

AFRICAN DUST AND HEALTH

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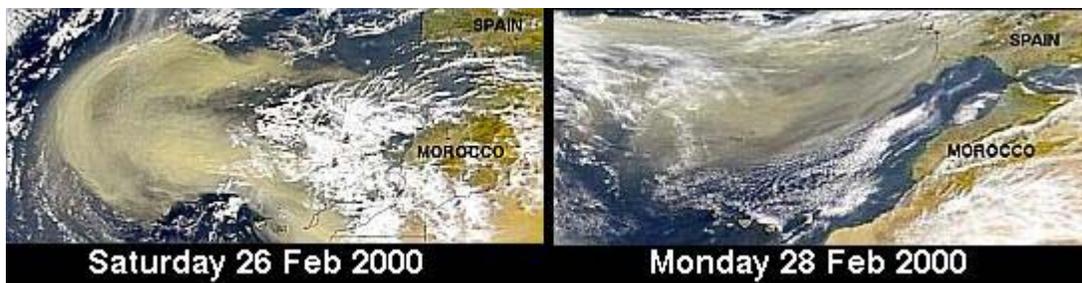
A study to identify microbes and pollutants transported across the Atlantic Ocean in the African soil dust.

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The United States Geological Survey Center for Coastal Geology in St. Petersburg, FL in collaboration with NASA/Goddard Space Flight Center began a study to identify microbes and pesticides transported across the Atlantic in African soil dust. Atmospheric transport of dust from North Africa to the western Atlantic Ocean region may be responsible for a number of environmental hazards, including the demise of Caribbean corals, red tides, amphibian diseases, increased occurrence of asthma in humans, and decrease of oxygen (eutrophication) in estuaries. Outbreaks of other unexplained environmental changes also may be attributable to the influx of African dust. The progress of the dust events is being detected and monitored via satellite imagery (e.g. SeaWiFS, ORBIMAGE, TOMS). Studies of these satellite images suggest that hundreds of millions of tons of dust are transported annually at relatively low altitudes across the Atlantic Ocean from the expanding Sahara Desert in Africa to the Caribbean Sea and southeastern United States.

It had been assumed that the ultraviolet radiation from the sun would kill microbes during the 5- to 7-day trip across the Atlantic Ocean, but scientists have discovered that hundreds of viable microorganisms are making the aerial journey. The studies, so far indicate that hundreds of viable microorganisms are making the aerial journey in each gram of dust apparently protected within the particles or shielded by overlying dust clouds. Of special interest in this study is asthma, which is becoming prevalent in Puerto Rico, Barbados and Trinidad.

A massive sandstorm blowing off the northwest African desert has blanketed hundreds of thousands of square miles of the eastern Atlantic Ocean with a dense cloud of soil dust from the Sahel and Sahara region. The massive nature of this particular storm was first seen in a SeaWiFS image on Saturday, 26 February 2000 when it reached over 1000 miles into the Atlantic. These storms and the rising warm air can lift dust 10,000 feet or so above the African deserts and then out across the Atlantic. During summer months these dust clouds frequently reach the Caribbean, Gulf of Mexico and the southeastern US. In the Caribbean they on occasion require the local weather services to issue air pollution alerts as was recently the case in San Juan, Puerto Rico. Recent studies by the U.S. Geological Survey (http://catbert.er.usgs.gov/african_dust/) have linked the decline of Atlantic coral reefs in the Caribbean to the increasing frequency and intensity of African Dust events. By March 4th, the cloud of dust had reached the northeast coast of South America.



These images show one of the largest Saharan dust storms ever observed by SeaWiFS.

The smallest particles (one micrometer) were found to contain 2 parts per million of the element mercury and as much as 60 parts per million Arsenic, which is many times greater than amounts normally found in the air. The mercury and Arsenic may have originated from open-pit mines in Algeria and from the rock formations from which the mercury is mined.

At the first sign of locust, the countries in North Africa in the Sahel region apply large amounts of pesticides, including those banned in the U.S. to fight the pests. These pesticides are also present in the dust reaching the Caribbean and southern U.S. and have been found accumulating in small quantities in drinking water cisterns in the Virgin Islands. African locusts have been known to take flight in the dust and reach Caribbean islands.

It has long been known that dust is transported from remote areas of the world, but the environmental impact of this dust is only now becoming more clearly understood.

Partners:

Scientists of the U.S. Geological Survey's (USGS) Coastal and Marine Geology Program and Biological Resources Division, in cooperation with The American Academy of Environmental Medicine, University of South Florida, University of Miami (Florida) and Florida International University.

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