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EDITION INDIA



Wednesday, Jul 31, 2024

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Behind Leh flight cancellations: high temperatures, low air

This faster-moving air then creates a lower pressure above the wing (as per Bernoulli's principle), when compared to the pressure under it. This difference in the pressure generates a force (called lift) underneath the wings that helps the aircraft take off.

Written by [Alind Chauhan](#)

Updated: July 31, 2024 07:46 IST





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The difference in the pressure over and under wings generates lift. (Image source: GettyImages)

Sizzling day-time temperatures in Leh, Ladakh, led to many flight cancellations on Sunday and Monday. While the mercury peaked at 33.5 degree Celsius on Sunday, it touched 31.8 degree Celsius on Monday. “High ground temperatures and runway restrictions in #Leh have necessitated the cancellation of all flights for today,” Indigo, posted on X on Monday.

Why did Leh’s high temperatures lead to flight cancellations? First, how do aircraft fly?

Aircraft wings are shaped such that their top is slightly more curved than the bottom. So when an aircraft begins to move, the air over the top of the wings moves faster than that under the bottom.

This faster-moving air then creates a lower pressure above the wing (as per Bernoulli’s principle), when compared to the pressure under it. This difference in the pressure generates a force (called lift) underneath the wings that helps the aircraft take off.

How do higher temperatures affect an aircraft’s flight?

Higher temperatures expand the air, making it less dense or thinner. In other words, they create more space between the air molecules which means that fewer molecules are available underneath the aircraft's wings to create enough lift to push the plane into the sky.

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Aircraft usually get 1% less lift with every 3 degree Celsius of temperature rise, said Williams, a professor of atmospheric science at the University of Reading (UK), told CNN in an interview in 2023.

Thin air also affects the performance of an aircraft's engine. For instance, the combustion that creates an engine's power is severely impacted as there are fewer molecules of oxygen to mix with the fuel. The thrust — the force which moves an aircraft through the air — produced by the engines is also reduced due to thin air.

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Consequently, higher temperatures mean that planes require longer runways and more powerful engines to take off. If an aircraft requires 6,500 feet of runway at 20 degree Celsius, it is going to require 8,200 feet at 40 degree Celsius, Williams said. In extreme situations, take off can become impossible.

Thinner air also makes landings more challenging. In addition to the brakes on the wheels, pilots use reverse thrust (literally, thrust in the opposite direction to the movement of the aircraft) to slow down the aircraft while landing. In case of thin air, the reverse thrust generated might not be enough to perform the task.

These aforementioned issues are particularly felt in airports located in higher altitudes (like the one in Leh), where the air is anyway thin and runways are often

shorter.

What is the role of global warming?

The extreme heat which is affecting take-offs and landing of aircraft is a consequence of global warming. The global average temperature has increased at least 1.1 degree Celsius since 1880. In India, annual mean temperatures have risen by about 0.7 degree Celsius compared to 1900 levels.

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Studies have found that an increase in temperatures has already started to disrupt air travel. A 2020 paper, "The impacts of climate change on Greek airports", analysed the performance of Airbus A320 — one of the most popular aircraft in the world — at 10 Greek airports between 1988 and 2017. The study revealed that with a warming of 0.75 degree Celsius per decade since the 1970s, the maximum take-off weight for Airbus A320 was reduced by 127 kg each year, roughly equivalent to the weight of one passenger and their suitcase. The weight of an aircraft is a crucial determinant of how much lift and thrust it needs to generate to take off.

This situation is expected to get worse. A 2023 study, "Decreased Aircraft Take-off Performance under Global Warming", published by Multidisciplinary Digital Publishing Institute (MDPI), found that with rising temperatures, the take-off distance for a Boeing 737-800 aircraft will "increase by 6% on average during 2071-2080 compared to 1991-2000 for the low-altitude airports, calling for an additional 113-222 m take-off distance in future summers".

Express Editorial | The growing cost of climate change

Aircraft manufacturers are always working towards making their planes lighter and more efficient. But much of that progress has likely been already made.

As a result, in the short term, airports will need to schedule flights in cooler times, increase the runway lengths, and decrease the take-off weight to deal with climate change-induced disruptions.



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However, in the long run, the best bet would be to radically curb the burning of fossil fuels that contribute to global warming.

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First uploaded on: 31-07-2024 at 06:54 IST

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EXPRESS Shorts



US woman found chained to tree came to India a decade ago to learn yoga

Cities Updated: July 31, 2024 07:44 IST

An American woman, who had come to India to learn yoga and meditation, was found chained to a tree in Maharashtra. She had met and married a man in Tamil Nadu but they had a falling out. After being tied to a tree for 40 days, she was rescued and a case has been registered...