Dust from distant lands may affect climate and health in the Americas and Europe

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Residents of the southern United States and the Caribbean have seen it many times during the summer months—a whitish haze in the sky that seems to hang around for days. The resulting thin film of dust on their homes and cars actually is soil from the deserts of Africa, blown across the Atlantic Ocean.

Now, there is new evidence that similar dust storms in the arctic, possibly caused by receding glaciers, may be making similar deposits in northern Europe and North America, according to Joseph Prospero from the University of Miami in a February 19 presentation to the American Association for the Advancement of Science.

"Our recent work in Iceland has shown that most of the dust events there are associated with dust emitted from glacial outwash deposits, which may be carried into the northern latitudes and into Europe by synoptic weather events," says Prospero, professor of marine and atmospheric chemistry at the University of Miami Rosenstiel School of Marine and Atmospheric Science, in his talk "Intercontinental Dust Transport: The Linkage to Climate and its Environmental Impact."

Satellite data have shown large dust plumes in the arctic, but persistent cloud cover has made finding the origins difficult. The glaciers have been retreating in Iceland for decades, and the trend is expected to continue with the changing climate. Prospero predicts that dust activity from the newly exposed glacial deposits will most likely increase in the future in Iceland and possibly from other glacial terrains in the Arctic.

Prospero's lifelong work has been to measure the effects of airborne dust. Since 1965, he and his colleagues have been measuring dust particles in Barbados, West Indies, thus creating the longest dust measurement data set in science. They found that dust transport increased greatly during the late 1960s and early 1970s at the same time as a severe drought in Northern Africa.

"The first 30 years of the dust record showed a strong relationship between dust transport across the ocean to rainfall amounts in the Sahel and Soudan regions of Africa," says Prospero. "It's important to note that the level of dust transport is not necessarily related directly to rainfall but possibly to other climate factors associated with the variability of rainfall."

Some of the most intense periods dust transport are associated with strong El Nino events, which may affect such factors as wind speeds and variability as well as rainfall—the same factors that affect dust mobilization and transport. However, since the late 1990s, the pattern of drought and dust transport has been disrupted—dust transport rates were actually greater than what Prospero's earlier model would indicate.

"We still have work to do to understand the fundamental processes and relationship between climate, rainfall, and dust transport," says Prospero. "Predicting the long-term effects of climate and dust transport is exacerbated by the fact that many of the climate prediction models for lower latitude Africa are not consistent."

Also needing more study is whether the dust particles pose any health threat to the people below. More than half of the particles in the dust mass transported over the Atlantic to the Americas is smaller than 2.5 microns, defined as "respirable particles" by the United States Environmental Protection Agency. Over the Caribbean region, the atmospheric concentration of fine dust particles frequently is within the

range of and sometimes exceeds the US EPA's standards for respirable particles.

"Although to date there is no strong evidence that African dust constitutes a health hazard, this possible impact would seem to warrant study especially since some climate change projections show increased dust transport in the future," concludes Prospero.

Provided by University of Miami Rosenstiel School of Marine & Atmospheric Science