

# Jet contrails affect surface temperatures

June 18 2015

---

High in the sky where the cirrus ice crystal clouds form, jet contrails draw their crisscross patterns. Now researchers have found that these elevated ice cloud trails can influence temperatures on the ground and affect local climate, according to a team of Penn State geographers.

"Research done regarding September 2001, during the three days following 9-11 when no commercial jets were in the sky, suggested that contrails had an effect," said Andrew M. Carleton, professor of geography. "But that was only three days. We needed to look longer, while jets were in the air, to determine the real impact of contrails on [temperature](#) and in terms of climate."

"Certain regions of the U.S. have more favorable atmospheric conditions for contrails than others, " said Jase Bernhardt, graduate student in geography.

For contrails to form, the atmosphere at the level the jet is flying must be cold enough that the moisture from the jet exhaust freezes into ice crystals. There also must be enough moisture in the air that the clouds that form remain in the sky for at least a few hours as persisting contrails.

Bernhardt and Carleton looked at temperature observations made at weather station sites in two areas of the U.S., one in the South in January and the other in the Midwest in April. They paired daily temperature data at each contrail site with a non-contrail site that broadly matched in land use-land cover, soil moisture and air mass conditions. The contrail

data, derived from satellite imagery, were of persisting contrail outbreaks. The researchers reported their results in a recent issue of the *International Journal of Climatology*.

They found that contrails depress the difference between daytime and nighttime temperatures, typically decreasing the maximum temperature and raising the minimum temperature. In this respect, the contrail clouds mimic the effect of ordinary clouds.

The researchers report that the "diurnal temperature range was statistically significantly reduced at outbreak stations versus non-outbreak stations." In the South, this amounted to about a 6 degree Fahrenheit reduction in daily temperature range, while in the Midwest, there was about a 5 degree Fahrenheit reduction. Temperatures the days before and after the outbreaks did not show this effect, indicating that the lower temperatures were due to the contrail outbreaks.

"Weather forecasting of daytime highs and lows do not include contrails," said Carleton. "If they were included in areas of contrail outbreaks, they would improve the temperature forecasts."

Provided by Pennsylvania State University

Citation: Jet contrails affect surface temperatures (2015, June 18) retrieved 11 July 2024 from <https://phys.org/news/2015-06-jet-contrails-affect-surface-temperatures.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.