

Our new contrail avoidance trial in Asia-Pacific

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We're partnering with Cathay Pacific to test our AI-powered contrail mitigation technology, contributing valuable new data to global contrail research and advancing understanding of contrail formation and avoidance in the Asia-Pacific region.

Contrails are the thin, white streaks that form behind airplanes when they fly through cold, humid air. Most dissipate quickly, but some can persist and spread into cloud-like formations that contribute to warming by trapping heat in the atmosphere.

Contrails are responsible for roughly one-third of aviation's total climate impact. And over the past few years, our efforts to reduce them have evolved from AI research models to real-world trials in the United States, across the North Atlantic, and now, in the Asia-Pacific region, the world's fastest growing aviation market.

We're partnering with Cathay Pacific, our first commercial airline partner in Asia to test contrail avoidance on ultra-long-haul flights ¹. Our early trials ran over 80 flights and have achieved roughly 40% estimated reduction in the warming impact of contrails by following contrail-avoidance routes. We're now expanding the trials to provide insights across Cathay Pacific's Asia extensive global network, helping evaluate the operational feasibility of contrail avoidance while contributing to global contrails research.

Putting predictive AI into the cockpit

What's exciting about avoiding contrails is that it can be very straightforward in theory. Aircraft adjust their altitude slightly to steer clear of cold, humid atmospheric zones where warming contrails are likely to form, much like pilots do to navigate around turbulence. Pilots and flight teams routinely make these kinds of small, planned adjustments for a variety of operational reasons, always within established safety parameters. These adjustments are not expected to impact passengers or the safety of the flight. Adjusting flight altitudes for contrail avoidance in practice means giving flight teams actionable data long before an aircraft leaves the gate, and then feeds that data to the cockpit. Building on our previous work deploying the contrail solution in live operations, we're partnering with Cathay Pacific to expand its use into the Asia-Pacific region.

Our system brings together AI predictions, satellite imagery, and advanced weather intelligence to pinpoint these contrail-forming zones in advance, allowing dispatchers and pilots to plan slight altitude shifts around them. In the air, Cathay Pacific connects these dynamic forecasts directly to the flight deck through in-flight Wi-Fi and its proprietary Electronic Flight Folder (EFF), giving pilots live insights alongside usual operational metrics without interrupting standard cockpit workflows.

Moving from proof of concept to scalable trial

We started an operational trial with more than 100 flights targeted across Cathay Pacific's network. More than 80 flights followed contrail-avoidance routes, with Google's satellite imagery analysis estimating that these flights reduced the warming impact of contrails by roughly 40%. The Hong Kong-Singapore corridor was among the routes tested, as flights in this airspace frequently

encounter conditions conducive to persistent contrail formation. Analysis from the trial indicates that interventions on this single route account for more than 50% of the trial's total emissions reductions.

Now, we're scaling the partnership with Cathay Pacific on a larger second phase of trial flights and partnering with Contrails.org, a nonprofit initiative dedicated to advancing the science of contrail mitigation. The trials are helping build a broader understanding of how contrail avoidance could work across different operating environments on Asia and transpacific routes, and contribute to the growing body of global contrails research.

Contrail mitigation remains one of the most immediately available, scalable, and cost-effective ways to reduce aviation's climate footprint, and it can get started now, with today's aircrafts and fuel. By advancing open contrails research together, we hope to accelerate progress in contrail science and unlock one of the most promising and cost-effective climate solutions available to aviation today.

<https://blog.google/innovation-and-ai/models-and-research/google-research/contrail-avoidance-ultra-long-haul-flights>