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CHEMICAL COMPOSITON OF AIR IMPACTED BY FINE SAHARAN DUST IN NORTH-CENTRAL TEXAS, U.S.A.

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Abstract

Daily average measurements of particulate matter (PM) finer than 2.5 microns (PM_{2.5}) and component chemical species were compiled for an air monitoring station in north-central Texas, U.S. The monitoring station is approximately 10,000 km away from sources of dust in northern Africa. One group (SD) of data was impacted by five Sahara dust events in June and July of 2018 and 2020, as confirmed by satellite imagery and atmospheric modeling. A second group (NSD) consisted of 10 background days in the same four months. At a 99% confidence interval, significantly different concentration profiles between groups were observed for PM_{2.5} and several chemical species: aluminum, iron, titanium, silicon, strontium, potassium, zirconium, ionic sodium, and nitrate. Results of this study advance our understanding of the composition of far-traveled, dust-laden air masses. An implication of this study is that PM_{2.5} concentration profiles impacted by Saharan dust should not be used to evaluate outcomes of regional emission reduction programs.

Key words: atmospheric modeling, fine particulate matter, monitoring, Saharan dust, Texas

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