New Entrants into the NAT system, how will they integrate?

Doug Meyerhoff

Introduction

Me

Air Traffic Controller 28 years operational (Royal Air Force, Nav Canada, Dubai Airport)

Air Traffic Management consultant

Co-founder and CEO of Airspace Unlimited

Airspace Unlimited

- Advanced tools for the new demands on airspace
  - We enable Special Use Airspace to be responsive to air traffic flows
  - to improve mission effectiveness and reduce emissions
- Can new concepts on SUA be transferred to space launch and recovery events?

Commercial Space Activity-Where are we?

Historically a state sponsored event resulting in no argument over commercial impact

Increasingly space activity is becoming a commercial activity impacting other airspace users (Airlines)

Obvious safety concerns demand huge volumes of airspace to be segregated for many hours, on multiple days for a single launch/recovery

Increased activity in Europe will have a significant operational, financial and environmental impact, but do we understand these effects?

What are the concerns?

Operationally

- Notification of launch and recovery is problematic as tactical publication of intended operations must be done at least 7 days in advance for NOTAM activation
- This must be done to cover plans A, B, and C if there are any delays.

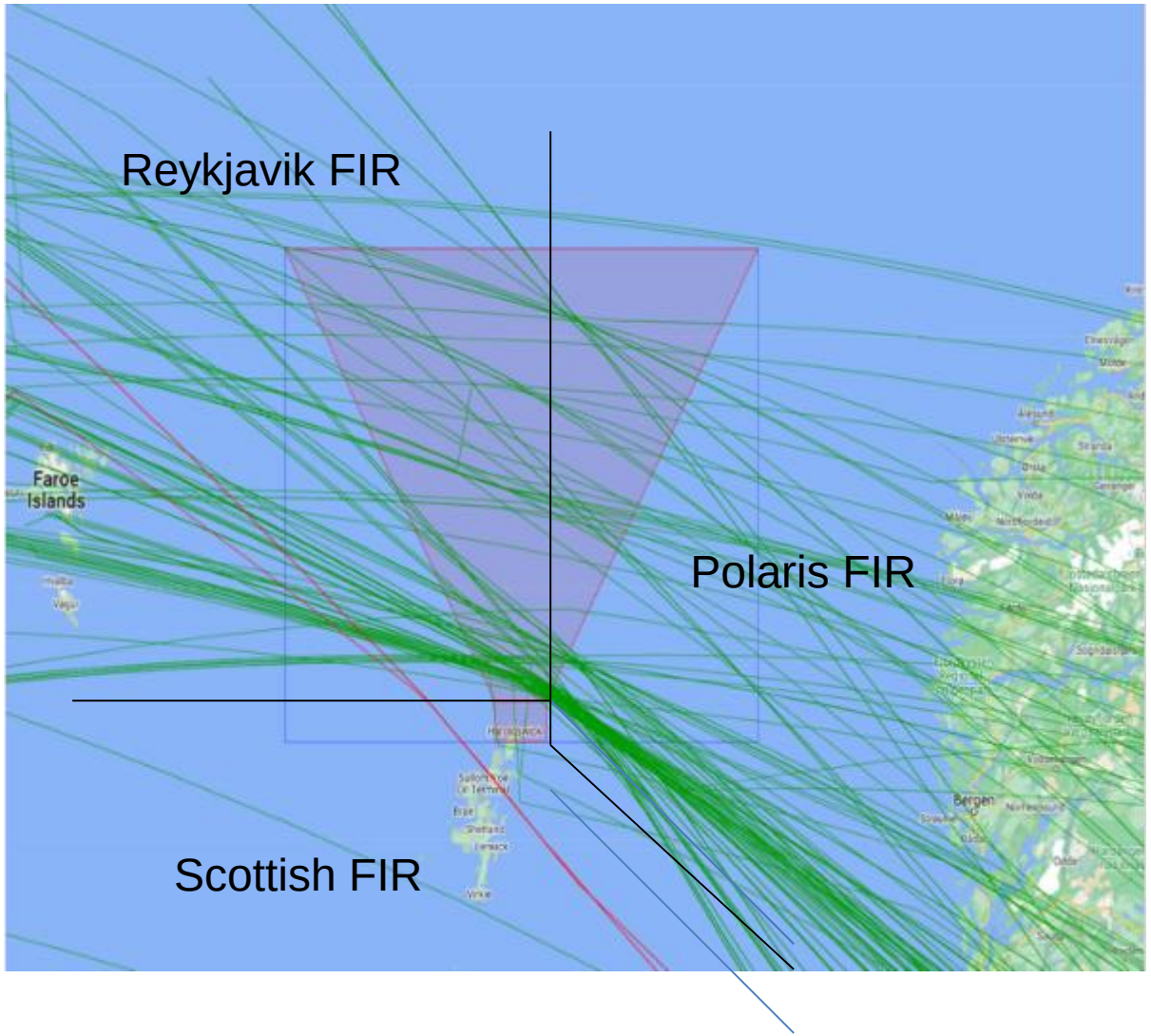
Financially

- Airlines will become increasingly resistant to irregular disruptions in airspace availability and related track extensions

Environmental

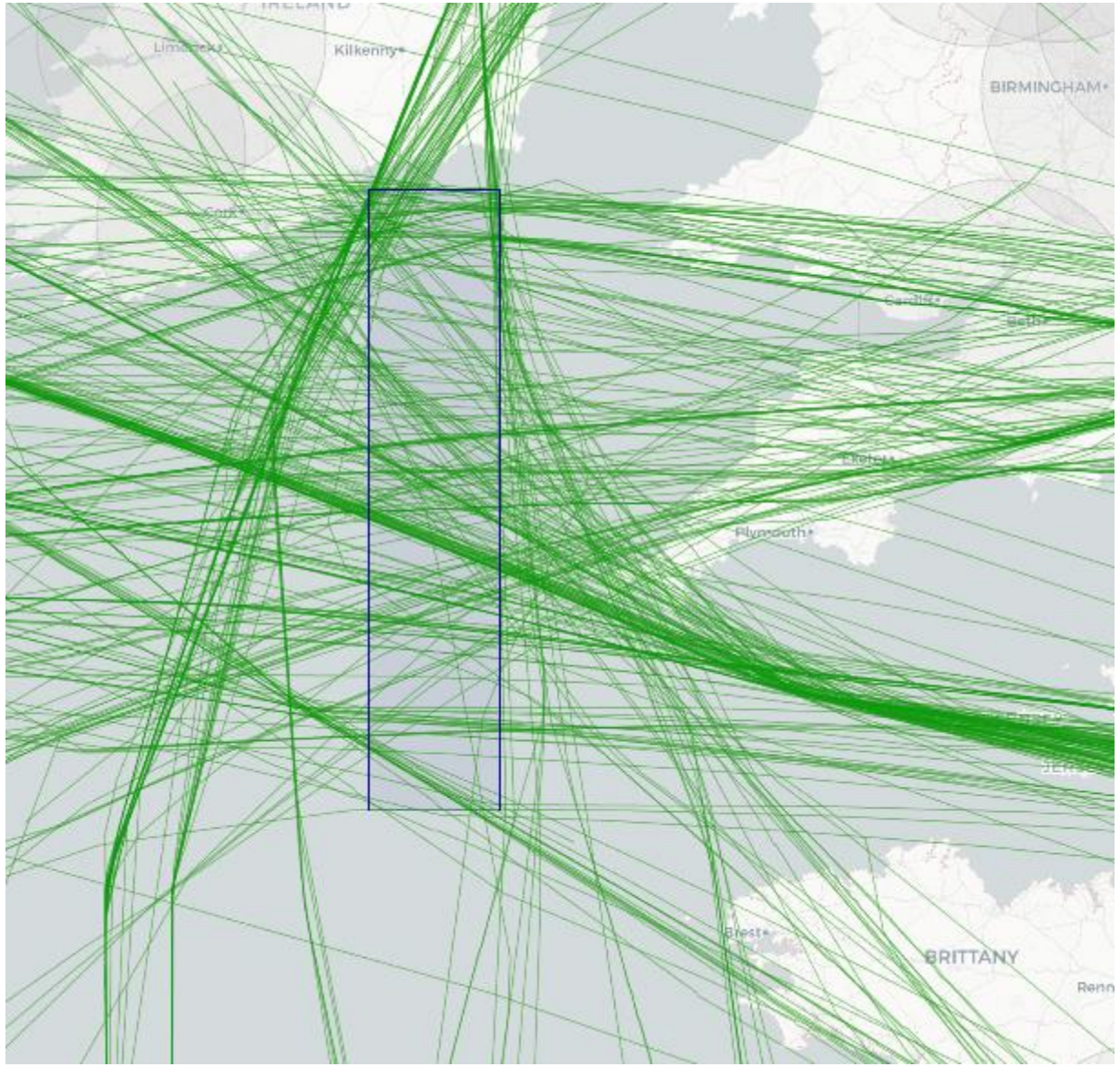
- Extended flight routing resulting in increased emissions

Let’s consider some operational impacts – launch



A launch from the Saxa Vord Spaceport impacts 3 separate Flight Information Regions

Let’s consider some operational impacts – recovery



Not only are the required areas very large, impacting large numbers of flights in just a few hours, there is significant wind uncertainty:

The recovery trajectory

The flights that are impacted

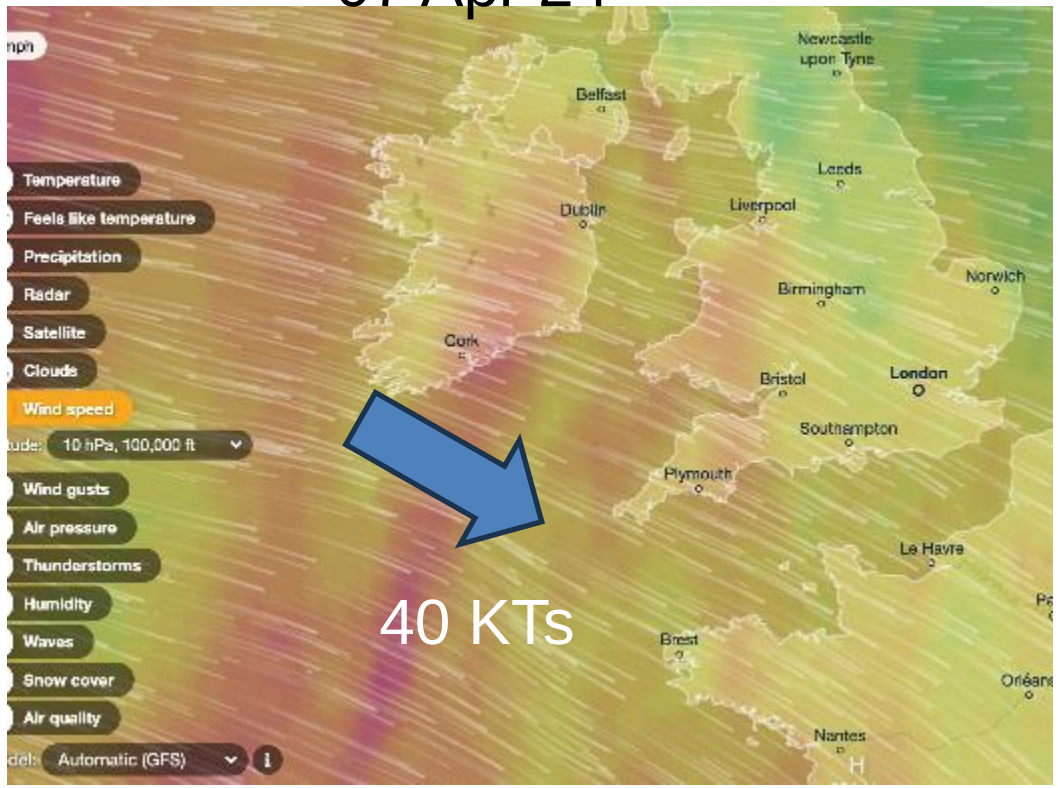
Let’s look at winds as an example ….

Source: AirOpt, flights through polygon shown 0800-1200 09 May 24

Operational Impact-Recovery

Wind at 100,000 ft

07 Apr 24



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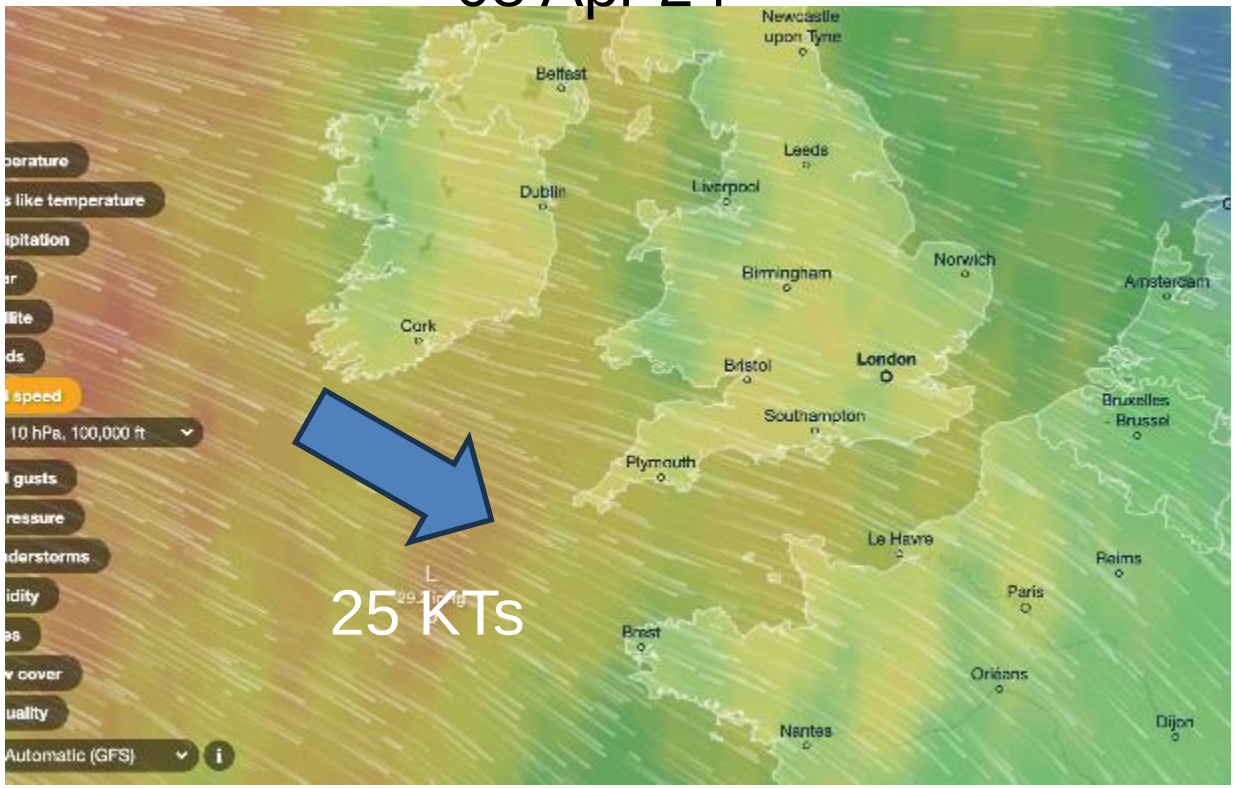

Wind images from Ventusky.com

Operational Impact-Recovery

Wind at 40,000 ft

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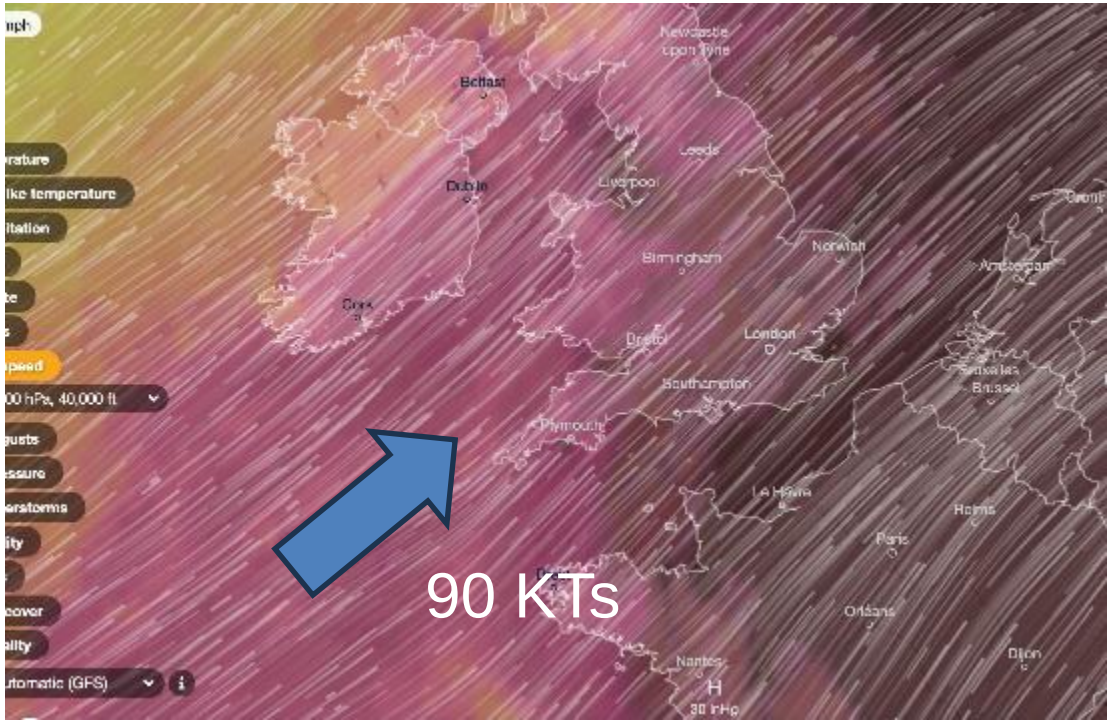

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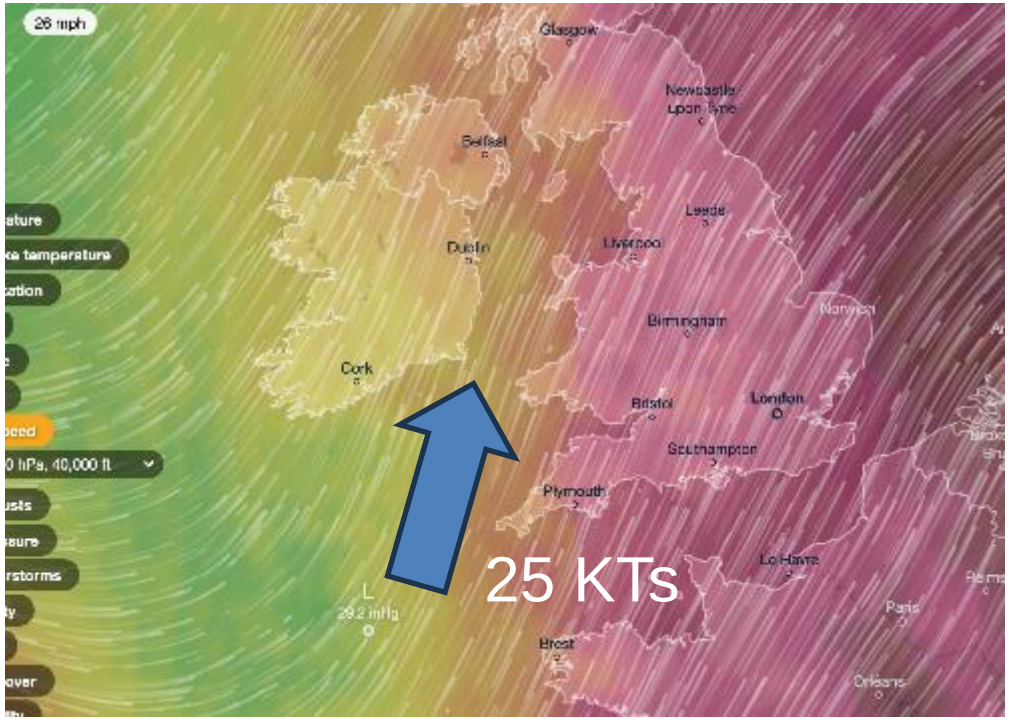

Wind images from Ventusky.com

Operational Impact-Recovery

Wind at 30,000 ft

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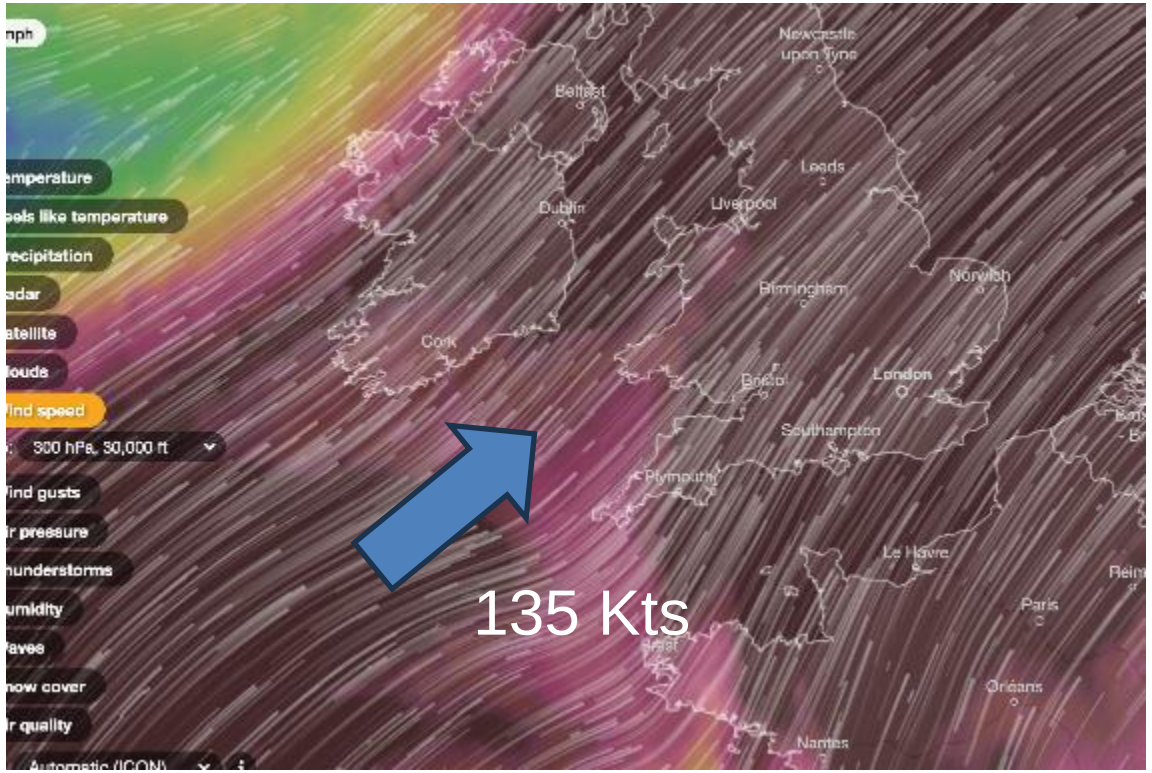
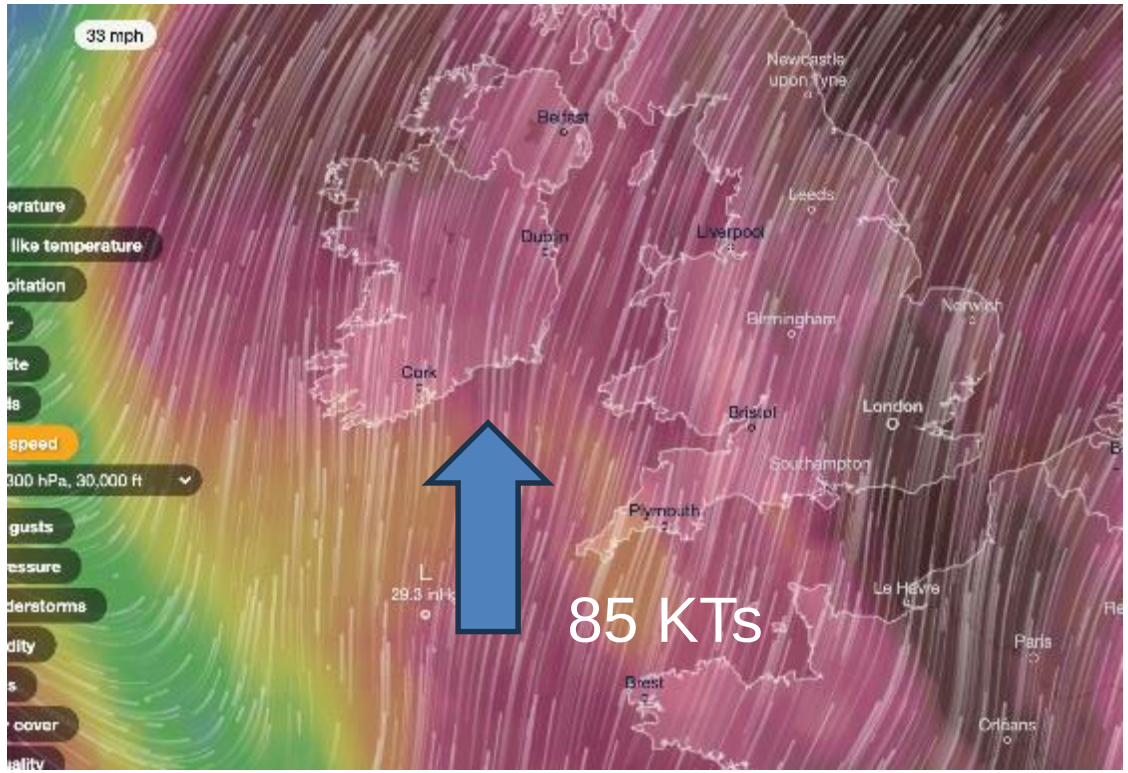


08 Apr 24



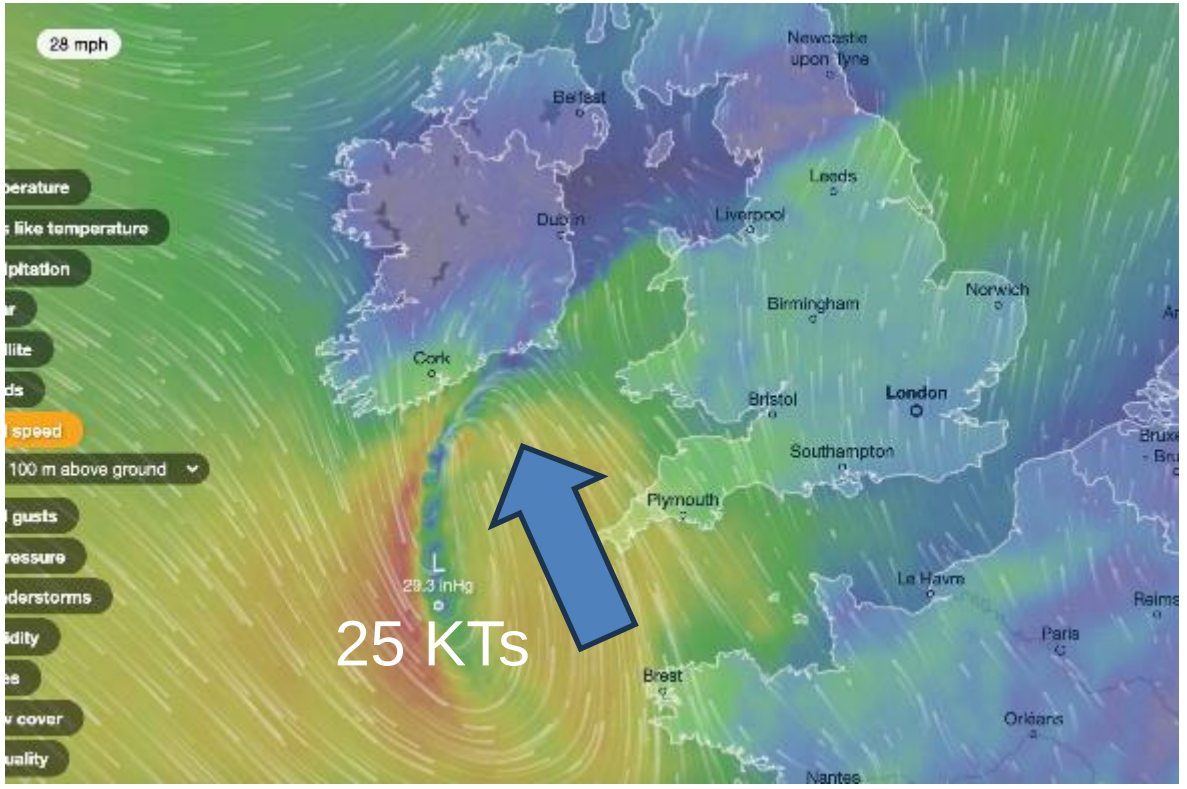
Wind images from Ventusky.com

Operational Impact-Recovery

Wind at 330 ft

07 Apr 24

08 Apr 24



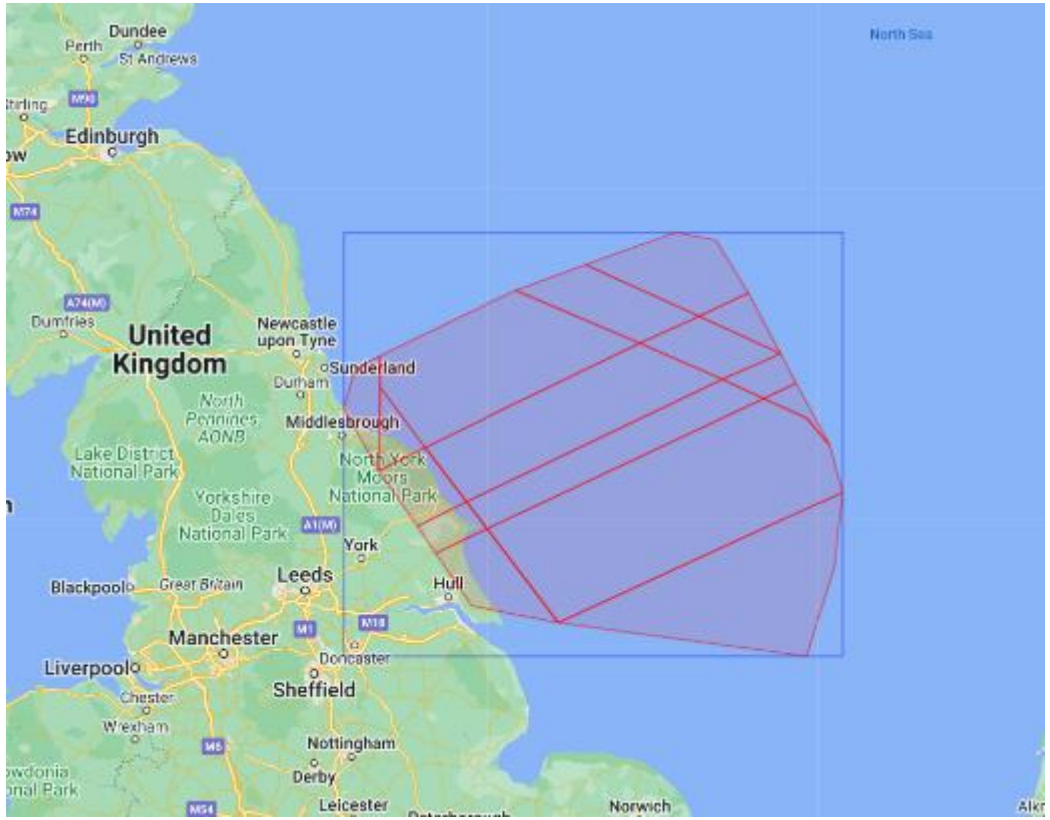
Wind images from Ventusky.com

What can we learn from emerging concepts?

1. Build bigger reservations with flexibility
   - Military principle of Variable Profile Area with modular airspace designs could apply to space launch and recovery
2. Leverage charges modulations to reduce impact on airlines
   - Rather than penalise flights for a space launch, find an economic trade-off
   - Shouldn’t all users pay for the airspace access?
3. Consider how airlines route their flights with the winds
   - Not historic but predictive analytics

1. Larger SUAs can be flexible to traffic flows

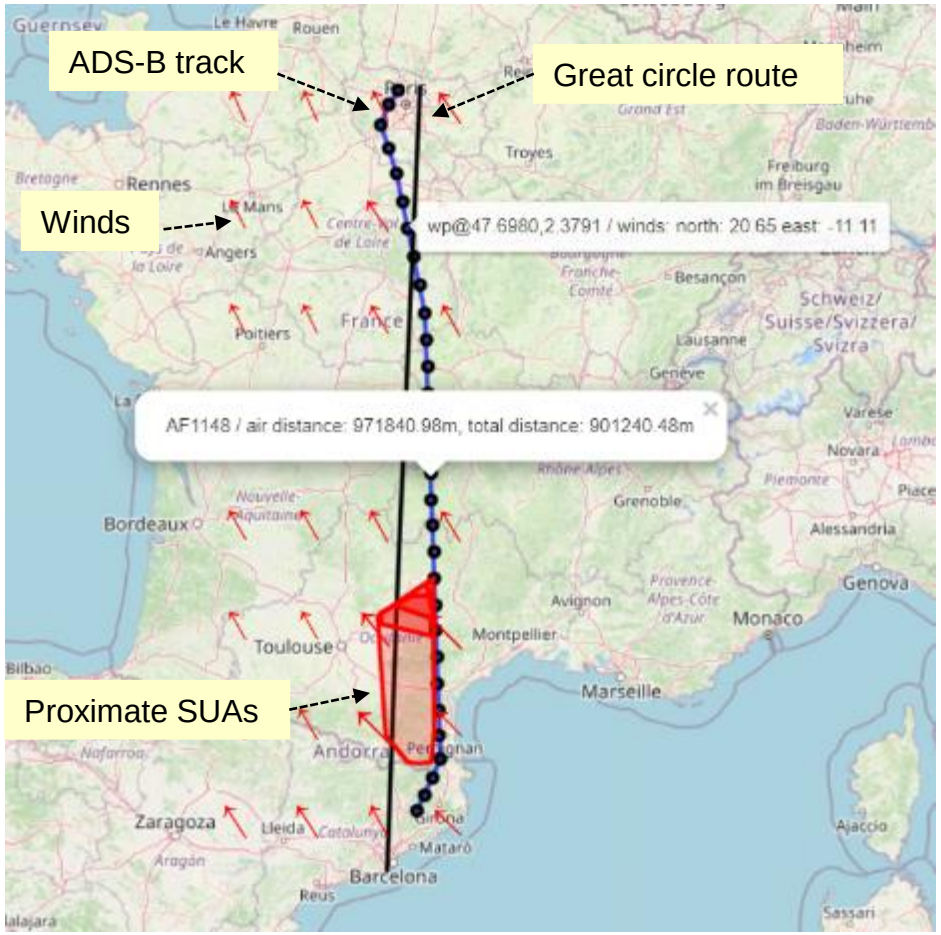
Existing EGD323 special use airspace (SUA)



Postulated D323 with increased area but the same or less impact on civil traffic

How flights actually route - air distance

Historic tracks only tell us so much, but we can analyse historic flights with the winds, and also predict trajectories



AF1148 from CDG to BCN

From the wind vectors we see that the flight is into a headwind, reflected by the air and ground (along track) distance respectively:

Ground distance:	901km
Air Distance:	972km

I.e. the effect of a 22 kt headwind is equivalent to flying an extra ~70km

How can these concepts be applied to space launch/recovery?

- Policy work is needed
  - How to balance airline interests to avoid pushback on launches
  - SUA charges for space flight
  - Engage with charges modulation – already a legal framework in Europe

- Airspace Unlimited is developing tools for airspace designers which can be appropriated to space
  - Advanced Analytics
  - Advanced Airspace Design

Real time impact

24 A/C
Southbound

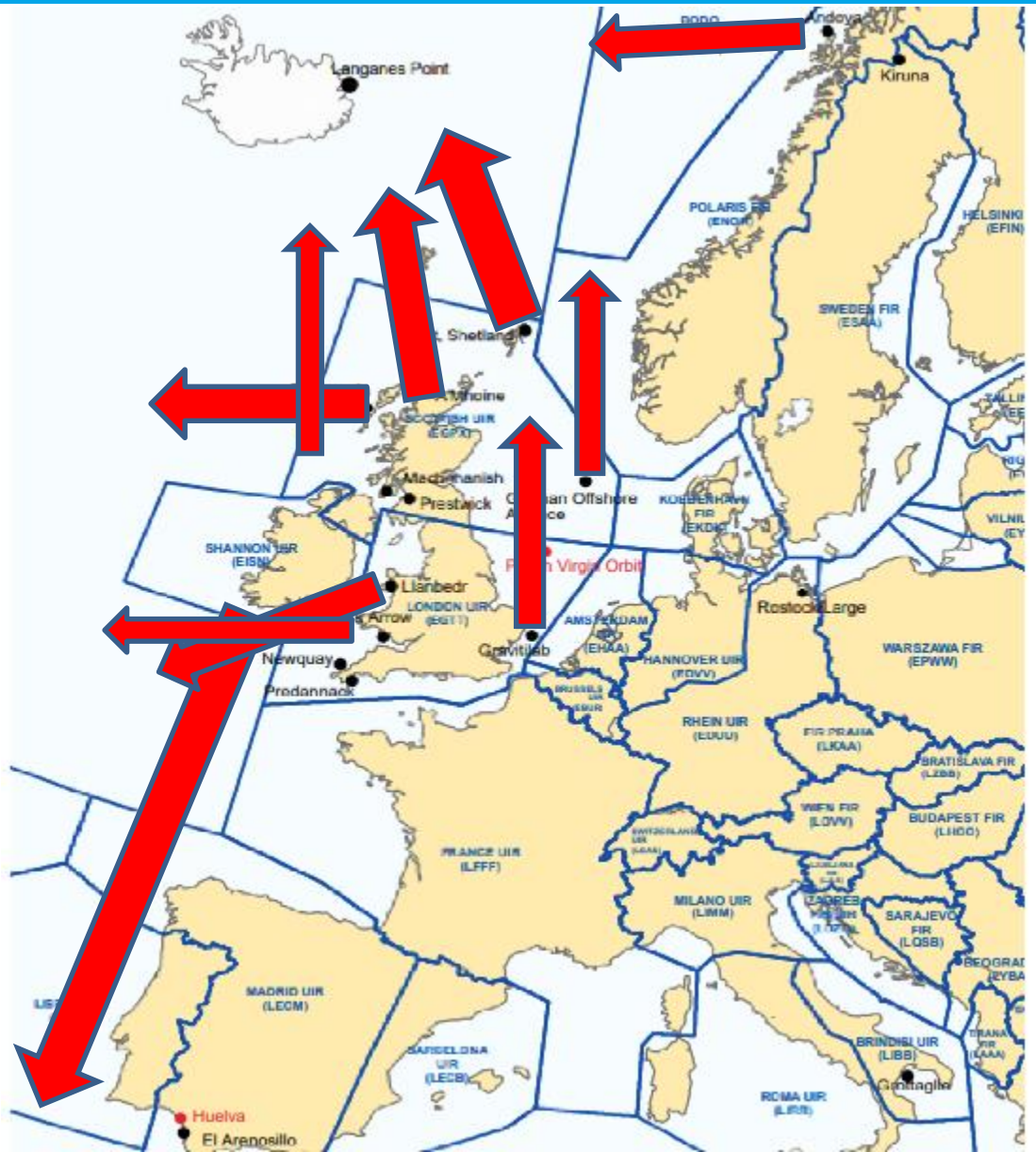
10 A/C
Northbound

Those A/C now routing to the west between JFK and MIA

34 A/C fly an extra 60 NM,

Equals an additional cost of $1500 USD per flight.

Proposed European Spaceport location and projected trajectories



Thank you

OVER and OUT