Marc Rußwurm

Assistant Professor in Machine Learning for Remote Sensing

Abstract

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CV updated 17. September 2024

2023 – today Tenure Track Assistant Professor at Wageningen University, Netherlands

2021 – 2023 Postdoctral Researcher at EPFL, Switzerland

2018 – 2022 Ph.D. Studies at TU Munich, Germany

2011 – 2018 Geodesy and Geoinformation Studies at TU Munich (B.Sc; M.Sc.)

Contact & Metrics

web marcrusswurm.com

Twitter twitter.com/MarcCoru

Google Scholar scholar.google.com/citations?user=MfGMG9wAAAAJ

Research Gate researchgate.net/profile/Marc-Russwurm

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

Research Experience & Institutions

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.

Jan–Mar '20 Visiting Researcher Palo Alto, USA

Stanford University (Visit)

Lobell Lab and Sustainability and AI 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.

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

IRISA Institute (Visit)

Environment Observation with Complex Imagery:
Research stay. Early classifification of time series. Multi-objective optimization (optimize accuracy and earliness).

2018 - 2021 Research Associate and Ph.D. Candidate

Technical University of Munich

Chair of Remote Sensing Technology:
Research fields: Multi-temporal Earth observation, machine learning and computer vision. Methodical work related to methods of natural language processing and applied to vegetation monitoring for Earth observation.

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.

2015–2018 Student Research Assistant

Technical University of Munich

Chair of Remote Sensing Technology:
Tutor 3rd MSc. Semester: Image Understanding III.

Education

2018 – Feb 2022 Technical University of Munich

Dr.-Ing. (Ph.D.)

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

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*

Scientific Involvement

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);

Program Committees

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 (2023-2024)

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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; Deutsche Forschungsgemeinschaft (DFG)

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)

Nominations

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)

Nov. 2019 — Nomination finalist for the AI-Newcomer award of German Informatics Society (GI) and the Federal Ministry of Education and Research (BMBF) in the category of natural sciences

Grants

2023-2025 — Co-PI Swiss Data Science Center (SDSC) proposal: AI for Detecting Ocean Plastic Pollution with Tracking (ADOPT)

Stipends, mobility, compute Grants

2024-2025 — NWO Small Compute Grant. SURF HPC Cluster. EINF-10479 OranjeSatCLIP.

March 2020 — DAAD-IFI Stipend for Research Stay at Lobell Lab, Stanford University

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June. 2019 — Travel Grants ICML Workshops on *AI for Social Good* and *Time Series*

May. 2019 — Google Education Credits - 5k$ in Google Credits for Crop Type Mapping

June 2017 — Travel grant - of International Society for Photogrammetry and Remote Sensing (ISPRS) (link)

Teaching - Courses and Lectures

Lectures & Exercises — WU Deep Learning (GRS-34806) - Lectures on Regularization in Deep Learning and Segmentation Models (2024)

WU Machine Learning (FTE-35306) - Lecture and Exercises on Random Forests and Decision Trees

WU Advanced Earth Observation (GRS-32306) - Lecture and Exercises on Remote Sensing within Marine Applications (2024)

Spatial Modeling for Earth Observation (EPFL ENV-408) - Lecture on Linear Regression for Environmental Science (2023)

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

Teaching - 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)

advised students — Dilge Gül (Master Thesis); Julia Wälti (Semester Project); Sushen Jilla Venkatesa (Semester Project); Laura Pasero (Master Thesis); Arthur Chevalley (Semester Project); Corinna Frank (Master Thesis); Max Zollner (Semester Project); Jennifer Kriese (Semester Project)

2018 TU Munich. Master level Geodesy and Geoinformation. Excercise Image understanding. Introduction to Deep Learning.

Doctoral Candidates

Doctoral Candidates

Vishal Nedungadi. Started 2024. Distribution Shifts in Remote Sensing & Agriculture advised with Ioannis Athanasiadis and funded by AgrifoodTEF

Claire Robin. Started 2024. Machine Learning Methods for Vegetation Dynamics Projection at High Resolution. Joint Advision with Markus Reichstein, Nuno Carvalhais (Max Plank Insitute for Biochemistry) and Kirsten de Beurs (WU-GRS).

Master Students

current (2024/2025)

Gabriele Tijunaityte: Ïdentifying and Analysing Double-Acquisions of PlanetScope and Sentinel-2 for Marine Debris Detection for subsequent Drift Modeling". Advised with Emanuele Dalsasso. Starting Sept 2nd

Milou Maathuis: Ëxploring the potential of high-resolution and hyper-spectral Satellite Imagery for River Plastic Mappingädvised with Emmerik, Tim van and Mathias Bochow. Starting Oct 28

Wessel Eshuis: "Deep Learning AI Models for Crop Type Mapping with Sentinel-2". advised with Dal Lago, Paolo. Starting Sept 2nd.

Takayuki Ishikawa: Ëvaluating the Impact of Deep Foundation models on Forest Inventoryädvised with Bonannella, Carmelo. Starting September 2nd.

Levien van Krieken: Can a Satellite-Geoguesser playing Neural Network predict cancer risk?ädvised with Bruin, Sytze de. Starting Sept 2nd.

former

2024 (WUR) Joost van Dalen. Extending the Segment Anything Model (SAM) for Marine Debris Segmentation in Sentinel-2 Imagery. Currently interining at Geoforschungszentrum Potsdam.

Stijn Peeters. Estimating log yard size from remote sensing imagery to predict sawmill productivity

UvA Ryan Amaudruz. Sky's the Limit: Satellite Imagery Analysis with Image-level and Dense Self-Supervised Learning Techniques

2022 (EPFL) Dilge Gül. Detecting Floating Plastic Debris. Assessment of using few-shot meta-learning approach with active learning methods to detect floating plastic debris on satellite images

Arthur Chevalley. Improving Remote Sensing Few-Shot Object Detection with Contrastive Sub-Parts

Laura Pasero. Plastic Detection in Marine Environments.

Corinna Frank. Runoff-Forecasting in an Alpine Catchment in the Upper Rhône Basin, Valais, Switzerland, with a Long Short-Term Memory Neural Network. received **Best EPFL Thesis Award**. Starting a PhD in 2025 with Manuela Brunner at ETH/SLF

Publications

Google Scholar scholar.google.com/citations?user=MfGMG9wAAAAJ

2024 Valentin Gabeff, Marc Rußwurm, Devis Tuia, Alexander Mathis. WildCLIP: Scene and animal attribute retrieval from camera trap data with domain-adapted vision-language models. International Journal of Computer Vision

Thiên-Anh Nguyen, Marc Rußwurm, Gaston Lenczner, Devis Tuia. Multi-temporal forest monitoring in the Swiss Alps with knowledge-guided deep learning. Remote Sensing of Environment

Jan Pisl, Marc Rußwurm, Lloyd Hughes, Gaston Lenczner, Linda See, Jan Dirk Wegner, Devis Tuia. Mapping drivers of tropical forest loss with satellite image time series and machine learning. Environmental Research Letters

2023

Rußwurm M., Klemmer K., Rolf E., Zbinden R., Tuia D. Geographic Location Encoding with Spherical Harmonics and Sinusoidal Representation Networks. ICLR Spotlight paper (top 5%)

Rußwurm M., Wang S., Kellenberger B., Roscher R., Tuia D.. Meta-learning to address diverse Earth observation problems across resolutions. Nature Communications Earth & Environment

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

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.

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).

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.

2020

2020

Rußwurm, M. and Körner, M. (2020). Self-attention for raw optical satellite time series classification. ISPRS Journal of Photogrammetry and Remote Sensing, 169:421 – 435.

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.

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.

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

Ben Bischke, Jakub Fil, Ramona Pelich, Tim G. J. Rudner, Marc Rußwurm, Veronika Kopačková, and Piotr Biliński. Multi^{3}net: Segmenting flooded

buildings via fusion of multiresolution,multisensor, and multitemporal satellite imagery, 2019.

2018 Marc Rußwurm and Marco Körner. Multi-Temporal Land Cover Classification with Sequential Recurrent Encoders, *ISPRS International Journal of Geo-Information*, 2018. (link)

2017 Marc Rußwurm and Marco Körner. 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, PDF)

Marc Rußwurm and Marco Körner. 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. (PDF)

2015 Marc Rußwurm and Anthony Moore. ”Visualising the project landscape”: a spatialisation describing workload attributes as terrain, *In Environmental Earth Sciences* 2015, volume 74, pp. 7159-7172. (link)