

Dust-plumes power intercontinental microbial migrations

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Along with pollutants from Asia, transpacific dust plumes deliver vast quantities of microbes to North America, according to a manuscript published online ahead of print in the journal *Applied and Environmental Microbiology*.

"We detected thousands of unique [microbial species](#), many of which seem particularly well-suited for atmospheric transport," says first author David J. Smith, a graduate student at the University of Washington, Seattle. "We also detected archaea, a domain of life that has never before been sampled at [high altitude](#). We are just starting to understand the consequences of long-range microbial transport."

"Over 70 million tons of Asian aerosols—mostly dust—reach our continent every year," says Smith. "There could be thousands of microbes per gram of dust. Do the math. The number is staggering. Distant continents are essentially sneezing on each other."

Although the research is basic, Smith foresees value in understanding how bacteria survive at high altitudes during intercontinental journeys. For example, identifying the mechanisms for resisting [ultraviolet radiation](#) at altitude, which likely involve protecting and repairing DNA, could prove invaluable to biotechnology and medicine, says Smith. "It is difficult to predict specific breakthroughs and applications, but studying microbes in [extreme environments](#) has had practical benefit before," he says, mentioning discovery of a thermostable enzyme from microbes in the hot springs of Yellowstone National Park, which proved invaluable

to [Polymerase Chain Reaction](#). Additionally, developing [predictive models](#) of disease dispersal via the tradewinds "could be of tremendous value to farmers," says Smith.

The research took place at an observatory perched on the summit of a volcano in the Pacific Northwest, says Smith. "We could process huge volumes of air, 24/7, and capture enough biomass to analyze airborne microorganisms using molecular methods." Two major pollution events emanating from Asia during the sampling season of 2011 helped the team distinguish Asian expatriate microbes from locals, along with chemical and meteorological methods, says Smith.

The research was physically challenging. "Mt. Bachelor is a very snowy place and one of the windiest mountains in North America," says Smith. "Some summit days were an endurance marathon. Wearing latex gloves when it's 20 degrees below zero is not fun. But it was a worthwhile sacrifice for science, and I would happily do it again."

Conducting the research also changed how Smith views the sky. "Now when I look at the clouds, I see microbial sanctuaries," he says.

More information: A PDF of the manuscript can be found online at bit.ly/asmtip1212a. Formal publication is scheduled for the February 2013 issue of *Applied and Environmental Microbiology*:

D.J. Smith, H.J. Timonen, D.A. Jaffe, D.W. Griffin, M.N. Birmele, K.D. Perry, P.D. Ward, M.S. Robert, 2012. Intercontinental dispersal of bacteria and archaea in transpacific winds. *Appl. Environ. Microbiol.* (E-pub ahead of print 7 Dec. 2012).

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