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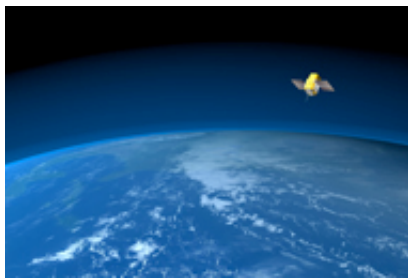
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Heads Up for Space Junk!

By Phil Berardelli
 ScienceNOW Daily News
 12 December 2006

SAN FRANCISCO, CALIFORNIA--Add the world's space agencies and satellite companies to those now worrying about the potential effects of global climate change. New research shows that while carbon dioxide buildup is warming the lower atmosphere, it's actually cooling the thermosphere, the outer edge of Earth's air that begins about 100 kilometers up. As a result, the thermosphere is becoming less dense, increasing the chances that space junk will hit the Hubble Space Telescope, the International Space Station, and other orbiting craft.

Smoother ride.

A thinning thermosphere means low-flying satellites and spacecraft will experience less drag while in orbit--but encounter more space junk.

Credit: UCAR

CO₂ in the lower atmosphere--called the troposphere--traps infrared radiation from the sun.

As molecules of the gas collide, they release that radiation in the form of heat, causing atmospheric temperatures to rise. In the thermosphere, however, the opposite happens. When CO₂ molecules collide, the resulting heat energy radiates into space and makes the thermosphere cooler and less dense than other layers.

In a presentation here yesterday at the annual meeting of the American Geophysical Union, atmospheric scientist Stan Solomon of the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, quantified the effect of climate change on the thermosphere. Solomon and co-researcher Liying Qian studied satellite data collected from NASA, the U.S. military, and private satellite companies. Using a climate model, they found that the current rate of CO₂ emissions will decrease the thermosphere's density 3% by 2017. That's good news for satellites and spacecraft, which have longer operational lifetimes when they're subjected to less drag. But it also means that defunct satellites and other space junk will stay in the thermosphere longer, posing an increased threat to important equipment.

"This is a big deal," says Kent Tobiska, president and chief scientist of Space Environment Technologies of Pacific Palisades, California, which provides NASA with space weather forecasting data. "The United States, Russia, China, India, and the other

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space-faring nations all need to be aware of the potential for collisions with space junk," Tobiska says. "As a result of this effect, it's become a bigger problem."

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