

KRISTIAN LAUTRUP NIELSEN

Applied Weather & Climate Scientist

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PROFILE

I am an applied weather and climate scientist with eight years of experience connecting meteorology, energy and scientific software. I have developed forecasting methods and operational workflows from data acquisition and quality control through modelling, verification and delivery. My experience includes developing the WEFEX extreme- weather forecasting application, machine-learning seasonal prediction, renewable-energy and electricity-demand analysis, and contributions to five EU-funded projects. This combines scientific depth with hands-on Python development and practical decision-support products.

PROFESSIONAL EXPERIENCE

World Energy & Meteorology Council (WEMC) - Norwich, England

Data Engineer - climate and energy services

2021-present

- I develop and maintain scientific Python workflows for weather and seasonal forecasting, climate-risk analysis and energy applications, including WEFEX and EU-funded research collaborations.
- Build and maintain operational seasonal forecast processing for an energy-sector client: ECMWF and NMME retrieval, model harmonisation, regional aggregation, bias correction, ensemble summaries and CSV delivery.
- Support reliable recurring production through scheduled processing, logging, run-status notifications and data-retention routines; resolve differences in forecast coordinates, units, grids and model versions.
- Contribute seasonal-data gathering, quality control and harmonisation for Teal, and prepare ERA5 anomaly and ECMWF forecast-skill analyses for WMO-related work.
- Develop the scientific methodology and operational processing framework for WEFEX, integrating ECMWF IFS/AIFS ensemble and seasonal forecasts with ERA5 reference climatologies to assess temperature, precipitation, wind-speed and wind-gust extremes. Implement data retrieval, GRIB-to-NetCDF conversion, variable harmonisation, wind diagnostics, percentile-based event probabilities and forecast verification using Brier Skill Score (BSS) and neighbourhood-based Brier Skill Score (NBSS), producing gridded, ADM0 and ADM1 outputs that relate ensemble forecasts to local climatological thresholds for practical decision support.
- Translate methods and results into project deliverables, maps and stakeholder presentations.

Underwriters Laboratories - AWS Truepower (UL) - Barcelona, Spain

Research Scientist

2018-2021

- Tailored seasonal climate forecasts for renewable-energy users through SECLI-FIRM, from user needs and data harmonisation to forecast verification and service delivery.
- Contributed to automated ERA5 retrieval and post-processing, multi-model forecast research and assessment of climate-change impacts on renewable-energy production.
- Presented seasonal forecasting methods and applications, including hydropower-resource forecasts for Colombia during strong El Niño events.

Vaavud

Intern

2017

- My main focus was on optimizing the meteorological WRF model of a European domain as well as its daily running process. I developed my python scripting and obtained further knowledge of meteorological models. It also gave me the opportunity to work together with a group of programmers and software developers.

MetCube

Intern

2016

- I calculated energy and carbon emission savings for the implementation of the company's products. I also helped in making the company's web-page in WordPress.

EU-FUNDED PROJECT CONTRIBUTIONS

SECLI-FIRM - Horizon 2020

As case study leader I tailored seasonal climate services for renewable-energy decisions at UL. Continued related multi-model research at WEMC, investigating forecast combinations, model independence, ensemble-size effects and probabilistic skill against ERA5.

FOCUS-Africa - Horizon 2020

My role was to develop Random Forest workflows for rainy-season onset and cessation, combining observed rainfall, climate drivers and dynamical forecasts. Implement operational processing using MSWEP/CHIRPS and seasonal data; assess skill through hindcasts and contribute first-author research (in-review) on onset prediction in Southeast Africa.

FOCI - Horizon Europe

Analyse climate and non-CO2-emission impacts on renewable resources and electricity demand. Develop weighted compound renewable-stress indicators (paper being written), compare climate-model responses and test sensitivity to thresholds and hydrological lags.

CROSSEU - Horizon Europe

Leading a Case Study on compound climate risks to European power systems. Prepare harmonised CMIP6 wind, solar, hydro and demand time series for plan4res workflows; analyse marginal costs, unmet demand and socioeconomic vulnerability, and prepare data and indicators for the Decision Support System.

ENGAGEMENT - NextGenerationEU / Italian PNRR

Develop extreme-climate-index and geospatial exposure workflows for Italy. Transform OpenStreetMap infrastructure into climate-grid-aligned datasets, including voltage-filtered power-line density, with additional transport, telecommunications and agricultural exposure layers.

TECHNICAL SKILLS

Python and scientific data:	xarray, NumPy, pandas, SciPy, Dask, NetCDF, GRIB, Zarr, APIs, CDO.
Forecasting and ML:	scikit-learn, Random Forest, XGBoost, gradient boosting, different bias correction methods, ensemble verification, BSS/CRPSS.
Geospatial and visualisation:	GeoPandas, Shapely, rasterisation, regional aggregation, matplotlib, Cartopy.
Systems:	Linux, Bash, Git, Conda, cron, automated pipelines, logging and monitoring.
Data sources:	ERA5/ERA5-Land, ECMWF IFS/AIFS and seasonal forecasts, C3S, NMME, MSWEP, CHIRPS, GFS, station observations and CMIP climate projections.

EDUCATION

**MSc, Climate Change:
Impacts, Mitigation and Adaptation**
University of Copenhagen, Denmark | 2013-2016

BSc, Geophysics
University of Copenhagen, Denmark | 2010-2013

SELECTED PUBLICATIONS AND CONFERENCE CONTRIBUTIONS

- Krikken, Geertsema, Nielsen & Troccoli (2024). **The Added Value of Statistical Seasonal Forecasts.** *Climate*, 12(6), 83. doi:10.3390/cli12060083.
- Goodess et al., including Nielsen (2022). **The Value-Add of Tailored Seasonal Forecast Information for Industry Decision Making.** *Climate*, 10(10), 152. doi:10.3390/cli10100152.
- Kristian Nielsen, Penny Boorman, Meshack Mliwa, Omari Hamisi Juma and Alberto Troccoli. **Machine Learning Prediction of the Rainy-Season Onset in Southeast Africa** (In review)
- Presentation at ECMWF UEF2026: **Introducing WEFEX: Forecasting Extreme Weather Risks Across Europe.** <https://ecmwfevents.com/i/using-ecmwf-s-forecasts-uef2026/public/agenda>

LANGUAGES

Danish - native | **English** - full professional proficiency | **Catalan** - semi professional proficiency | **German** - limited proficiency.

REFERENCES

Alberto Troccoli - Managing Director of WEMC	alberto.troccoli@wemcouncil.org
José Vidal - Product Manager UL Renewables	jose.vidal@ul.com