

Lukas Kugler

Curriculum Vitae

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RELEVANT WORK EXPERIENCE

- 03/2020 - present** **University Assistant** Vienna, Austria
Department of Meteorology and Geophysics, University of Vienna
Teaching of Bachelor and Master tutorials (see “Teaching” section)
- 09/2020** **Participant of the ESoWC challenge** Reading, UK
Team with Sebastian Lehner, hosted by ECMWF, € 5000 grant by Copernicus-ECMWF
Hydrological forecasts using Machine Learning methods
The results were presented at
- the final project meeting at ECMWF HQ, (09/2019),
 - the workshop on building reproducible workflows for Earth sciences (10/2019)
 - the “1st Artificial Intelligence for Copernicus workshop“ (11/2019)
 - the Austrian meteorologists’ day (11/2019)
- 10/2017 - 08/2019** **Assistant Model Developer** Vienna, Austria
UBIMET GmbH (private weather service)
- Taking care of continuously running forecast models from a software and meteorological perspective
 - Experiments for improving the used parametrizations and source-code development for the LSM parametrization
 - Developing data-driven blending methods of forecast models
 - Rewriting legacy code in python to improve the speed of execution
 - Providing code to handle large data volumes for the most used file formats in python for plotting, verification, analytics

EDUCATION

- 03/2020 - present** **PhD Meteorology** Vienna, Austria
Candidate for PhD
Department of Meteorology and Geophysics
University of Vienna
- PhD topic: Data assimilation of cloud-affected satellite observations for convective-scale numerical weather prediction
Supervisor: Prof. Martin Weissmann

10/2017 - 01/2020	MSc Meteorology Department of Meteorology and Geophysics University of Vienna Defensio on January 20, 2020 MSc thesis topic: The Added Value of Machine Learning in Forecasting Wind Turbine Icing Supervisor: Ass.-Prof. Manfred Dorninger	Vienna, Austria
10/2013 - 09/2017	BSc Meteorology Department of Meteorology and Geophysics University of Vienna Thesis topic: Parameterizing the asphalt surface temperature (in German) Supervisor: Dr. Dieter Mayer	Vienna, Austria
03/2013 - 12/2013	Bachelor studies Economics Vienna University of Economics and Business Business administration, Economics, Mathematics, Business Law	Vienna, Austria

CONFERENCE PRESENTATIONS

10/2023	International Symposium on Data Assimilation, Bologna, Italy Talk: Comparing the assimilation of visible and infrared satellite observations to radar reflectivity for convective-scale numerical weather prediction
05/2023	Meeting of the Austrian Meteorological Society, Innsbruck, AT Poster: The potential impact of assimilating cloud-affected visible and infrared satellite observations for convective-scale numerical weather prediction
04/2023	General Assembly of the European Geosciences Union, Vienna, AT Talk: Assimilating cloud-affected visible & infrared satellite observations in idealized simulations
06/2022	International Symposium on Data Assimilation, Fort Collins, CO, USA Talk: Assimilating visible & infrared satellite observations for convective scale NWP
05/2022	General Assembly of the European Geosciences Union, Vienna, AT Talk: Assimilating visible & infrared satellite observations for convective scale NWP
11/2019	1st Artificial Intelligence for Copernicus workshop, Reading, UK Talk: Machine learning techniques for high-impact-weather (flood forecasts)

PUBLICATIONS (incl. manuscripts)

Kugler L., M. Weissmann (in preparation): Observation operator nonlinearity of visible and infrared satellite observations.

Kugler L., M. Weissmann (in preparation): Combined assimilation of radar and cloud-affected visible and infrared satellite observations.

Necker, T., Wolfgruber, L., **Kugler, L.**, Weissmann, M., Dorninger, M. & Serafin, S. (2023): The fractions skill score for ensemble forecast verification. doi:[10.22541/au.169169008.89657659/v1](https://doi.org/10.22541/au.169169008.89657659/v1) (under review) Quarterly Journal of the Royal Meteorological Society.

Kugler L., J.L. Anderson, M. Weissmann (2023): Potential impact of all-sky assimilation of visible and infrared satellite observations compared to radar reflectivity for convective-scale NWP, doi:[10.1002/qj.4577](https://doi.org/10.1002/qj.4577) Quarterly Journal of the Royal Meteorological Society.

Kugler L. (2019): The Added Value of Machine Learning in Forecasting Wind Turbine Icing, MSc Thesis, University of Vienna, doi:[10.25365/thesis.60595](https://doi.org/10.25365/thesis.60595)

TEACHING EXPERIENCE

Spring 2021

Spring 2022

Physical Concepts, Bachelor Meteorology, University of Vienna

The course covered the basics of thermodynamics, radiation and hydrodynamics and was conducted for students of Meteorology and Astronomy as a collaboration between the Department for Meteorology and the Department for Astrophysics

Winter 2022

Dynamics of the Atmosphere, Bachelor Meteorology, University of Vienna

The course covered fundamental forces, equations of motion in various coordinates, approximations to the equations, vorticity equation, atmospheric waves.

Spring 2023

Advanced Data Assimilation, Master Meteorology, University of Vienna

I pioneered a hands-on course where students could learn concepts of data assimilation with practical examples using the Data Assimilation Research Testbed (DART) and forecast data from the Weather Research and Forecasting Model (WRF)

The course introduced DART, WRF and covered Bayes theorem, forecast verification, sequential assimilation, localization, inflation, overfitting of observations and the theoretical optimum for spread.

LANGUAGES & IT SKILLS

- **Languages:** German (native), English (fluent, C1)
- **Programming languages:** Python, Fortran, Bash, Matlab
- **HPC experience** from various HPC courses for speed-up and efficiency of code