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Clouds contribute to climate problems

Research shows clouds over Arctic regions emit infrared radiation, leading to global climate change

Michael Huang/Associate News Editor

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While most are aware that green house gasses contribute to global warming, which scientists have found can raise ocean water temperatures and change global climates, researchers at the University have found there may be another culprit behind global climate change: clouds.

The study found that clouds play a large role in melting Arctic ice because they emit far more infrared radiation than they reflect, said Jennifer Francis, an associate research professor at the Rutgers Institute of Marine and Coastal Sciences.

"It appears that in recent years the primary factor is an increase in infrared energy emitted downward from the atmosphere to the surface," Francis said, adding, "IR radiation is emitted by things like greenhouse gases, clouds, and water vapor."

With increasing trends in both cloudiness and water vapor over the Arctic Ocean during spring and summer, sea ice begins to melt, Francis said. As the ice melts, more solar energy is absorbed by the newly exposed unfrozen, ocean and in turn warms the water, causing more ice to melt on the sides and underneath, she said.

"If the sea ice melts, it does not contribute to sea level rise, as this ice is already floating," Francis said. "It does, however, have a large role in the global climate system and in the ecosystem of the Arctic region."

Research shows that the infrared radiation is at least as important as the solar radiation absorbed by the ocean, Francis said.

"Why are the clouds and water vapor increasing," Francis asked. "We're not sure yet, but we suspect it is related to the general warming of the global atmosphere, which enables the atmosphere to contain more water vapor, and this likely leads to more clouds," she said.

The loss of ice from the earth's oceans can mean a change in climate and can shift ecosystems.

"Many species of animals in the Arctic (including humans) depend on sea ice for their hunting methods and transportation, and we're already seeing huge shifts in populations of animals along Arctic coasts," Francis said. "Ice is a very good reflector of sunshine, so if we have much less ice and snow, the Earth will absorb more solar energy rather than reflecting it back to outer space, which will

further contribute to global warming."

Surprisingly, research showed that although clouds both block incoming solar radiation and emit infrared radiation to the Earth's surface, the emission effect substantially outweighs the blocking effect, Francis said.

The change in trends comes from data collected over 26 years from three satellite sensors, according to a prepared statement from the University. Two of the sensors measured clouds and the atmosphere, while the third measured the extent of ice coverage, according to the statement.

"The main reason for [arctic ice melting] is increased greenhouse gases that humans have added to the atmosphere, primarily since the industrial revolution," Francis said. "People living in the US produce more greenhouse gases per person than people from any other country, mainly because we use so much energy in the form of fossil fuels."

Francis said that while the effects of climate change would not be sudden and dramatic, but that humans will feel them eventually.

"Noticeable, damaging change is almost certainly in our future," she said, adding that solving such a problem will not be easy.

"[It] will require a combination of technological advances in alternative energies and efficiency, changes in individual behavior and mindsets toward issues like nuclear power and taxes for mass transit, and visionary leaders who are willing to make tough choices to reverse the trajectory of energy usage," Francis said.

Francis, as well as Elias Hunter, also a researcher at the Rutgers Institute of Marine and Coastal Sciences, have published their studies in a recent issue of "EOS Transactions," a weekly newspaper of geophysics that includes articles on current research and on the relationship of geophysics, according to their Web site.

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