5.123 Rapid increases in dust storm activity and valley fever infection in the southwestern United States.

Presenting Author:
Daniel Tong, NOAA Air Resources Lab & George Mason University, daniel.tong@noaa.gov

Co-Authors:
Julian Wang, NOAA Air Resources Lab
Binyu Wang, George Mason University
Pius Lee, NOAA Air Resources Lab
Thomas Gill, University of Texas at El Paso

Abstract:

We present here our recent efforts to develop the National Climate Assessment Dust Indicator to document the trend of windblown dust emissions in the western United States. Climate models consistently predict unprecedented drought risk in the American Southwest and Central Plains, arousing fear of another “Dust Bowl” in the coming decades. To examine the trend in dust emissions, a novel dust identification algorithm is developed to reconstruct dust records from the IMPROVE surface aerosol monitoring network. This method separates dust aerosols from other aerosol types using five criteria: 1) high PM_{10} and $PM_{2.5}$ concentrations; 2) a low ratio of $PM_{2.5}$ to PM_{10}; 3) high concentrations of crustal elements (Si, Ca, K, Fe, Ti); 4) low concentrations of anthropogenic pollutants (As, Zn, Cu, Pb, etc); and 5) low enrichment factors of anthropogenic pollution elements (Cu, Zn, Pb, K). Using this approach, 25-year dust storm climatology is reconstructed in the western United States. The new dust climatology reveals a rapid increase in dust storm activity in the southwestern United States. A total of 2260 dust events were recorded from 1988 to 2013 at 23 sites. There were approximately 20 dust storms per year recorded at these sites in the 1990s, but more than doubled in the 2000s (48 storms per year). Although the trend is not monotonic, the increasing trend is significant, with the calmest year in the 2000s seeing a comparable number of dust storms to that in the dustiest year in the 1990s. Meanwhile, the Center for Diseases Control and Prevention has reported a sharp increase in valley fever (*Coccidioidomycosis*), an infection caused by inhalation of a soil-dwelling fungus. The incidence rate of valley fever has increased by eight-fold from 1998 in 2011 in the same regions where we detected increased dust activity.