Loess landscapes could be major source of dust

September 3 2013

Dust, which affects weather and climate and can be hazardous to health, can be generated when sand or silt grains are either dislodged from the surface by other windblown grains (saltation) or lifted by wind directly (direct entrainment). Direct entrainment of silt has been thought to generate only minimal quantities of dust, and atmospheric models that include dust usually assume that dust generation occurs through saltation.

To test dust emission mechanisms, Sweeney and Mason conducted field and laboratory experiments with samples with varying dust grain size from the Peoria Loess in the central Great Plains of Nebraska. Loess is formed through accumulation of wind-blown dust and composed mainly of silt-sized particles. Scientists have believed that these landscapes should not be major sources of dust.

Through their experiments, the authors determine the threshold wind velocity needed to generate dust through direct entrainment of various size grains from the loess. They find that most dust generation from loess does occur by direct entrainment with fairly moderate wind velocities, while saltation was rare, contrary to expectations.

The results indicate that dust generation from the Peoria Loess could have been significant over geologic time scales. The authors suggest that a dry, windy climate, combined with lower vegetation density in the past, could have led to large-scale erosion of the Peoria Loess in Nebraska, causing the formation of wind-aligned ridges that have been observed.

Furthermore, the study shows that, in general, if loess landscape surfaces are exposed to wind, perhaps through changes in vegetation cover or land use, they could potentially become major sources of dust, with potential implications for climate, weather, and human health.

More information: Sweeney, M. and Mason, J. Mechanisms of dust emission from Pleistocene loess deposits, Nebraska, USA, *Journal of Geophysical Research-Earth Surface*. DOI: 10.1002/jgrf.20101 , 2013 onlinelibrary.wiley.com/doi/10 … /jgrf.20101/abstract

Provided by American Geophysical Union