How does climate change influence aircraft design and operation?

Aircraft are designed to operate within a given range of static temperatures and altitudes (pressures), called the aircraft environmental flight envelope. Aircraft manufacturers strive to extend this range to the maximum to give airlines the highest operational flexibility.

Although flight envelopes are of similar shape, they are specific for every aircraft type and are determined by airworthiness certification.

An aircraft is not allowed to operate in atmospheric conditions which are outside the certified flight envelope. Increasing or decreasing temperatures can then e.g. prevent airlines to reach certain airports occasionally, or even permanently.

The dynamic behaviour of the atmosphere is potentially also altered by climate change, and may further impact aircraft design and/or the operations.

Aircraft manufacturers therefore need to know the impact of climate change on the flight envelope and the dynamic properties of the atmosphere to adapt the design accordingly. This presentation aims at describing the limiting design aspects of a typical aircraft flight envelope.