

Garrison, V. H., C. A. Kellogg, R. S. Carr, W. T. Foreman, M. S. Majewski, M. Nipper, S. L. Simonich and G. W. Smith. 2006. Do persistent organic pollutants, metals, and microbes transported with African dust contribute to disease on coral reefs? Eos Trans. AGU, 87(36), Ocean Sci. Meet. Suppl., Abstract OS24L-O1.

Abstract:

Persistent organic pollutants (pesticides, polychlorinated biphenyls, and polyaromatic hydrocarbons), metals, and viable pathogens have been identified in African dust air samples from the Caribbean and the Sahara. These findings support our hypothesis that African dust air masses transport biological and chemical contaminants, along with known nutrients, thousands of kilometers to the Caribbean and the Americas. Although global atmospheric systems have been transporting fine soil particles across oceans for millions of years, dust air-mass composition has changed over the past several decades as a result of human activities in both the source regions and the areas over which the dust traverses: burning of biomass and waste; widespread use of pesticides, plastics, and pharmaceuticals; and increased industrialization. The suite of persistent organic pollutants and some of the metals we have identified in dust air masses in the Caribbean and Saharan are known to be actively toxic, carcinogenic, mutagenic, or disruptive of endocrine systems in humans and other organisms, or to interfere with photosynthesis. Preliminary ecotoxicology tests indicate African dust collected in the Caribbean is highly toxic to the gametes and embryos of some marine organisms. In addition, a proven coral pathogen, *Aspergillus sydowii*, has been identified in dust air samples from the Caribbean and soil from the Sahara. These preliminary research findings offer support for our corollary hypothesis that the chemical and microbial contaminants transported with dust adversely affect downwind coral reefs and human health. Based on these latest findings and the ecotoxicology literature, we present plausible pathways and processes by which nutrients, microbes, and pollutants in African dust may play a role in disease on coral reefs. Is it a coincidence that coral reef declines began at the same time that the quantities of dust transported from Africa increased and the composition of the dust changed?