

# Aircraft contrails stoke planet warming, cloud formation

BY ALISTER DOYLE, REUTERS MARCH 30, 2011

Aircraft condensation trails criss-crossing the sky may be warming the planet on a normal day more than the carbon dioxide emitted by all planes since the Wright Brothers' first flight in 1903, a study said on Tuesday.

It indicated that contrails -white lines of vapour left by jet engines -also have big knock-on effects by adding to the formation of high-altitude, heat-trapping cirrus clouds as the lines break up.

The findings may help governments fix penalties on planes' greenhouse gas emissions in a UN-led assault on climate change. Or new engines might be designed to limit vapour and instead spit out water drops or ice that fall from the sky.

"Aircraft condensation trails and the clouds that form from them may be causing more warming today than all the aircraft-emitted carbon dioxide (CO<sub>2</sub>) that has accumulated in the atmosphere since the start of aviation," the journal Nature Climate Change said in a statement of the findings.

The study, by experts at the DLR German Aerospace Center, estimated that the net warming effect for the Earth of contrails and related cirrus clouds at any one time was 31 milliwatts per square metre, more than the warming effect of accumulated CO<sub>2</sub> from aviation of 28 milliwatts.

A milliwatt is a thousandth of a watt. Aviation emissions now account for about three per cent of annual CO<sub>2</sub> emissions from fossil fuels, more than a century since Orville and Wilbur Wright made the first powered airplane flight.

But a key difference is that CO<sub>2</sub> lingers for decades while warming from contrails quickly ends if flights are grounded, such as after the Sept. 11, 2001 attacks in the United States, or in Europe after last year's Icelandic volcano eruption.

"You can get rid of contrails very quickly. You can't get rid of CO<sub>2</sub> quickly," lead author Ulrike Burkhardt at DLR told Reuters.

The main climate effect of white lines and related cirrus clouds is to trap heat radiating back from the Earth's surface. They also have a smaller, counter-effect by slightly dimming sunlight and so slowing warming. Contrails are especially dense over parts of Europe and eastern United States.

"This is a breakthrough in modelling and understanding of contrails," Olivier Boucher, of the Met Office Hadley Centre in England who wrote a related article in Nature, said.

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