



## Machine Learning Approaches to Improve Accuracy in Extreme Seasonal Temperature Forecasts: A Multi-Model Assessment

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This study focuses on applying machine learning techniques to bias-correct the seasonal temperature forecasts provided by the Copernicus Climate Change Service (C3S) models. Specifically, we employ bias correction on forecasts from five major models: UK Meteorological Office (UKMO), Euro-Mediterranean Center on Climate Change (CMCC), Deutscher Wetterdienst (DWD), Environment and Climate Change Canada (ECCC), and Meteo-France. Our primary objective is to assess the performance of our bias correction model in comparison to the original forecast datasets. We utilise temperature-based indices recommended by the Expert Team on Climate Change Detection and Indices (ETCCDI) to evaluate the effectiveness of the bias-corrected seasonal forecasts. These indices served as valuable metrics to gauge the predictive capability of the models, especially in forecasting natural cascading hazards such as wildfires, droughts, and floods. The study involved an in-depth analysis of the bias-corrected forecasts, and the derived indices were crucial in understanding the models' ability to predict temperature-related extreme events. The results of this research contribute valuable information for decision-making and planning across various sectors, including disaster risk management and environmental protection. Through a comprehensive evaluation of machine learning-based bias correction techniques, we enhance the accuracy and applicability of seasonal temperature forecasts, thereby improving preparedness and resilience to climate-related challenges.