atmosphere

MDPI

Editorial

Student-Led Research in Atmospheric Science

Ari D. Preston [1,*] and David E. Reed [2]

[1] Department of Atmospheric Sciences, Northern Vermont University-Lyndon, Lyndonville, VT 05851, USA
[2] Department of Environmental Science, University of Science and Arts of Oklahoma, Chickasha, OK 73018, USA
* Correspondence: aaron.preston@northernvermont.edu

Engaging students in research is critical to their development as atmospheric scientists. Although student-led research may be narrow in scope, it still plays an important role in advancing atmospheric science. Anthropogenic climate change is responsible for warming global surface temperatures, which has increased the frequency and intensity of weather and climate events [1]. This makes it especially important that we prepare the next generation of atmospheric scientists to address our changing climate.

This Special Issue was proposed to collect student-led atmospheric research that is high-quality but limited in scope or impact. Submissions can be from course-based research projects, summer Research Experience for Undergraduate fellowships, or faculty-mentored research. Submissions contribute to scientific knowledge and may include the following:

- Methodological studies;
- Proof-of-concept results;
- Descriptive-in-nature projects;
- Case studies;
- Qualitative research;
- Negative or null results.

This volume includes eight important student-led manuscripts in the field of atmospheric science. These articles were reviewed and accepted for publication after a critical peer review. The published articles share results from faculty-mentored student projects that advance scientific knowledge. This Special Issue showcases a diverse field of authors from 10 different countries. All eight papers have been widely viewed. They range in scope from climate change impacts and air quality studies to instrumentation and storm electrification research. These eight articles are summarized below:

- Two papers address the regional impacts of climate change in East Asia and the Mediterranean. For example, one paper examines the impacts of climate change in Vietnam and adaptation measures for farmers in that country [2]. The other paper examines the impacts of climate change on variability in precipitation rates in Syria [3].
- Three papers focus on student-led instrumentation projects. For example, one paper examines energy balances by having students construct a domeless net radiometer to measure surface temperatures [4]. Another paper investigates the removal of humidity and hydrogen chloride using different types of humidity pretreatment dryer devices [5]. The third paper discusses the use of a cargo bicycle equipped with air chemistry instrumentation to study the dynamics of aerosol particles in urban air before, during, and after the COVID-19 pandemic in Germany [6].
- Two papers focus on particulate matter (PM). For example, one paper uses a model to forecast PM behavior in the Caribbean. They use the coupled Seasonal Autoregressive Integrated Moving Average and Generalized Autoregressive Conditional Heteroscedastic (SARIMA-GARCH) model to perform this research [7]. The other paper examines how PM can generate reactive oxygen species, which can lead to various diseases [8].

Citation: Preston, A.D.; Reed, D.E. Student-Led Research in Atmospheric Science. *Atmosphere* **2023**, *14*, 904. https://doi.org/10.3390/atmos14050904

Received: 15 January 2023
Accepted: 24 February 2023
Published: 22 May 2023

- One paper focuses on storm electrification. They use polarimetric radar data and total lightning data to develop lightning cessation guidance for isolated cells in the Washington, D.C., area [9].

In conclusion, this Special Issue provides new avenues for recognizing student-led research. The findings reported help to improve the understanding of our complex atmosphere, especially in the context of climate change.

Author Contributions: D.E.R. conceptualized the theme of this Special Issue and A.D.P. prepared the original draft of this editorial. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest: A.D.P. serves as co-editor for this Special Issue journal and is the second author of one of the published manuscripts.

References

1. IPCC. 2018: Summary for policymakers. In *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*; Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., Shukla, P., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., et al., Eds.; Cambridge University Press: Cambridge, UK; New York, NY, USA, 2022; pp. 3–24. [CrossRef]
2. Giusto, B.D.; Le, T.M.N.; Nguyen, T.T.M.; Nguyen, T.T.H.; Vu, N.U.M.; Lavallee, J.P. Development versus adaptation? Facing climate change in Ca Mau, Vietnam. *Atmosphere* **2021**, *12*, 1160. [CrossRef]
3. Da Ros Carvalho, H.; McInnes, K.J.; Heilman, J.L. Construction of a simple domeless net radiometer for demonstrating energy balance concepts in a laboratory activity. *Atmosphere* **2021**, *12*, 1620. [CrossRef]
4. Gil, H.-N.; Dinh, T.-V.; Lee, J.-H.; Park, B.-G.; Choi, I.-Y.; Lee, S.-W.; Kim, I.-Y.; Kim, J.-C. Effects of humidity pretreatment devices on the loss of HCl gas emitted from industrial stacks. *Atmosphere* **2021**, *13*, 33. [CrossRef]
5. Klemm, O.; Ahrens, A.; Arnswald, M.; Bethke, R.; Berger, D.F.; Blankenhaus, K.; Blauth, L.; Breuer, B.; Buchholz, S.; Burek, F.; et al. The impact of traffic and meteorology on urban particle mass and particle number concentrations: Student-led studies using mobile measurements before, during, and after the COVID-19 Pandemic Lockdowns. *Atmosphere* **2021**, *13*, 62. [CrossRef]
6. Abu Hammad, A.H.Y.; Salameh, A.A.M.; Fallah, R.Q. Precipitation variability and probabilities of extreme events in the eastern mediterranean region (latakia governorate-syria as a case study). *Atmosphere* **2022**, *13*, 131. [CrossRef]
7. Alexis, E.; Plocoste, T.; Nuiro, S.P. Analysis of Particulate Matter (PM10) Behavior in the caribbean area using a coupled sarima-garch Model. *Atmosphere* **2022**, *13*, 862. [CrossRef]
8. Koike, Y.; Kameda, T. Effects of chemical reactions on the oxidative potential of humic acid, a model compound of atmospheric humic-like substances. *Atmosphere* **2022**, *13*, 976. [CrossRef]
9. Drugan, J.J.; Preston, A.D. Lightning cessation guidance using polarimetric radar data and lightning mapping array in the washington, D.C. area. *Atmosphere* **2022**, *13*, 1111. [CrossRef]