

Green-GEAR

Green operations with Geometric altitude, Advanced separation and Route charging solutions

Vertical Guidance using Geometric Altimetry

- for the Terminal Manoeuvring Area (TMA):
 - removal of transition layer → higher capacity through reduction of containment limits
 - higher predictability of vertical profile enabling less fuel consumption and noise
 - more efficient route network

- study of en-route effects:
 - density and baro pressure
 - temperature profile

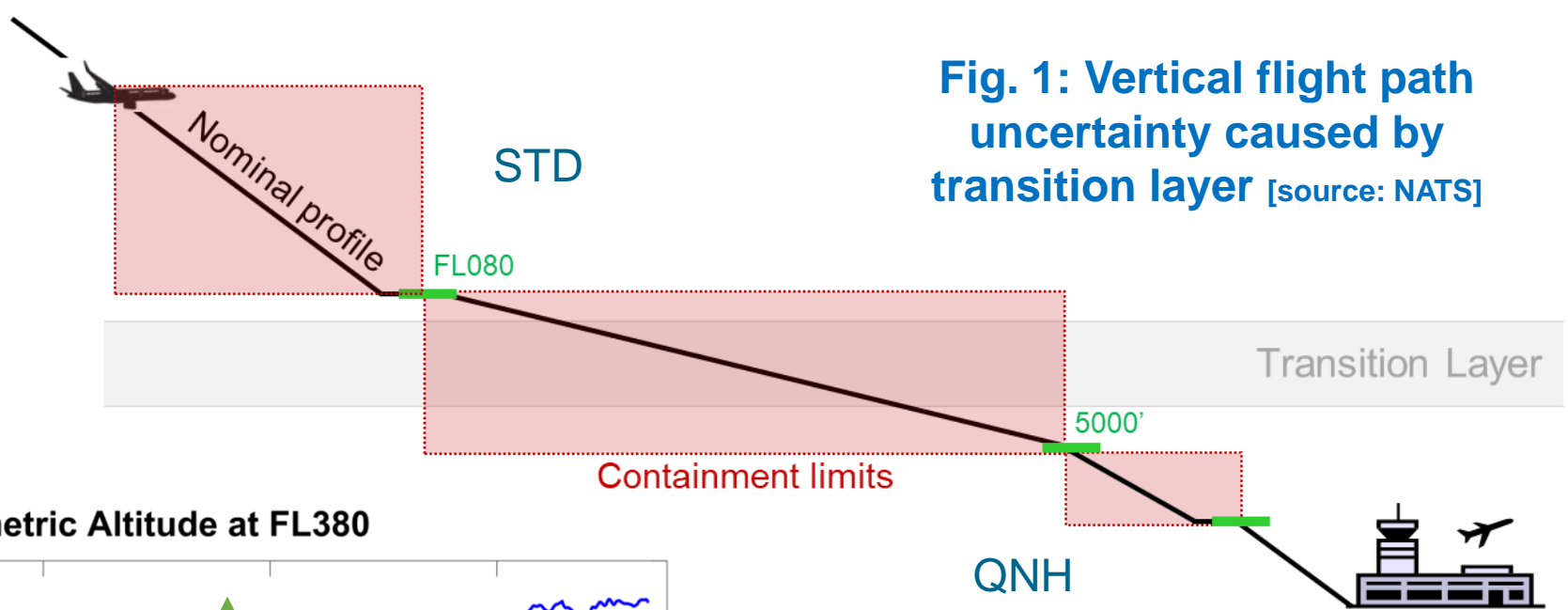


Fig. 1: Vertical flight path uncertainty caused by transition layer [source: NATS]

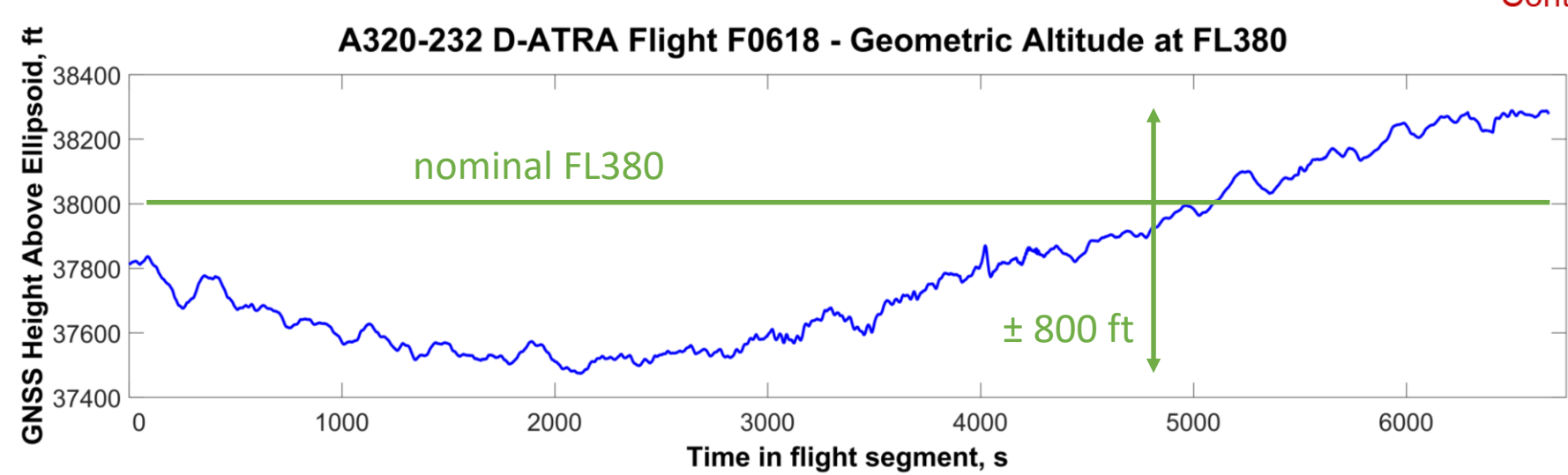


Fig. 2: Sample of difference between geometric and barometric altitude in cruise [source: DLR]

Advanced Separation Minima

- reduced Altimetry System Error (ASE) through geometric altimetry as enabler
- Reduced Vertical Separation Minima (RVSM) 2 – reduction of vertical separation to 500 ft
- collision and wake turbulence risk analysis
- initial safety case and concept validation
- integration of new aircraft types

Fig. 3: Vertical errors definition [after ICAO Doc 9574; source: DLR]

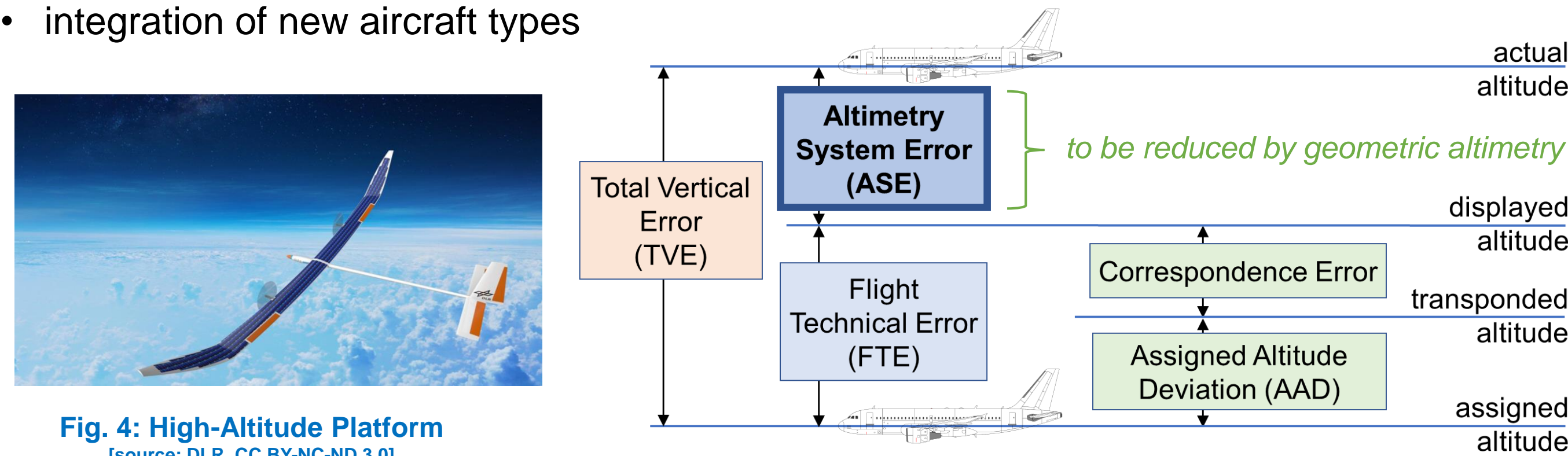
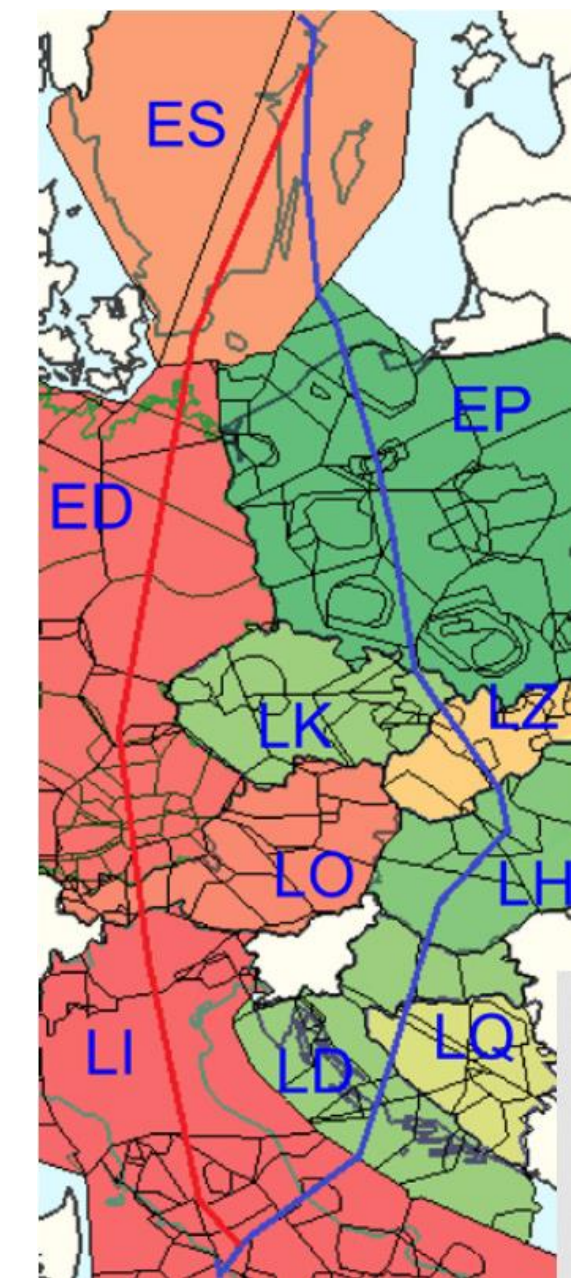


Fig. 4: High-Altitude Platform [source: DLR, CC BY-NC-ND 3.0]

Green Route Charging

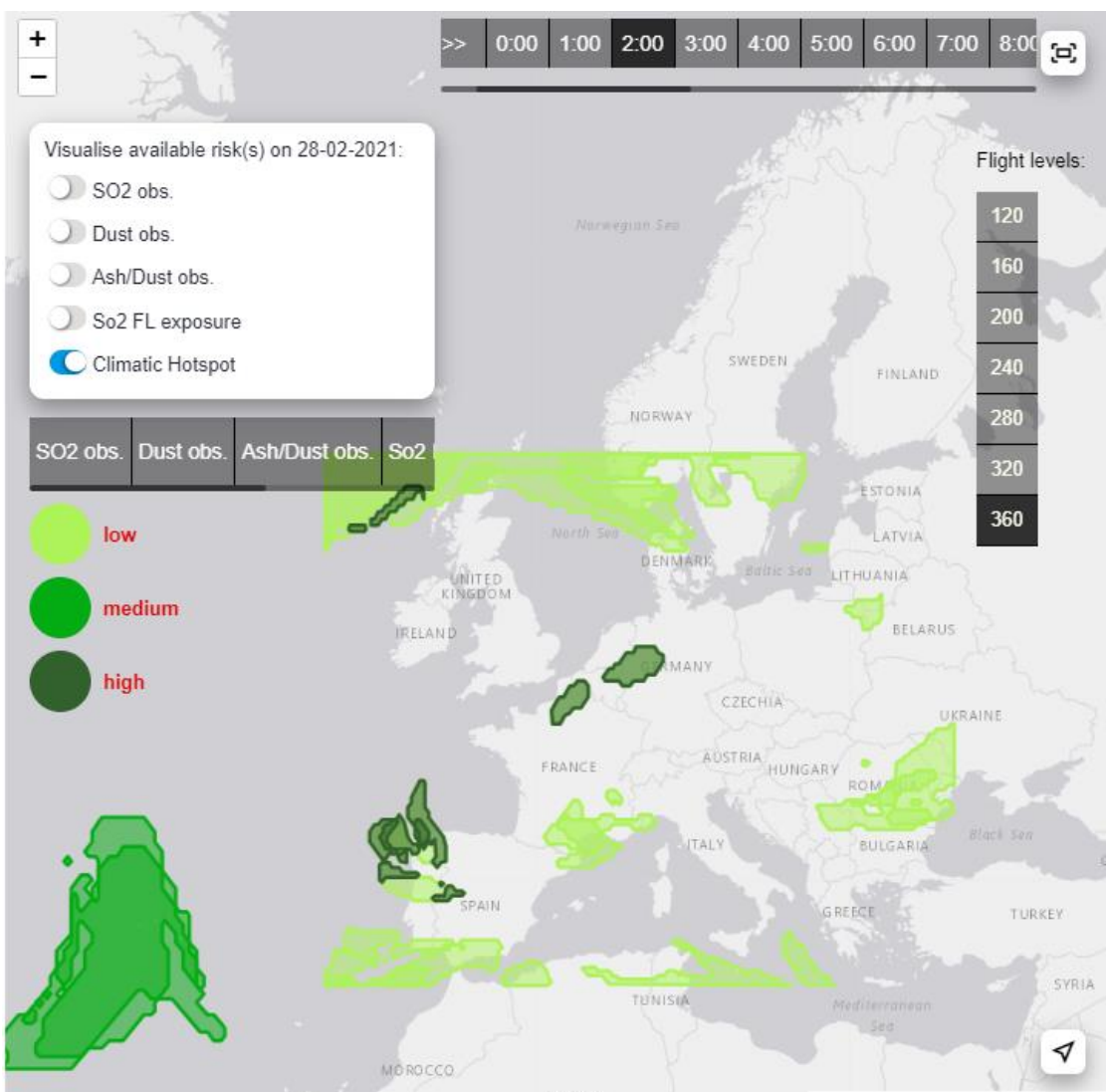
Fig. 5: Differences in navigation fees (unit costs) per airspace sector (colour-coded) and resulting cost-optimised trajectory planning (blue line) [source: Delgado 2015¹]



- propose business and operational incentivisation of climate-optimised flight planning through route charging
- not only CO₂, but also areas with high climate impact contribution (climatic hotspots) to be considered
- achieve environmental benefits at network level

1: Delgado, L.: European route choice determinants. 11th USA/Europe Air Traffic Management Research and Development Seminar, Lisbon, 23rd – 26th June 2015.
2: ALARM demo website at <https://alarm-project.eu/integrated-platform-for-the-nowcasting-and-forecasting-of-multiple-meteorological-hazards-including-climatic-impact/>

Fig. 6: Sample map of climatic hotspots [source: ALARM project²]



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