



Contrails

Frequently Asked Questions

What are contrails?

Contrails form when the warm moist exhaust from aircraft mixes with the cold drier ambient air producing ice crystal clouds. The nuclei of some of the ice crystals in a contrail will contain minute products of combustion but they are essentially ice.

Why can trails come from the aircraft tail and wings and not from the engines?

More than two contrails can sometimes be visible even behind a two engine jet aircraft. However, there are sources of contrails other than the engines such as the changes in pressure as air flows around the wing edges. Due to the laws of science there is a relationship between the pressure, volume and temperature of a gas. As the air flows over a vehicle, or aircraft, it undergoes a number of pressure changes which can result in it being cooler in parts. As the air cools it is less able to hold moisture so it condenses out as a vapour which is observed as a contrail. The vortices coming off the wing tips of aircraft are a common phenomenon.

Why do contrails seem to form grid like patterns in the sky?

Aircraft often follow similar routes separated by altitude, time, lateral distance and direction and that is why grid like patterns can be seen in the sky.

Why do some contrails disappear almost instantly whilst other are long lasting?

This is dependent on the ambient atmospheric conditions such as temperature, pressure and humidity. Contrails can grow and continue to spread forming persistent contrails that can last for several hours and become indistinguishable from naturally occurring cirrus clouds.

Why do some aircraft leave contrails and others don't, even when they seem to be flying at the same height?

Contrails of more efficient engines with cooler exhaust gases can form at lower altitudes than those of less efficient engines. Images from a German scientific paper showed an Airbus A340 (maiden flight: 1991) leaving contrails and a Boeing 707 (maiden flight 1957) not leaving contrails. Both were flying at 33,000 feet but the newer engines of the A340 produced more water vapour so made contrails.

A number of aircraft seen leaving contrails do not appear on any web tracking services – Why is this?

We are aware of web services that allow the tracking of flights. However, the Government are not responsible for any of these services. If an aircraft is not visible on a flight tracking service, it either does not have the correct transponder or it's out of coverage.

What exhaust gases do aircraft emit?

As well as water vapour (the primary exhaust emission); jet engines emit carbon dioxide, small amounts of un-burnt hydrocarbons, oxides of nitrogen and carbon monoxide. Such emissions are regulated by the International Civil Aviation Organization (ICAO). The latest assessment of emissions from aircraft can be found in this the most recent National Atmospheric Emissions Inventory report:

http://uk-air.defra.gov.uk/reports/cat07/1503131022_GB_IIR_2015_Final_v20.pdf

Are there any ill health effects caused by contrails?

There is no evidence that contrails cause health problems. The main impact of aviation on local air quality at ground level relates to emissions during the landing and take-off phase up to about 3000 feet. Above this height the oxides of nitrogen and particulate matter which can cause respiratory problems become dispersed.

Do contrails impact on climate change?

Whilst persistent contrails have an effect on the reflection of solar radiation, the Intergovernmental Panel on Climate Change Fifth Assessment Report states that the contribution from persistent contrails from aviation to climate change is around 100 times smaller than the effects of greenhouse gases.

What about geoengineering or weather modification programmes?

We are aware that other countries have used weather modification techniques known as cloud seeding with the usual intent to increase precipitation (rain or snow). Normally this cloud seeding is done from aircraft. The House of Commons Committee on Science and Technology in its report "The Regulation of Geoengineering" does not deem weather modification techniques as geoengineering which are seen as major projects used for the purpose to minimise or reverse the human impacts of climate change. The UK does not use cloud seeding, neither does it deploy geoengineering.

The Government's view on Geoengineering Research may be found here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/308979/Government_s_view_on_geo-engineering_research.pdf

[END]