Earth is getting dustier, model suggests

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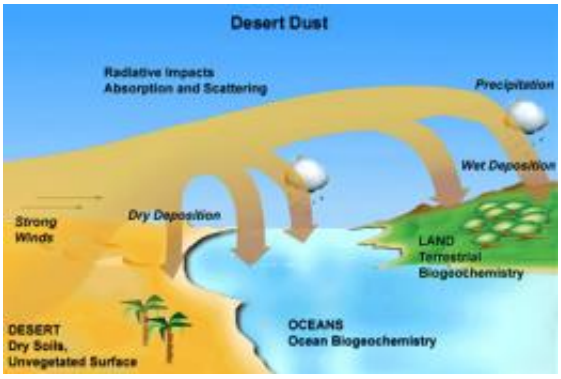

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(PhysOrg.com) -- If the house seems dustier than it used to be, it may not be a reflection on your housekeeping skills. The amount of dust in the Earth's atmosphere has doubled over the last century, according to a new study; and the dramatic increase is influencing climate and ecology around the world.

The study, led by Natalie Mahowald, associate professor of earth and atmospheric sciences, used available data and computer modeling to estimate the amount of desert dust, or soil particles in the atmosphere, throughout the 20th century. It's the first study to trace the fluctuation of a natural (not human-caused) aerosol around the globe over the course of a century.

Mahowald presented the research at the fall meeting of the American Geophysical Union in San Francisco Dec. 13.

Desert dust and climate influence each other directly and indirectly through a host of intertwined systems. Dust limits the amount of solar radiation that reaches the Earth, for example, a factor that could mask the warming effects of increasing atmospheric carbon dioxide. It also can influence clouds and precipitation, leading to droughts; which, in turn, leads to desertification and more dust.

Ocean chemistry is also intricately involved. Dust is a major source of iron, which is vital for plankton and other organisms that draw carbon out of the atmosphere.

To measure fluctuations in desert dust over the century, the researchers gathered existing data from ice cores, lake sediment and coral, each of which contain information about past concentrations of desert dust in the region. They then linked each sample with its likely source region and calculated the rate of dust deposition over time. Applying components of a computer modeling system known as the Community Climate System Model, the researchers reconstructed the influence of desert dust on temperature, precipitation, ocean iron deposition and terrestrial carbon uptake over time.

Among their results, the researchers found that regional changes in temperature and precipitation caused a global reduction in terrestrial carbon uptake of 6 parts per million (ppm) over the 20th century. The model also showed that dust deposited in oceans increased carbon uptake from the atmosphere by 6 percent, or 4 ppm, over the same time period.

While the majority of research related to aerosol impacts on climate is focused on anthropogenic aerosols (those directly emitted by humans through combustion), Mahowald said, the study highlights the important

role of natural aerosols as well.

"Now we finally have some information on how the desert dust is fluctuating. This has a really big impact for the understanding of climate sensitivity," she said.

It also underscores the importance of gathering more data and refining the estimates. "Some of what we're doing with this study is highlighting the best available data. We really need to look at this more carefully. And we really need more paleodata records," she said.

Meanwhile, the study is also notable for the variety of fields represented by its contributors, she said, which ranged from marine geochemistry to computational modeling. "It was a fun study to do because it was so interdisciplinary. We're pushing people to look at climate impacts in a more integrative fashion."

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