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Evidence for Large Increases in Clear-Air Turbulence over the Past Four Decades

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Clear-air turbulence (CAT) is hazardous to aircraft and is projected to intensify in response to future climate change. However, our understanding of past CAT trends is currently limited, being derived largely from outdated reanalysis data. Here we analyse CAT trends globally during 1979–2020 in a modern reanalysis dataset using 21 diagnostics. We find clear evidence of large increases around the globe at aircraft cruising altitudes. For example, at an average point over the North Atlantic, the total annual duration of light-or-greater CAT increased by 17% from 466.5 hours in 1979 to 546.8 hours in 2020, with even larger relative changes for moderate-or-greater CAT (increasing by 37% from 70.0 hours to 96.1 hours) and severe-or-greater CAT (increasing by 55% from 17.7 hours to 27.4 hours). Our study represents the best evidence yet that CAT has increased over the past four decades.