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WORKING PAPER

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EXECUTIVE COMMITTEE

Agenda Item 16: Environmental Protection – International Aviation and Climate Change

ADAPTATION AND CLIMATE RESILIENCE FOR THE AVIATION SECTOR

(Presented by Brazil and supported by 19¹ LACAC Member States)

EXECUTIVE SUMMARY

As climate projections show an increased likelihood of surpassing 1.5°C, urgent efforts to reduce GHG emissions remain critical. ICAO has prioritized mitigation through initiatives like LTAG, CORSIA (Annex 16, Vol. IV), and SAF promotion under the CAAF/3 Framework. However, climate impacts are already affecting aviation, demanding equal attention to adaptation. The prolonged closure of Porto Alegre Airport in Brazil due to unexpected flooding highlights the sector's vulnerability. This disruption underscores the need for resilient infrastructure and forward planning. This paper calls on ICAO to elevate adaptation strategies to the same level of importance as GHG mitigation within global aviation policy.

Action: The Assembly is invited to:

- recognize that climate change is already having an impact on the aviation system and that equal attention must be given by ICAO to mitigation and adaptation efforts; and
- urge the ICAO Council to properly address the need to develop further actions regarding adaptation and climate resilience for the aviation sector.

<i>Strategic Goals:</i>	This working paper relates to the Strategic Goal – <i>Aviation is Environmentally Sustainable</i> .
<i>Financial implications:</i>	
<i>References:</i>	

¹ Belize, Bolivia (Plurinational State of), Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela (Bolivarian Republic of)

1. INTRODUCTION

1.1 The Intergovernmental Panel on Climate Change (IPCC) has long warned of the risks associated with global warming exceeding 1.5°C above pre-industrial levels. In its 2018 Special Report, the IPCC estimated that this threshold would be reached between 2030 and 2052, depending on emissions scenarios. However, recent observations and analyses from the Sixth Assessment Report (2021) and other global monitoring bodies have indicated that this temperature threshold may be surpassed as early as the early 2030s—and in some cases, even sooner. Indeed, data from 2023 and early 2024 show that global temperatures have already temporarily exceeded the 1.5°C mark, largely driven by a combination of greenhouse gas accumulation and natural climate variability (i.e. *el niño*).

1.2 Because earlier estimates suggested there was more time to act, both international frameworks and national strategies have tended to prioritize mitigation over adaptation. This emphasis is clearly reflected in the aviation sector, where structured efforts such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), sustainable aviation fuel (SAF) initiatives, and the Long-term Aspirational Goal of net-zero carbon emissions by 2050 (LTAG) have taken centre stage. In contrast, adaptation strategies—those designed to increase the sector's resilience to climate impacts—have received comparatively less attention, often limited to guidance documents without an implementation framework. This imbalance, however, is becoming increasingly untenable in a world where climate disruptions are no longer a distant threat, but a present and escalating challenge.

2. DISCUSSION

2.1 Mitigation has been the cornerstone of ICAO's environmental strategy. The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), established in 2016, aims to cap net emissions from international flights at 2020 levels by requiring operators to offset excess emissions through the purchase of carbon credits. ICAO has also promoted a "basket of measures" that includes technological innovation, operational improvements, and the use of sustainable aviation fuels (SAF). In support of these measures, ICAO launched the ACT-SAF (Assistance, Capacity-building and Training for Sustainable Aviation Fuels) programme in 2022 to provide targeted support to States and stakeholders to develop and deploy SAF. The adoption of the LTAG in 2022 marked a collective commitment by ICAO member States to achieve net-zero carbon emissions from international aviation by 2050.

2.2 In contrast to its mitigation portfolio, ICAO's work on adaptation is less institutionalized. While climate resilience is acknowledged as critical, there is no adaptation program equivalent in structure or visibility to ACT-SAF. Instead, ICAO has produced a set of guidance materials: the Climate Adaptation Synthesis Report, a three-part guidance on climate risk assessment, and the Eco-Airport Toolkit on Climate Resilient Airports. These documents identify vulnerabilities such as extreme heat, sea level rise, and severe weather, and outline procedures for assessing and managing climate risks at the local level. Although useful, these tools lack a centralized framework that would promote widespread adoption across States.

2.3 The imbalance between mitigation and adaptation efforts is clear. ICAO has created structured, multilateral programs and mechanisms for mitigation, complete with timelines, targets, and support structures. Adaptation, by comparison, has relied on decentralized efforts and does not count of specific budget to allow for an assistance and capacity-building program for states. This imbalance leaves aviation infrastructure and operations increasingly vulnerable to climate events, especially as such events become more frequent and severe.

2.4 To better illustrate this argument, there is the case of Porto Alegre International Airport, as reported in AN-Conf/14-WP/166 of the 14th Air Navigation Conference, in Montréal, Canada (https://www.icao.int/Meetings/anconf14/Documents/WP/wp_166_en.pdf).

2.5 In May 2024, unprecedented flooding in southern Brazil led to the prolonged closure of Salgado Filho International Airport, a key air hub located in the city of Porto Alegre that had served over 7.5 million passengers in 2023. Record rainfall—equivalent to five months' worth in just two weeks—caused Guaíba Lake to rise to 5.3 meters, submerging the airport's runways, terminals, and critical infrastructure. Operations were fully suspended on 3 May, following the inundation of both the passenger terminal and radar shelters. Emergency measures were implemented swiftly: flights were temporarily rerouted to a nearby military Air Force base, and air traffic control was transferred to the city of Curitiba, 750 kilometres away. A temporary radar system was restored within 20 days. Partial operations resumed on October 21, 2024, and full services were only reinstated by 16 December—more than six months after the initial disruption.

2.6 The economic toll was substantial. The Brazilian government approved a compensation package of R\$425.96 million (approx. USD \$80 million) to support airport repairs and maintain basic operations. The closure also caused significant disruptions in trade and tourism: airport exports dropped 72%, and imports fell 91.5% in May 2024 compared to the previous year. This situation highlights the vulnerability of critical aviation infrastructure to extreme climate events, reinforcing the need for integrated adaptation strategies.

2.7 The Porto Alegre case exemplifies the real-world impacts of climate change on aviation and exposes the consequences of underdeveloped adaptation planning. While the aviation sector cannot afford to slow down its decarbonization efforts, it also cannot ignore the increasing need for resilience. Moving forward, equal focus must be given to both adaptation and mitigation, ensuring that the global aviation system remains operational, safe, and efficient in a changing climate.

3. CONCLUSION

3.1 The aviation sector, highly sensitive to environmental disruptions, must prepare not only to reduce its own emissions but also to withstand increasingly frequent and severe climate impacts. While ICAO has taken meaningful steps towards mitigation—through mechanisms like CORSIA, LTAG, and SAF promotion adaptation efforts have so far lacked the same level of structure and institutional support.

3.2 The case of Porto Alegre Airport illustrates the operational and economic vulnerabilities aviation faces in a warming world. This paper is both a reminder and a call to action: adaptation and mitigation must be addressed as equally urgent and mutually reinforcing pillars of climate strategy. As such, ICAO and its member States are encouraged to enhance guidance, resources, and planning tools to support the aviation sector's resilience alongside its decarbonization efforts.