

Jonathan Giezendanner

PhD, Engineer

Deep Learning • Remote Sensing • Environmental & Computational Sciences

Machine learning researcher specializing in environmental applications. Developing deep learning and spatiotemporal fusion models for weather forecasting and remote sensing. Experienced in processing large-scale geospatial datasets. PhD in environmental and computational science. Strong expertise in Python and deep learning frameworks.

🌐 Boston, USA

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🔄 GieziJo

in j-giezendanner

🏠 cNxEnK4AAAAJ (Google Scholar)

En Fluent **Fr** Native **De** Native **It** Basic

Skills

- › Programming languages (e.g., Python, C, C#, R, MATLAB)
- › Deep Learning Frameworks (PyTorch, PyTorch Geometric, Fast.ai)
- › Remote sensing data processing tools (GDAL, RasterIO, Xarray, Dask)
- › GIS software (e.g., QGIS, PostgreSQL, PostGIS)
- › High-performance computing (HPC, Slurm) and Cloud computing (AWS)

Technical Expertise

- › Spatiotemporal modeling
- › Deep Learning
- › Geospatial analysis and remote sensing data
- › Climate change and Environmental Sciences
- › Statistical analysis
- › Parallel Computing

Current Position

Since **Postdoctoral Research Scientist**

2024 Massachusetts Institute of Technology (MIT), Earth Intelligence Lab

Boston, USA

- › Developing Deep Learning methods for local-scale weather forecasting:
 - Developing novel deep learning frameworks based on CNNs, Transformers and GNNs
 - Integrating reanalysis data and foundation model embeddings from partners (IBM, Shell)
 - Incorporating remote sensing data through vision-based algorithms
 - Adapting approaches for high-resolution local predictions
 - Optimizing computational efficiency for operational use

- › Leveraging deep learning techniques to:
 - Improve accuracy and lead time of local weather forecasts
 - Generate predictions for data-scarce regions, locations with limited or no observational data
 - Improve modeling accuracy of extreme weather events
- › Collaborating with meteorologists and climate scientists to enhance model interpretability and practical application

Previous Experience in Mathematical Modeling, Deep Learning and Environmental Sciences

2024 Postdoctoral Research Scientist

2021 University of Arizona, Social Pixel Lab

Tucson, USA

- › Led development of innovative deep learning models for environmental monitoring, including:
 - CNN-LSTM fusion for 20-year flood mapping (published at CVPR Earthvision 2023)
 - Deep vision models for global real-time flood monitoring with NASA
 - Long-term rice field mapping using Landsat and MODIS
- › Engineered scalable pipelines for processing high-resolution satellite data and inferring flood maps using HPCs and Docker
- › Developed Google Earth Engine applications:
 - Decision-support tool for stakeholders (local government and communities)
 - Visualization platform for flood hazards
- › Managed multiple projects collaborating with international partners (IRRI, NASA, FFWC Bangladesh), while supervising and training PhD students

2021 Research Scientist

2021 University of Bern

Bern, Switzerland

- › Applied hydrological model to Panke urban watershed (north Berlin) using Earth Observation data:
 - Integrated satellite imagery for land use classification
 - Incorporated precipitation data
 - Analyzed urban features' impact on watershed hydrology
- › Developed data processing pipelines for diverse Earth Observation datasets
- › Collaborated with urban planners to assess flood risk management implications

2020 Postdoctoral Research Scientist

2020 Swiss Federal Institute of Technology (EPFL), Ecohydrology Lab (ECHO)

Lausanne, Switzerland

- › Developed model combining metapopulation dynamics and scaling theory for river networks:
 - Analyzed species persistence under varying hydrologic connectivity
 - Incorporated seasonal fluctuations in drainage density and habitat quality
- › Identified scaling properties of metapopulation capacity with network attributes
- › Established links between ecological patterns and hydrological/geomorphological factors in river systems

2019 Doctoral Research Scientist

2016 Swiss Federal Institute of Technology (EPFL), Ecohydrology Lab (ECHO)

Lausanne, Switzerland

- › Specializing in theoretical ecology, metapopulation dynamics and landscape ecology
- › Developed advanced metapopulation models incorporating landscape-explicit information:
 - › Extended classical patch-based models to include complex habitat matrices
 - › Analyzed impacts of connectivity on mountain species under climate change scenarios

- › Applied Earth Observation data to model spatial presence of carabid species:
 - › Focused on *Pterostichus flavofemoratus* and *Carabus depressus* in Gran Paradiso National Park
 - › Integrated dynamic landscape descriptors into species distribution models
- › Investigated scale-dependency of metapopulation models:
 - › Analyzed model consistency across different landscape resolutions
 - › Explored extrapolation of local studies to larger regions
- › Interdisciplinary research bridging population ecology, landscape ecology, and geomorphology
- › Teaching experience:
 - › Organized exercise sessions for MS class on Water Resources Engineering
 - › Mentored students in computational methods and ecological modeling

2015 Computer Vision Scientist

2015 Insel University Hospital Bern, Support Center for Advanced Neuroimaging (SCAN) Bern, Switzerland

- › Developed novel algorithms for image/spectral processing of radiological data:
 - Parallelized computation-intensive algorithm for image textural features using POSIX threads and CUDA
 - Enhanced JAVA plugin for metabolic map computation from MRSI data
 - Created tool for coregistration of longitudinal MRI examinations
- › Implemented machine learning approaches:
 - Developed on-line learning algorithm for automatic optimal MRS-model selection
 - Created software for machine learning-based prediction of tumor progress in brain tumor patients
- › Contributed to clinical routine and scientific studies:
 - Developed user-friendly, versatile patient reporting tools
 - Implemented interactive region of interest definition for medical images
- › Collaborated effectively in an interdisciplinary team of medical and non-medical professionals

2015 Major Projects done during Masters

2013 Swiss Federal Institute of Technology (EPFL) Lausanne, Switzerland

- › Master thesis: Rainfall Forecasting in Burkina Faso using Bayesian-Wavelet Neural Networks
 - Forecast rainfall at different lead times for weather stations in Burkina Faso
 - Developed a Bayesian Neural Network, a variation of Artificial Neural Networks producing a posterior distribution, allowing uncertainty estimates
 - Incorporated Wavelet Transform preprocessing to better characterize the temporal change
- › Computation Sciences and Engineering Semester Project: 3D Graph-Based Formation Odor Source Localization
 - Developed an algorithm for robots to move in formation to detect an odor source
 - Implemented both on real world robots and in simulation
 - Implemented TCP and UDP communication between the robots and a mechanical arm in a wind tunnel
- › Environmental Sciences and Engineering Semester Project: GPU-Parallelization of the Texas A&M Oil Spill Model
 - Ported existing oil spill modeling framework from Fortran to Python
 - Parallelised particle (bubbles) simulation on GPU with CUDA
 - As each simulated bubble is independent, the model could be fully parallelised, seeing a linear improvement in computational time

- › Design Project: Fine Particle Distribution Estimation in Lausanne using the OpenSense Network
 - Model fine particle distribution in Lausanne based on data gathered on top of Buses, navigating the city

Publications

Underscore: equal contributions, *: direct student supervision

Most Relevant Papers (Weather, Climate, Flood Hazards)

Published and In Press

- 2025 Local Off-Grid Weather Forecasting with Multi-Modal Earth Observation Data
 Yang Q.*, **Giezendanner J.***, Civitarese D. S., Jakubik J., Schmitt E., Chandra A., Vila J., Hohl D., Hill C., Watson C., Wang S.
 arXiv
- 2025 Assessing Inundation Semantic Segmentation Models Trained on High- versus Low-Resolution Labels using FloodPlanet, a Manually Labeled Multi-Sourced High-Resolution Flood Dataset
 Zhang Z., **Giezendanner J.**, Mukherjee R., Tellman B., Melancon A., Purri M., Gurung I., Lall U., Barnard K., Moltan A.
 Journal of Remote Sensing
- 2025 Sensitivity to Data Choice for Index-Based Flood Insurance
 Saunders A.*, Tellman B., Benami E., Anchukaitis K., Hossain S., Bennett A., Islam A.K.M. S., **Giezendanner J.***
 Earth's Future
- 2024 A globally sampled high-resolution hand-labeled validation dataset for evaluating surface water extent maps
 Mukherjee R., Policelli F., Wang R., Tellman B., Sharma P., Zhang Z., **Giezendanner J.**
 Earth System Science Data
- 2023 Inferring the past: a combined CNN-LSTM deep learning framework to fuse satellites for historical inundation mapping
Giezendanner J., Mukherjee R., Purri M., Thomas M., Mauerman M., Islam A.K.M. S., Tellman B.
 Computer Vision and Pattern Recognition Conference (CVPR), EARTHVISION
- 2023 A Comparison of Remote Sensing Approaches to Assess the Devastating May - June 2022 Flooding in Sylhet, Bangladesh
 Saunders A.*, **Giezendanner J.***, Tellman B., Islam A., Bhuyan A., Islam A.K.M. S.
 2023 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)

In Preparation

- In Downscaling Weather at Arbitrary Locations using Earth Observation Data
 Prep. **Giezendanner J.**, Yang Q., Civitarese D. S., Jakubik J., Schmitt E., Chandra A., Vila J., Hohl D., Hill C., Watson C., Wang S.

- In Urban Flood Observations (UFO): A global high-resolution hand-labeled training and
 Prep. validation dataset
[Mukherjee R.](#), [Friedrich H. K.](#), Tellman B., Islam A., Zhang Z., Lall U., Lakshmi V., **Giezendanner J.**
- In VIIRS Provides Continuity from MODIS for Deep Learning Enabled Satellite Inundation
 Prep. Mapping
 Saunders A.*, Tellman B., **Giezendanner J.***
- In MODIS is dead, long live VIIRS: Global inundation maps for the future
 Prep. [Saunders A.*](#), **Giezendanner J.***, Tellman B., Policelli F.

Additional Papers

- 2024 Impact Evaluations in Data Poor Settings: The Case of Stress-Tolerant Rice Varieties in Bangladesh
 Al Rafi, D. A., **Giezendanner J.**, Josephson A., Michler J. D., Pede V. O., Tellman B.
 arXiv
- 2021 A note on the role of seasonal expansions and contractions of the flowing fluvial network on metapopulation persistence
Giezendanner J., Benettin P., Durighetto N., Botter G., Rinaldo A.
 Water Resources Research
- 2020 Earth and field observations underpin metapopulation dynamics in complex landscapes: Near-term study on carabids
Giezendanner J., Pasetto D., Perez-Saez J., Cerrato C., Viterbi R., Terzago S., Palazzi E., Rinaldo A.
 Proceedings of the National Academy of Sciences
- 2020 Beyond the patch: on landscape-explicit metapopulation dynamics
Giezendanner J.
 PhD Thesis
- 2019 On the probabilistic nature of the species-area relation
 Zaoli S., Giometto A., **Giezendanner J.**, Maritan A., Rinaldo A.
 Journal of Theoretical Biology
- 2019 A minimalist model of extinction and range dynamics of virtual mountain species driven by warming temperatures
Giezendanner J., Bertuzzo E., Pasetto D., Guisan A., Rinaldo A.
 PLoS One
- 2016 Towards 3-D distributed odor source localization: an extended graph-based formation control algorithm for plume tracking
 Soares J. M., Marjovi A., **Giezendanner J.**, Kodiyan A., Aguiar A. P., Pascoal A. M., Martinoli A.
 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

- 2016 Automatic quality assessment of short and long-TE brain tumour MRSI data using novel Spectral Features
de Barros N. P., McKinley R., **Giezendanner J.**, Knecht U., Wiest R., Slotboom J.
Proc. Intl. Soc. Mag. Reson. Med
- 2015 Rainfall Forecasting in Burkina Faso Using Bayesian-Wavelet Neural Networks
Giezendanner J.
Master Thesis

Additional Experiences

Since **Co-Founder & Developer** [part time]

2020 Early Coffee Games SNC

Switzerland, Remote

- › Co-founded Early Coffee Games in 2020, transitioning from hobby to semi-professional game development
- › Leading development of “Hermit: an Underwater Tale”, a fast-paced action game with arcade elements
 - Secured ProHelvetia pre-production and production grants (2020, 2022)
 - Showcased the game as part of Swiss delegation:
 - Game Developers Conference (GDC) in San Francisco (2022)
 - Tokyo Game Show (2023)
 - Gamescom in Köln (2024)
- › Developed “Chromatic Racing”, an interactive art piece for Espace Jean-Tinguely Nicki de Saint Phalle museum (2021-2024)
- › Manage a team of 5 people, collaborating with artists, musicians, and writers to create comprehensive game experiences
- › Experienced in C# development for over 10 years, with strong skills in project structure and management

2020 **Co-Founder & Developer** [part time]

2014 Sharped Stone Studios

Switzerland, Remote

2015 **Teaching assistant**

2012 Swiss Federal Institute of Technology (EPFL)

Lausanne, Switzerland

2013 **Engineering Intern**

2013 Emch+Berger Ingeneering Office

Bern, Switzerland

2011 **Research assistant**

2011 Swiss College of Agriculture

Bern, Switzerland

2009 **Caregiver Intern**

2009 Regional Hospital Moutier

Moutier, Switzerland

2009 **Group Leader, Sergeant**

2008 Swiss Armed Forces, Medics

Airolo, Switzerland

Extracurricular activities

- 2016 **Chief Financial Officer**
- 2015 **Internal catering manager**
- 2014 **Electricity- and water-supply manager**
Balélec Music Festival

- 2015 **Class Representative**
2013 Swiss Federal Institute of Technology (EPFL)

- 2014 **Founder and Vice-President**
2012 Environmental Sciences and Engineering Student Organisation (TREE)

Education

- 2019 **PhD Environmental Sciences and Engineering**
Swiss Federal Institute of Technology (EPFL), Ecohydrology Lab (ECHO) Lausanne, Switzerland
› Mentors: Prof. Dr. Andrea Rinaldo and Prof. Dr. Damiano Pasetto

- 2015 **MSc Environmental Sciences and Engineering**
Minor in Computation Sciences and Engineering
Swiss Federal Institute of Technology (EPFL) Lausanne, Switzerland

- 2013 **BSc Environmental Sciences and Engineering**
Swiss Federal Institute of Technology (EPFL) Lausanne, Switzerland