Smog may boost storms, NASA finds

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Courtesy NASA and World Science staff

Summertime storms in the southeastern United States are worse at midweek than on weekends, NASA scientists say—and air pollution is the likely culprit.

Data from the agency's Tropical Rainfall Measuring Mission satellite showed midweek storms tend to be stronger, rainier and wider than on weekends, the researchers reported, while air pollution also peaks midweek.

"It appears that we're making storms more violent," said Thomas Bell, an atmospheric scientist at NASA's Goddard Space Flight Center in Greenbelt, Md., lead author of the study published online this week in the Journal of Geophysical Research.

The findings are separate from those of other studies that suggest human-induced global warming may exacerbate storms in the long term. Still other research has contradicted that idea.

Bell's team used the satellite data to estimate daily summertime rainfall averages from 1998 to 2005.

On average, they found it rained most between Tuesday and Thursday; the increases were highest in the afternoons, when conditions for summertime storms peak. Maximum afternoon rainfall was found on Tuesdays, with 1.8 times more rainfall than on Saturday afternoons.

The team used ground-based data to help confirm the weekly trend in rainfall seen from space. To learn whether pollution could be responsible, they also analyzed nationwide pollution data for 1998 to 2005 from the Environmental Protection Agency. Pollution tended to peak at midweek, mirroring the rainfall trend, they added.

"It doesn't mean one caused the other," Bell said. "But it's well known that particulate matter [pollution] has the potential to affect how clouds behave."

Scientists long have questioned the effect of workweek pollution, such as emissions from traffic, businesses and factories, on weather patterns. Clouds are "seeded" by particles in the air. Water and ice in clouds grab hold around the particles, forming additional water droplets. Some types of particles are pollution.

A number of scientists think more pollution thwarts rainfall by dispersing the same amount of water over more seeds, preventing them from growing large enough to fall as rain. Still, other studies suggest some factors can override this effect.

In the Southeast, summertime conditions for large, frequent storms already prevail, which overrides the rain-thwarting dispersion effect, according to Bell's team. When conditions favor big storms, they explained, updrafts carry the smaller, pollution-seeded raindrops high up where they condense and freeze. "It's the freezing process that gives the storm an extra kick, causing it to grow larger and climb higher into the atmosphere," Bell said.

Image: Massive accumulations of rain (red) from a 2003 storm in the South east. Data from NASA's TRMM satellite has found that more rain falls mid week. (Credit: NASA)