EMANUELE SILVIO GENTILE

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Italian & British Citizen
Languages: English (near-native), Italian (native), French (intermediate)

PROFESSIONAL SUMMARY

Quantitative analyst and atmospheric physicist at a leading European hedge fund manager with a PhD in weather and climate modelling and a First-Class degree in Theoretical Physics from Imperial College London. Experience at NOAA Geophysical Fluid Dynamics Laboratory, University of Reading, and Nanook Advisors developing and evaluating weather forecasting and quantitative analytics systems, analysing large datasets, and quantifying uncertainty in complex dynamical systems using NWP, AI/ML, and multivariate statistical post-processing for energy and commodity markets.

CORE COMPETENCIES

- Experience developing, scaling, and evaluating weather analytics and forecasting capabilities for energy and commodity market applications using, AI-driven weather models, as well as statistical post-processing.
- Skilled in monitoring, recalibrating, and improving weather algorithms, forecast workflows, and operational analytical pipelines using Python, ML, HPC, and cloud computing environments.
- Experience acting as an interface across quantitative research, technology, engineering, and trading teams, translating atmospheric processes and forecast uncertainty into actionable analytics & operational tools.
- Strong expertise in atmospheric physics, numerical weather prediction, and high-resolution weather and climate modelling, with applications to extreme winds, precipitation, clouds, and weather-related hazards.
- Experience analysing large, high-frequency environmental datasets and quantifying uncertainty in complex dynamical systems, including ensemble forecasts, km-scale simulations, and AI-driven weather products.
- Experience improving operational weather and climate models through advanced air-sea coupling, boundary-layer turbulence and cloud parameterizations (CLUBB), and coupled atmosphere-ocean-wave ensemble forecasting (MOGREPS-UK).
- Proven leadership and collaboration across academia, government, and industry partnerships in the UK, US, and Europe, with experience delivering results under tight deadlines in fast-paced environments.

TECHNICAL SKILLS

- **Weather Analytics & Forecasting Systems:** Experience developing, scaling, and evaluating weather analytics and forecasting systems for energy and commodity market applications using NWP, AI-driven weather models, and statistical post-processing.
- **Programming, Cloud & HPC:** Proficient in Python (Xarray, Pandas, NumPy, SciPy, Matplotlib, Cartopy, TensorFlow), R, Fortran 77/90, C, and Bash scripting. Experienced with HPC systems (Slurm), cloud/distributed workflows, and scalable weather-data pipelines for operational forecasting and energy-market applications.
- **Large-Scale Data Processing:** Expertise handling large climate and weather datasets using NetCDF, Zarr, Dask, Xarray, NCO, and CDO, including scalable data pipelines, forecast verification, and analytics workflows.
- **Machine Learning & AI Weather Models:** Experience with TensorFlow, PyTorch, Scikit-learn, GPU-based programming, and the evaluation of AI weather forecasting systems from multiple providers.
- **Climate & Weather Models:** Hands-on experience with global climate models (GFDL AM4, X-SHiELD), regional NWP systems (Met Office UKEP), and AI-based forecasting models for extreme events, ensemble forecasting, and climate-risk applications.
- **Observational & Reanalysis Data:** Expertise working with satellite, lidar, and reanalysis datasets (e.g., ERA5, IMERG, ASCAT, ARM, MERRA) for extreme weather, forecasting, and climate-risk applications.
- **Documentation & Collaboration Tools:** Proficient in Git, LaTeX, MS Office, Google Workspace, Notion, Slack, and MS Teams within collaborative research and operational environments.

CAREER SUMMARY

Weather-focused quantitative analyst – Nanook Energy Advisors, London, UK **2026 – present**

I am driving the development and scaling of weather analytics and forecasting systems for energy and commodity market applications, including the monitoring, statistical recalibration, and enhancement of conventional and AI-driven weather forecast workflows. I am also acting as an interface across quantitative research, technology, and trading teams, coordinating weather-data pipelines and delivering analytical support for trading functions.

Research Scientist – University of Reading & NCAS, Reading, UK **2025 – 2026**

Led high-resolution modelling and applied climate-risk analysis for the CANARI project.

- Led high-resolution and probabilistic modelling of extreme wind and precipitation hazards using large ensembles to quantify uncertainty and assess impacts for infrastructure, energy, and financial risk.
- Led AI/ML weather-modelling demonstrator (WCSSP India) including workflow design, deployment, and automated predictive analytics.
- Translated climate-model outputs into decision-relevant insights through work with the Hub for Applied Weather and Climate Science, supporting operational and climate-risk users.

Postdoctoral Research Associate - Princeton University & GFDL-NOAA, Princeton, NJ, US **2022 – 2025**

Led high-resolution climate-model research at NOAA-GFDL to improve simulation of extreme events and generate scenario outputs supporting policy, business, and infrastructure risk decisions.

- Conducted scenario analysis and model evaluation using AM4 and global km-scale simulations (X-SHiELD) to assess drivers of extreme winds, precipitation, and cyclone behaviour under warming.
- Improved robustness of climate-model components and diagnostics, enhancing reliability of risk-relevant outputs.
- Built Python/Fortran diagnostics to quantify uncertainty, assess model performance, and analyse atmospheric dynamics relevant for hazard risk.
- Collaborated with NOAA, NCAR, Penn State, UWM, and Stockholm University, presenting findings to policy, infrastructure, and climate-risk stakeholders.

PhD Researcher — University of Reading & UK Met Office (CASE studentship), UK **2018 – 2022**

Focused on mesoscale wind extremes and coupled weather model development for operational forecasting.

- Developed convective-scale ensemble approaches to evaluate extreme-wind risk and improve uncertainty representation in operational forecasts.
- Assessed atmosphere-ocean-wave interactions affecting extreme winds, with relevance to offshore risk.
- Created climatologies of wind extremes for model calibration, validation, and event-risk assessment.
- Investigated predictability and scenario sensitivity of Mediterranean cyclone events compound hazards.

EDUCATION AND TRAINING

Ph.D. in Atmosphere, Oceans and Climate, University of Reading, UK (2018-2022)
Thesis by articles: *The impact of atmosphere-ocean wave coupling on extreme surface wind forecasts*
Supervisors: Prof Suzanne Gray, Prof Janet Barlow, Prof Huw Lewis (Met Office)
Funding: Awarded a four-year CASE studentship by NERC, UK.
Completed advanced PhD-level courses in numerical modelling, machine learning, and atmospheric dynamics.

BSc ARCS , Physics with Theoretical Physics, Imperial College London, UK (2015-2018)
Grade: First Class Honours
Final Year Project: *Calculating evanescent Floquet modes in photonic crystals: bringing topological surface states to light*, supervised by Prof Ortwin Hess
Award: Tessella Prize for Software (best BSc computational project in the department)

Additional Courses & Training: Machine Learning in Weather & Climate - ECMWF MOOC; Diabatic Processes in the Atmosphere – Diabatic Winter School, Norway (2020); Data Assimilation – Theory &Aapplication in operational ECMWF forecasting, UOR& ECMWF (2020); Entrepreneurship & Sustainability – YES Competition, University of Reading & Syngenta (2019); Innovating for Sustainable Development, Kintbury (2019).

PUBLICATIONS

Peer-reviewed

- **Gentile, E. S.,** Hunt, K. M. R., Tomassini, L., Harvey, B., & Martinez-Alvarado, O. *Global diurnal precipitation cycle in the AI model GraphCast and a 5-km Unified Model: Challenges and opportunities.* Accepted in Geophysical Research Letters (2025). DOI: 10.1029/2025GL120961
- **Gentile, E.S.,** Zhao, M., Harris, L., Hodges, K., *Response of Extreme North Atlantic Midlatitude Cyclones to a Warmer Climate in the GFDL X-SHiELD Kilometer-Scale Global Storm-Resolving Model* (2024). DOI: 10.1029/2024GL112570
- Pantillon, F., Davolio,S., Avolio,E., Calvo-Sancho,C., Carrió, D.S., Dafis,S., Flaounas,E., **Gentile, E.S**., Gonzalez-Aleman,J.J., Gray,S.L., Miglietta,M.M., Patlakas,P., Pytharoulis,I., Ricard,D., Ricchi,A. and Sanchez, C., *The crucial representation of deep convection to predict the cyclogenesis of medicane Ianos.* Weather and Climate Dynamics (2024) DOI: 10.5194/egusphere-2024-1105
- **Gentile, E.S.**, Zhao, M., Tan, Z., Larson, V., Zarzycki, C., *The Effect of Coupling Between CLUBB Turbulence Scheme and Surface Momentum Flux on Global Wind Simulations.* Journal of Advances in Modeling Earth Systems (2024) DOI: 10.1029/2024MS004295
- **Gentile, E.S.**, Zhao, M. and Hodges, K., *Poleward intensification of midlatitude extreme winds under warmer climate.* npj Climate and Atmospheric Science Journal. DOI: 10.1038/s41612-023-00540-x.
- **Gentile, E.S.**, Gray, S.L. *Attribution of observed extreme marine wind speeds and associated hazards to midlatitude cyclone conveyor belt jets near the British Isles.* International Journal of Climatology 43, 2735-2753 (2023) DOI: 10.1002/joc.7999
- **Gentile, E.S.**, Gray, S.L., Lewis, H.W., *The sensitivity of probabilistic convective-scale forecasts of an extratropical cyclone to atmosphere-ocean-wave coupling.* Quarterly Journal of the Royal Meteorological Society 148, 685-710 (2022) DOI: 10.1002/qj.4225
- **Gentile, E.S.**, Gray, S.L., Barlow, J.F, Lewis, H.W., Edwards, J.M., *The impact of atmosphere-ocean-wave coupling on the near-surface wind speed in forecasts of extratropical cyclones.* Boundary-Layer Meteorology 180, 105–129 (2021) DOI: 10.1007/s10546-021-00614-4

Accepted for publication

Gentile, E.S., Zhao, M., Larson, V., Zarzycki, C., Svensson, G, Donner L. *Enhancing nocturnal convection and Low-Level-Jet representation over the Great Plains via prognostic momentum fluxes and generalized turbulent lengthscale in CLUBB turbulence scheme.* Accepted for publication in the Journal of Advances in Modeling Earth Systems (2025).

Submitted

Schiemann, R. K. H., Lister, G., Hatcher, R., Hodson, D., Lawrence, B., Shaffrey, L., Dittus, A., Robson, J., Harvey, B., Hodges, K., Martínez-Alvarado, O., Woolnough, S., Turner, A. G., **Gentile, E. S.**, et al. *The CANARI HadGEM3 Large Ensemble: Design and evaluation of historical simulations.* Submitted to Geoscientific Model Development (2025).

In preparation

Gentile, E. S., Harvey, B., Martinez-Alvarado, O. and Hodges, K. *Future Northern Hemisphere extreme winds and associated insurance risk under SSP3-7.0 from a large-ensemble climate model.* In preparation for submission to Nature Climate Change (2025).