Acidic clouds nourish world's oceans

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Scientists at the University of Leeds have proved that acid in the atmosphere breaks down large particles of iron found in dust into small and extremely soluble iron nanoparticles, which are more readily used by plankton.

This is an important finding because lack of iron can be a limiting factor for plankton growth in the ocean - especially in the southern oceans and parts of the eastern Pacific. Addition of such iron nanoparticles would trigger increased absorption of carbon dioxide from the atmosphere.

"This could be a very important discovery because there's only a very small amount of soluble iron in the ocean and if plankton use the iron nanoparticles formed in clouds then the whole flux of bioavailable iron to the oceans needs to be revised," says Dr Zongbo Shi, lead author of the research from the School of Earth and Environment at the University of Leeds.

Water droplets in clouds generally form around dust and other particles. When clouds evaporate, as they often do naturally, the surface of the particle can become very acidic. This is especially true where the air is polluted.

Paradoxically, scientists suggest that large scale industry in countries like China could be combating global warming to some extent by creating more bioavailable iron in the oceans, and therefore increasing carbon dioxide removal from the atmosphere.

"Man made pollution adds more acid to the atmosphere and therefore may encourage the formation of more iron nanoparticles," says Dr Shi.

Scientists carried out the research by simulating clouds in the laboratory to which they added Saharan dust samples. They were then able to mimic natural conditions in order to monitor the chemical processes happening in the system. The laboratory experiments have been confirmed in natural samples where such cloud processing is known to have occurred.

The findings highlight the complexity of the pattern of natural iron delivery to the oceans, throwing new light on recent high profile plans to add iron to the southern oceans artificially to stimulate plankton growth.

"This process is happening in clouds all over the world, but there are particularly interesting consequences for the oceans. What we have uncovered is a previously unknown source of bioavailable iron that is being delivered to the Earth's surface in precipitation," says Professor Michael Krom, the principal investigator of the research, also at the University of Leeds.

More information: The research was published in the September issue of *Environmental Science and Technology*.

Source: University of Leeds (news : web)