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## A LARGE SILICON-ALUMINUM AEROSOL PLUME IN CENTRAL ILLINOIS: NORTH AFRICAN DESERT DUST?

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**Abstract:** During a summer atmospheric chemistry field project in central Illinois in 1979, unusually high concentrations of Si, Al, and other earth's crust elements were observed simultaneously in two series of 2-h aerosol samples collected at sites separated by about 20 km. The Si-Al "event" persisted for about 32 h, and was accompanied by winds shifting from east through north as a weak low pressure area moved eastward across southern Illinois, and a nearly stationary front moved back and forth across the study area. Comparison of aerosol Si/Al and Ca/Al ratios during the event with those in possible sources showed that local soils, coal flyash, and Al smelter emissions were unlikely sources of the observed plume, and focused the investigation on distant dust sources. Climatology favors north Africa over the western United States as a source of desert dust in summer. Forty-eight hour back-trajectories from Illinois show flow from the Gulf of Mexico. Temperature and humidity soundings at Key West, Florida, three days before the onset of the dust plume in Illinois, showed a typical "Sahara air" profile, and simultaneous mineral dust measurements at Miami indicated a strong influx of North African dust at the same time. The evidence indicates that North African dust is the most likely source of the observed high concentrations of Si and Al in central Illinois in July 1979, and illustrates that long range transport can influence air quality at great distances from source areas. Copyright © 1996 Elsevier Science Ltd

*Key word index:* Desert dust, long-range transport, clay minerals, African dust, mineral aerosols.