

Early Career Scientists' (ECS) Contributions to Meteorology 2023

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1. Introduction

In the frame of the current growing awareness of climate change and its impact on society and ecosystems [1,2], young meteorologists' jobs assume a crucial role, since young experts' training contributes not only to the scientific understanding of key weather phenomena but also to the mitigations of the effects of climate change. A strong and up-to-date formation allows early meteorologists to provide accurate weather forecasts, which are fundamental, particularly in cases of extreme events, such as thunderstorms, floods, and droughts [3]. Moreover, they can play a key role in the education of the general population on meteorological phenomena and their implications on climate change, and in the sensibilization of the public opinion on the importance of environment protection and the adoption of sustainable practices [4]. In this framework, in 2022, a special issue (SI) aimed to provide an opportunity for early career scientists in meteorology to share their valuable results with the scientific community was launched. It attracted many young scientists, and a relevant number of papers was published. For this reason, we have decided to launch the 2023 edition of this SI.

Examples of topics included in this SI comprise current challenging areas in weather models, AI, and machine learning, which are gradually competing with traditional predictions dominated by physical models [5], coupling between Air Quality and Meteorological Models [6], remote sensing in meteorology, and urban weather.

Twelve relevant papers in the proposed topics were accepted for publication and are supported by science-based evidence, including studies, experiences, strategies, procedures, and practices at a global level. All the submitted papers were prepared by early career scientists as first authors, and they were (in some cases) supported by their professors and tutors. All the submitted manuscripts were assessed by at least two referees in order to guarantee a rigorous peer review process to comply with the standards of other papers submitted to *Meteorology*.

2. An Overview of Published Articles

Janku and Dobrovolný (contribution 1) analyzed heat waves and their impact on the canopy urban heat island using observational data from stations located in Brno, Czechia, during the period 2011–2020. They found that heat waves became significantly more frequent, longer, intense, and severe. As a consequence, urban environments became exposed to an even more severe heat load.

Kulesza (contribution 2) analyzed the relationship between the global solar radiation reaching the Earth's surface in Poland and the direction of air mass advection. The paths of air mass inflow were identified using 72 h backward trajectories. She found that the average daily sum of radiation during air mass inflow from all the directions identified was different from the average daily sum in the multi-year period.

Phadtare (contribution 3) analyzed the dynamics of a propagating and stationary cyclonic system over the east coast of the Indian peninsula. The first one crossed the Indian peninsula on the 9–11 November 2015, while the second one was stationary over the coast on the 15–18 November 2015. The propagation mechanisms of the two vortices were investigated using vorticity budgets, adopting a criterion for the coastal vortex stagnation.



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Istrate et al. (contribution 4) analyzed the climatic characteristics of 23 convective parameters from sounding data and ERA5 in Northeastern Romania. The convective features of hailstorms were analyzed using several instability parameters grouped into five categories, i.e., particle theory indices, moisture, temperature, kinematics, and complex indices.

Hachaichi (contribution 5) presented an initial endeavor in identifying climate peer cities by employing geographic, demographic, and socioeconomic data. He utilized the “Balanced Iterative Reducing and Clustering using the Hierarchies algorithm” to cluster cities from different geographical areas that showed comparable socioeconomic profiles.

Berthomier and Perier (contribution 6) presented a deep learning model designed for estimating precipitation from satellite observations on a global scale. These observations, combined with deep learning methods, offer the opportunity to address the challenge of estimating precipitation on a global scale. The system demonstrated highly accurate precipitation estimation, especially within equatorial regions.

Elyoussoufi et al. (contribution 7) analyzed the relationship between inclement weather and road conditions for a specific location, i.e., Boulder, Colorado. They found that the weather not only plays a significant role in traffic conditions but also affects the actions that humans take during these events.

Sanchez et al. (contribution 8) examined the precipitation system in the Amazon basin during the austral summer. The primary objective of this article was the assessment of the distinctions among three daily rainfall networks in the Amazon basin, employing three distinct correlation metrics.

Sherman et al. (contribution 9) used reduced-order models of stratospheric wave–zonal interactions to study interannual variability in stratospheric zonal winds and sudden stratospheric warming events. They demonstrated that reduced-order models, in conjunction with data assimilation schemes, can be used to produce model outputs that match averaged ERA-Interim re-analysis data.

Jakovlev et al. (contribution 10) used Met Office, ERA5, and MERRA2 re-analysis data to examine the impact of SST variability on the dynamics of the polar stratosphere and ozone layer over the period from 1980 to 2020. In particular, they studied the differences in the influence of different types of ENSOs for the El Niño and La Niña phases.

Kristof et al. (contribution 11) analyzed the thermal load of a person walking or standing in fog, focusing on the fog events of the Hungarian lowland, and investigated the sensitivity of human thermal load to changes in anthropometric data and human activity during fog events.

Lukens et al. (contribution 12) introduced the System for Analysis of Wind Collocations (SAWC), jointly developed by NOAA/NESDIS/STAR, UMD/CISESS, and UW-Madison/CIMSS; moreover, they aimed to support users’ needs to analyze wind data from multiple sources. A one-year comparison of data from the Aeolus satellite with other wind datasets was performed to demonstrate the utility of SAWC.

Conflicts of Interest: The author declares no conflicts of interest.

List of Contributors

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