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Clouds' role in global warming studied

By **Robinson Shaw**

A cloud's thickness and brightness, or its ability to reflect sunlight, influences how our planet heats and cools. Clouds can act as a natural shield by reflecting sunlight back into space, creating cooler temperatures. And clouds also wrap the skies like a blanket, sealing in warmth.

Until recently it was unclear how clouds will react when the Earth gets warmer. However, after three years of observations of low stratus, cumulus and stratocumulus clouds over land, Anthony Del Genio of NASA's Goddard Institute for Space Studies discovered that when air temperatures were higher, clouds were thinner and thus less capable of reflecting sunlight. These thinner clouds occurred regardless of weather conditions, season or time of day.

"The bottoms of the clouds rise with warmer temperatures, while the top of the cloud stays the same so the clouds become thinner," explained Del Genio. "When low clouds are present, warmer air flowing over land tends to be drier. As a parcel of dry air rises, it has to rise farther before it saturates with enough water to form the cloud base."

Del Genio disputes a theory that rising carbon dioxide levels would have only a slight impact on global temperatures because the theory doesn't take into account real world cloud behavior.

"The minimum amount of warming predicted by scientists should be increased by at least 1 F as a result of the new findings," said Del Genio.

Del Genio studied more than 3,000 individual cloud "snapshots" collected between 1994 and 1997 at the Department of Energy's Atmospheric Radiation Measurement Southern Great Plains field station.

"We concluded that over more than half of the world, when the temperatures were warmer, the low-level clouds reflect less sunlight, which will only exacerbate global warming," said Del Genio.

The link between cloud thinning and temperature was initially observed in 1992 over much of the world with long-term satellite observations. George Tselioudis, William Rossow and David Rind of the NASA Goddard Institute for Space Studies published the observation using the NASA-funded International Satellite Cloud Climatology Project database, a global composite of cloud observations from international weather satellites.

"In the larger context of the global warming debate I'd say we shouldn't look for clouds to get us out of this mess," said Del Genio. "This is just one aspect of

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clouds, but this is the part people assumed would make global warming less severe."

Del Genio and colleagues' research was published in the Oct. 1, 2000, issue of the American Meteorological Society's Journal of Climate.



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