WORLD CLIMATE RESEARCH PROGRAMME

WCRP Carbon Footprint

Pierre Friedlingstein, Chikage Miyoshi, Neil Harris, Narelle Van der Wel

WMO UNESCO INTERNATIONAL COUNCIL FOR SCIENCE WCRP World Climate Research Programme

Carbon Footprint

- **JSC-41(May 2020) – It was decided to establish a WCRP Carbon Footprint Working Group**

This did not happen because we prioritized community effort towards the WCRP transition to a new structure. The pandemic meant that we did not want to add additional 'work' and also that this work became less urgent without international travel.

- **JSC-41B (Nov-Dec 2020) – Detlef noted that COVID-19 has forced us to change how we do business and that in the future at least 50 percent of interactions and meetings will be virtual.**

It became obvious that we need to prepare for a return to travel. We also need policies to ensure that future decision making includes emissions considerations, but measuring our carbon footprint from travel and being accountable for it is the place to start.

Carbon Footprint

Phase 1: Determining how to calculate travel emissions

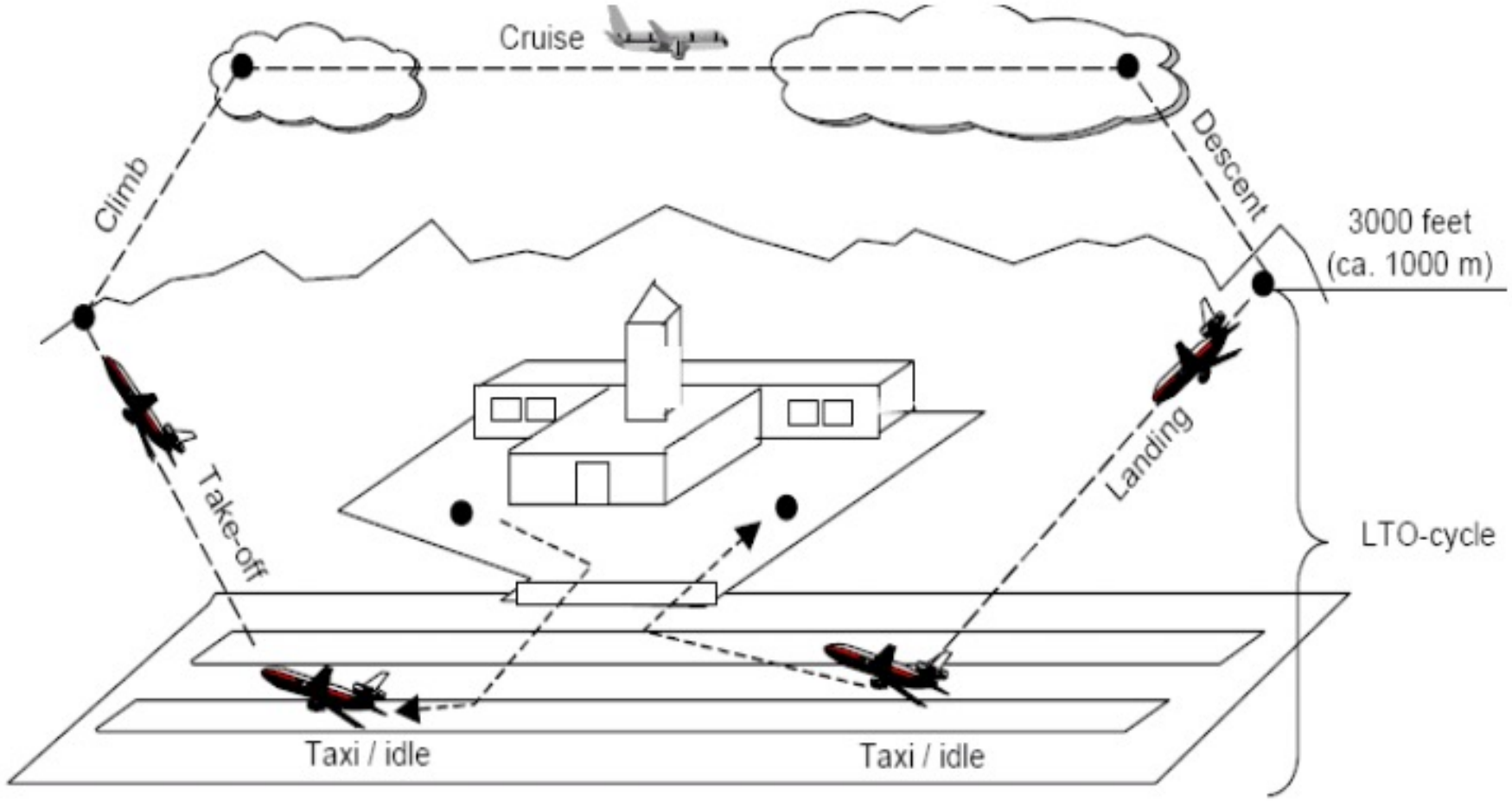
- Scoping - There were various options, but most were more catered to companies - data requirements and costs were high.
- September 2020 – Discussions with Cranfield University about building a simple carbon calculator (Chikage Miyoshi, Neil Harris)
- July 2021 – Work is underway, proof of concept completed, and an agreement with Cranfield should be finalized any day now!

Carbon footprint

Objectives

- Provide tool for to analyse carbon footprint produced by business travel for the WCRP activity for benchmarking
- Proof of concept using the actual travel data in 2019
- Explore the opportunity how to trade off the benefit of business trip and the carbon footprint for establishing the travel policy considering the environmental impact.

Figure 1 Standard flying phase (IPCC, 1997)



Cranfield Air Transport Carbon Calculator

Methodology and data used for this simplified model (see Figure 2)

- **Great Circle Distance** is computed with the **Haversine formula** between two points of airports (origin and destination) ‘s longitude and latitude data (4,103 airports in the world out of 6,800 commercial airports)
- **Flying distance: GCD+ 50 km**
- **Travel itinerary record**: the names of airport (IATA code), departure date, and arrival date
- **Default altitude**: cruise phase altitude according to GCD and aircraft type
- **Default aircraft type**: only three aircraft types (wide body, narrow body, and regional jet)
- **Fuel consumption factor data** (by flying altitude) is estimated for each aircraft type based on BADA.

  Wide body: average of B777 and A350

  Narrow body: average of A321 and B737-800

  Regional jet : E175
- **Only for an economy class case**
- **Configuration : the number of seat in aircraft**
- **Load factor: occupied rate on each flight (the number of passenger / the number of seat)**

Proof of concept using the actual travel data (from WMO Science & Innovation Department) in 2019

Destination	No. of trip	Average distance flown (km)	Average CO_2 per trip (kg)	Total CO_2 (kg)
EUROPE	251	10,537	1,212	304,171
AFRICA	48	8,801	1,030	49,440
NORTH AMERICA	48	16,162	1,797	86,248
FAR EAST	44	13,646	1,541	67,798
SOUTH AMERICA	28	12,036	1,390	38,930
AUSTRALIA & PACIFIC	8	21,489	2,409	19,270
MIDDLE EAST	2	7,204	907	1,815

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Phase 2: Preparing guidelines on how to implement the calculator

Next steps:

- Work with SPARC International Project Office for a pilot study
- Online workshop for the WCRP Secretariat and IPOs on how to implement the carbon calculator, including: what information to provide, when and how to report, how we ensure transparency, and any other considerations. Outcome: Creation of draft guidelines.
- JSC-43 – Report to the JSC on proposed *Guidelines for Reporting on WCRP Carbon Emissions from Travel*
- Implementation in 2022, first report of WCRP travel related carbon emissions at JSC-44