

9th December 2021



11TH SESAR INNOVATION DAYS

ANSP MEASURES OF FLIGHT DESCENT PERFORMANCE

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11th SESAR Innovation Days



CONTENTS

TODAY'S AGENDA

- BACKGROUND
- METRIC
- APPLICATION
- CONCLUSION
- Q&A

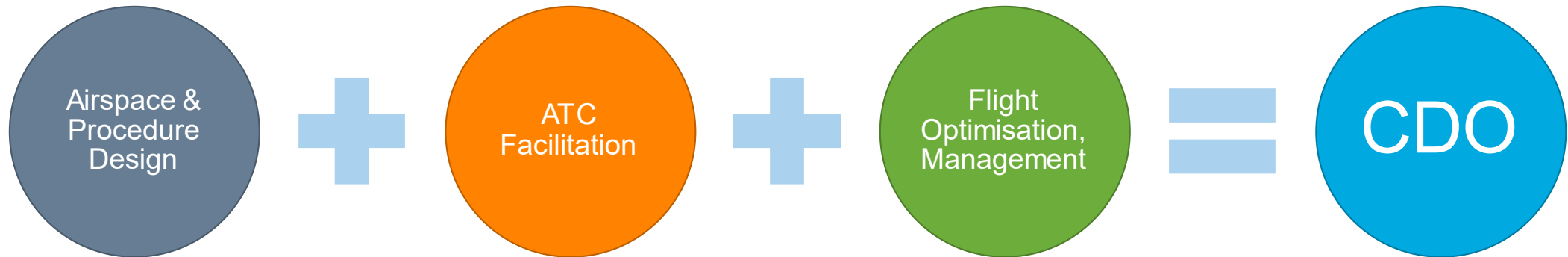




BACKGROUND

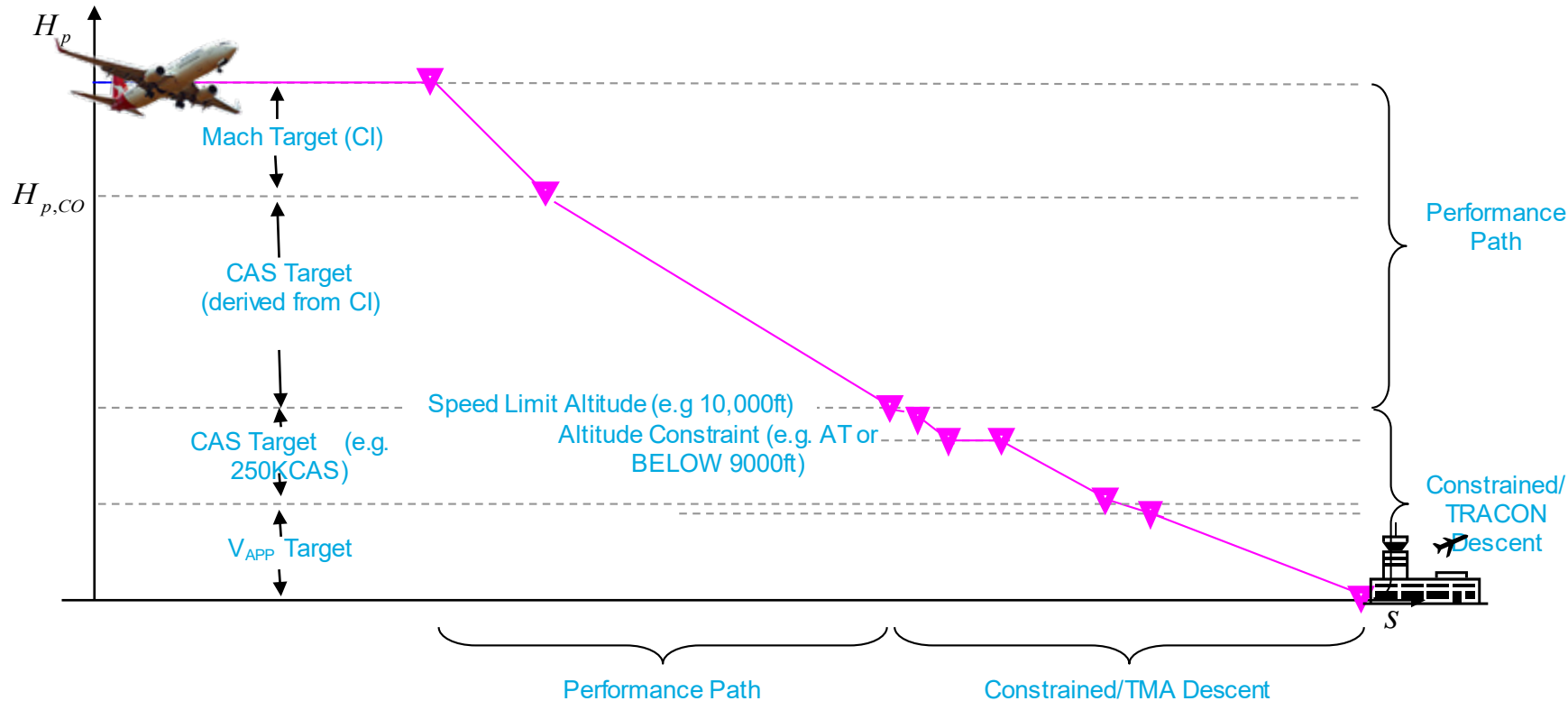
ICAO Definition: Continuous Descent Operation (CDO)

“CDO is an aircraft operating technique aided by appropriate **airspace** and **procedure design** and appropriate **ATC clearances** **enabling the execution of a flight profile optimized to the operating capability of the aircraft**, with low engine thrust settings and, where possible, a low drag configuration, thereby reducing fuel burn and emissions during descent.”



AUTOMATION MANAGED DESCENTS

Descent Profile: Medium & large jets



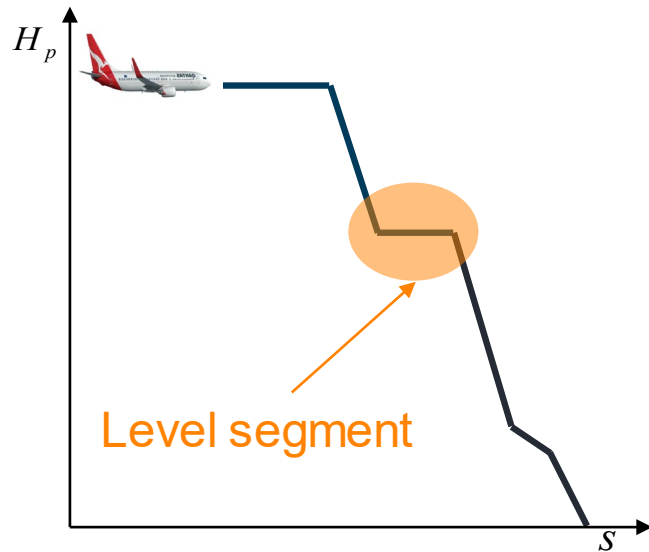
FMS



Airbus A320 Cockpit [Image credit: Airbus]

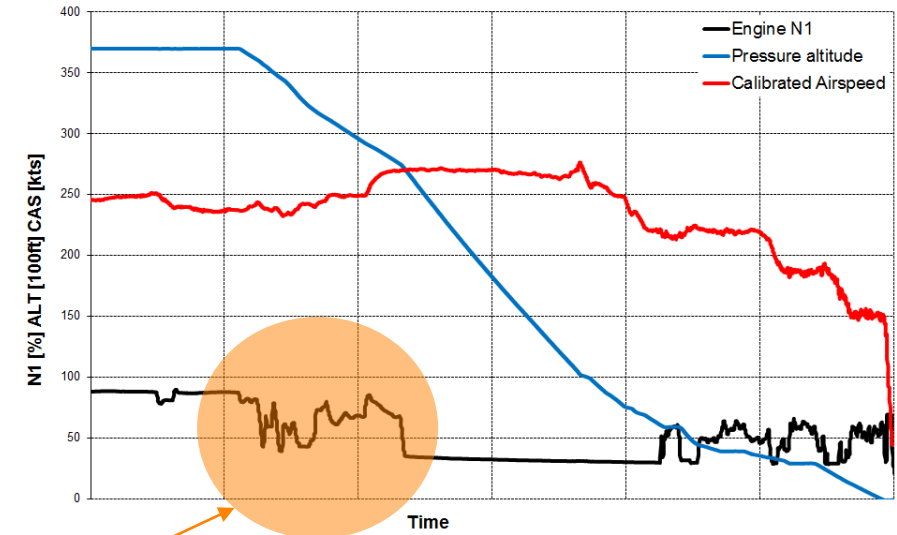
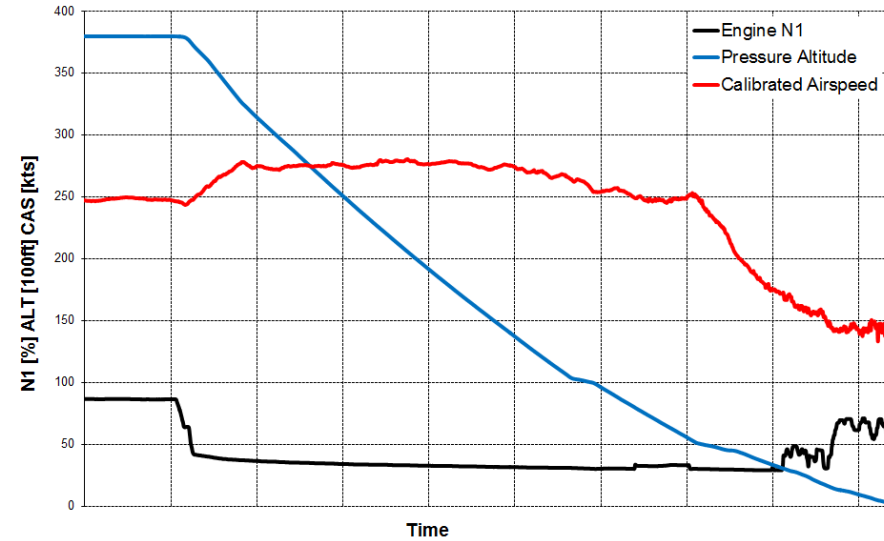
CONTINUOUS DESCENTS

Conventional Measure



On-board flight data (QAR)

Both are continuous descents!



Throttling, more fuel burn



METRIC

A NEW METRIC

Can we derive a metric that identifies if a descent was *managed* rather than simply *continuous*?

→ Facilitating a descent operation that

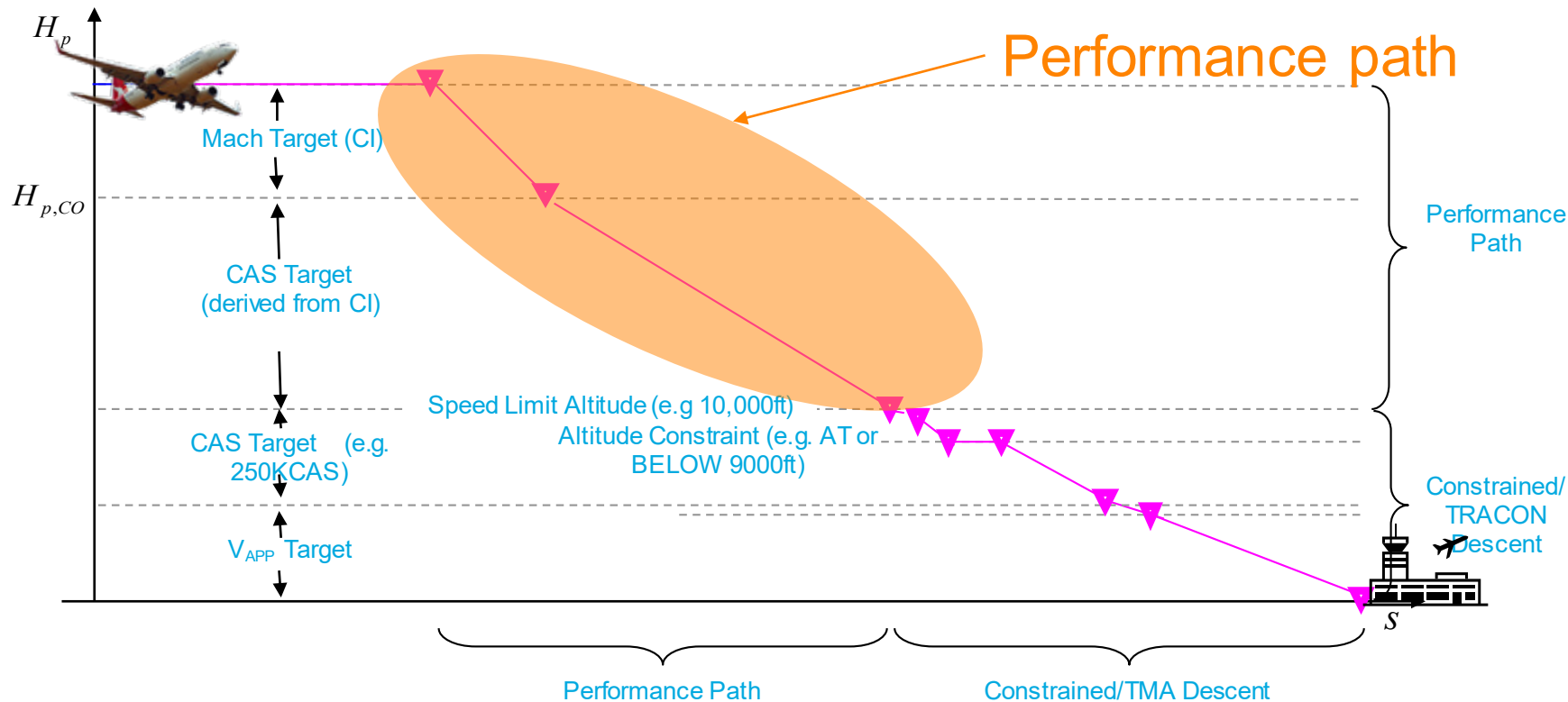
1. allows for ***predictable*** dissipation of the aircraft's energy,
2. at the ***lowest cost*** to the operator (i.e. Cost Index),
3. including any ***known*** constraints.

→ Improved efficiency, lower noise, and risk

→ ***Managed Descent*** rather than a Continuous Descent

MEASURING AUTOMATION MANAGED DESCENTS

Descent Profile: Medium & large jets



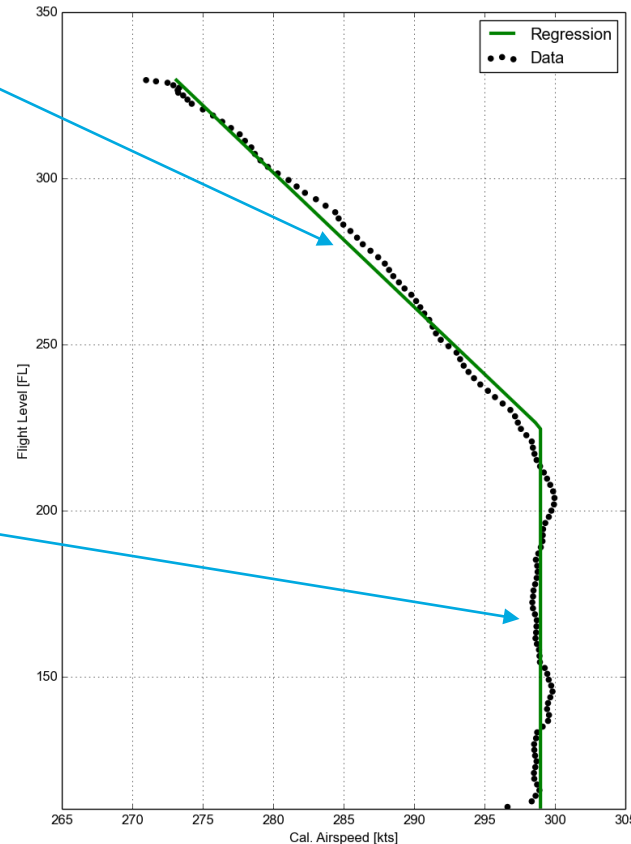
SCOPE

- Medium and large jets
- Performance path – constant Mach and constant CAS segments
- Low speed deviations (to target speed profile)
- No level segments
- Target speed profile identified by regression

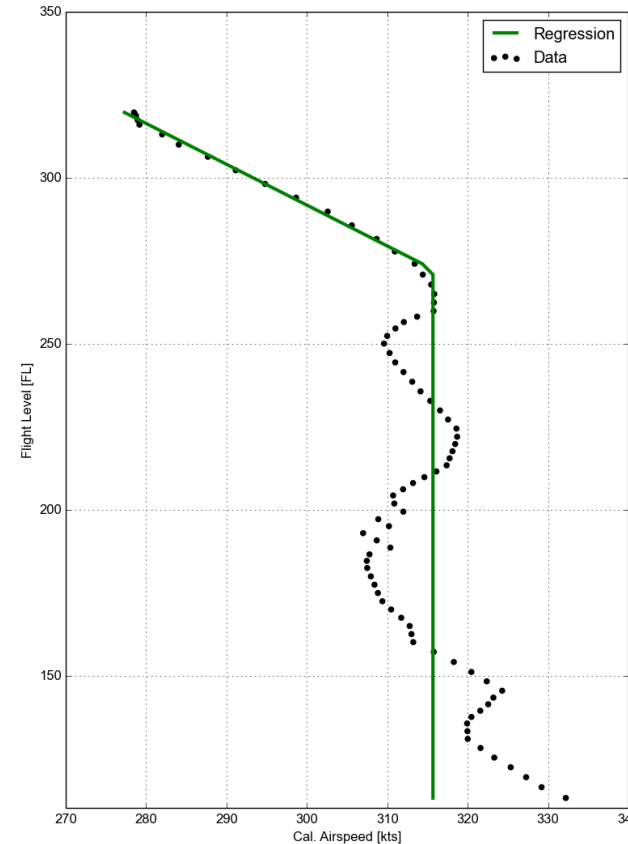
MEASURING AUTOMATION MANAGED DESCENTS

Constant
Mach

Constant
CAS



Managed descent



'Open' descent

THRESHOLDS

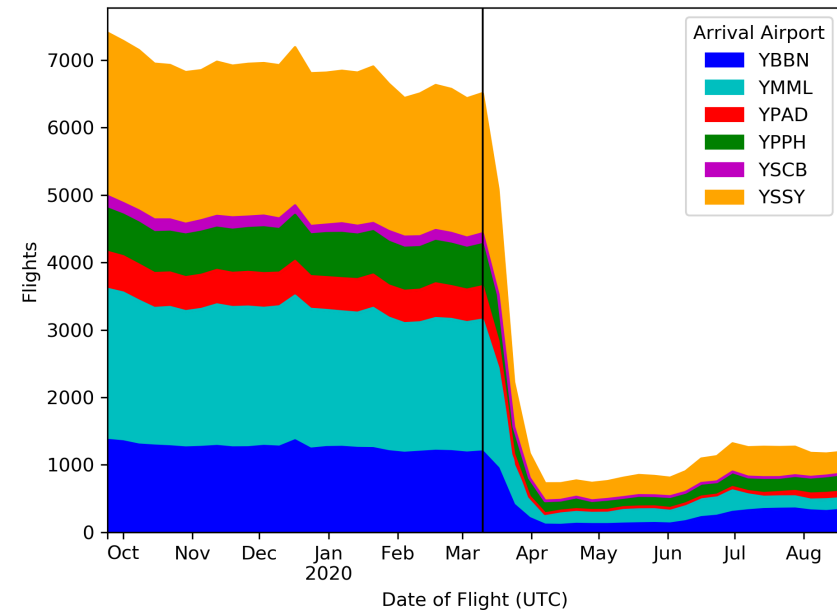
- Deviations within auto-throttle limits
- Deviations within speed brake guidelines



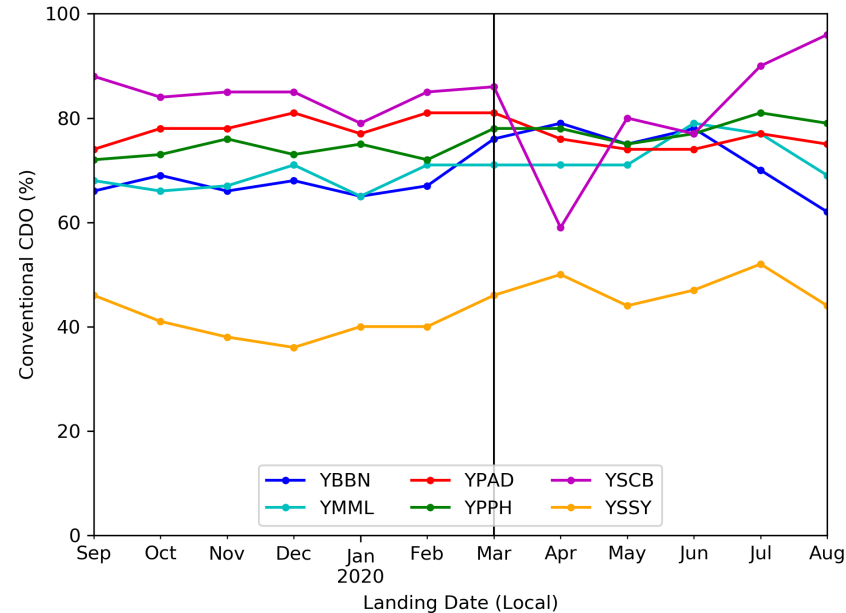
APPLICATION

CONVENTIONAL CDO VS MANAGED DESCENT METRIC

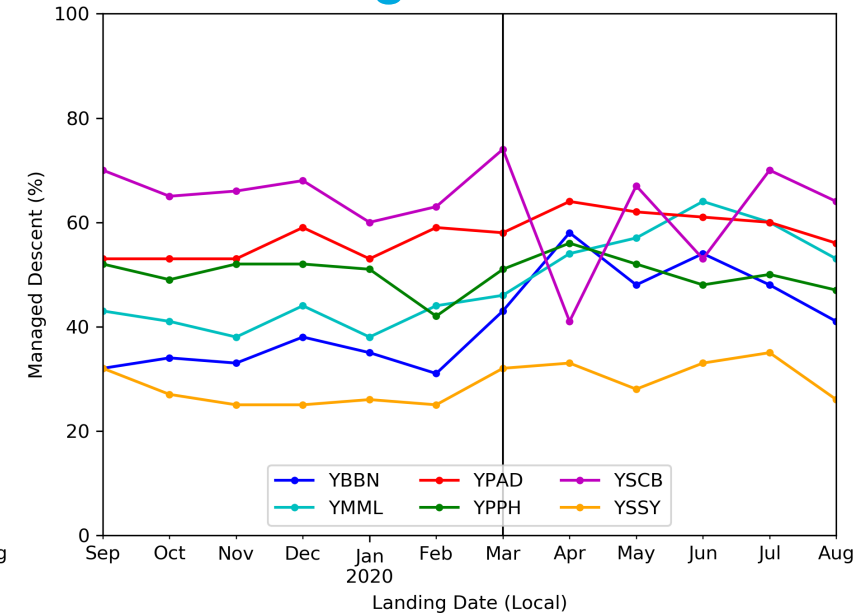
Traffic Levels



Conventional CDO

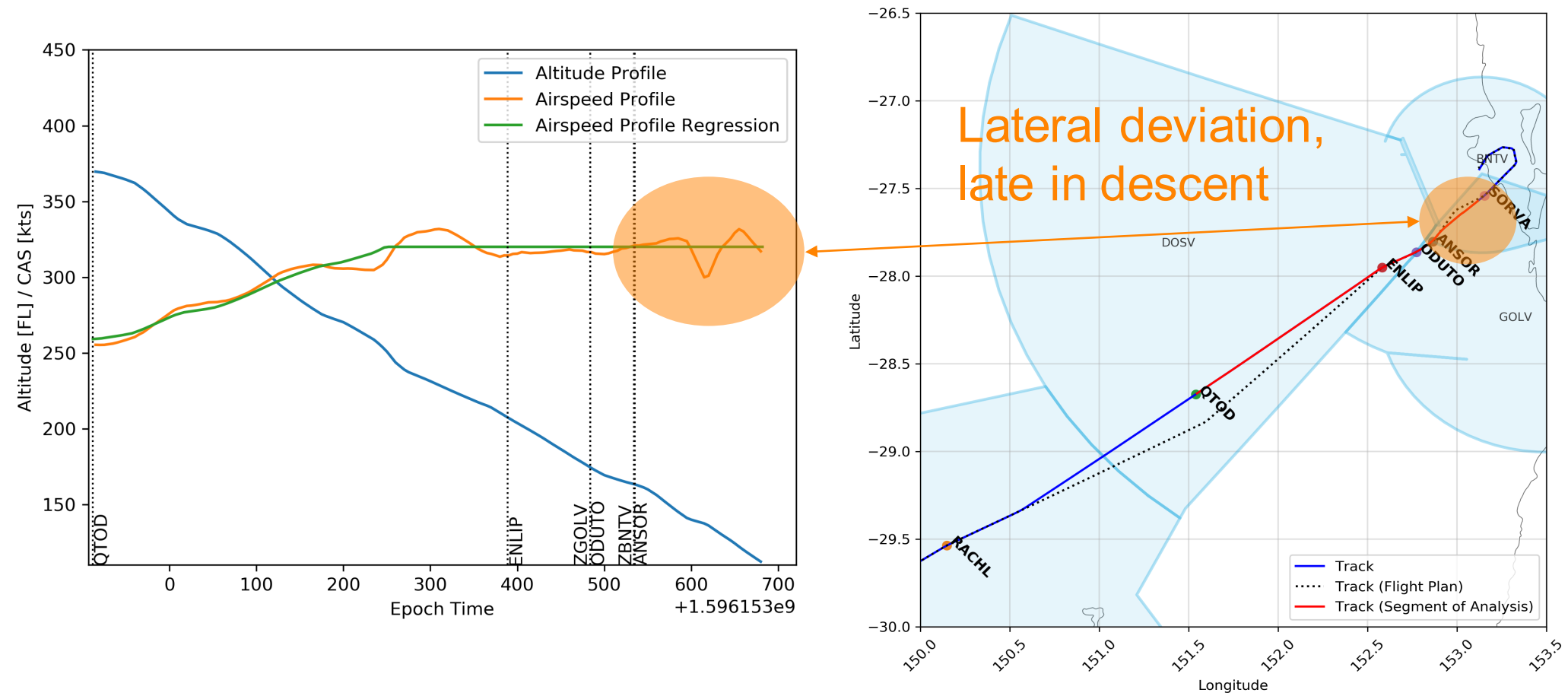


Managed Descent



- Overall: Managed descent performance was lower than conventional CDO measure (in both low and high traffic scenarios)
- YMML example: Managed descent performance abruptly declined with increase in traffic (June 2020) – an opportunity for improvement in low traffic scenario

EXAMPLE OF INTERVENTION





CONCLUSION

KEY POINTS

1. To optimize CDO for operators, ANSPs require a CDO performance measure that identifies whether a CDO was performed in a predictable and efficient manner (e.g. by aircraft automation) rather than the conventional method.
2. Further work is needed to extend the metric, e.g. to include other aircraft types and descent segments, with the data available to ANSPs.
3. Through CDO implementation guidelines and development in measuring CDO performance, such as managed descents, ANSPs can optimize services in current and future scenarios to maximize the benefits of CDO to the aviation industry.

THANK YOU

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