Contrails, Chemtrails and Climate Change

OPSGROUP Team
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Putting 'climate change' in the title of a post on an aviation page probably isn't the best way to draw in the readers. But this is not a lecture. Promise.

So, what is it about?

It isn't about **chemtrails**. They aren't a real thing.

It is about **contrails**. The wispy bits of whatever that your airplane engines fart out as you fly, or the 'engine plumes' if prefer to imagine your airplane resembling something like a peacock.

Contrails are basically water vapour. They form when the exhaust gases from the engine starts to cool and mix with the air around them. The humidity rises, the water cools and condensation occurs.

A small, small proportion of what is burped out of the engine is not water though, but impurities from inside the engine.

Things like sulphur particles. It only makes up about 0.05%, but these tiny particles give the water something to freeze onto and they cause tiny ice crystals to form.

The peacock. This might be photoshopped…

So why do we care about this?

They are quite a useful indicator of **possible wake turbulence** for us, but aside from that (and unless you are one of the pilots who likes to draw amusing pictures in the sky with them) then we don't really care that much.

But maybe we should care a bit, because some contrails loiter up there for ages – these are known as *homomutatus* contrails. Frankly, anything which sounds a little like 'mutant' should cause concern, and these definitely do, because they are responsible for the word we shall not utter.

Ok, we will, just to be clear – **global warming.**

Not here to lecture though! Promise!

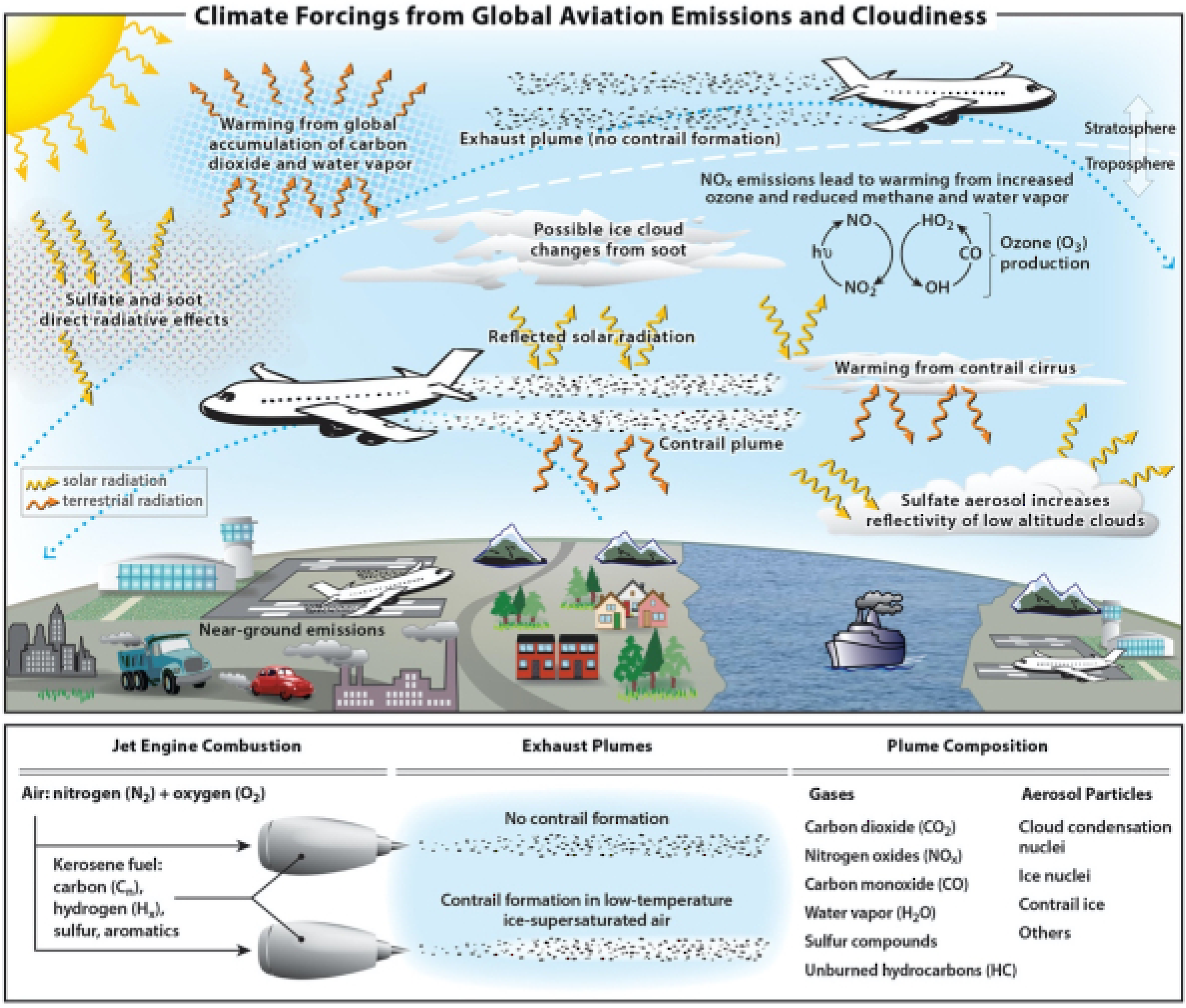
A little bit of science (still not a lecture)

So, the airplane burps out the water, it turns into contrails which then hang up there in the stratosphere. Aviation causes only about 5% of the water present in the stratosphere, so it isn't a terrible culprit.

Unfortunately, though, those homomutatus contrails, plus the extra water, plus the ice particles – all that stuff left up there by airplanes – causes terrestrial radiation to backscatter. It also stores up some of the radiation coming in and the result is something they call **'radiative forcing'**.

Basically, extra heating-up happens.

So, airplanes are spitting out C02 and contrails, and the contrails are thought to be responsible for something between 20% to about 40% of all the radiative forcing aviation causes to occur (they don't really know how much, but they reckon about that amount).



Just for info, not a lecture

So… why are we actually telling you if this isn't a lecture?

We're getting there, stay attentive!

Free Route Airspace (a big open area between 2 waypoints where you are routed in a straight-line between them) has already helped reduce fuel burn and C02 emissions. They reckon it saved about 40 tonnes of fuel a day, and reduced the C02 by about 150 tonnes a day.

So, the helping-the-environment plans are already helping you because it means **less fuel burn**.

ICAO and Eurocontrol, in conjunction with EDYY/Maastricht have now set up a project called the **Contrail Prevention Trial**.

The Contrail Prevention Trial will initially only take place in Maastricht and the plan is to sometimes **re-route aircraft** around atmospheric conditions that are most conducive to contrails.

The Contrail Prevention Trial

If you are routing through Maastricht airspace **you might find you are given a re-route**. It won't be huge, it might mean a little bit of an **increase in fuel burn**, but it will hopefully mean a **decrease in the contrails** your aircraft produces.

You won't really know, but some clever science person down on the ground hopefully will.

So, a little bit of science, no lecture, and some info on why, if you are routing through Maastricht sometime in 2021, you might be given a tactical diversion. Now you know why

Here is the **official announcement** on it, found on the Eurocontrol homepage:

CONTRAIL PREVENTION TRIAL – MAASTRICHT UAC (EDYY) AIRSPACE
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IN AN EFFORT TO MINIMISE THE IMPACT OF AVIATION ON THE
ENVIROMNENT, MUAC WILL BE RUNNING A CONTRAIL PREVENTION TRIAL FROM
18TH JANUARY 2021 UNTIL 31ST DECEMBER 2021 BETWEEN 1500-0500UTC
WINTER (1400-0400UTC SUMMER).

FLIGHTS MAY BE TACTICALLY REQUESTED TO DEVIATE FROM THE PLANNED/REQUESTED
FLIGHT LEVEL BY THE SECTOR CONTROLLER.

ANY FLIGHT FLYING VIA MAASTRICHT UAC SECTORS BETWEEN THESE TIMES
MAY BE CHOSEN. THE TRIAL WILL GO AHEAD DEPENDENT ON THE WEATHER
CONDITIONS.

MUAC AO HOTLINE +31 43 366 1428

NMOC ON BEHALF OF MAASTRICHT (EDYY) FMP
==

Unreliable Airspeed and the Hidden Risks of Aircraft Storage

Chris Shieff
29 January, 2021

The dramatic effect that Covid-19 has had on the aviation industry has **grounded an unprecedented**

number of aircraft. They have been placed into storage whilst the world waits to recover. The pandemic emerged without warning, and some operators were likely not prepared for what was coming.

Now travel bans are lifting, airports are reopening, and airlines are **scrambling to return aircraft to the skies.**

EASA recently released a disturbing Safety Information Bulletin. There has been an alarming trend in the number of aircraft experiencing unreliable speed and altitude indications during first flights after storage, caused by **contaminated air data systems.**

The result has been multiple rejected take offs and airborne returns. Most of the events have been caused by nesting insects in the pitot static system – **even after covers were installed.**

Modern flight instruments provide large amounts of information to crew with great precision, while automation makes flying transport category aircraft almost routine. Flight envelope protections and aural/tactile warnings keep us safe even in most abnormal scenarios.

At the heart of all of this is the **air data computer (ADC)** – a small piece of hardware that **needs accurate information from outside of the aircraft to work correctly**. They are the "Achille's heel" of modern electronic flight information systems. In a nutshell, these small computers obtain and process information from the aircraft's pitot static system, and supply critical systems with information such as airspeed, altitude and temperature.

Like all computers, they don't think for themselves. They are only as accurate as the information they receive. So, when the pitot static system is contaminated, they can only respond to what they sense. **They can't look out the window.**

History has shown that unreliable airspeed events are dangerous:

February 6, 1996. Birgenair Flight 301, a Boeing 757, departed Puerto Plata in the Dominican Republic, on a routine flight. During the climb out, the Captain's airspeed indicator began to increase dramatically. The autopilot reacted as designed, and increased pitch to reduce airspeed, while the auto-throttles reduced power.

In the meantime, the co-pilot's ASI indicated a dangerously slow airspeed which was decreasing. Almost simultaneously, an overspeed warning was generated. The autopilot reached the limits of its programming and disengaged. The stick-shaker activated, warning the confused crew that the aircraft was flying critically close to a stall.

The Captain responded by applying full thrust. The excessively high angle of attack resulted in insufficient airflow to match demand and the left-hand engine flamed out. The right-hand engine developed full power and the aircraft entered a spin. Moments later the aircraft became inverted, before impacting the Atlantic Ocean. The three pilots had 43,000 hours of experience between them.

The cause of the accident was a ***blockage of a single pitot tube****. The likely culprit was the black and yellow mud dauber – a small wasp known to nest in artificial cylindrical structures.* ***The aircraft hadn't flown in 20 days.***

The threat of similar events is greatly increased by **improper storage techniques** and **rushing to return to service.**

Getting aircraft flying again is a **complex process** and presents **major risks**. It is up to operators to ensure adequate procedures are in place to accomplish it safely. They must anticipate the difficulties and rapid adaptation to internal procedures that this entails.

Don’t know where to start? We don’t blame you. Thankfully, EASA has published guidance which can help mitigate some of these risks. Here is a brief rundown of their recommendations:

- **Assemble your A-team.** Everyone needs to be onboard. Flight operations, CAMOs, maintenance organisations, type certificate holders and aviation authorities are your first port of call. Find out what needs to be done for each individual tail number and communicate with human resources for manpower, supply chain for the tools, and flight ops for hangar spacing and crewing. Think about who you need to talk too and get started early.
- **Similar aircraft stored in similar conditions will invariably behave in the same way.** Safe return to service begins with **good data**. It is vital that defects are reported and linked. If a nest is found in an aircraft’s pitot tube, the odds are there will be many more. The data needs to be analysed, and operating procedures (**such as additional checks**) need to be changed to reflect it.
- **Storage Procedures.** It is possible that aircraft were not fully stored in accordance with manufacturer procedures. Implement a **rock-solid audit programme** to make sure things are being done properly. EASA recommend extra inspections, ground runs and flight testing of **at least ten percent** of aircraft before release to service.
- **Storage Environment** The storage environment presents significant hazards to airworthiness. Insects, sand, salt, dust and humidity can all damage aircraft. There may not have been enough protective covers to go around. Was there biocide in the fuel? Is it even useable? It is advised that extra checks be carried out on aircraft parts that are susceptible to contamination, **particularly pitot/static systems**. Get additional support to add those inspections.

- **Remote Storage** This presents unique challenges. Engineering services may be limited, and staff may become overwhelmed with the large number of aircraft waiting to become airworthy. You may need to send additional manpower or require ferry permits to move aircraft around. Is enough equipment on hand to complete extra checks?

- **Time.** Nothing happens in a day. **Commercial time pressure is a major risk factor.** Getting an airplane airworthy can cause delays and rushing has a profound effect on safety. Plan ahead and make sure your deadlines are realistic. Communicate them with your staff to ensure confidence.
- **Inappropriate decision making.** This is hazardous, particularly with unfamiliar procedures. Storage on this scale has never happened before and **answers may not be in existing manuals.** Key personal may not be immediately available to help. Remind staff not to act alone and create a team responsible for making decisions in this challenging scenario
- **Limited staff experience.** Remember that **this has never happened before** and you may need the help of staff who are new to your organisation. Make sure they are aware of internal procedures that they need to know beforehand. It is a good idea to **properly supervise them** and assess their work.

- **The elephant in the room. Covid-19.** The virus has changed the way we can work. Staff can’t move around as freely and there may be restrictions on how many people can work together. You may need to plan ahead and establish isolated teams who work remotely if practical.

- **Overdue maintenance.** Airworthiness directives, MELs, routine maintenance, inspections, ground runs, test flights. There is a lot to do**.** Start with comprehensive **airworthiness reviews** of each individual tail number.
- They will be under the same pressure that you are. Communicate with them ahead of time and **check their availability**.
- **Pilot training.** It is likely they are uncurrent, and operating aircraft which have just come out of long-term storage. **Simulator training should be relevant to the challenges they will face in the current operating environment.** Consider critical systems vulnerable to damage in storage and the affect that these might have on the first flight. In other words, expect the unexpected and provide them with the ability to **react quickly and with confidence.**

Covid-19 has created a lot of unknowns in our industry. Amongst the noise of statistics and global media, it is important to **remain vigilant** to the risks specific to aviation that the virus has created. Most of us will have heard by now that aviation itself is not inherently dangerous, but terribly unforgiving of complacency. Never has this been more important than when returning 75% of the world’s fleet from storage to the skies.