Airbus Zephyr High Altitude Long Endurance RPAS

‘Operations Above FL600 – Lessons from UTM’

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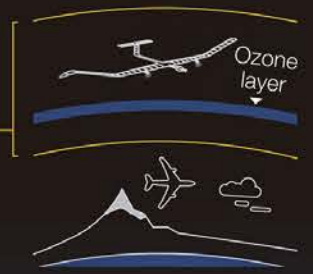
Zephyr

Pioneering the stratosphere

The world's leading solar-electric stratospheric unmanned aerial vehicle

What is it?

Runs on sunshine in the **stratosphere**



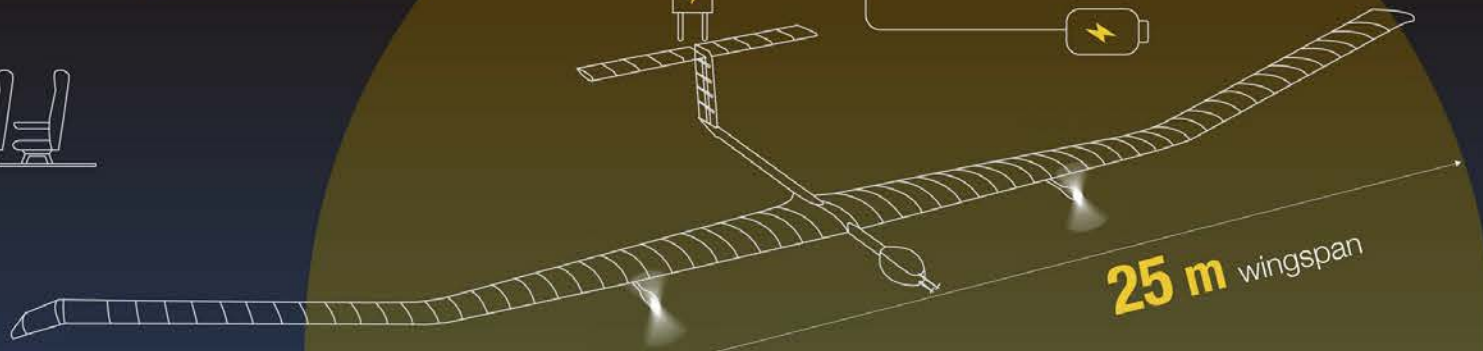
Weighs **75 kg**

Supports up to **5 times** its own weight

Manufactured from fibres no thicker than **a human hair**

Powered by **the sun**

Zephyr uses **solar energy, with secondary batteries** charged in daylight to power overnight flight



Zephyr flies for longer than any other aircraft during its successful maiden flight:

25 days, 23 hours, 57 minutes

What will it do?

Zephyr:

- See clearly
- Sense efficiently
- Connect precisely

Zephyr is able to **revolutionise missions** all over the world:

- Defence
- Humanitarian
- Security
- Environmental

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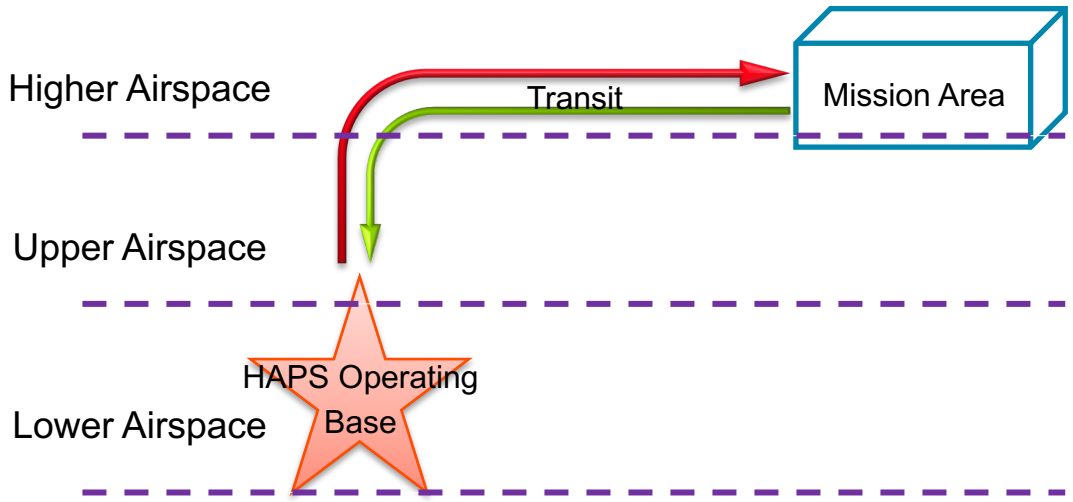
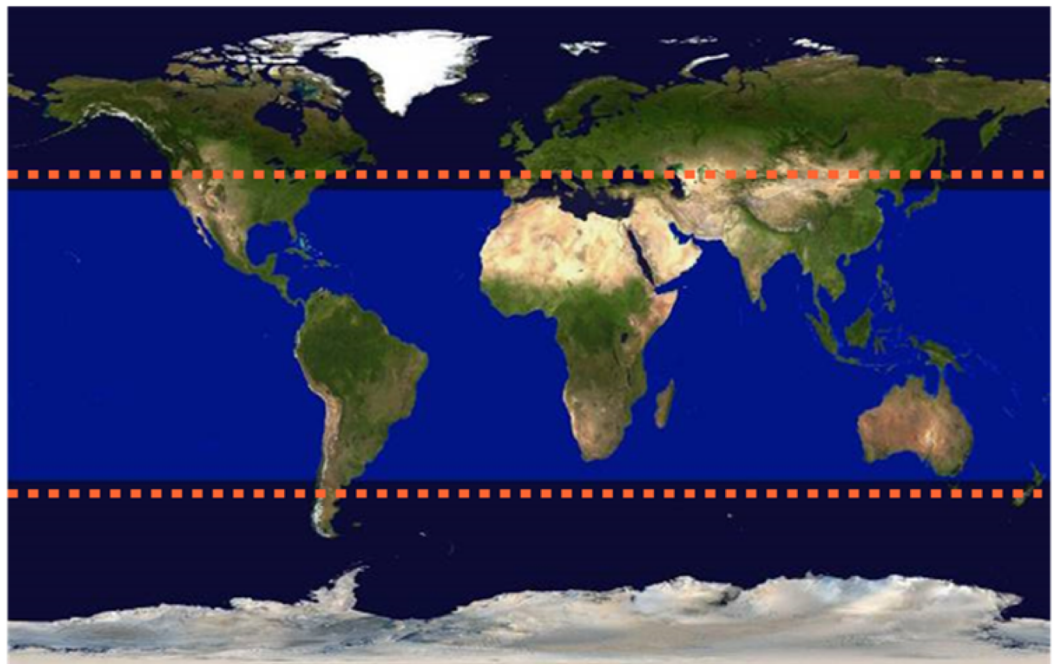
Zephyr Global CONOPs

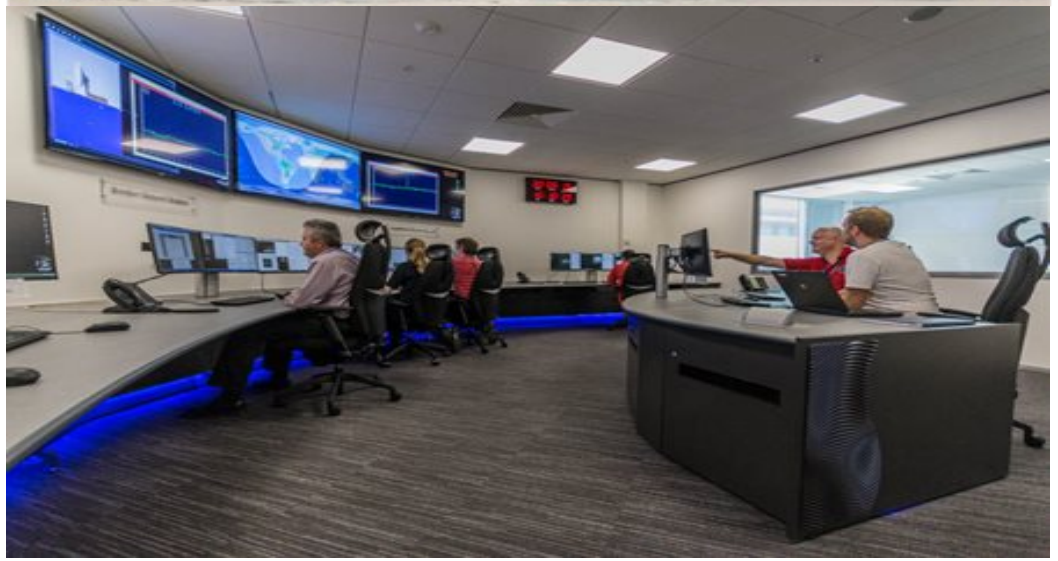
- Mid-latitude year-round capability
- High-latitude seasonal capability
- Low-latitude strategic Operating Bases

- Beyond Radio Line of Sight communications
- Centralised Mission Control Centres

- Move RPA around the world to mission areas
- ~1000 nm per day (weather dependent)
- Mission delivery for weeks/months
- Shuttle RPA to maintain continuous coverage







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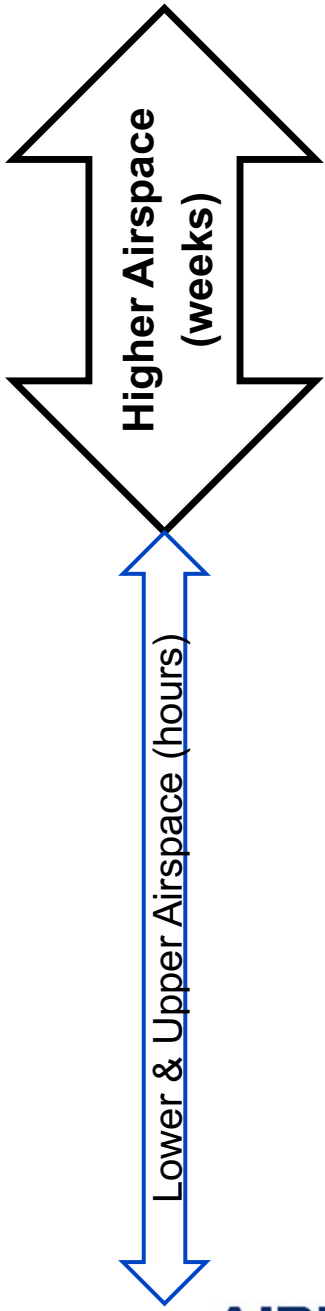
Zephyr's Unusual Flight Characteristics

- Slow flight – 40-50 KTAS in stratosphere
- Limited manoeuvrability – very small turn radius
- Low rates of climb and descent
- Affected by wind (mainly in troposphere) – may not follow precise track
- Not capable conforming to normal 'IFR' expectations
- But: 99% of Zephyr flight is well above other air traffic



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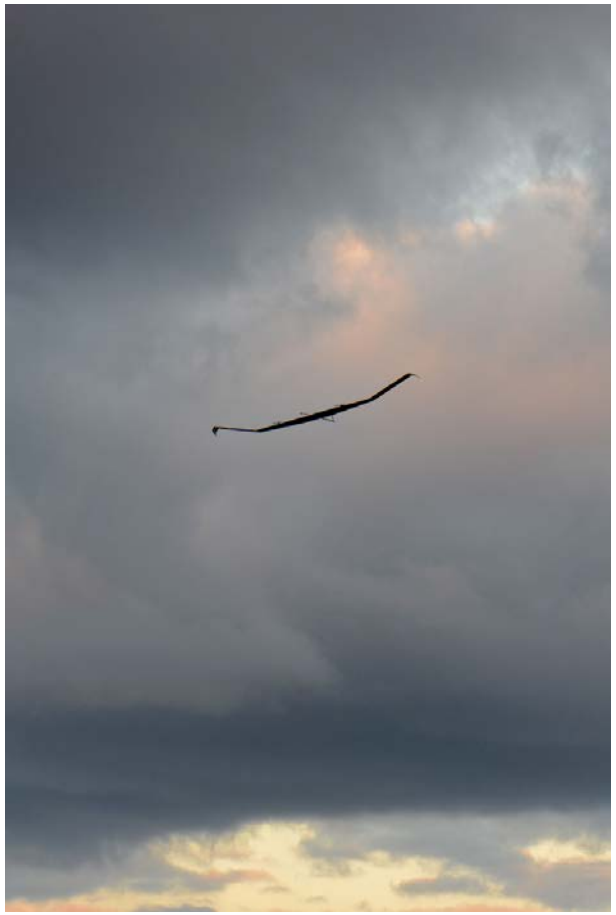
Higher Airspace (>FL600) traffic *accommodation* – happening now

- Zephyr does not need to operate in proximity to other aviation – equitable use of airspace
  - Operating bases can be remote from major airports
  - Climb/descent areas can be sited away from busy Lower/Upper airspace
  - Electronic conspicuity is normal

- Nothing happens quickly for Zephyr
  - Zephyr climb and descent can be readily coordinated through normal ATM practice
  - Safe separation through bespoke separation criteria & temporary corridors is feasible
  - (Abnormal) interactions with Lower/Upper Airspace users can be predicted and mitigated

- Very low traffic Higher Airspace density - few users capable of operations
  - We can be accredited to self-separate – remain well clear
  - And to co-operate where needed
  - Prediction and notification of anomalous system behaviour – handle the exceptions



Enablers for sustainable Higher Airspace Accommodation

- Work with Air Traffic Authorities and ANSP to access Higher Airspace safely and easily
  - Quickly establish any necessary temporary managed airspace
  - Facilitate IFR traffic co-ordination in the event of abnormal system behaviour

- Define the boundary of Higher Airspace above which craft can manoeuvre freely
  - Based on real-world traffic patterns
  - May vary between and within FIR/UIR

- Establish a user-centric approach to keeping out of each other's way
  - Time-bound 'booking' of volumes of Higher Airspace (but not formally segregated)
  - Moving towards a UTM-like approach on Higher Airspace

- Set out protocols which facilitate crossing of airspace boundaries
  - Commonality between States
  - Avoiding the need for multiple bi-lateral agreements – easier for everybody

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Next Steps

- **(H)UTM - the new paradigm for Higher Airspace?**
  - Same principles as (L)UTM - different kinematics
  - Accommodate diverse craft (eventually including manned SSJ)
  - Define ‘top-end’ interface with ATM
  - Accommodate international flights

- **ICCAIA Paper at ICAO ANC – Operations Above FL600**
  - Proposes ICAO, Industry and State collaboration to address global Higher Airspace operations

- **Gather real-world data to support UTM adaptation**
  - Working together through ICCAIA collaboration

The opportunity exists *now* to learn safely from accommodated Higher Airspace operations

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