

Chemical contaminants, globally transported dust and downstream ecosystems

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Viable microorganisms, macro- and micronutrients, trace metals and a variety of chemical contaminants, predicted to be carried in global dust systems and deposited in the oceans and on land, may play important roles in the complex changes occurring in downstream ecosystems. We are specifically focusing on coral reef and human health. Every year, hundreds of millions of tons of African dust are transported from the Sahara and Sahel across the Atlantic to the Caribbean, and southeastern U.S. A similar global system transports dust from the Gobi and Takla Makan deserts across Korea, Japan, and the northern Pacific to the Hawaiian Islands. The Asian system periodically reaches the western U.S. and at times transits North America to the western Atlantic Ocean. Fine soil particles have been transported globally for millions of years, however the quantities of dust have increased dramatically since the early 1970s. Global climate systems, local meteorology, geomorphology of source areas, and regional land use practices affect the quantities of dust transported. The quality of the dust has also changed. Dust may transport a variety of microorganisms and chemicals that hitch hike on or within the small particles. We have recently begun a pilot project to test our hypothesis that Sahelian dust air masses transport chemical contaminants (from the burning of biomass and waste, and use of antibiotics, pharmaceuticals, and pesticides in dust source regions) thousands of kilometers to the Americas, and that those contaminants may be working synergistically to adversely affect coral reef and human health.