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Climate change caused by vapour trails less significant than expected – but air traffic causes more cirrus cloud formation

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A jet's exhaust gas and vapour trail

Estimates by Intergovernmental Panel on Climate Change updated under leadership of DLR

It has been revealed that the effect of vapour trails on global climate change is much less than originally supposed. This is the conclusion reached recently by researchers from the German Aerospace Center (DLR) in Oberpfaffenhofen.

Since 1999, the estimates of the Inter-governmental Panel on Climate Change (IPCC) were considered the standard appraisal of the contribution of air traffic to climate change. Under the leadership of DLR, these figures have now been updated in a new publication (Sausen et al, 2005). According to the newly-published figures, the contribution of vapour trails is much (in fact three times) less than estimated by the IPCC in 1999. However, the contribution made by the aircraft-induced formation of cirrus clouds may be even greater than that presumed in 1999 (twice as high), although this is still not yet completely verified.

Because of the considerable uncertainty surrounding this contribution, we cannot say for sure that the contribution made by aircraft-induced cirrus cloud formation is entirely negligible.

Like vapour trails, aircraft-induced cirrus cloud formation cause global warming. The IPCC's conclusions as to the other effects of air traffic on climate change (including the increasing concentration of carbon dioxide, the accretion of ozone and the breakdown of methane caused by nitrogen oxide emissions) were confirmed. This study draws its information from a range of simulations and measurements taken over the last five years.

One of the most important of these was the EU project TRADE-OFF, the aim of which was to scrutinise more closely the chemical and climatic effects of air traffic.

This work appeared in a special volume published by the *Meteorologische Zeitschrift*, in which 15 scientifically verified contributions evaluate the results of the European conference organised by DLR in 2003: 'Aviation, Atmosphere and Climate'.

The subjects under discussion range from the particles emitted by aircraft to our influence on clouds and climate change. Another contribution (Mannstein and Schumann) demonstrates that vapour trails can grow to become cirrus clouds that cover an area about ten times the size of the original vapour trail.

The objective analysis of the effects of air traffic on the world's climate is one of DLR's key tasks, says Professor Joachim Szodrich, the member of DLR's Executive Board with responsibility for aviation and energy. The associated research activities at DLR are reflected in a variety of publications. In addition to the special volume mentioned above, further articles dedicated to topics such as the effect of aerosols from aircraft on cloud formation and strategies to reduce the climatic impact of aviation appear in other scientific journals (*Geophysical Research Letters, Atmospheric Physics and Chemistry, Transportation Research, Comptes Rendus Physique*).

The Inter-governmental Panel on Climate Change was established in 1988 by the WMO (World Meteorology Organisation) and UNEP (United Nations Environment Programme). The goal of the IPCC is to evaluate scientific, technical and socio-economic information to achieve a better understanding of the risks of climate change caused by human activity.

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