Civil Aviation Authority

Airborne Conflict
UK CAA Level Bust Strategy
June 2014

The Significant 7

Loss of Control

Runway Excursion

CFIT

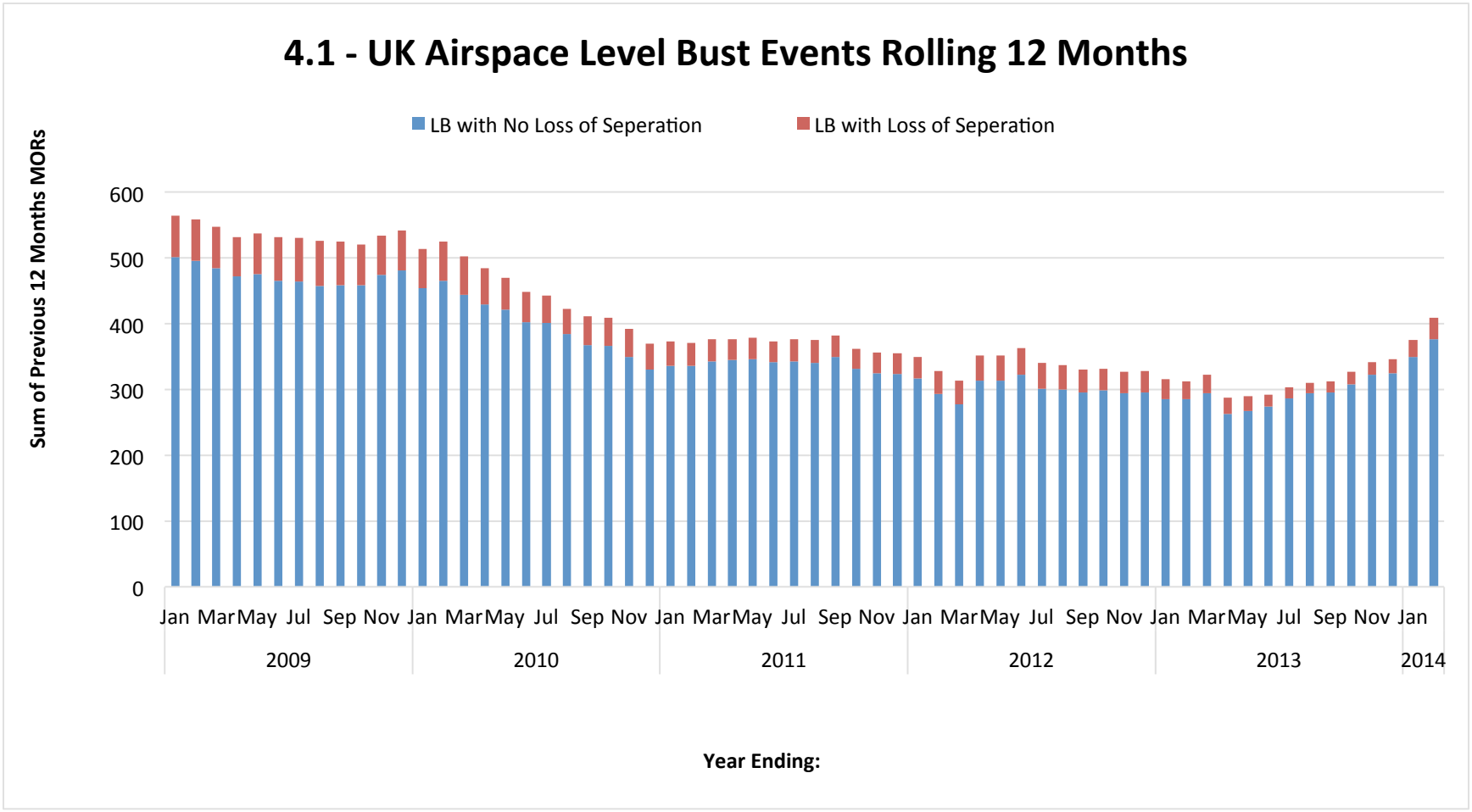
Runway Incursion

Airborne Conflict

Ground Handling

Fire

UK Airspace Level Bust Data



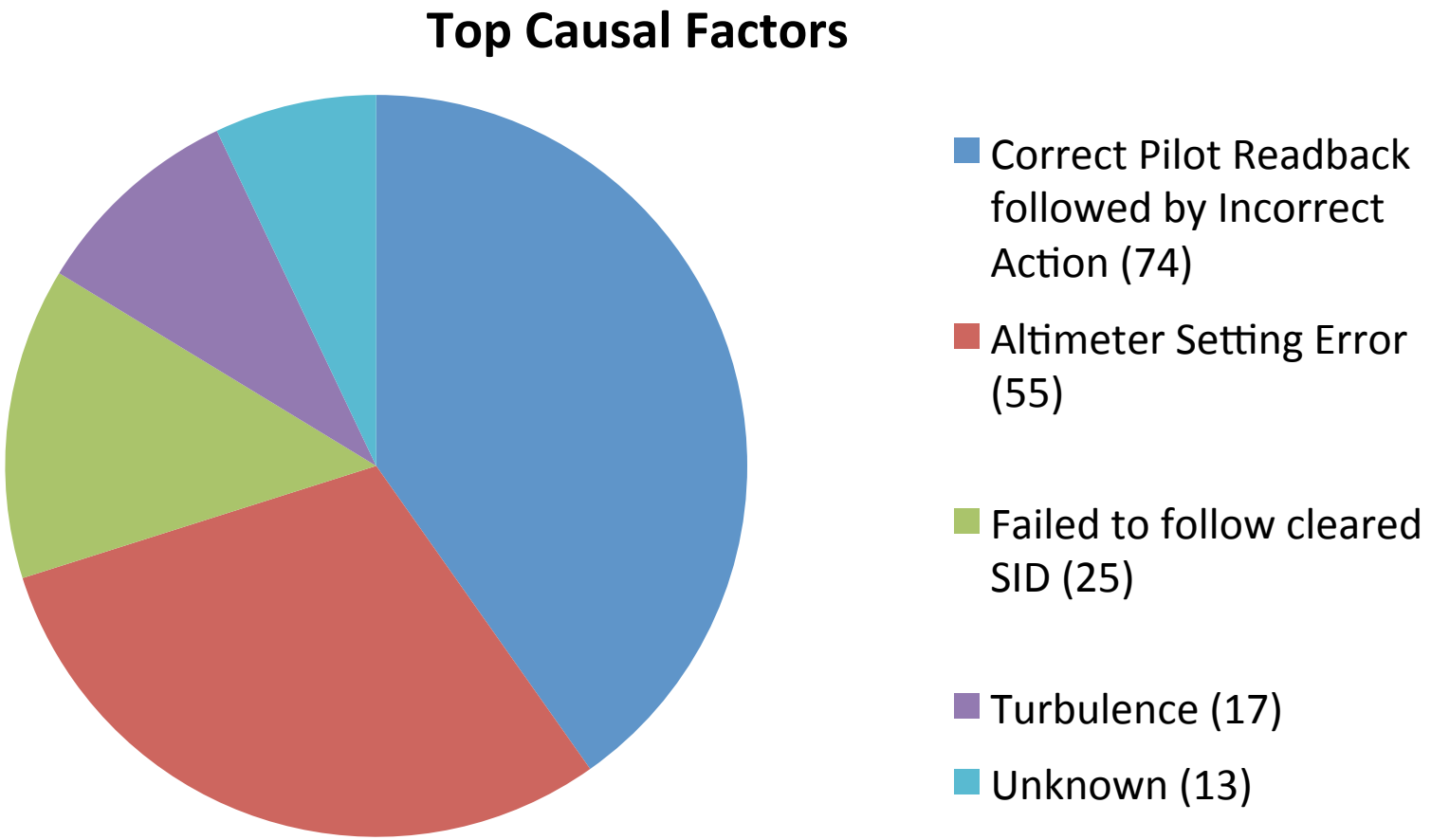
UK Airspace Level Bust Events by State of Registry 2013

State of Registry	Number of Level Busts*	Number of UK Movements	Level Busts per 10,000 Movements
United Kingdom	**160**	**1,044,015**	**1.53**
Ireland	7	339,174	0.21
United States	45	117,538	3.83
Germany	19	94,101	2.02
Netherlands	8	68,690	1.16
France	7	37,590	1.86
Switzerland	4	29,554	1.35
Portugal	8	26,593	3.01
Belgium	5	25,871	1.93
Norway	4	23,848	1.68
United Arab Emirates	4	20,712	1.93
Turkey	7	15,829	4.42
Denmark	4	11,273	3.55
Isle of Man	6	no split	-
Bermuda	4	no split	-
All Foreign Operators	***186***	***1,033,502***	***1.80***

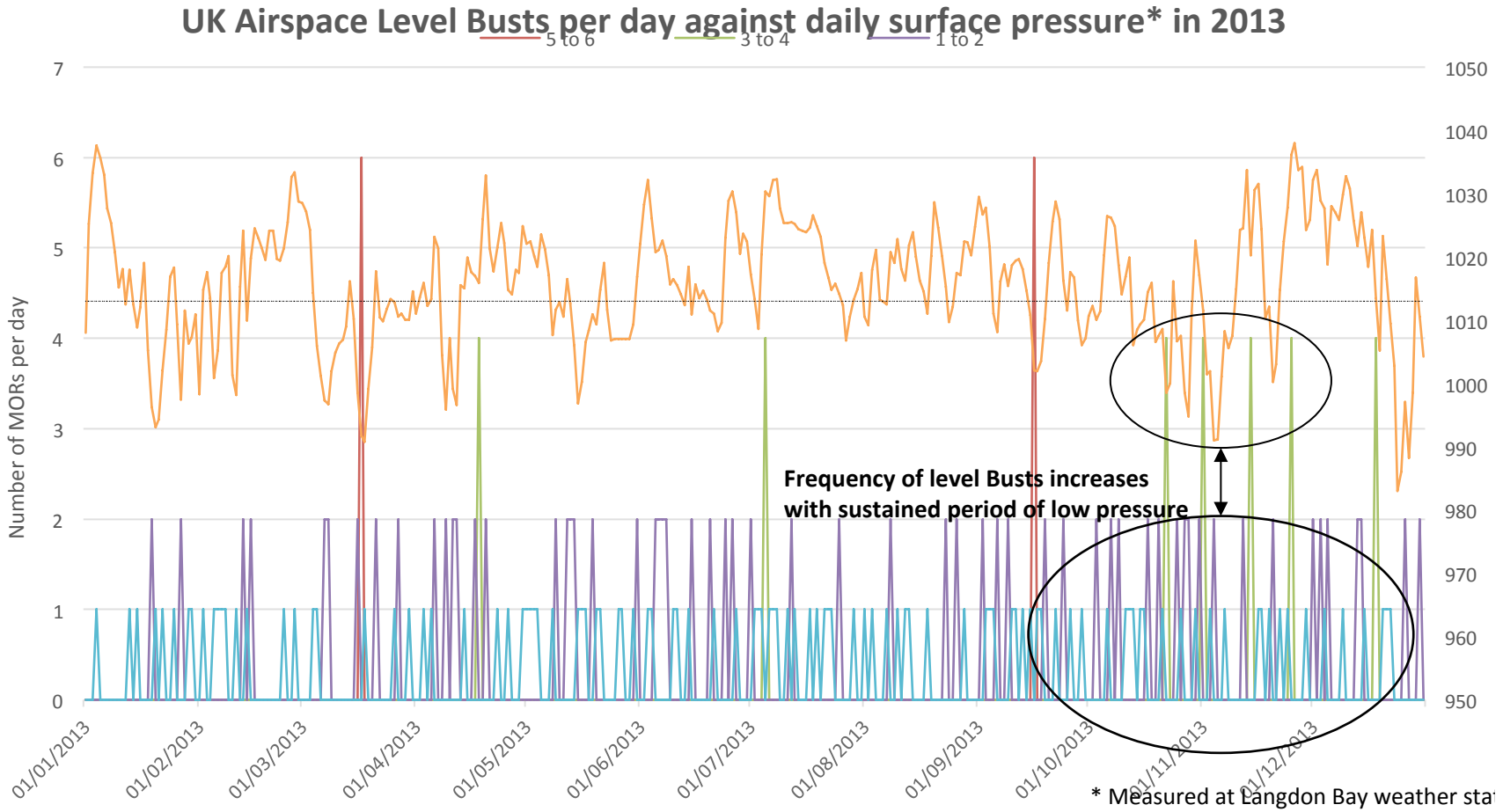
* Operators State of registry who have more than 3 incidents

Sources: Movements - NATS
Events from MORs in ECCAIRS

Level Bust Causal Factors



Level Bust & Daily Pressure



UK DIFFERENCES

- Unique operating procedures within UK airspace:
  - Transition Altitudes 3, 5 or 6,000 ft
  - UK Flight Information Services including Air Traffic Services Outside Controlled Airspace (ATSOCAS)
  - Intricate airspace structure
  - SIDs with stepped climb procedures

UK COMPLEX AIRSPACE
LEVEL BUST SCENARIO

Level bust by Cessna 525 and subsequent AIRPROX with a non-UK operated B777 over London, July 2009

• Overlap of London City DVR 4T SID departure track with base-leg turn for traffic inbound to Heathrow

• Controller did not detect incorrect C525 pilot read back of cleared altitude - C525 flew through its cleared level

• C525 was unable to generate RAs and there was no Mode S downlink of selected flight level, so controller unable to detect its climb to an unsafe altitude prior to exceeding its expected level-off altitude

• B777 crew response to TCAS RA warnings and poor communication of events to ATC resulted in delay before controller became aware that there had been an RA event

• Aircraft passed abeam each other lateral separation 0.5nm vertical 164 ft.

3D MAPPING

- Demonstration of the UK CAA's work
- 3D mapping of UK Airspace and Airborne Conflict events in Google Earth

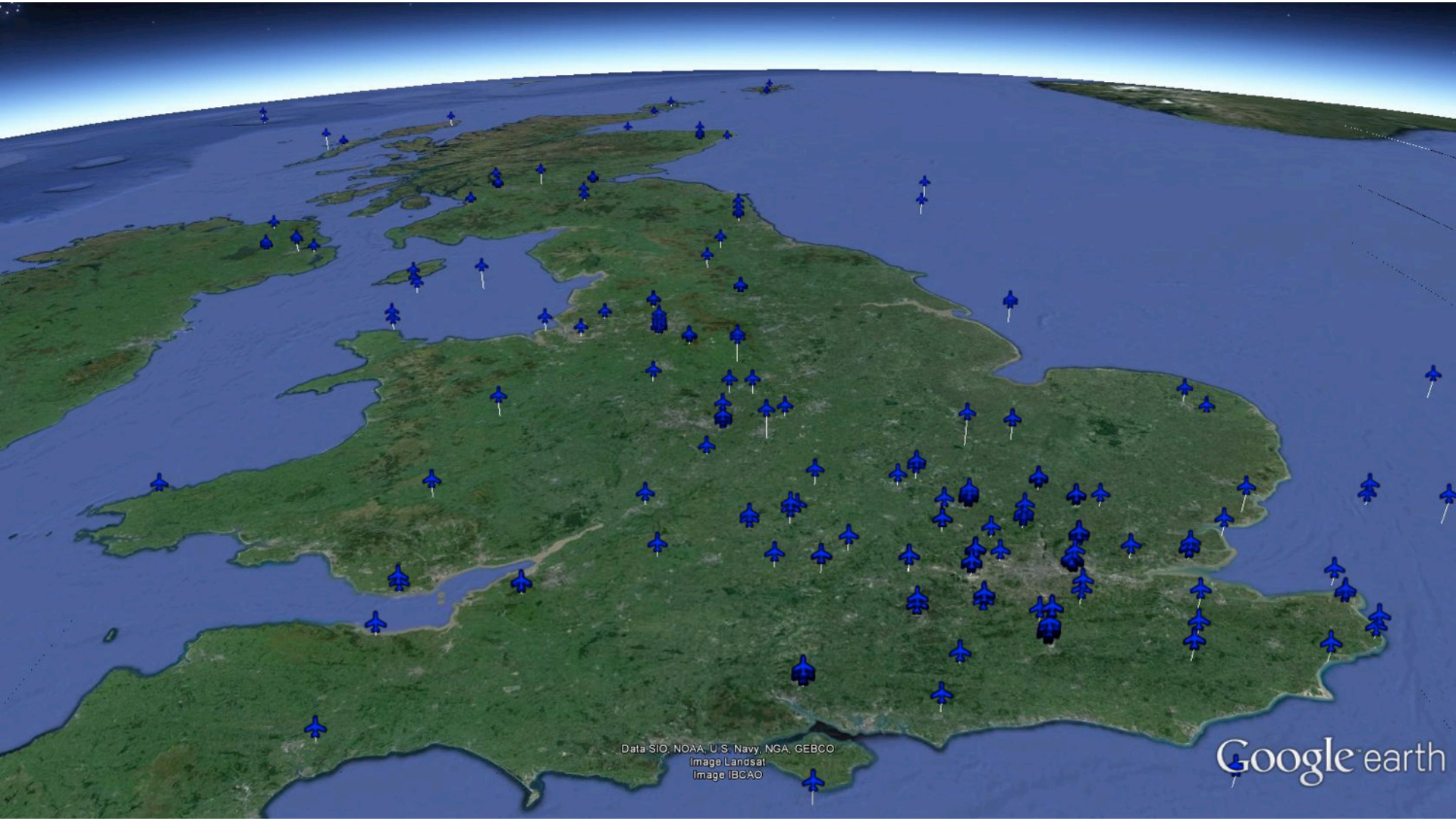

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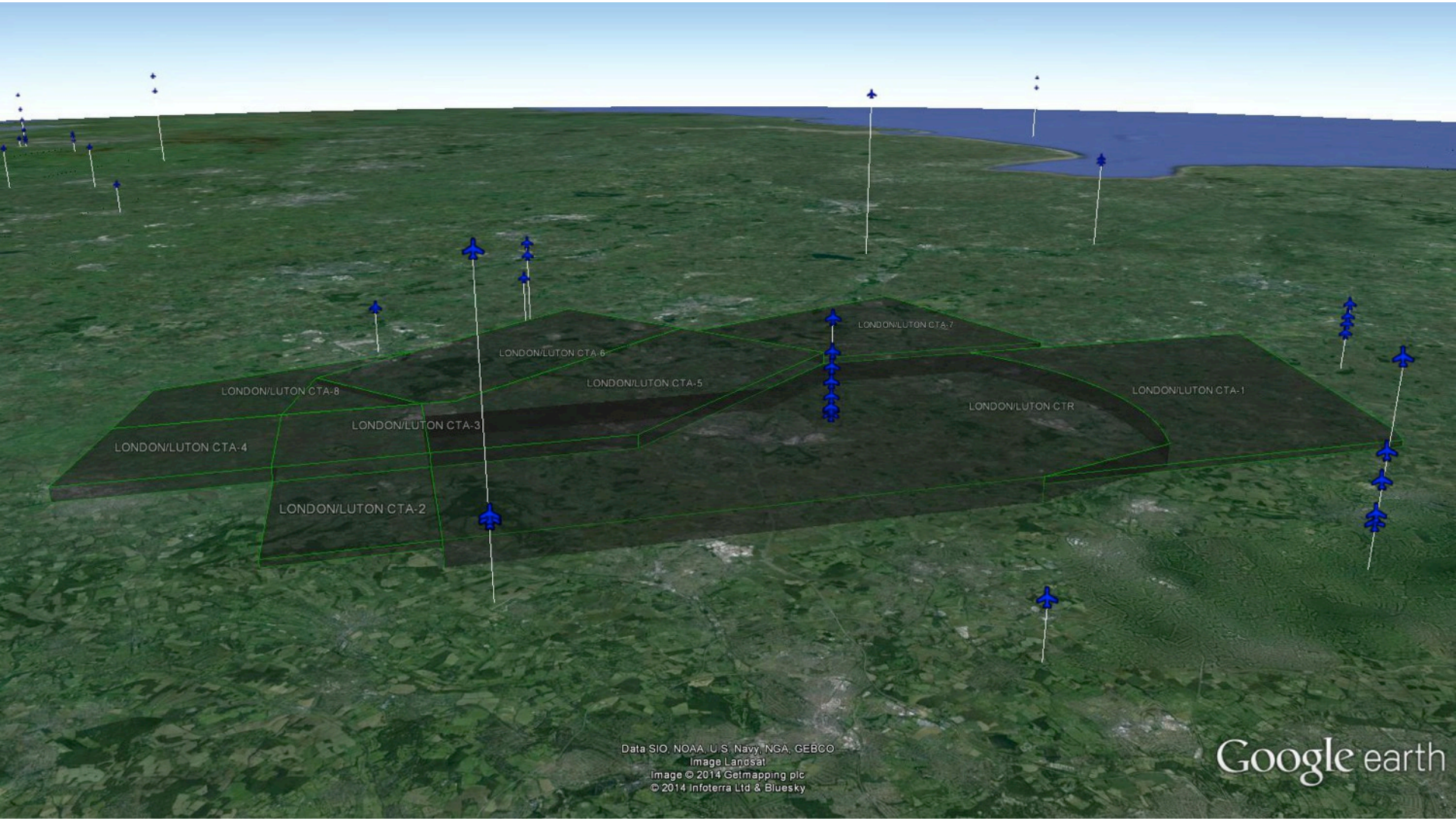
Image IBCAO
Google earth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LONDON/LUTON CTA-1
LONDON/LUTON CTR
LONDON/LUTON CTA-3
LONDON/LUTON CTA-4
LONDON/LUTON CTA-2
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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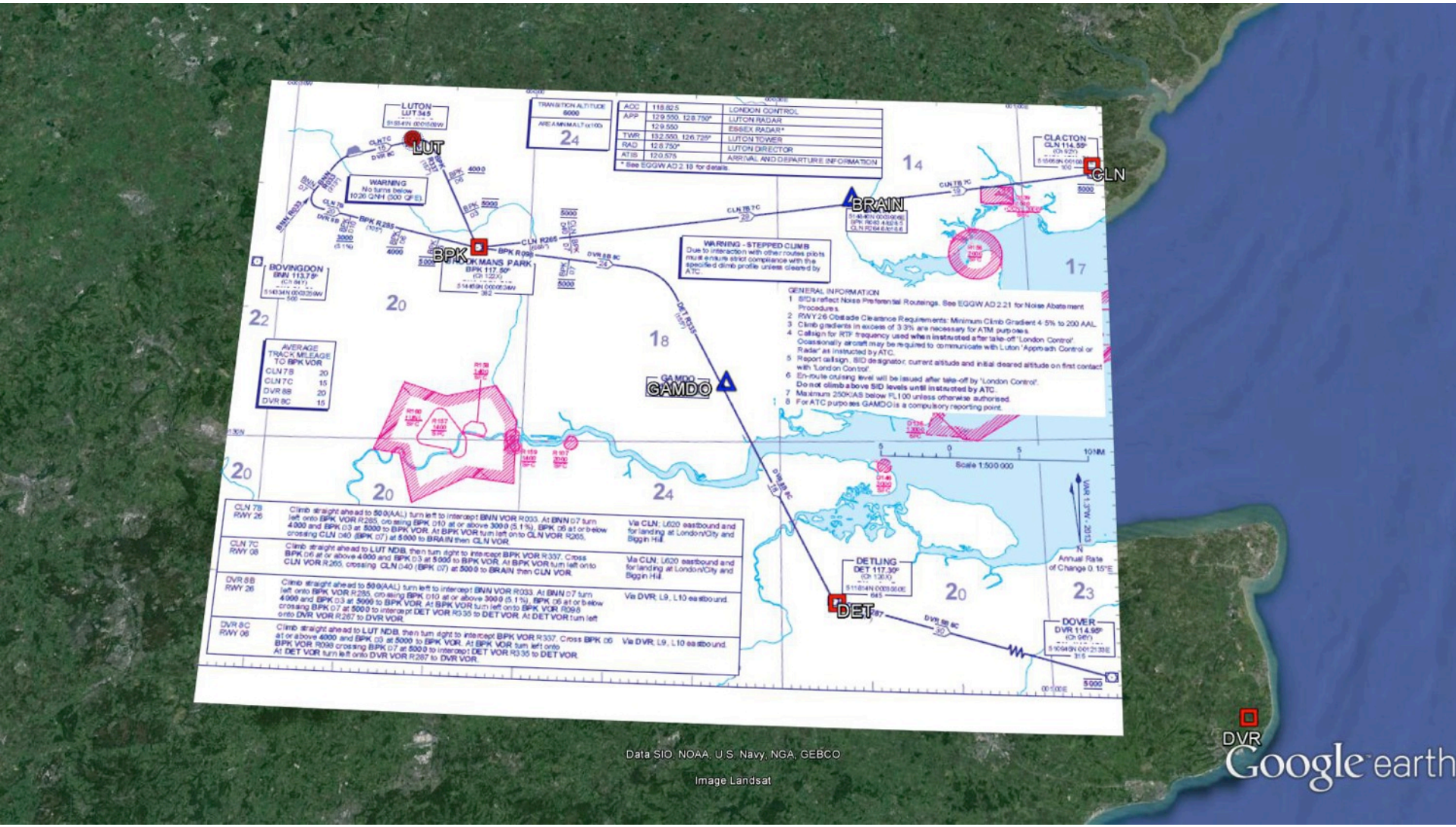
LUTON
LUT 345
BPK
BOVINGDON
BNN 113.7
BROOKMANS PARK
BPK 117.50
WARNING
No turns below
1026 QNH (500 QFE)
TRANSITION ALTITUDE
6000
AREA MINIMA (x100)
24
ACC 118.82.5 LONDON CONTROL
APP 129.550, 128.750* LUTON RADAR
129.550 ESSEX RADAR*
TWR 132.550, 126.725* LUTON TOWER
RAD 128.750* LUTON DIRECTOR
ATIS 120.575 ARRIVAL AND DEPARTURE INFORMATION
* See EGGW AD 2.18 for details.
CLACTON
CLN 114.55*
CLN
BRAIN
WARNING - STEPPED CLIMB
Due to interaction with other routes pilots must ensure strict compliance with the specified climb profile unless cleared by ATC.
GENERAL INFORMATION
1 SIDs reflect Noise Preferential Routeings. See EGGW AD 2.21 for Noise Abatement Procedures.
2 RWY 26 Obstacle Clearance Requirements: Minimum Climb Gradient 4·5% to 200 AAL.
3 Climb gradients in excess of 3·3% are necessary for ATM purposes.
4 Callsign for RTF frequency used when instructed after take-off 'London Control'. Occasionally aircraft may be required to communicate with Luton 'Approach Control or Radar' as instructed by ATC.
5 Report callsign, SID designator, current altitude and initial cleared altitude on first contact with 'London Control'.
6 En-route cruising level will be issued after take-off by 'London Control'. Do not climb above SID levels until instructed by ATC.
7 Maximum 250KIAS below FL100 unless otherwise authorised.
8 For ATC purposes GAMDO is a compulsory reporting point.
AVERAGE TRACK MILEAGE TO BPK VOR
CLN 7B 20
CLN 7C 15
DVR 8B 20
DVR 8C 15
GAMDO
DETLING
DET 117.30*
DET
DOVER
DVR 114.95*
DVR
Scale 1:500 000
10NM
VAR 1.3°W - 2013
Annual Rate of Change 0.15°E
CLN 7B RWY 26 Climb straight ahead to 500(AAL) turn left to intercept BNN VOR R033. At BNN D7 turn left onto BPK VOR R265, crossing BPK D10 at or above 3000 (5.1%). BPK D6 at or below 4000 and BPK D3 at 5000 to BPK VOR. At BPK VOR turn left onto CLN VOR R265, crossing CLN D40 (BPK D7) at 5000 to BRAIN then CLN VOR. Via CLN: L620 eastbound and for landing at London/City and Biggin Hill.
CLN 7C RWY 08 Climb straight ahead to LUT NDB, then turn right to intercept BPK VOR R337. Cross BPK D6 at or above 4000 and BPK D3 at 5000 to BPK VOR. At BPK VOR turn left onto CLN VOR R265, crossing CLN D40 (BPK D7) at 5000 to BRAIN then CLN VOR. Via CLN: L620 eastbound and for landing at London/City and Biggin Hill.
DVR 8B RWY 26 Climb straight ahead to 500(AAL) turn left to intercept BNN VOR R033. At BNN D7 turn left onto BPK VOR R265, crossing BPK D10 at or above 3000 (5.1%). BPK D6 at or below 4000 and BPK D3 at 5000 to BPK VOR. At BPK VOR turn left onto BPK VOR R098 crossing BPK D7 at 5000 to intercept DET VOR R335 to DET VOR. At DET VOR turn left onto DVR VOR R287 to DVR VOR. Via DVR: L9, L10 eastbound.
DVR 8C RWY 08 Climb straight ahead to LUT NDB, then turn right to intercept BPK VOR R337. Cross BPK D6 at or above 4000 and BPK D3 at 5000 to BPK VOR. At BPK VOR turn left onto BPK VOR R098 crossing BPK D7 at 5000 to intercept DET VOR R335 to DET VOR. At DET VOR turn left onto DVR VOR R287 to DVR VOR. Via DVR: L9, L10 eastbound.
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Google earth


Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Google earth


OLNEY
LUT
CLN
BRAIN
HEN
BPK
RODNI
GAMDO
CPT
DET
DVR
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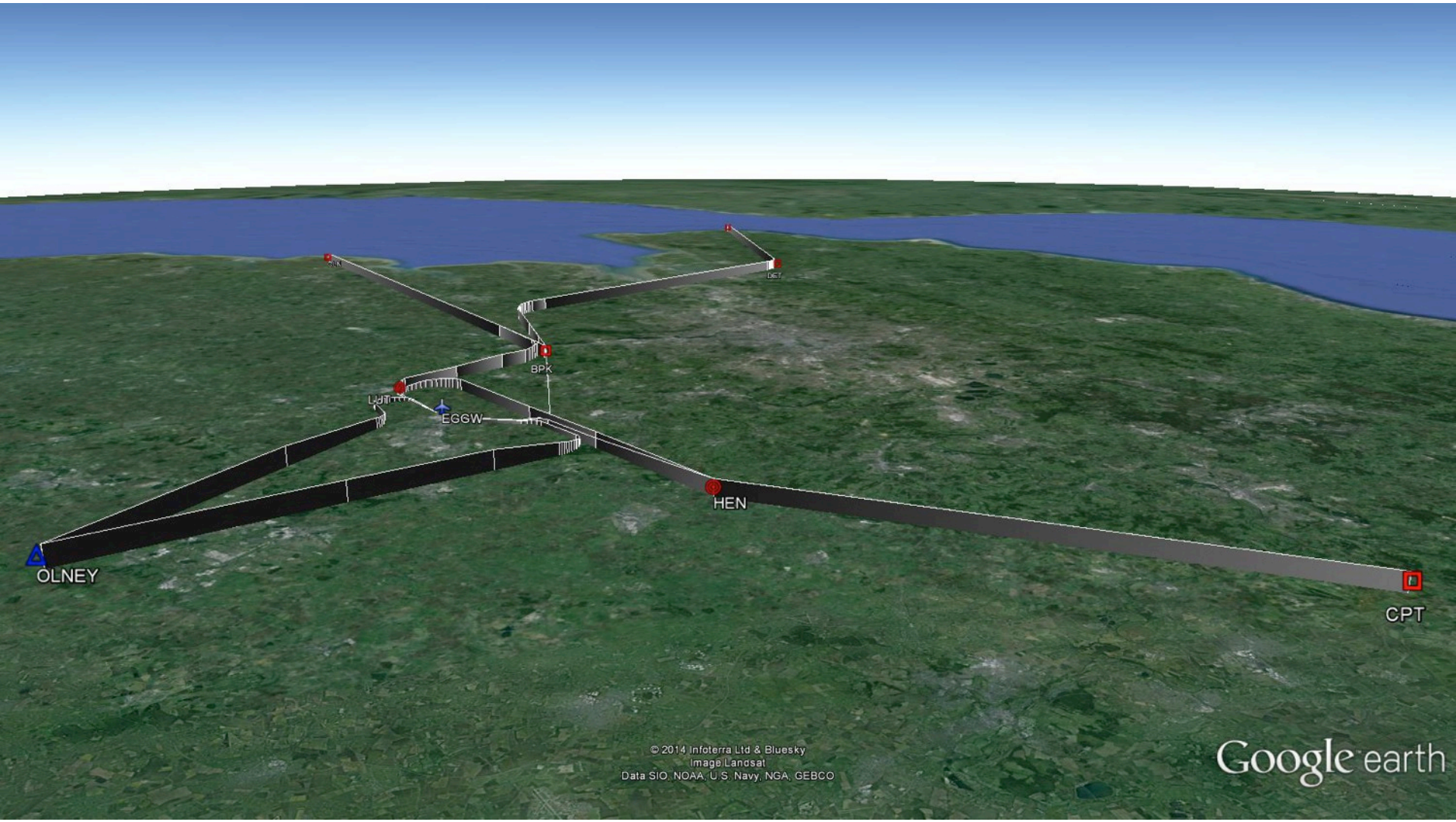
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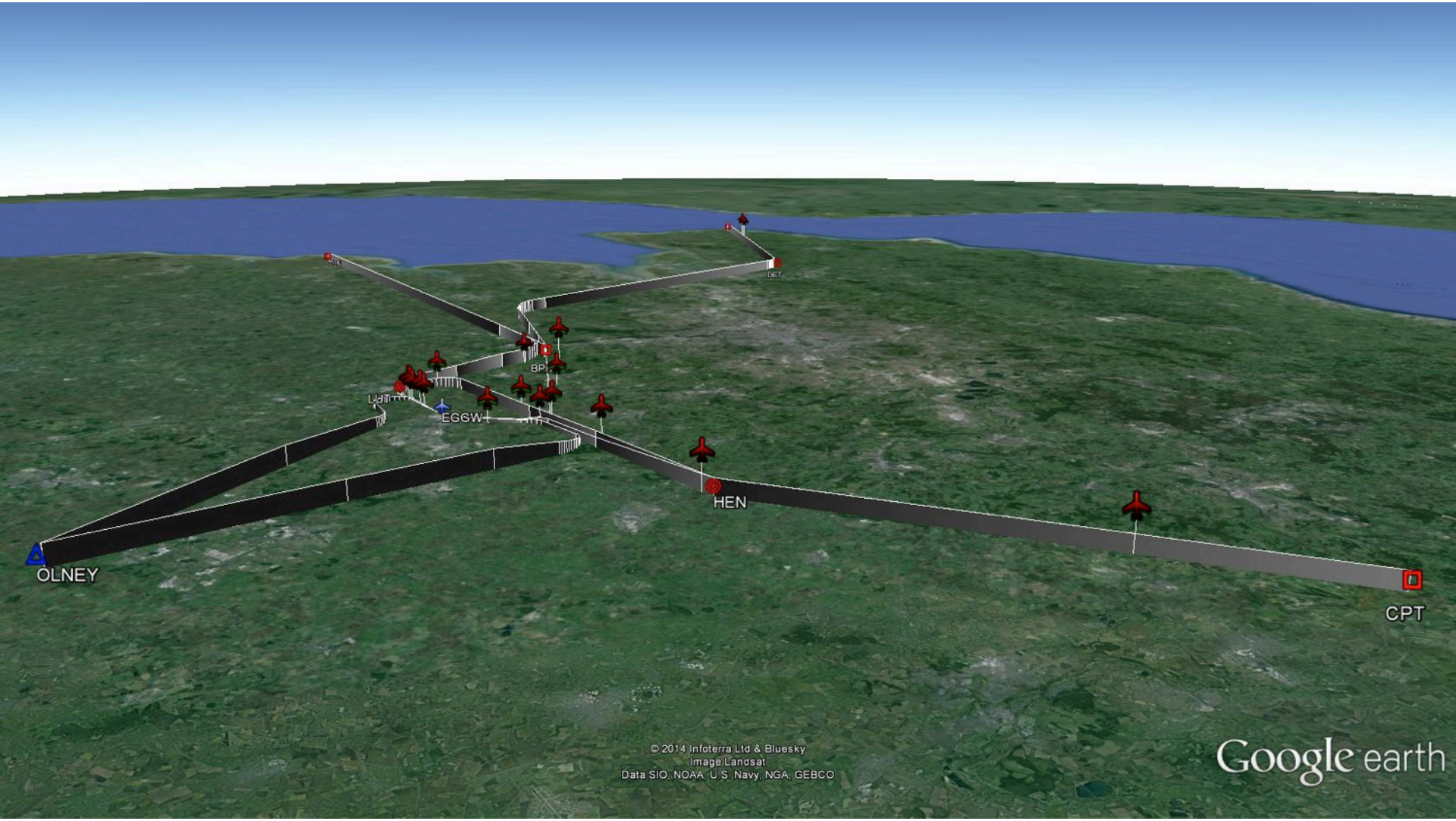
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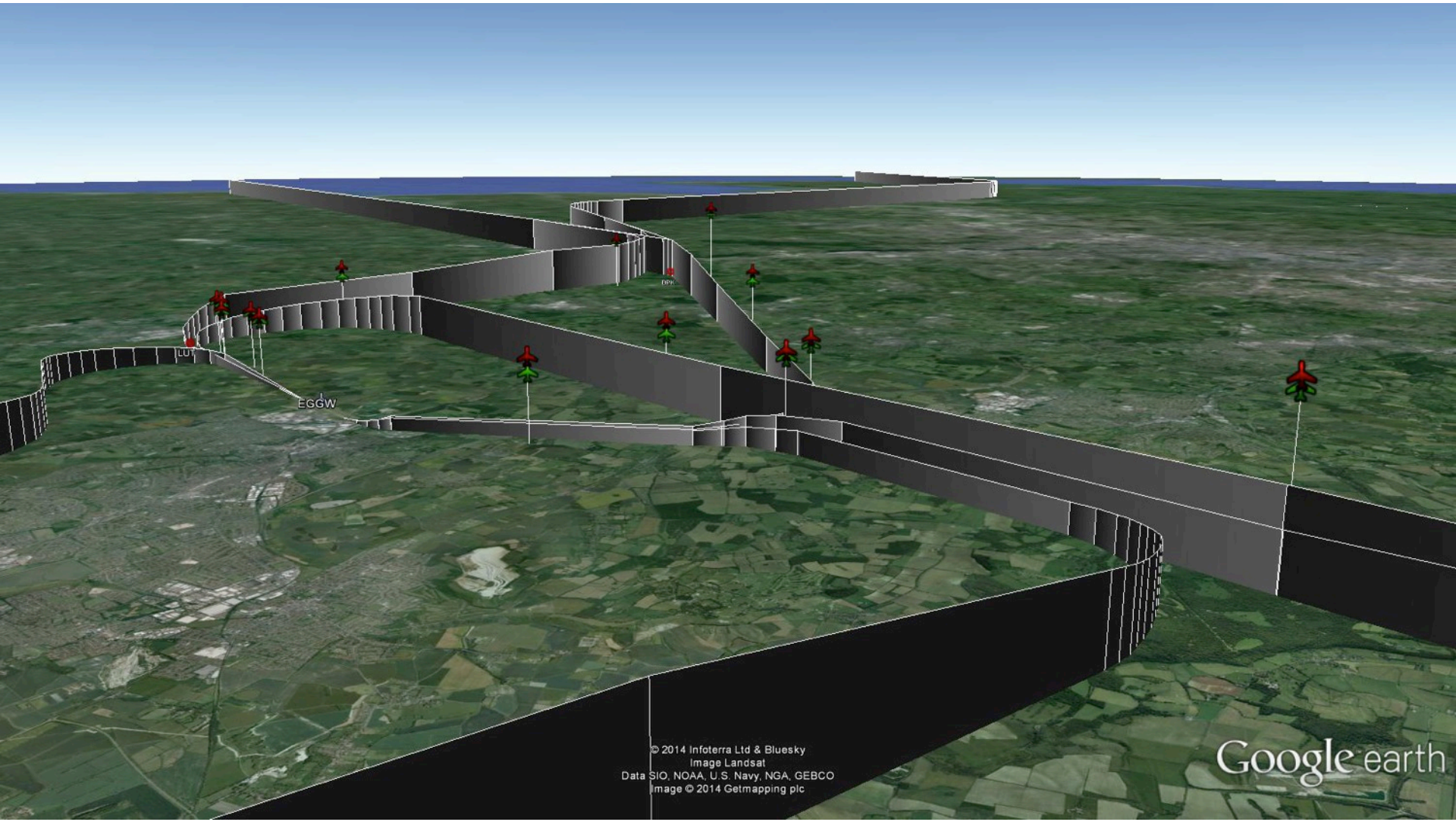
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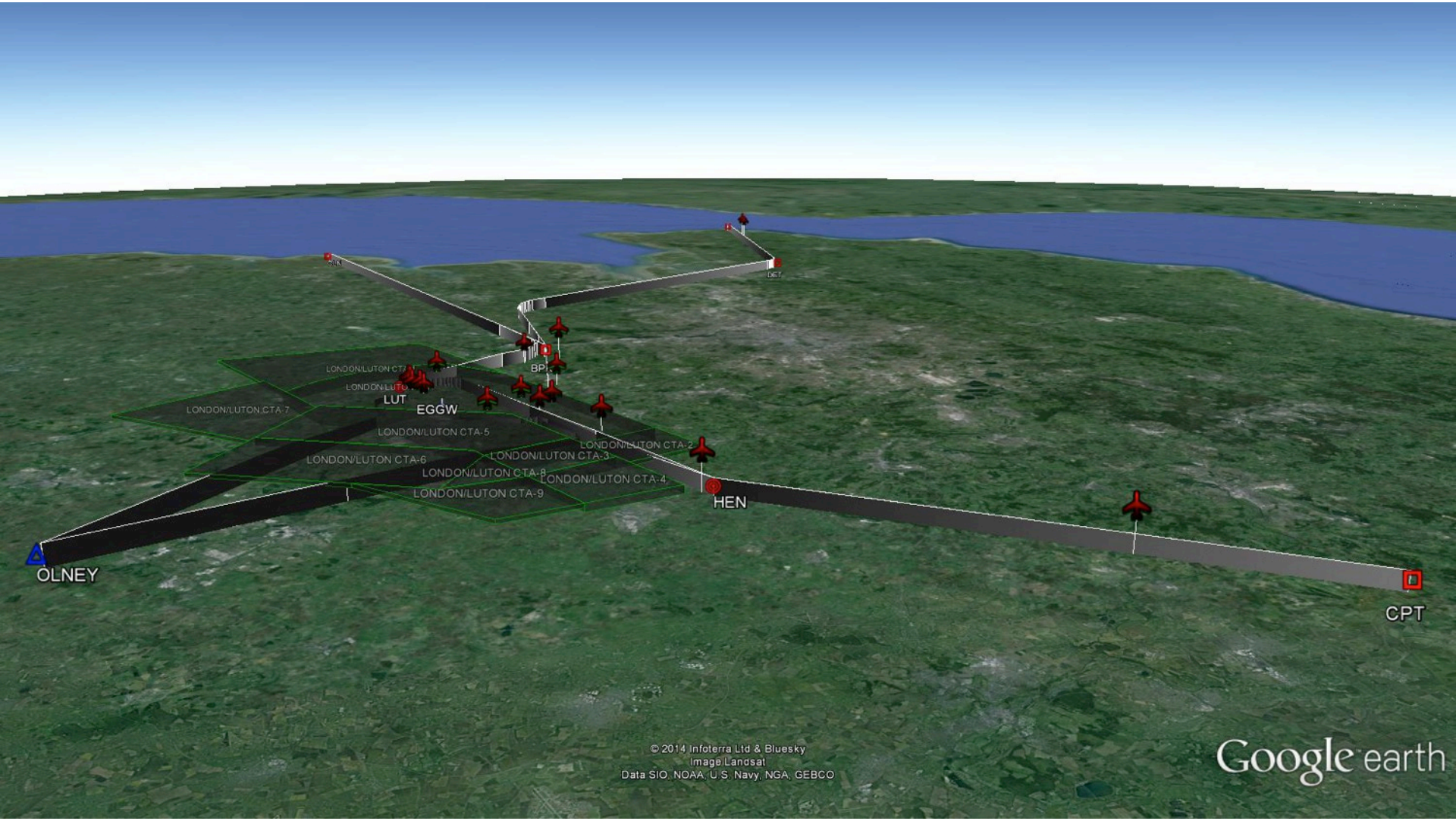
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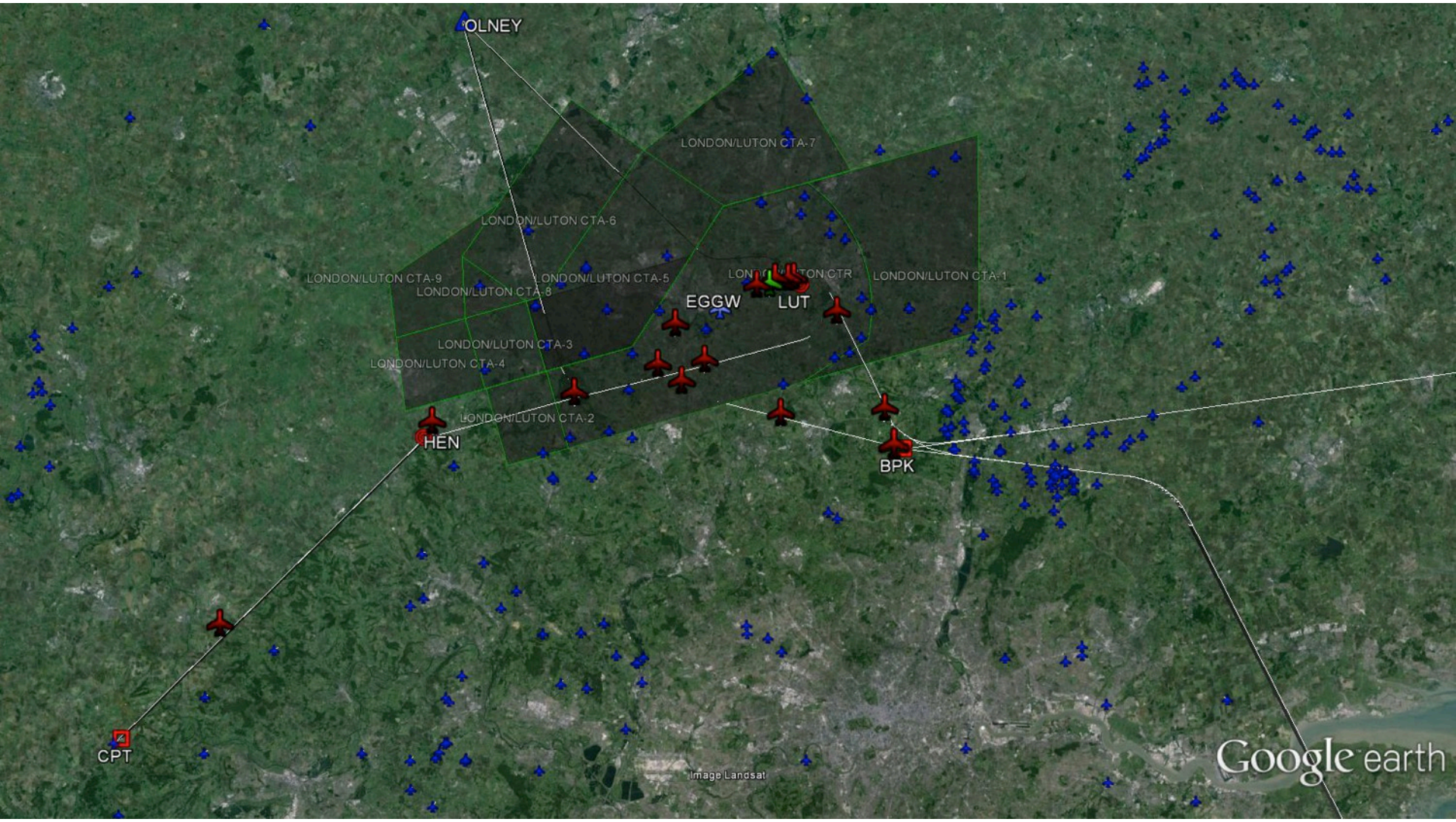
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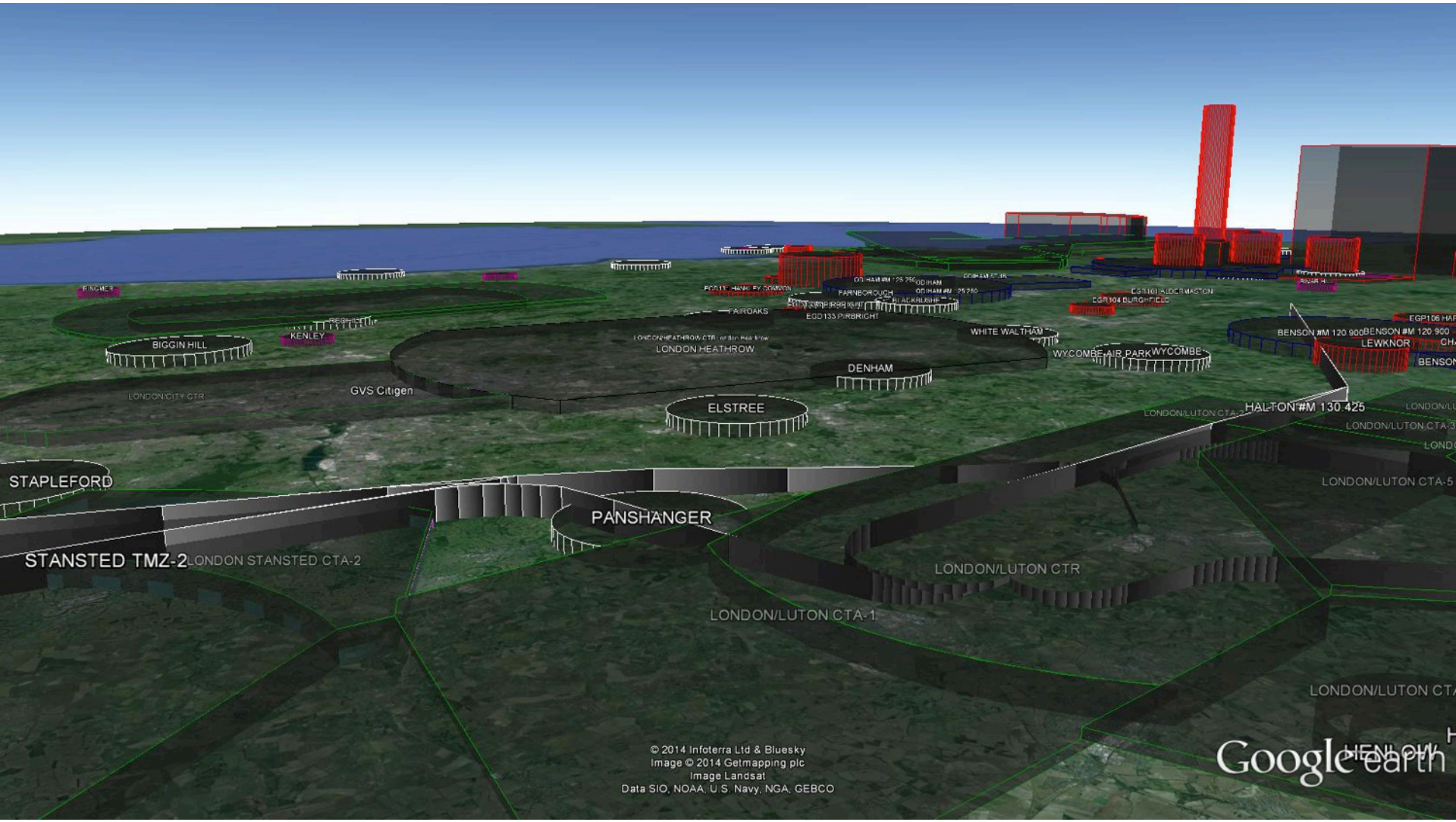
BIGGIN HILL
KENLEY
LONDON/CITY CTR
GVS Citigen
LONDON HEATHROW
FAIROAKS
EGD133 PIRBRIGHT
BLACKBUSHE
FARNBOROUGH
WHITE WALTHAM
WYCOMBE AIR PARK
WYCOMBE
EGR101 ALDERMASTON
EGR104 BURGHFIELD
BENSON #M 120.900
LEWKNOR
DENHAM
ELSTREE
HALTON #M 130.425
LONDON/LUTON CTA-2
LONDON/LUTON CTA-3
LONDON/LUTON CTA-5
STAPLEFORD
PANSHANGER
STANSTED TMZ-2
LONDON STANSTED CTA-2
LONDON/LUTON CTR
LONDON/LUTON CTA-1
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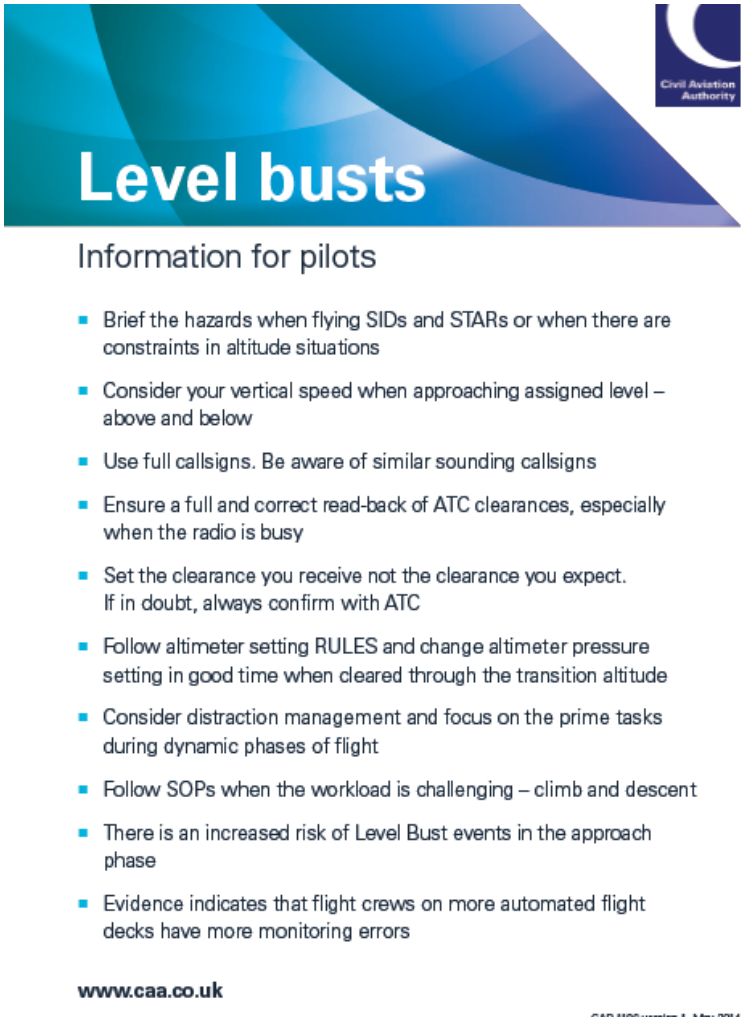
LEVEL BUST TOP TIPS



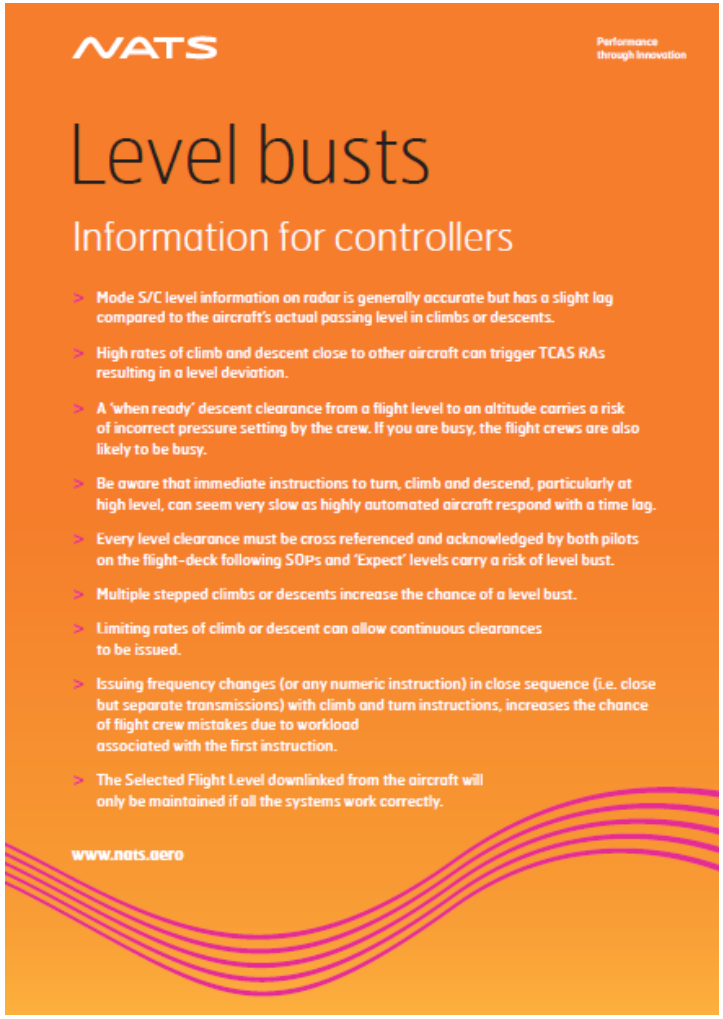
Civil Aviation Authority

Level busts

Information for pilots

- Brief the hazards when flying SIDs and STARs or when there are constraints in altitude situations
- Consider your vertical speed when approaching assigned level – above and below
- Use full callsigns. Be aware of similar sounding callsigns
- Ensure a full and correct read-back of ATC clearances, especially when the radio is busy
- Set the clearance you receive not the clearance you expect. If in doubt, always confirm with ATC
- Follow altimeter setting RULES and change altimeter pressure setting in good time when cleared through the transition altitude
- Consider distraction management and focus on the prime tasks during dynamic phases of flight
- Follow SOPs when the workload is challenging – climb and descent
- There is an increased risk of Level Bust events in the approach phase
- Evidence indicates that flight crews on more automated flight decks have more monitoring errors

www.caa.co.uk



NATS

Performance through innovation

Level busts

Information for controllers

- Mode S/C level information on radar is generally accurate but has a slight lag compared to the aircraft's actual passing level in climbs or descents.
- High rates of climb and descent close to other aircraft can trigger TCAS RAs resulting in a level deviation.
- A 'when ready' descent clearance from a flight level to an altitude carries a risk of incorrect pressure setting by the crew. If you are busy, the flight crews are also likely to be busy.
- Be aware that immediate instructions to turn, climb and descend, particularly at high level, can seem very slow as highly automated aircraft respond with a time lag.
- Every level clearance must be cross referenced and acknowledged by both pilots on the flight-deck following SOPs and 'Expect' levels carry a risk of level bust.
- Multiple stepped climbs or descents increase the chance of a level bust.
- Limiting rates of climb or descent can allow continuous clearances to be issued.
- Issuing frequency changes (or any numeric instruction) in close sequence (i.e. close but separate transmissions) with climb and turn instructions, increases the chance of flight crew mistakes due to workload associated with the first instruction.
- The Selected Flight Level downlinked from the aircraft will only be maintained if all the systems work correctly.

www.nats.aero

STATISTICS & DATA

- All our data is reliant on the information included in your safety reports
- Location is often vague, incomplete or missing
- More accurate information on MORs will enable better mapping
- Helps understanding of the problem and its sources
- Allows targeted advice on operating within our complex airspace

REPORTING

- A Just Culture to encourage reporting is vital
- Level Busts are most often reported by the ANSP and not the flight crew
- Reports on those events which **did not result in a level bust** are also vital to understand why procedures are failing

HOW TO HELP US HELP YOU

- Better data will enable us to accelerate the development of this project
- Mapping events allows us to identify hotspots or to focus on SIDs
- Overlaying traffic flow helps when reviewing airport expansions or airspace change proposals
- Project will be extended to look at CFIT, Laser incidents, Wake Turbulence events

Jacky Mills
Flight Operations Policy Specialist
jacky.mills@caa.co.uk