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Future changes in weather and climate hazards to aviation

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The human impacts of weather and climate hazards are usually felt at ground level. Aviation is perhaps unique, however, in the sense that the impacts often occur in the upper atmosphere at cruising altitudes of around 40,000 feet. Anthropogenic climate change is occurring at those altitudes in the upper troposphere and lower stratosphere, too. Weather-related hazards such as turbulence already cause a large fraction of commercial aircraft accidents. This presentation will review how these hazards are changing over time because of the changing climate.

Turbulence currently causes 71% of weather-related aircraft accidents, injuring hundreds of passengers and flight attendants annually and costing hundreds of millions of dollars. Recent evidence shows that clear-air turbulence that is strong enough to lift passengers from their seats has increased by 55% since 1979 over the North Atlantic, with similar increases over the USA and elsewhere. Climate model projections indicate a doubling or trebling in turbulence this strong around the midlatitudes in the coming decades, as the jet streams become more sheared in response to anthropogenic temperature changes at cruising altitudes.

Other weather and climate hazards to aviation that will be reviewed in this presentation include the prospect of more lightning strikes; rising sea levels and storm surges flooding coastal airports with increasing frequency; and warmer air on the runway reducing lift generation and making it more difficult for aircraft to take-off.