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| Book Name: | [Geography, Earth Science and Environment: Research Highlights](https://www.bookpi.org/bookstore/product/geography-earth-science-and-environment-research-highlights-vol-1/) |
| Manuscript Number: | **Ms\_BPR\_4333** |
| Title of the Manuscript: | **Atmospheric Aerosol Outbreak over Nicosia, Cyprus, in April 2019: Case Study** |
| Type of the Article | **BOOK CHAPTER** |

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| PART 1: Comments | | |
|  | Reviewer’s comment | Author’s Feedback *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Please write a few sentences regarding the importance of this manuscript for the scientific community. A minimum of 3-4 sentences may be required for this part.** | **This manuscript presents a detailed study of an extreme atmospheric aerosol outbreak over Nicosia, Cyprus, in April 2019, providing valuable insights into aerosol dynamics in the Eastern Mediterranean, a climate change hotspot. By analyzing aerosol optical depth, Ångström exponent, single scattering albedo, and other parameters, the study enhances understanding of the physical and optical properties of aerosols during such events. Combining AERONET sun-photometer data, lidar observations, and HYSPLIT trajectory analysis, it confirms the Saharan origin of the aerosol and quantifies its radiative forcing effects. This research contributes significantly to the scientific community by offering critical data for regional climate modeling and understanding aerosol impacts on radiative balance.** |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | **The current title, "Atmosphere aerosol outbreak over Nicosia, Cyprus, in April 2019: case study", is informative and gives a clear idea of the article's focus. However, it could be improved for better clarity and engagement. A possible alternative title could be:**  **"Analysis of a Major Aerosol Outbreak Over Nicosia, Cyprus: Insights from the April 2019 Event"** |  |
| Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here. | **Suggestions for Improvement:**   1. **Clarify the research significance: The abstract should emphasize why this study is important, particularly in the context of climate change, regional radiative forcing, and aerosol-climate interactions.** 2. **Highlight key findings more concisely: Reduce technical jargon (e.g., "Ångström exponent" can be briefly described as "a measure of aerosol particle size") and focus on the broader implications of the findings.** 3. **Incorporate broader impact: Briefly mention how these findings contribute to advancing climate models or understanding aerosol impacts on human health.** 4. **Avoid overly detailed data points: While specific measurements (e.g., "AOD exceeded 0.9 at λ = 500 nm") are useful, summarizing them in plain language makes the abstract more accessible.** |  |
| **Is the manuscript scientifically, correct? Please write here.** | **Based on the content presented in the manuscript, it appears to be scientifically rigorous, well-researched, and based on established methodologies. The study uses robust tools and approaches, such as AERONET solar photometer data, lidar measurements, and HYSPLIT background analysis, which are widely recognized in the atmospheric science community. The discussion is thorough and supported by visual data, such as figures showing aerosol optical depth, size distribution, and radiative forcing. In addition, the paper reviews the findings of previous studies and the climate impacts in the Eastern Mediterranean region. For further improvement, please consider the following comments:**  **Methodology: The combination of ground-based observations and modeling (AERONET, lidar, HYSPLIT) ensures comprehensive data collection and interpretation.**  **Scientific rigor: Key parameters, such as AOD, Ångström exponent, single scattering albedo, and refractive index, are analyzed in detail to confirm the aerosol's Saharan origin.**  **Contextual significance: The study highlights the impact of the aerosol outbreak on radiative forcing, linking it to broader climate and air quality implications.**  **Potential Improvements:**  **Discussion of uncertainties: While the methodology is sound, the manuscript could benefit from a brief discussion of potential uncertainties in the data or limitations of the tools (e.g., HYSPLIT's assumptions or AERONET's calibration accuracy).**  **Interdisciplinary impact: The paper might also touch upon the broader implications of such aerosol events on human health, agriculture, or regional weather patterns.**  **Conclusion:**  **The manuscript appears to be scientifically correct and methodologically robust. However, addressing uncertainties and emphasizing interdisciplinary impacts could further enhance its contribution to the scientific community.** |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.** | **The manuscript includes a comprehensive list of references, many of which are well-established and relevant to the topic of aerosol studies, atmospheric modeling, and radiative forcing. However, there are areas where recent or additional references could enhance the manuscript’s relevance and depth. Below are observations and suggestions:**  **Strengths of the References:**  **Foundational references: The inclusion of key studies (e.g., IPCC reports, foundational aerosol studies like Dubovik et al., and HYSPLIT methodology papers) ensures that the manuscript is built on well-validated research.**  **Regional focus: References specific to aerosol events and dust transport in the Eastern Mediterranean (e.g., Amiridis et al., Papayannis et al.) establish the manuscript’s regional relevance.**  **Potential Gaps and Suggestions:**  **Recent Studies: While many references are highly relevant, some seem slightly dated. Incorporating studies published in the last 3-5 years could improve the manuscript's freshness. For example:**  **Advances in aerosol radiative forcing modeling and its integration into climate predictions.**  **Recent analyses of aerosol impacts on health or ecosystems in Mediterranean or semi-arid regions.**  **Updated assessments of Sahara dust dynamics using satellite data or newer lidar techniques.**  **Suggested recent works:**  **"Improved aerosol radiative effects from updated global aerosol climatology" by Malavelle et al. (2021) for radiative forcing updates.**  **"Advances in aerosol-cloud interactions: A review" by Seinfeld et al. (2021) to deepen the discussion on indirect aerosol effects.**  **Regional studies using MODIS and CALIPSO satellite data for broader comparisons with other Mediterranean locations.**  **Broader Impacts: The manuscript could include references to aerosol effects on human health or agriculture, particularly in Mediterranean climates where dust frequently impacts air quality.**  **1) DOI: https://doi.org/10.2205/2022ES000812 (Date of access 27.01.2025).**  **2) DOI:** [**http://doi.org/10.26480/jcleanwas.02.2021.78.84**](http://doi.org/10.26480/jcleanwas.02.2021.78.84)  **3)  doi:**[**10.38094/jastt42176**](https://doi.org/10.38094/jastt42176)**.**  **4) https://doi.org/10.1007/s11069-023-06232-2**  **5)** [**Evaluating land use plans in line with climate change adaptation policies in the Semnan Urban Region**](https://publish.mersin.edu.tr/index.php/igd/article/view/1485)  **6) https://doi.org/10.1007/s12524-024-01886-2** |  |
| Is the language/English quality of the article suitable for scholarly communications? | The language and English quality of the article are generally suitable for scholarly communication, as the manuscript uses technical terminology and formal tone appropriate for a scientific audience. However, there are some areas where the language could be improved for better clarity, fluency, and conciseness. |  |
| Optional/General comments | The manuscript presents a significant and well-executed study on aerosol dynamics over Cyprus, particularly during an extreme event in April 2019. The findings are relevant to both regional and global discussions on atmospheric science, climate change, and air quality. However, the manuscript can benefit from some refinements to enhance its overall impact and accessibility.  **Suggestions for Improvement:**   1. **Emphasize Broader Implications**:    * While the study is technically robust, the broader implications of the findings, such as their relevance to climate modeling, public health, or policy-making, could be highlighted more explicitly. For example:      + How do such events affect human health or visibility in urban settings like Nicosia?      + How can this data be used to inform mitigation strategies for air quality management? 2. **Improve Visual Presentation**:    * The figures are informative, but some graphs (e.g., aerosol optical depth variations) could be simplified or annotated to make them more user-friendly for readers less familiar with the topic. Highlighting key points directly in the figures could help. 3. **Address Data Uncertainties**:    * A brief section discussing the uncertainties or limitations of the measurements (e.g., calibration issues, HYSPLIT trajectory assumptions) would add credibility and transparency to the findings. 4. **Highlight Novelty**:    * While the manuscript compares the event to past studies, it could better highlight what makes this event or study unique. For instance:      + Is this the most comprehensive dataset for aerosol characterization in this region to date?      + Are there novel techniques or findings that set this research apart? 5. **Engage a Broader Audience**:    * While the manuscript is geared toward atmospheric scientists, adding a brief explanation of technical terms (e.g., Ångström exponent, single scattering albedo) in the introduction or footnotes could make it accessible to interdisciplinary researchers or policymakers.   **Conclusion:**  This manuscript provides valuable insights into aerosol dynamics, particularly in a region vulnerable to climate change. With adjustments to language, structure, and broader relevance, the study has the potential to make a strong contribution to the field of atmospheric sciences. |  |

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| **PART 2:** | | |
|  | **Reviewer’s comment** | **Author’s comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Are there ethical issues in this manuscript?** | *(If yes, Kindly please write down the ethical issues here in details)* |  |

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| **Reviewer Details:** | |
| Name: | **Vahid Isazade** |
| Department, University & Country | **University of Tehran, Iran** |