klemmer, K., Rolf, E., Zbinden, R., Tuia, D. Geographic Location Encoding with Spherical Harmonics and Sinusoidal Representation Networks (2024). International Conference on Learning Representations. ICLR Spotlight paper (top 5%)
- 2022 Drees, L., Weber, I., Rußwurm, M., & Roscher, R. (2022, September). Time Dependent Image Generation of Plants from incomplete Sequences with CNN-Transformer. In DAGM German Conference on Pattern Recognition (pp. 495-510). Cham: Springer International Publishing.
- 2021 Kondmann, L., Toker, A., Rußwurm, M., et al., (2021). DENETHOR: The DynamicEarthNET dataset for Harmonized, inter-Operable, analysis-Ready, daily crop monitoring from space. In Thirty-fifth Conference on Neural Information Processing Systems Datasets and Benchmarks Track (Round 2).
- 2019 Bischke, B., Fil. J., Pelich, R., Rudner, T. G. J., Rußwurm, M., Kopačková, V., Biliński, P. Multi³net: Segmenting flooded Buildings via Fusion of Multiresolution, Multisensor, and Multitemporal Satellite Imagery. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 33, No. 01, pp. 702-709).

Computer Vision Workshops - peer-reviewed, with proceedings

- 2023 Gabeff, V. A. G., Russwurm, M., Tuia, D., & Mathis, A. (2023, June). Scene and Animal Attributes Retrieval from Camera Trap Data with Domain-adapted Language-Vision Models. In Computer Vision and Pattern Recognition (CVPR) Workshops.
- 2020 Rußwurm, M., Wang, S., Körner, M., and Lobell, D. (2020). Meta-learning for Few-shot Land Cover Classification. In 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), pages 788-796. EarthVision 2020 Best Paper Award.
- 2017 Rußwurm, M. & Körner, M. Temporal Vegetation Modelling using Long Short-Term Memory Networks for Crop Identification from Medium-Resolution Multi-Spectral Satellite Images, In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops 2017. (best paper award)

Machine Learning Workshops - peer-reviewed, non-archival

- 2024 Claire, R., Weynants, M., Benson, V., Carvalhais, N., Rußwurm M., and Reichstein, M. Spatially far, Ecologically close: Evaluating Extrapolation on Vegetation Forecasting Models. In 2nd Machine Learning for Remote Sensing Workshop at ICLR 2024.
- 2023 Rußwurm, M., Gül, D., & Tuia, D. (2023, April). Improved Marine Debris Detection in Satellite Imagery with automatic Refinement of Coarse Hand Annotations. In 1st Machine Learning for Remote Sensing Workshop at ICLR 2023.
- 2022 Rußwurm, M., & Tuia, D. (2022, November). Instance Norm improves

Meta-learning in Class-imbalanced Land Cover Classification. In 36th Conference on Neural Information Processing Systems.

- 2019 Rußwurm, M., Lefèvre, S., & Körner, M. (2019, June). Breizhcrops: A Satellite Time Series Dataset for Crop Type Identification. In Proceedings of the International Conference on Machine Learning Time Series Workshop.
- 2019 Rußwurm, M., & Körner, M. (2018). Convolutional LSTMs for cloud-robust Segmentation of Remote Sensing Imagery. NeurIPS 2018 Spatiotemporal Workshop.
- 2018 Rudner, T. G., Rußwurm, M., Fil, J., Pelich, R., Bischke, B., Kopacková, V., & Bilinski, P. (2018, December). Rapid Computer vision-aided Disaster Response via Fusion of Multiresolution, Multisensor, and Multitemporal Satellite Imagery. In Proceedings of the First Workshop on Al for Social Good. Neural Information Processing Systems (NIPS-2018), Montreal, (pp. 3-8).

Conference Proceedings - Environmental Science

2023 Antropov, O., Molinier, M., Kuzu, R.S., Hughes, L., Rußwurm, M., Tuia, D., Dumitru, C.O., Ge, S., Saha, S. and Zhu, X.X., 2023, July. Semi-Supervised Deep Learning Representations in Earth Observation Based Forest Management. In IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium (pp. 650-653). IEEE.

> Chevalley, A., Tomoiagă, C., Detyniecki, M., Rußwurm, M., & Tuia, D. (2023, July). Improving Few-Shot Object Detection with Object Part Proposals. In IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium (pp. 6502-6505). IEEE.

> Pisl, J., Hughes, L. H., Rußwurm, M., & Tuia, D. (2023, July). Classification of Tropical Deforestation Drivers with Machine Learning and Satellite Image Time Series. In IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium (pp. 911-914). IEEE.

> Rußwurm, M., Hughes, L. H., Pasquali, G., Dumitru, C. O., & Tuia, D. (2023, July). Detection of Settlements in Tanzania and Mozambique by many regional Few-shot Models. In IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium (pp. 522-525). IEEE.

- 2022 Rußwurm, M., Wang, S., & Tuia, D. (2022, July). Humans are poor few-shot Classifiers for Sentinel-2 Land Cover. In IGARSS 2022-2022 IEEE International Geoscience and Remote Sensing Symposium (pp. 4859-4862).
- 2021 Mifdal, J., Carmo R., Rußwurm M. (2021). Towards detecting Floating Objects on a global scale with Learned Spatial Features using Sentinel 2. ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci., V-3-2021, 285-293, 2021, 169:421 - 435.

Ansari, H., Rußwurm, M., Ali, M., Montazeri, S., Parizzi, A., & Zhu, X. X. (2021, July). InSAR Displacement Time Series Mining: A Machine Learning Approach. In 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS (pp. 3301-3304). IEEE.

Carmo, R., Mifdal, J., & Rußwurm, M. (2021, September). Detecting Macro Floating Objects on Coastal Water Bodies using Sentinel-2 Data. In OCEANS 2021: San Diego-Porto (pp. 1-7). IEEE.

2020 Rußwurm, M., Pelletier, C., Zollner, M., Lefèvre, S., and Körner, M. (2020). Breizhcrops: A Time Series Dataset for Crop Type Mapping. ISPRS -International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLIII-B2-2020:1545-1551.

> Rußwurm, M., Ali, M., Zhu, X. X., Gal, Y., and Körner, M. (2020). Model and Data Uncertainty for Satellite Time Series Forecasting with Deep Recurrent Models. In IGARSS 2020 - 2020 IEEE International Geoscience and Remote Sensing Symposium, pages 7025–7028. Nominated best Student Paper IGARSS 2020.

> Wang, S., Rußwurm, M., Körner, M., and Lobell, D. (2020). Meta-learning for Few-shot Time Series Classification. In 2020 IEEE International Geoscience and Remote Sensing Symposium, IGARSS 2020. IEEE. Nominated best Student Paper IGARSS 2020.

2019 Coca-Castro, A., Rußwurm, M., Reymondin, L., & Mulligan, M. (2019, July). Sequential Recurrent Encoders for Land Cover Mapping in the Brazilian Amazon using Modis Imagery and Auxiliary Datasets. In IGARSS 2019-2019 IEEE International Geoscience and Remote Sensing Symposium (pp. 9843-9846). IEEE.

2017 Rußwurm, M. & Körner, M. Multitemporal Crop Identification from Medium-Resolution Multi-Spectral Satellite Images based on Long Short-Term Memory Neural Networks, International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences (ISPRS), 2017, volume XLII-1/W1, pp. 551-558.