

Analysis of the Impacts Of Global Climate Phenomena (ENSO, Dipole Mode and MJO) to PM_{2.5} in Indonesia

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Abstract

Global climate phenomena and air pollution, especially PM_{2.5}, have a complex relationship and influence each other in Indonesia. Indonesia, as an archipelagic country located in a tropical region, is vulnerable to global climate change that occurs globally. PM_{2.5} are small particles that can penetrate the human respiratory system and enter the bloodstream, causing various health problems including respiratory disorders, cardiovascular disease, and even death. Apart from the impacts of the human activities (land burning, industrial activities, transportations), the increase of PM_{2.5} also connected to the climate change. This study aims to analyze the correlation of global climate phenomena, especially ENSO, Dipole Mode, and MJO, to PM_{2.5} in Indonesia. Model data of PM_{2.5} from Copernicus Atmosphere Monitoring Services (CAMS) is used to cover Indonesia area. This study presents the spatial correlation of PM_{2.5} and global climate phenomena. The results show that El Nino have higher correlation value, compare to La Nina, which range from -0.5 to 0.6. PM_{2.5} and -0.3 – 0.3, respectively. The correlation between PM_{2.5} and Dipole Mode have high value, ranging from -0.7 – 0.6. During El Nino and Positive/Negative Dipole Mode, areas prone to forest fires have a positive correlation with PM_{2.5}. Meanwhile, the Java region has a correlation value that is the opposite of the index when El Nino and Positive/Negative Dipole Mode occur. A better understanding of the relationship between global climate phenomena and air pollution, especially PM_{2.5}, is important for developing effective mitigation strategies. Measures such as sustainable forest management, diversification of energy sources, increasing transportation efficiency, as well as monitoring and enforcing regulations on industrial emissions can help reduce PM_{2.5} emissions and their negative impacts on human health and the environment in Indonesia.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

MAP-AQ: Monitoring, Analysis and Prediction of Air Quality, ACAM: Atmospheric Chemistry and the Asian Monsoon