

Supporting
European
Aviation



TRANSPORTATION SYSTEM-LEVEL RESILIENCE – CHALLENGES AND SOLUTIONS

The Impacts of Climate Change for Aviation

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12th September 2025



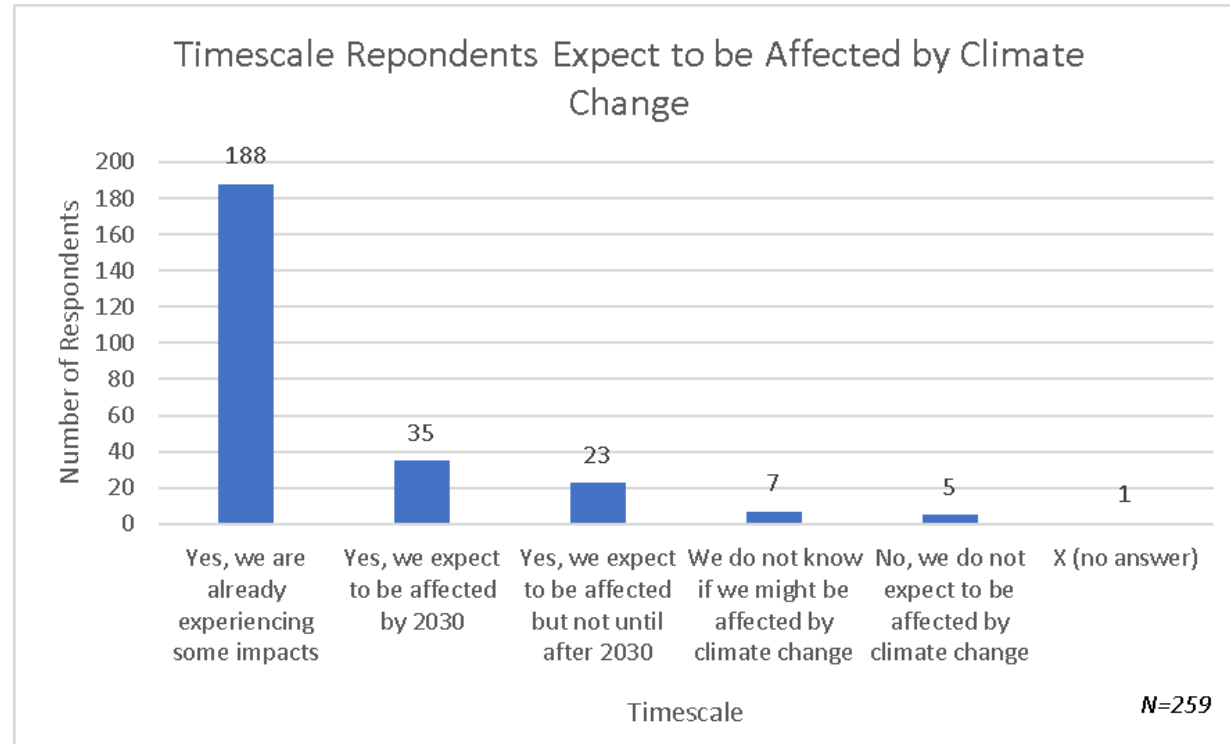
Climate Change impacts for aviation are wide-ranging



The 2024 ICAO Climate Adaptation Synthesis



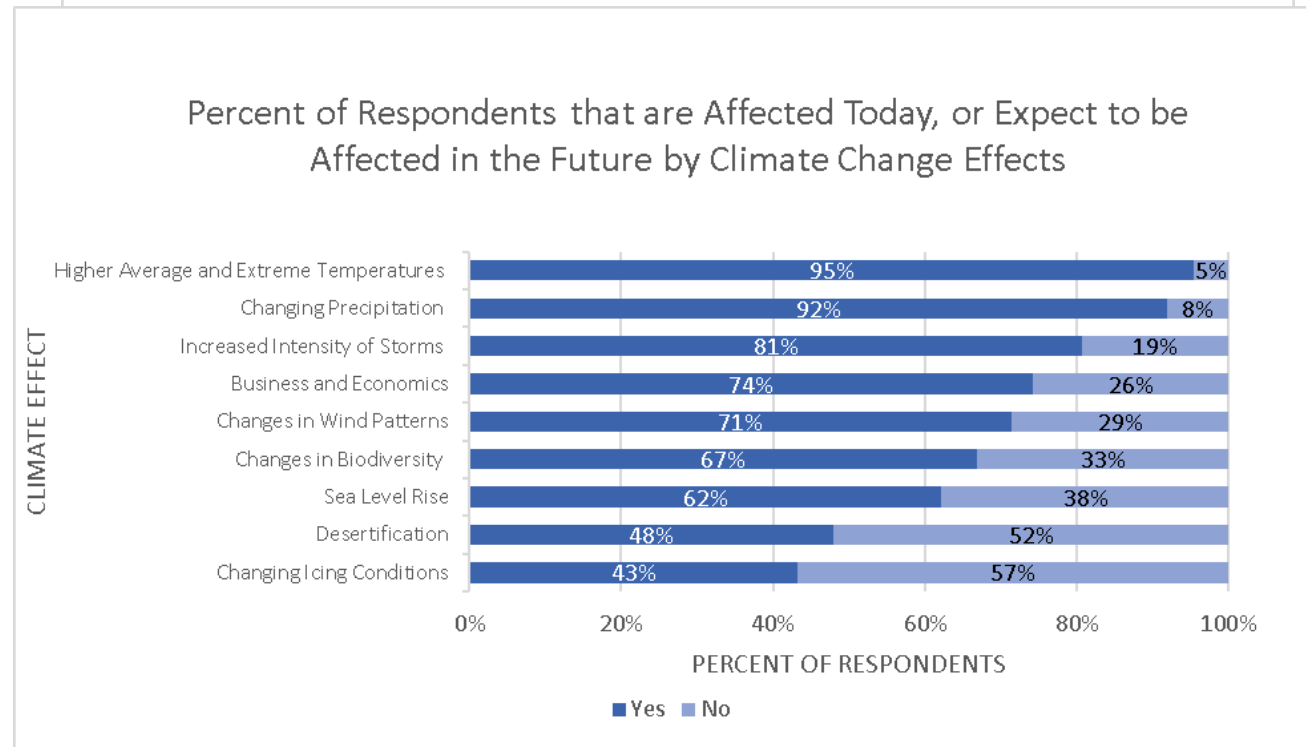
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2025



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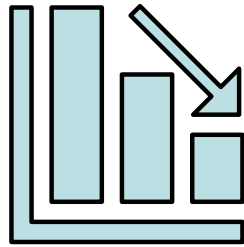


Impacts of Storms

- Disruption to operations:
 - delays, re-routings, route extensions, trajectory management, HFE, increased fuel burn and emissions
 - potential en-route capacity loss and congestion
- Larger / more intense convective systems could affect multiple hub airports
- Damage to infrastructure
- Increase in lightning strikes: airport closures

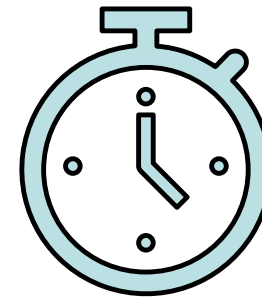


Frequency of major storms forecast to drop by 2050, *but* intensity of storms that do affect flights will lead to more significant delay



-8% to -12%

Forecast drop in share of all flights likely to be delayed by a major storm (*if there was no change in the aviation system in 2050*)



20 to 22 minutes

Forecast average en-route ATFM delay due to weather per flight delayed by a major storm in 2050

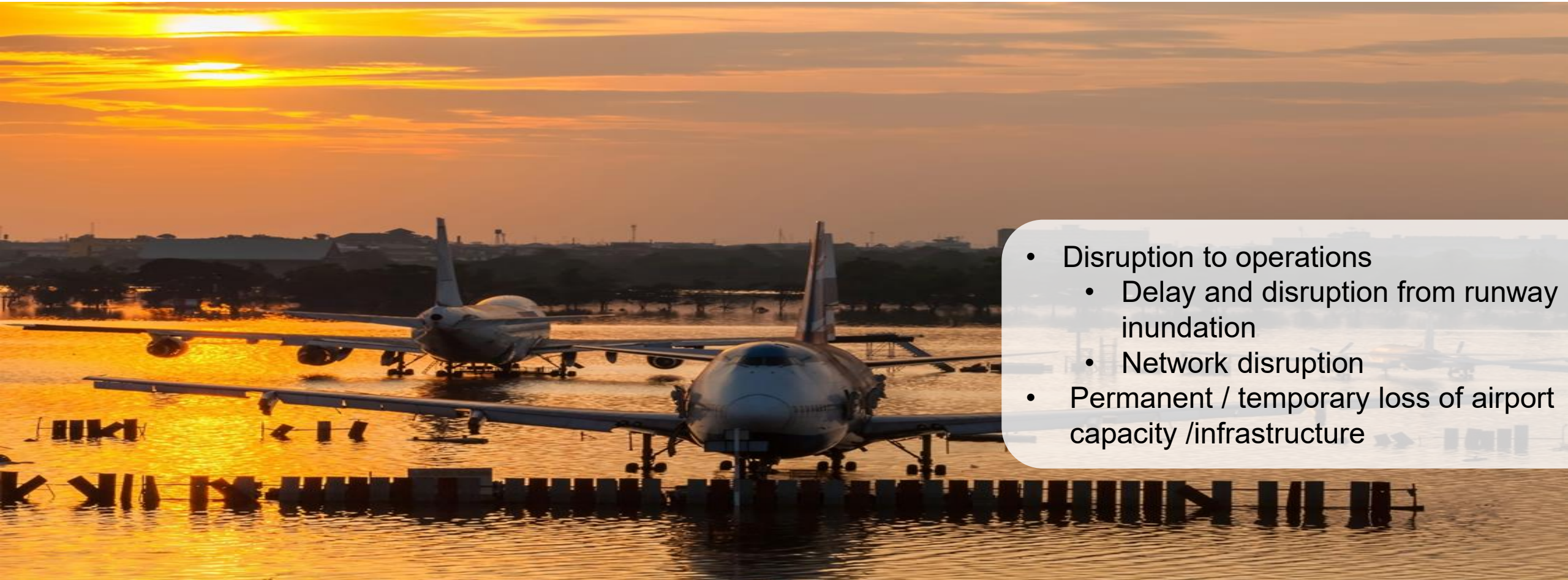
Higher average and extreme temperatures



- Changes to aircraft performance: take-off, payload, runway length, landing speed
 - Phoenix 2017: too hot for some regional jets to take-off (certification)
- Heat damage to airport surface (e.g. runway, taxiway)
- Heat damage to equipment e.g. ATM equipment, electronic equipment

Conditions for passengers, personnel, ground handlers, ATC

Sea-level rise & storm surge

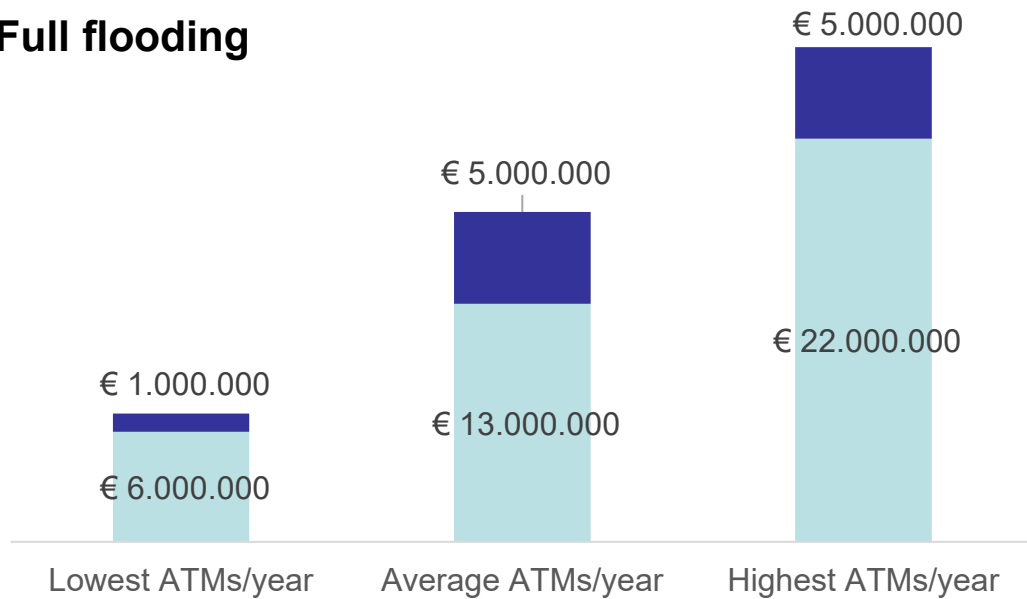


- Disruption to operations
 - Delay and disruption from runway inundation
 - Network disruption
- Permanent / temporary loss of airport capacity / infrastructure

Operational impacts = costs

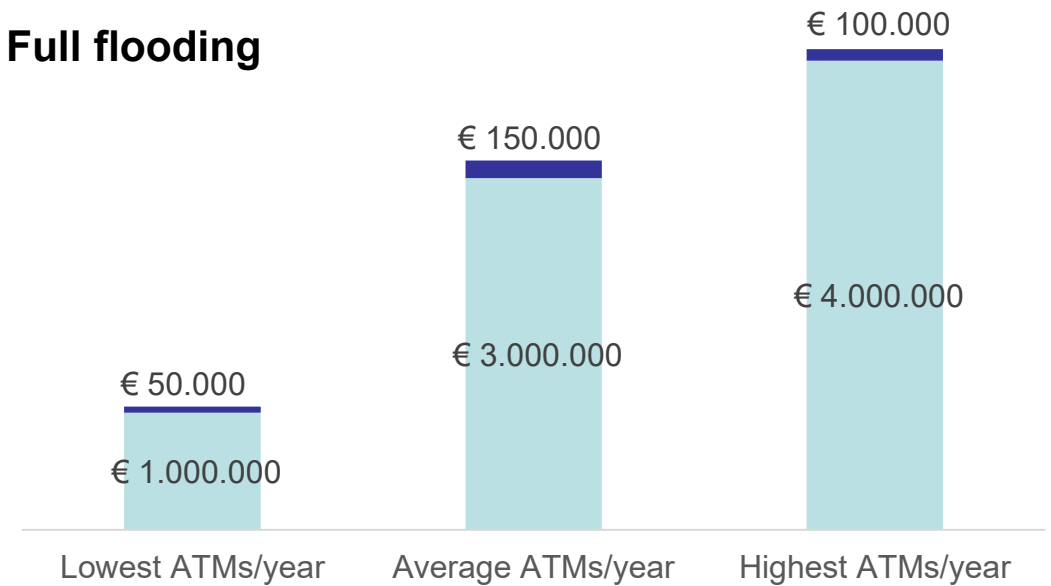
Cost impacts for large airports

Full flooding



Cost impacts for medium airports

Full flooding



■ Cancelled ATM/day
 ■ Diverted ATM/day

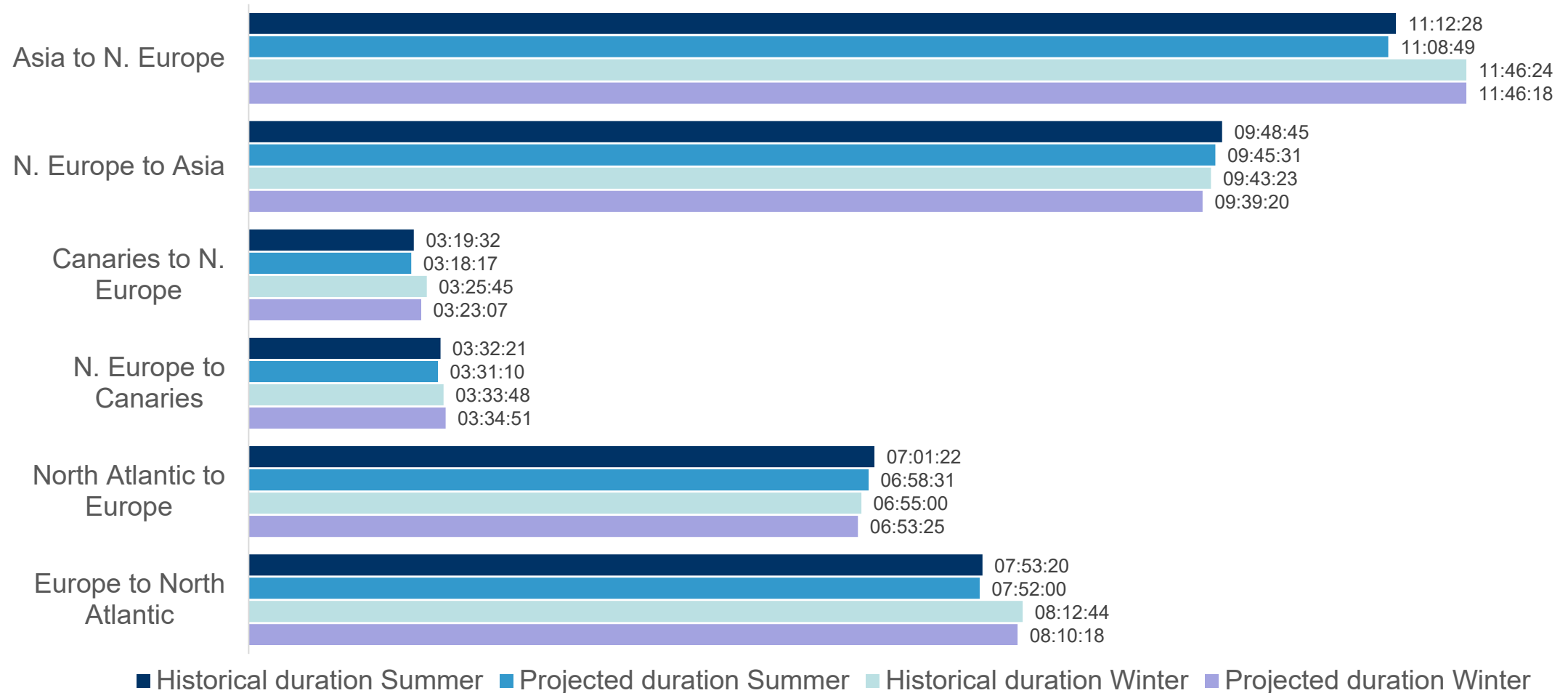
Wind



- Changes to trans-Atlantic flight times and routings: airport slot management
- Increase in crosswinds due to shifts in prevailing wind direction
- Changes in procedure due to crosswinds - environmental impact?
- Reduction in capacity at airports with no crosswind runway
- Disruption to operations if winds are too strong to take-off or land for spec aircraft type
- More clear air turbulence: injuries and aircraft damage

Image: Thales

Overall flight durations will be shorter for both eastbound and westbound transatlantic flights by 2050



Average flight duration*

* Where apparent contradictions to the existing literature exist - this is due to more recent TP algorithm and climate models being used in present analysis, including multi-model.

Summer 2023: the start of a new normal?

Will 'prime fire season' force a change to our summer holidays forever?

According to a recent poll two thirds (67%) of UK holidaymakers said the extreme heat of 2022 has seen them change their travel plans this year.

Mallorca tourists run for their lives as terrifying storms send deckchairs flying

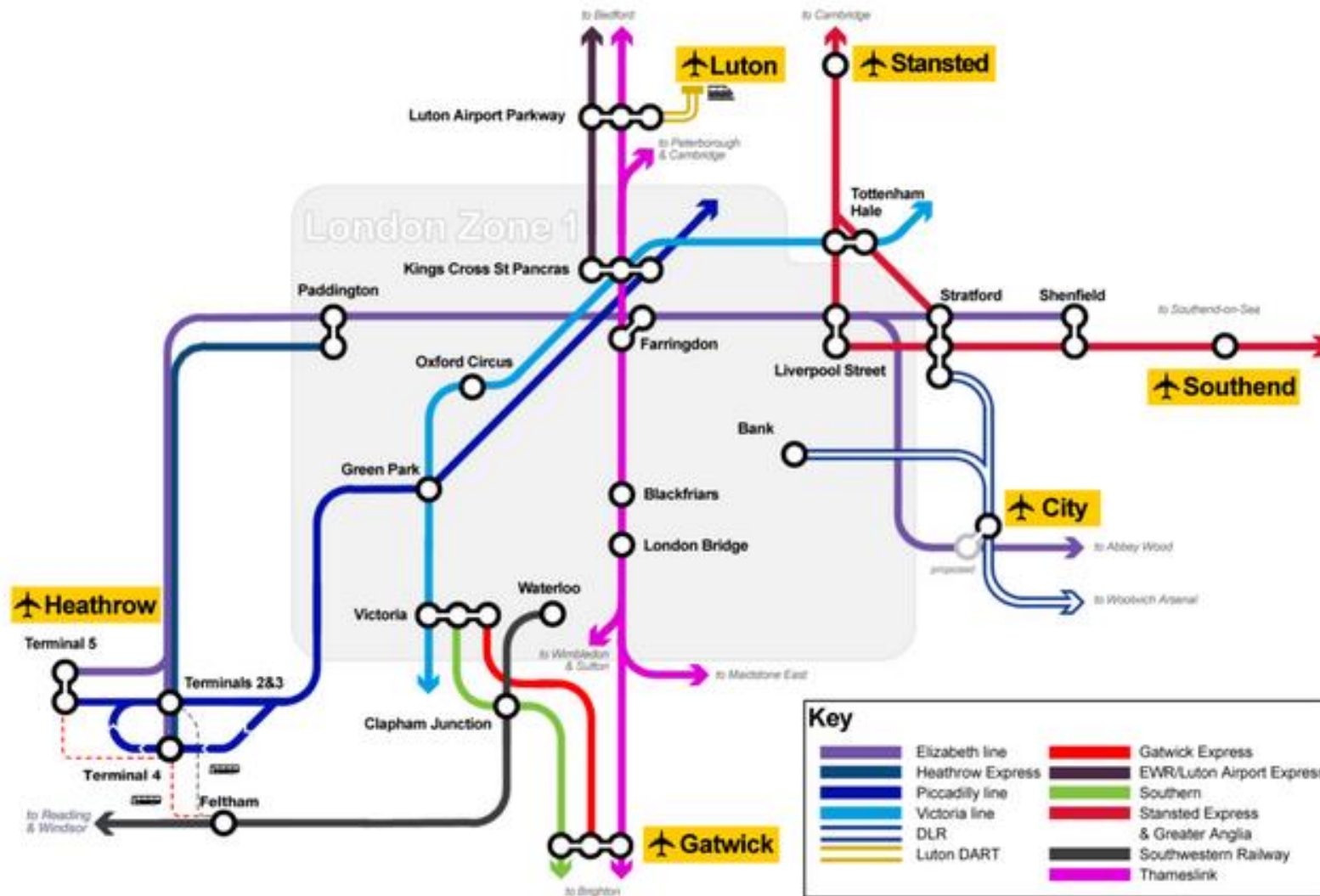
The holiday hotspot has been battered by a vicious storm that caused a cruise ship crash and has turned dream getaways into nightmares for many Brits caught in the chaos

Extreme heat in Europe is becoming the new normal — prompting tourists toward cooler destinations

More tourists are thought to be prioritizing milder temperatures or even off-season travel to avoid spending their time away in oppressive heat.



Every airport is different: but (almost) all rely on ground transport



Athens International Airport, January 2022



Athens International Airport, January 2022



But how much and how fast?



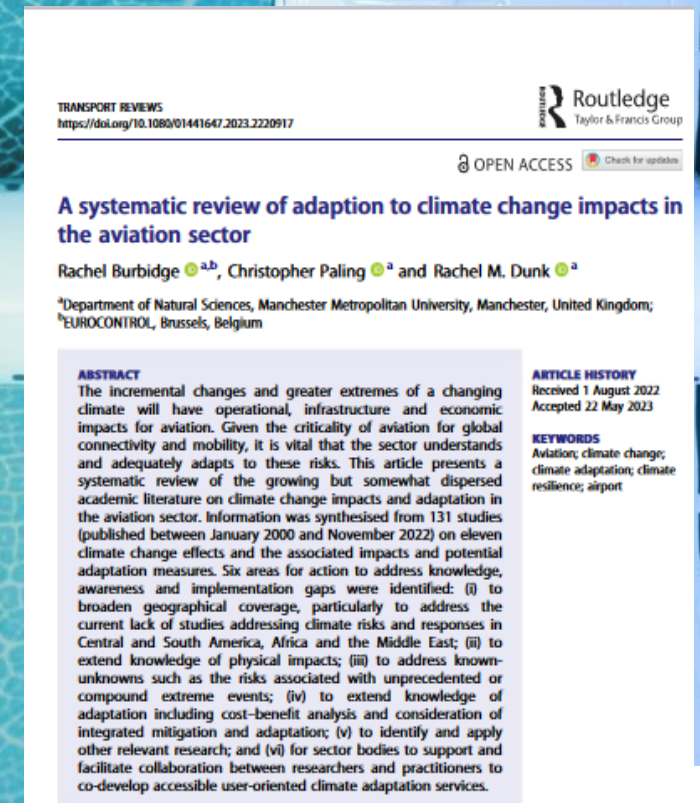
Thank you for your attention

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