

UC Davis Aviation Noise and Emissions Symposium 2022

Climate Change Risks for Aviation

Rachel Burbidge, EUROCONTROL 3rd May 2022

















Climate Change Risks for European Aviation 2021





- ★ An overview of short-term weather impacts on European aviation
- ★ Impact of changes in storm patterns and intensity on flight operations
- ★ Impact of sea level rise on European airport capacity
- ✤ Impact of climate change on tourism demand
- ★ Impact of changes in wind patterns on flight operations

https://www.eurocontrol.int/publication/eurocontrol-study-climate-change-risks-european-aviation



IMPACT OF CHANGES IN STORM PATTERNS AND INTENSITY ON FLIGHT OPERATIONS



Whilst the frequency of major storms associated with SWD is forecast to drop by 2050, the intensity of storms that do affect flights will lead to more significant delay



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-8% to -12%
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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



IMPACT OF SEA LEVEL RISE ON EUROPEAN AIRPORT OPERATIONS



Two thirds of coastal and low-lying airports are expected to be at risk of storm surge marine flooding up to 2090

Sample of 270 airports



Storm surges will remain the main driver of marine inundation in the 21st century, with an estimated 2/3 of coastal and low-lying airports at risk of some level of runway flooding by 2090.



One-day airport closures due to full flooding will have operational impacts



The results of the operational impact assessment show that in the case of a one-day closure of an airport due to full or partial/severe flooding, an average of 0-1% (medium airports) and 2-3% (large airports) of all Air Traffic Movements (ATM) per day in the ECAC region could be impacted.



Operational impacts translate into high costs for all stakeholders as a result of loss of activity and damage



The results of the cost impact assessment show that the **cost of diverted and cancelled flights** in the case of a oneday closure at a large airport due to full flooding could be in the **region of €3 million (medium airports) or €18 million** (large airports).



The impact on smaller airports should not be underestimated



A total of **91% of the airports** considered in this study that were identified to be **at risk of flooding** in the future are **small airports**. Whilst disruption at these airports would have a limited cost from delayed/diverted/cancelled flights, the **cost to the local economy** is expected to be far more **significant**.



IMPACT OF CLIMATE CHANGE ON TOURISM DEMAND

The TCI combines five climate variables (temperature, relative humidity, precipitation, wind speed and sunshine duration) to quantify the effect of the climate on tourist comfort when undertaking general, light tourism activity such as sightseeing.

Focus on Summer tourism

Methodology: Tourism Climatic Index (TCI)

Timeframe 2050

₩ CID = Daytime comfort CIA = Average daily thermal comfort R = Precipitation

- S = Sunshine duration
- W = Windspeed





Countries are projected to have longer periods of 'good' to 'ideal' climate for general, low level tourist activity



Across the ECAC region, countries are projected to have an **increasing length of time** in which the climate will be **'Good' to 'Ideal'** for general, low level **tourist activity**. For most, this increase will be the result of **improved climate into the autumn months** (Sep, Oct, Nov), particularly in **central Europe**.



Key trends could drive a growth in tourism flows in shoulder months and potentially shift to north-western Europe



A changing European climate by 2050 will boost the favourability of destinations during shoulder months for general tourism, and increasingly flexible demographics may enable tourist number growth during these months. This could be complemented by growth in the ECAC North West region due to a more favourable summer climate.

* Based on European demographic data.

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IMPACT OF CHANGES IN WIND PATTERNS ON FLIGHT OPERATIONS



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



■ Historical duration Summer ■ Projected duration Summer ■ Historical duration Winter ■ Projected duration Winter

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.



ADAPTING TO A CHANGING CLIMATE

Adapting to a changing climate: coordination and collaboration are key



Individual Action

- States and aviation sector organisations to carry out climate change risk assessment so as to identify and understand the impacts that need to be addressed.
- Identify appropriate adaptation responses: individual organisations taking their own adaptation planning decisions based on their specific circumstances and business plans.

Coordinated Action for an Interconnected Network

- Due to the interconnectedness of the European and global aviation systems, an integrated approach to building resilience is required.
- Start taking action now to ensure that our response is both timely and in proportion to the threat.

The more we can reduce emissions now, the less we will need to adapt in the future



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Thank you for your attention

rachel.burbidge@eurocontrol.int



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