

Abstract

Beyond the Limits of Climate Intelligence

Geoskop has been awarded a research project by the European Space Agency (ESA) under the Phi-Lab NET Spain program, which addresses the current limitations of climate change models.

The proposed solution integrates deep learning algorithms to correct both systematic and certain non-systematic errors in climate change models, aiming to deliver highly accurate climate predictions. While bias correction methods are widely accepted for addressing some systematic errors, several unresolved error sources persist:

1. The correction process relies on assumptions about error nature (i.e., additive or multiplicative forms) which often do not align with the actual data characteristics.
2. No universal "best" bias correction method exists; performance varies by climate model, location, or season, potentially resulting in suboptimal corrections.
3. Bias correction algorithms target only consistent, repeatable errors that manifest uniformly across a model, overlooking irregular or context-specific discrepancies.

To overcome these challenges, Geoskop will develop a novel deep learning algorithm tailored for micro-scale climate predictions, trained and blindly validated against ground-truth observations. This algorithm will be benchmarked using the DKRZ Levante HPC to generate climate predictions on data from CMIP6 models and from thousands of weather stations, enabling scalable and robust validation at high resolution.

Additionally, Geoskop will collaborate with Dr.-Ing. Ivanka Pelivan from Fraunhofer Heinrich Hertz Institute (HHI), who will validate the output predictions in Germany using HHI's experience with climate data analysis and verification, ensuring that the output technology could be beneficial for Germany and that the algorithm expands the capabilities of current bias correction methods in climate science.

Geoskop, is a Spanish company with robust scientific expertise in climate prediction, leverages proprietary algorithms, AI, and HPC to drive climate-resilient solutions for renewables and beyond. Geoskop already published