Vertical Efficiency

FABEC Standing Committee Environment

08.12.2020

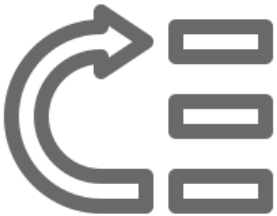
INTRODUCTION

Vertical efficiency = EC KPI

EUROCONTROL

View on operational data

Top priority due to cost analysis



Looking for partners to improve VFE

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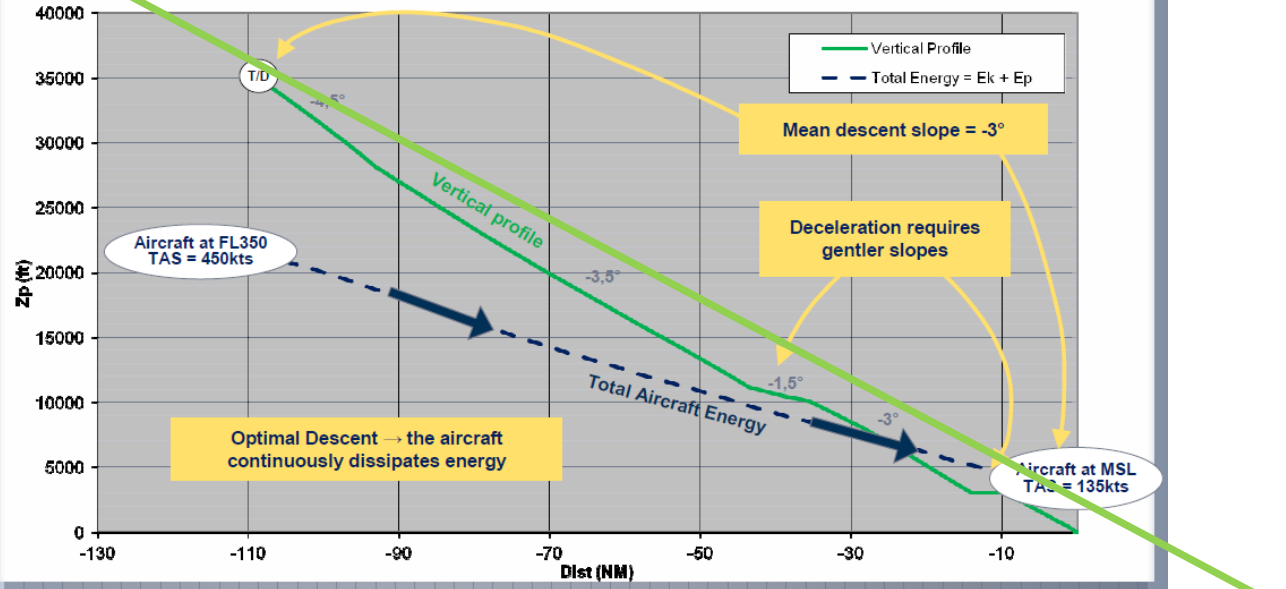
AIRBUS DEFINITION CDO

Introduction to descent operations

- During descent, the A/C continuously loses Energy (kinetic energy + potential energy)
- Descent slope strongly depends on flying objective (maintain speed or deceleration)



AIRBUS

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AS IS: LEVEL FLIGHT CLIMB / DESCENT BRU

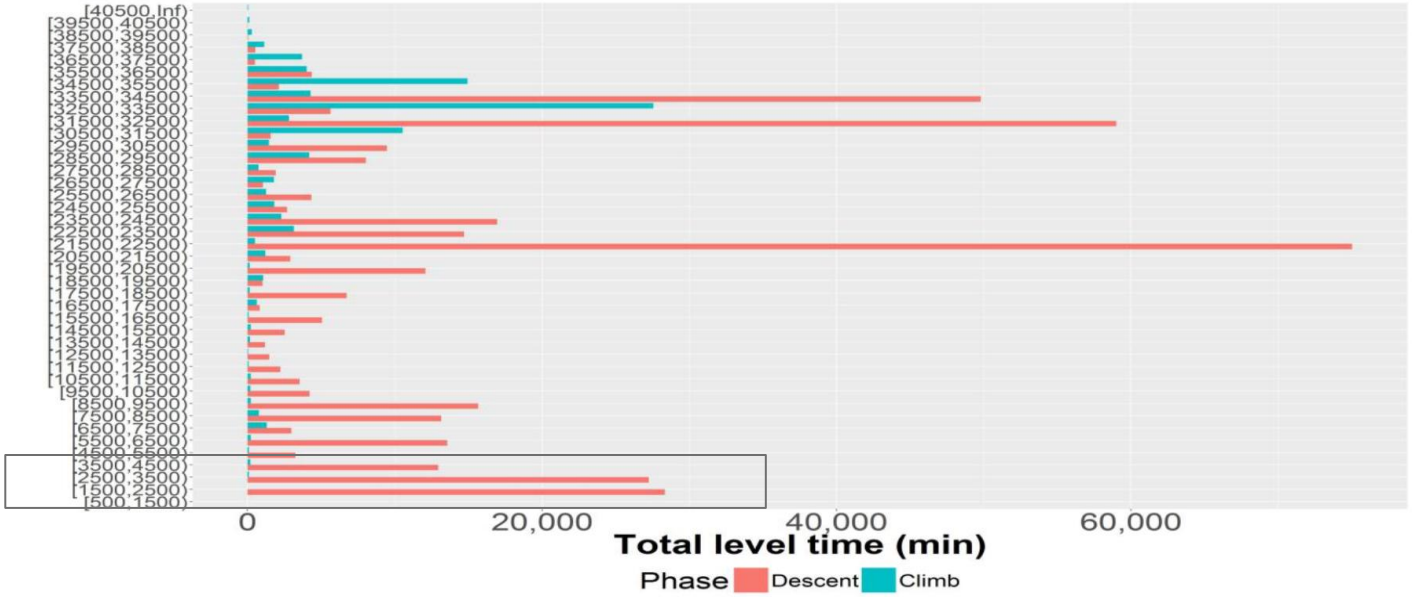
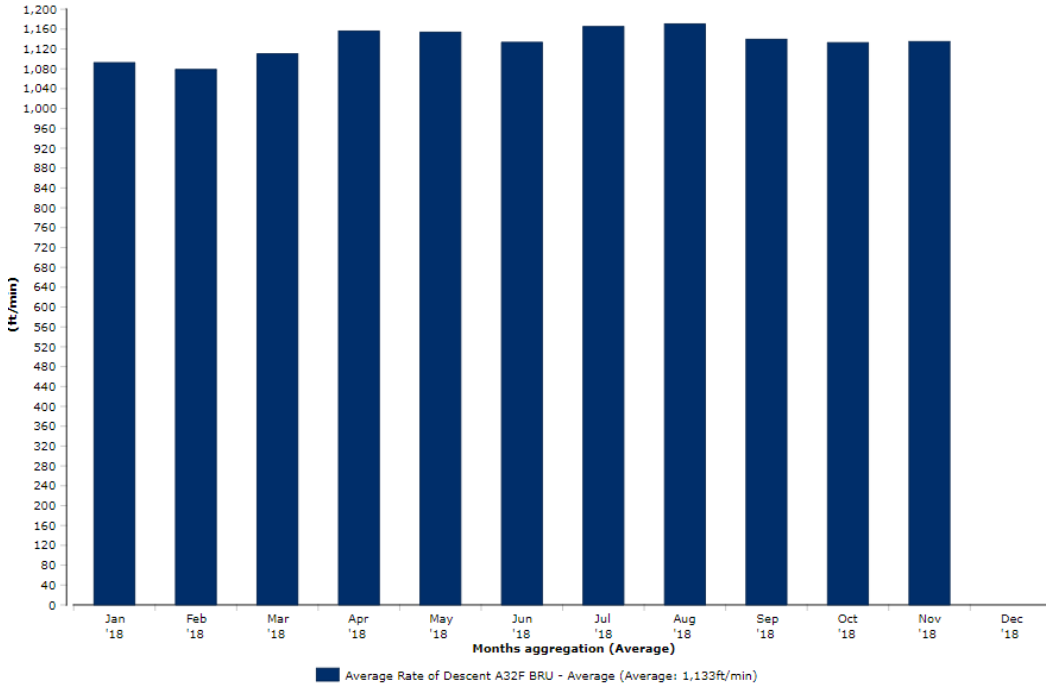


Figure 11 Total level time per altitude band

The high amount of level flight from FL220 to FL240 is due to the Letters of Agreement. At lower altitudes, the small peaks for the climb are a consequence of a small number of initial climb restrictions while the level flight at 2,000 and 3,000 feet during descent is a result of the level flight before ILS interception. Due to political reasons, there is a noise restriction above the FLORA VOR at 6,000 feet which (partially) explains the level flight at [5500,6500) feet.

Source: Eurocontrol, September 2018

RATE OF DESCENT STATISTICS 2018 BRU SN FLIGHTS



Average rate of descent

1133 ft/min iso 1500 ft/min

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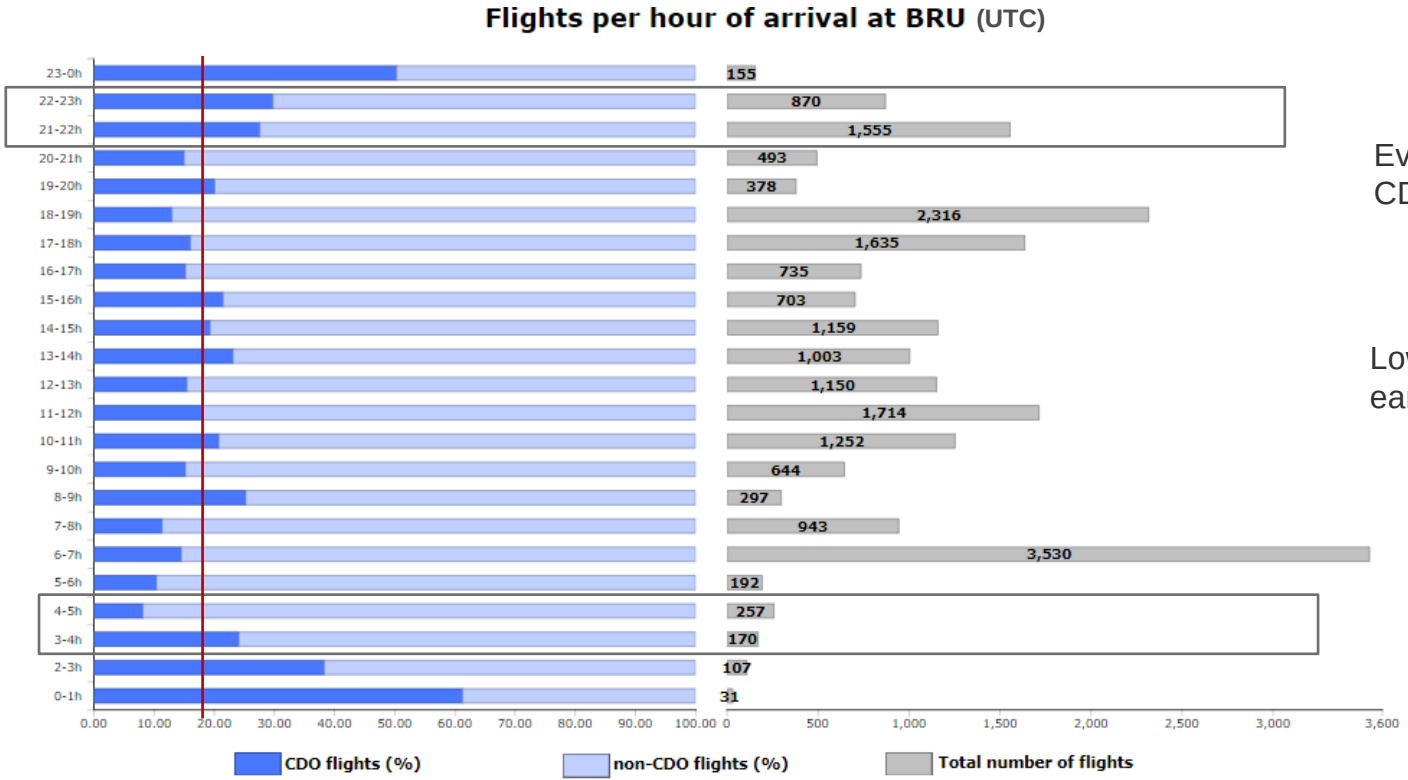
CDO PERFORMANCE BRU: A320/A330 – S18



Even in low-traffic moments, low CDO performance in BRU

Low-hanging fruit: A330 arrival early in the morning

Yearly average 17%

Definition of CDO in this analysis: slope of descent between 2.7° and 3.3° as from air distance to landing = 100NM

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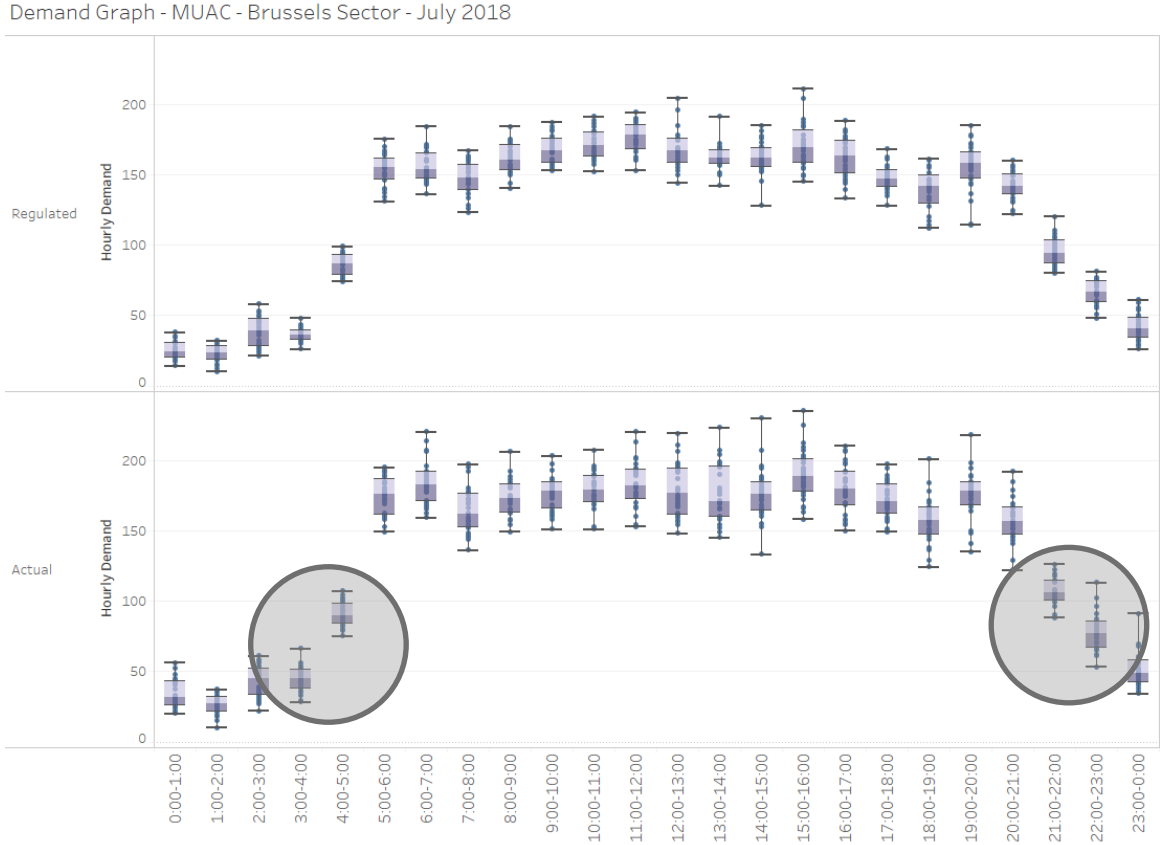
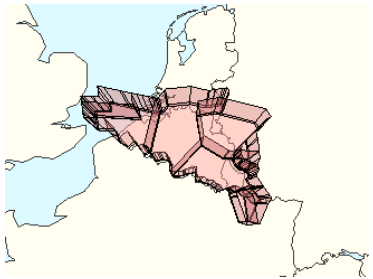
DEMAND CAPACITY MUAC BRU SECTORS – SUMMER





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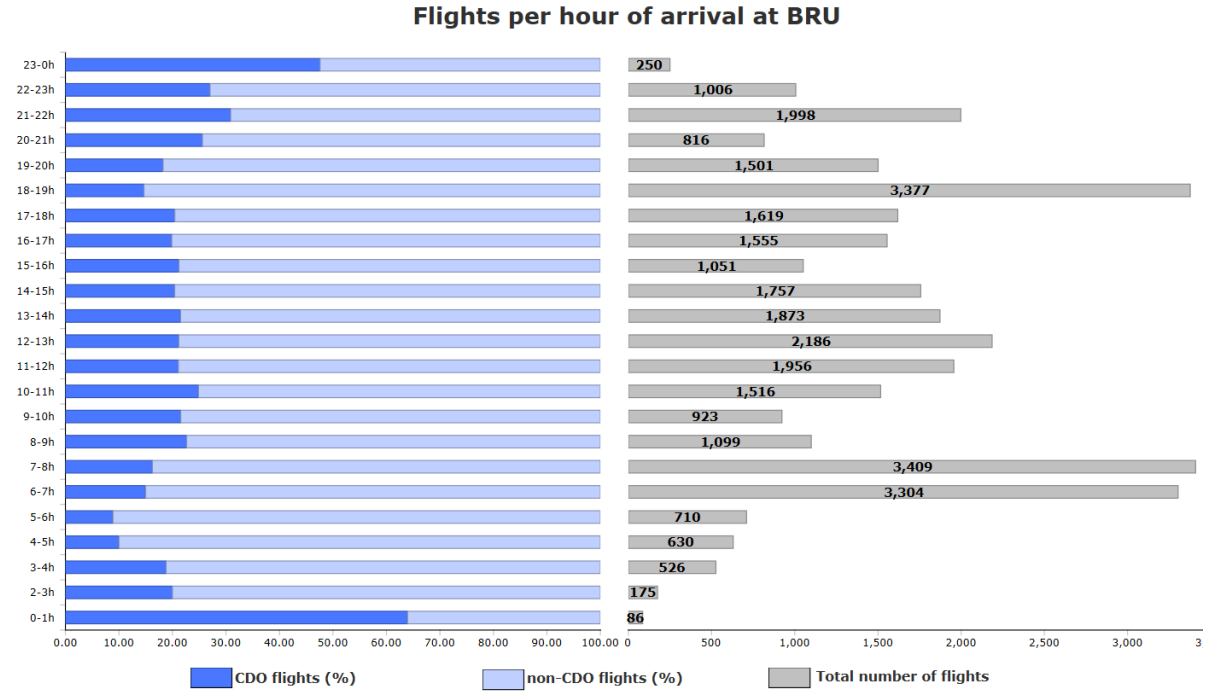
Eurowings Group LUFTHANSA GROUP

CDO PERFORMANCE BRU: A320/A330 – 2019

Yearly average

20,6%



Definition of CDO in this analysis: slope of descent between 2.7° and 3.3° as from air distance to landing = 100NM

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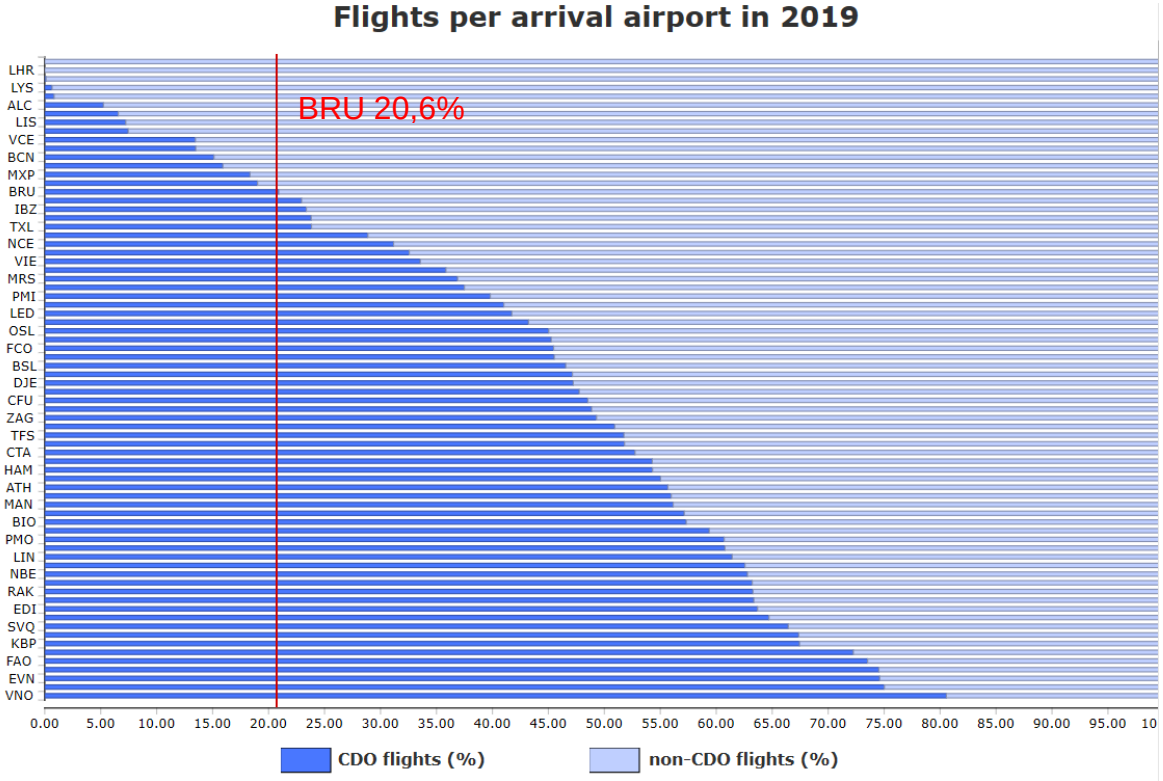
CDO PERFORMANCE OTHER AIRPORTS 2019



Definition of CDO in this analysis: slope of descent between 2.7° and 3.3° as from air distance to landing = 100NM

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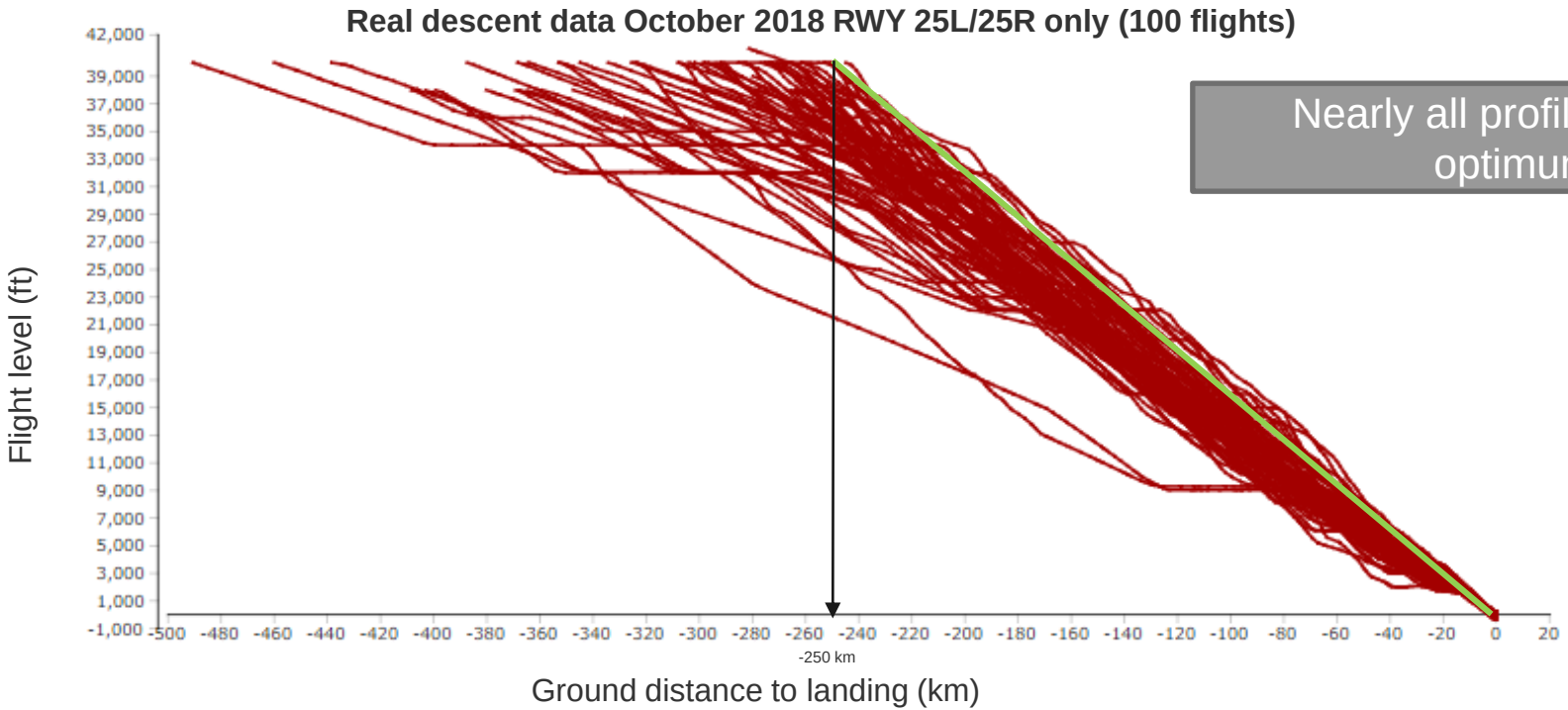
A330 DESCENT PROFILE BRU



Nearly all profiles below optimum

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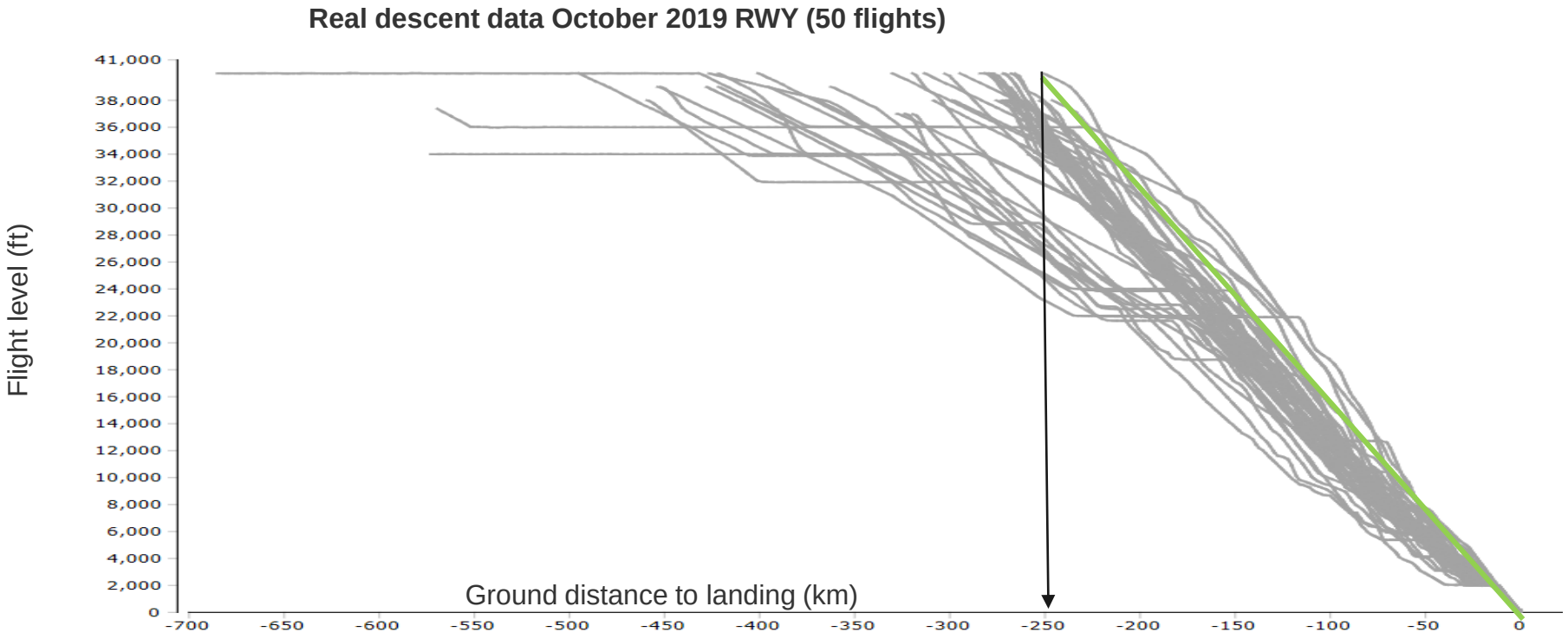
A330 DESCENT PROFILE BRU



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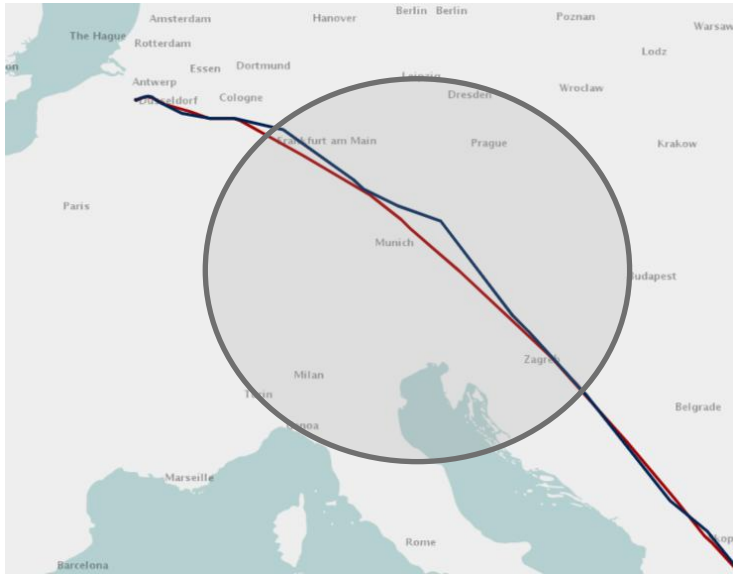
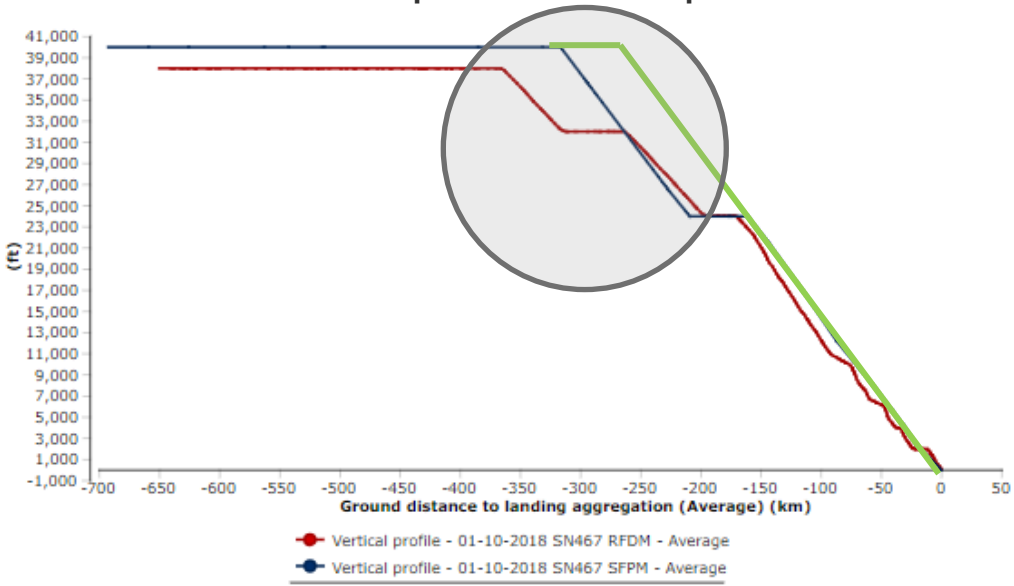
CASE: SN467 EBB-BRU 01/10/2018

Lateral profile: actual vs. planned



Vertical profile: actual vs. planned



Lateral profile shows low traffic / direct route
Aircraft forced into early descent

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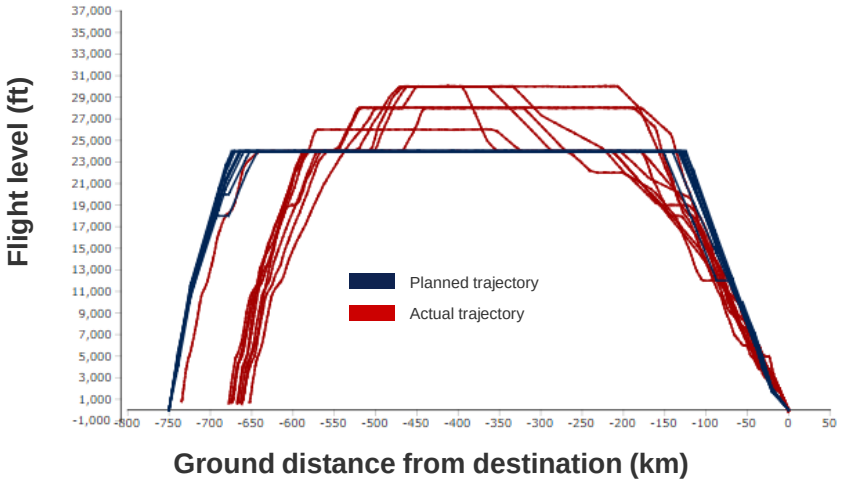
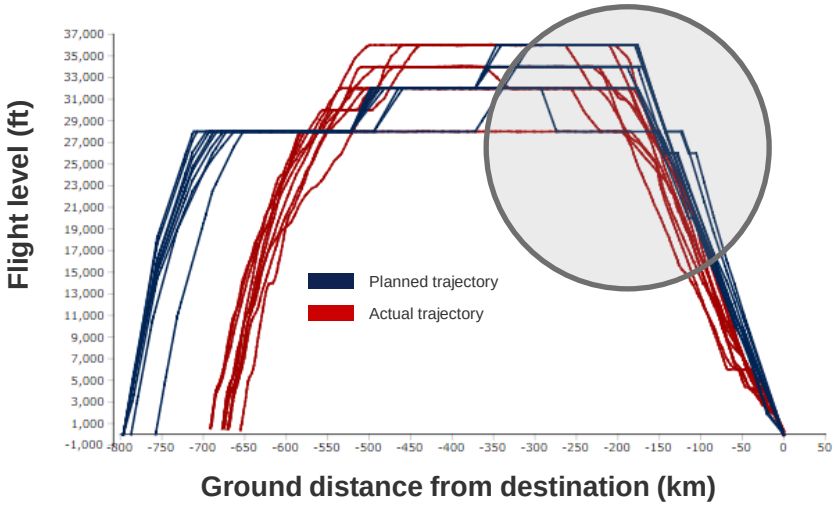
LYS-BRU FL245 RESTRICTIONS

10 LYS-BRU flights 03/09/2018-03/09/2018

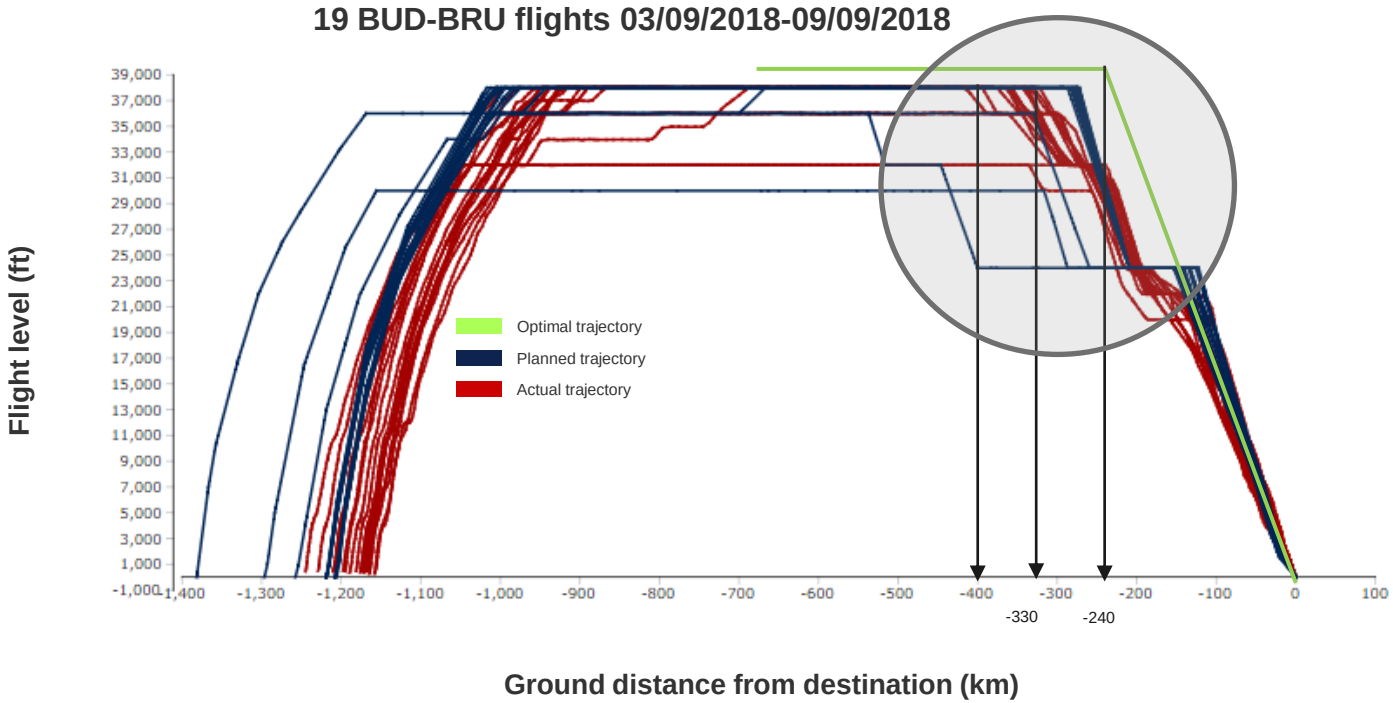


10 LYS-BRU flights 01/12/2018-08/12/2018



- FL improved in planning: currently cap on FL330
  - Even better in operations: further improvement possible?
- Improved CDO

A320 SN FLIGHTS INBOUND BRU FROM EAST



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COST OF EARLY DESCENTS BRU

Early descent inbound BRU															
			A33F						A32F						
	#/week A33F	constraint	TRIPFUEL	TRIPFUEL w/o constraint	DIFF	COW	kg	#week A32F	TRIPFUEL	TRIPFUEL w/o constraint	DIFF	COW	kg		
ARVOL	16	ARVOL 240	8.700	8.500	200	34	3.746	248	4.285	4.192	93	5	24.379	ideal T/D = VEKIN	
GTQ	19	SORAL 240	7.027	6.874	153	26	3.403	161	3.299	3.192	107	6	18.209	ideal T/D = DIK	
WOODY	0	LILSI 310	6.550	6.500	50	9	0	123	3.288	3.140	148	8	19.242	ideal T/D = LILSI	
KOK	18	DVR 190	8.417	7.749	668	114	14.074	42	3.876	3.698	178	10	7.902	ideal T/D = MADUX	
ABAMI	0	ABAMI 240					0	52	2.531	2.475	56	3	3.078	Ideal T/D = NEREL	

Total potential fuel savings: 5800 ton/year

Total potential CO_2 reduction: 18000 ton/year

PRELIMINARY VIEW BRU CCO/CDO

Suboptimal vertical efficiency BRU
Horizontal efficiency is lost in VFE

Next to HFE, VFE must become a priority as well.

brussels airlines

Belgian airport users are heavily impacted by upper air / MUAC optimization in terms of operational restrictions & related costs

- Total cost SN only estimated > €5 mio yearly (CCO excl.)
- High environmental impact

TO BE OVERCOME

- Congestion Belgian airspace in between main EU hub airports.

- Complex airspace structure with high interdependencies.

- Multilateral approach required.

PROPOSED ACTION PLAN

1. Agree on CDO measurement principle between MUAC, Skeyes and airlines: definition, KPI
2. Regular follow up on vertical efficiency evolution
3. Reduce network restrictions: planning and operation (capacity mngt)

Short term

a. Cruise restrictions: further lift restrictions GVA/LYS (current restriction at 33,000 ft/29,000ft) and perpetuate

b. CDO: lift restrictions in low-traffic periods (e.g. Corona times, A330 early morning arrivals). FL245 restriction only at 85 NM from landing for example.

Medium term

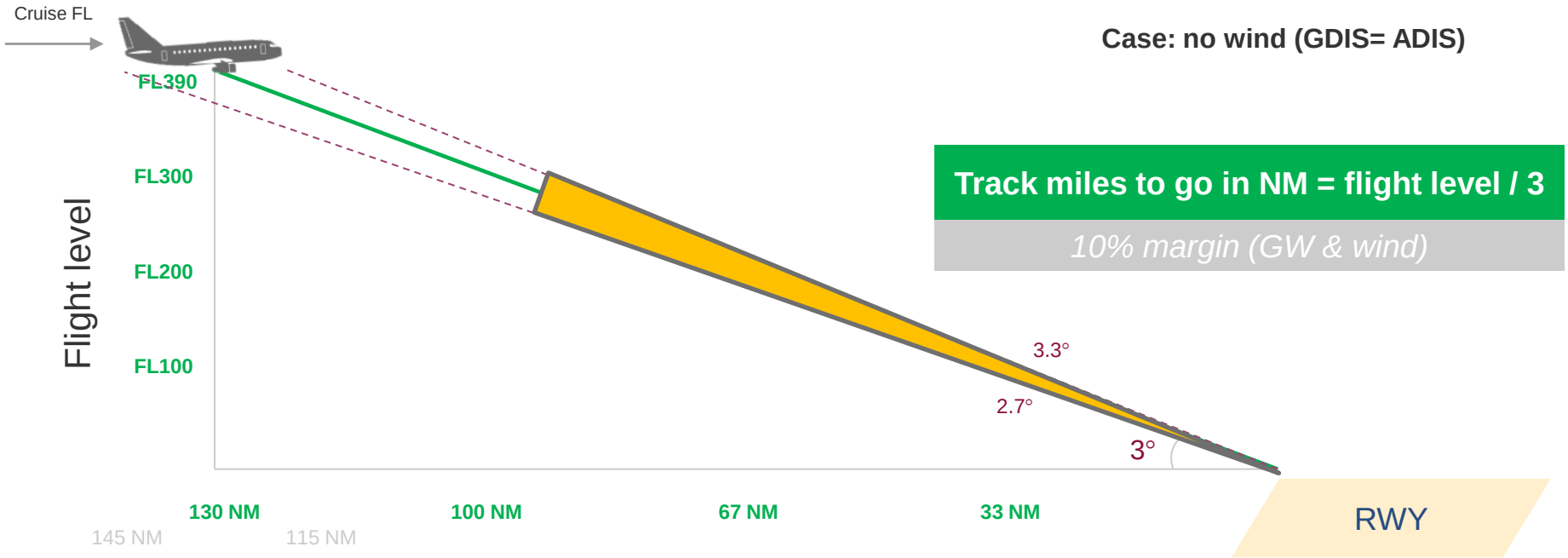
c. Lift restrictions in planning, reflect optimization in letters of agreement

Thank you

www.brusselsairlines.com

ANNEXES

CDO PLANNING FROM FLIGHT DECK



Case: no wind (GDIS= ADIS)

Track miles to go in NM = flight level / 3

10% margin (GW & wind)

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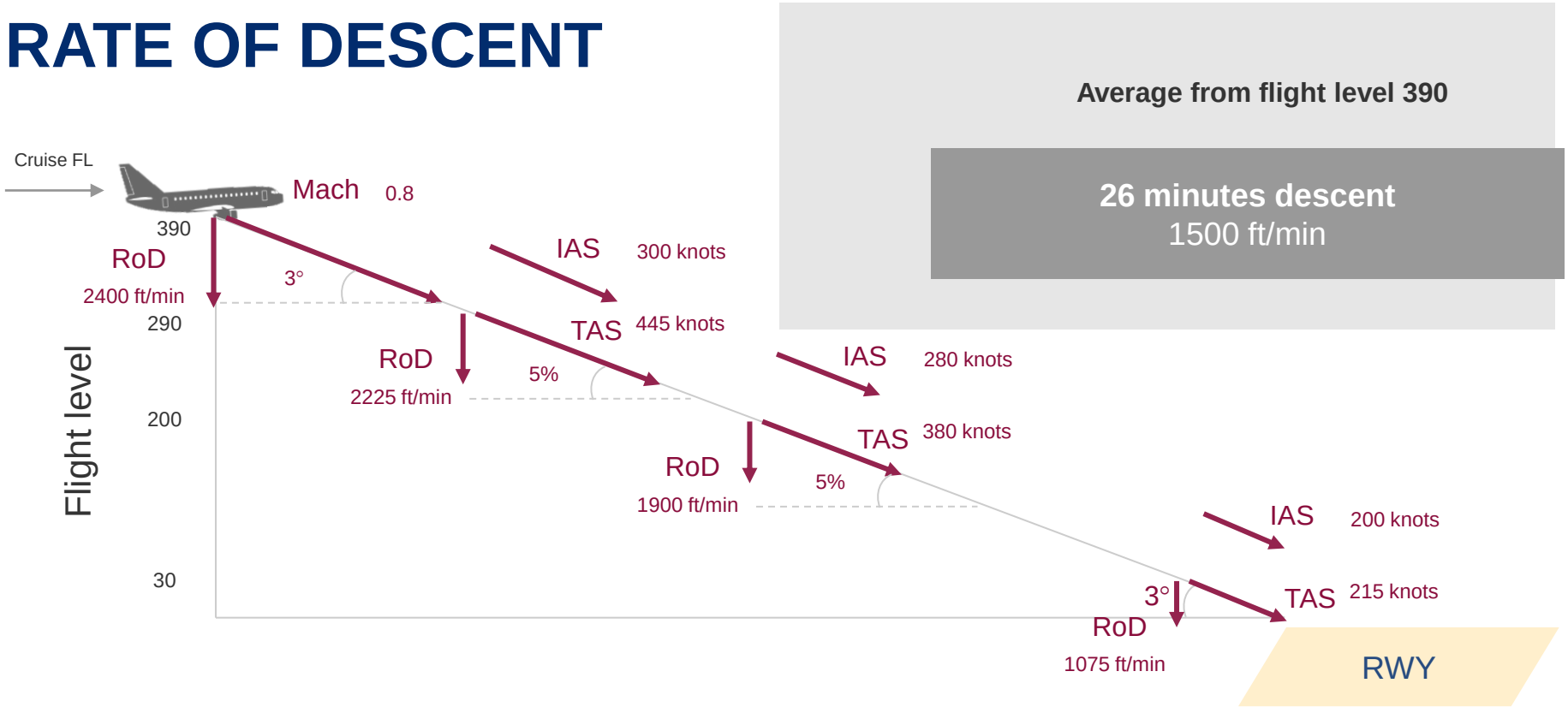
RATE OF DESCENT



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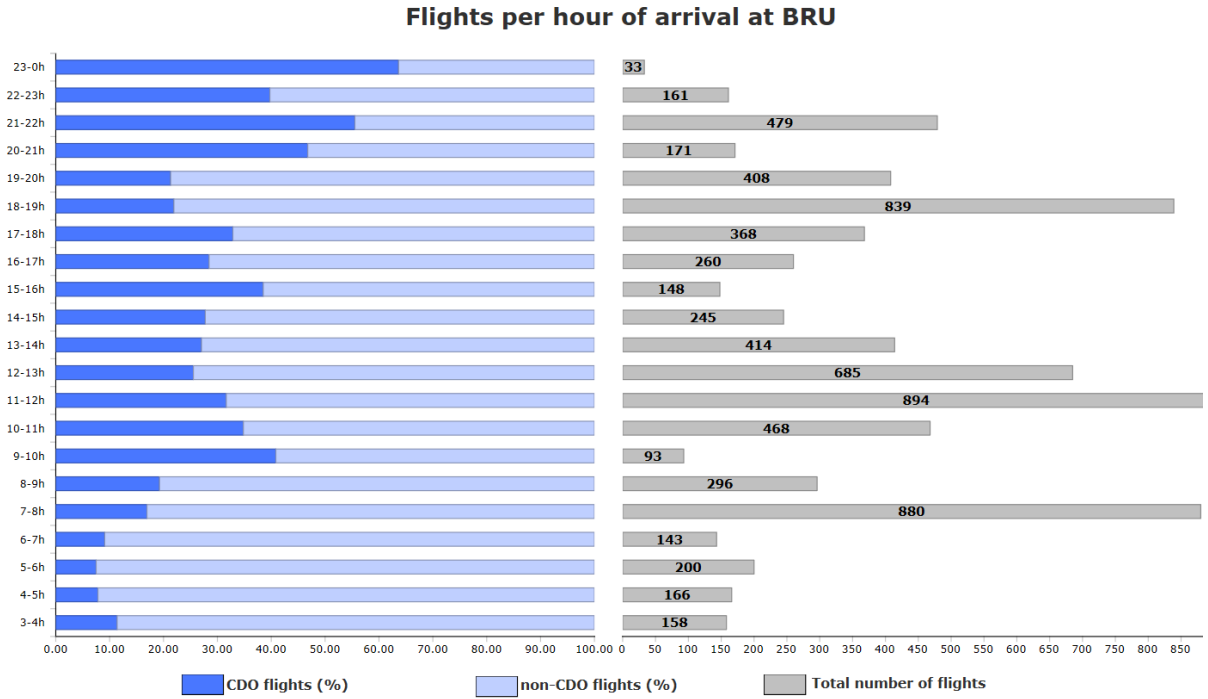
CDO PERFORMANCE BRU: A320/A330 – 2020 YTD

Yearly average 27,9%



Definition of CDO in this analysis: slope of descent between 2.7° and 3.3° as from air distance to landing = 100NM

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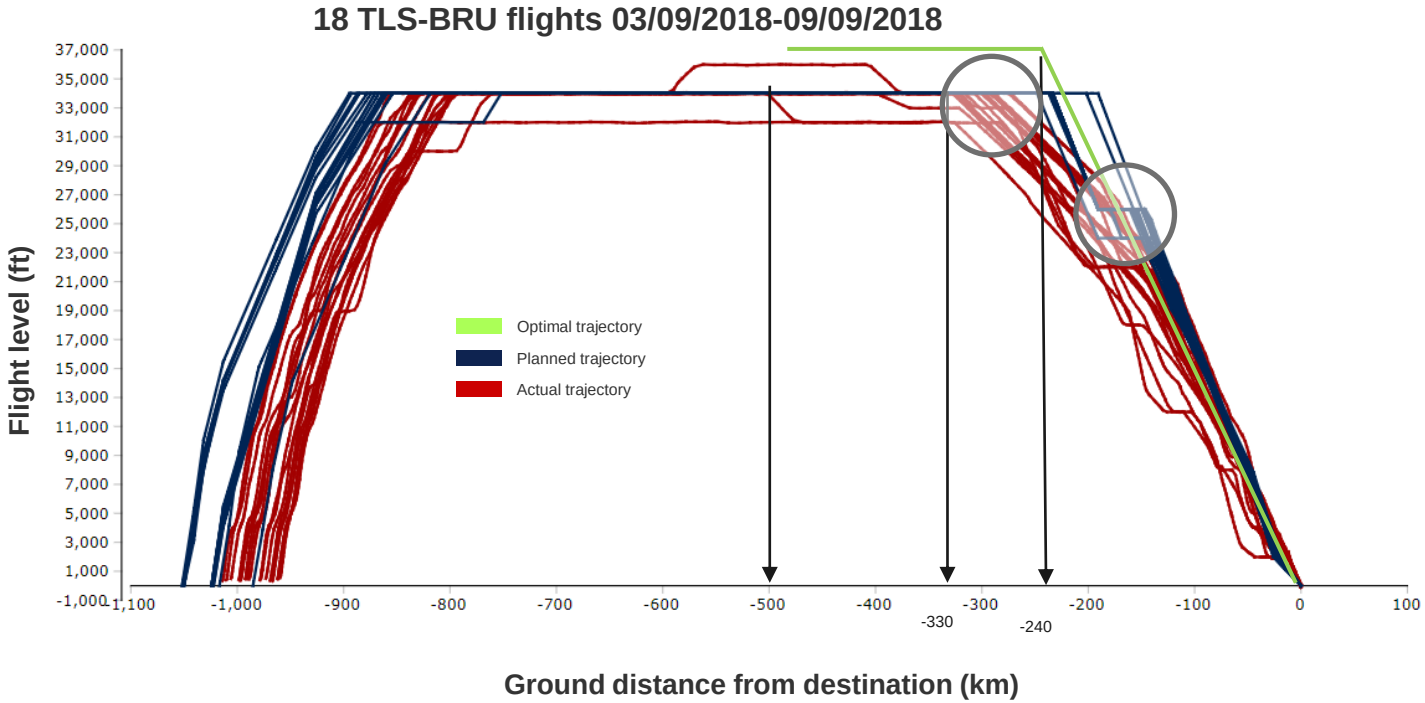
A320 SN FLIGHTS INBOUND BRU FROM SOUTH



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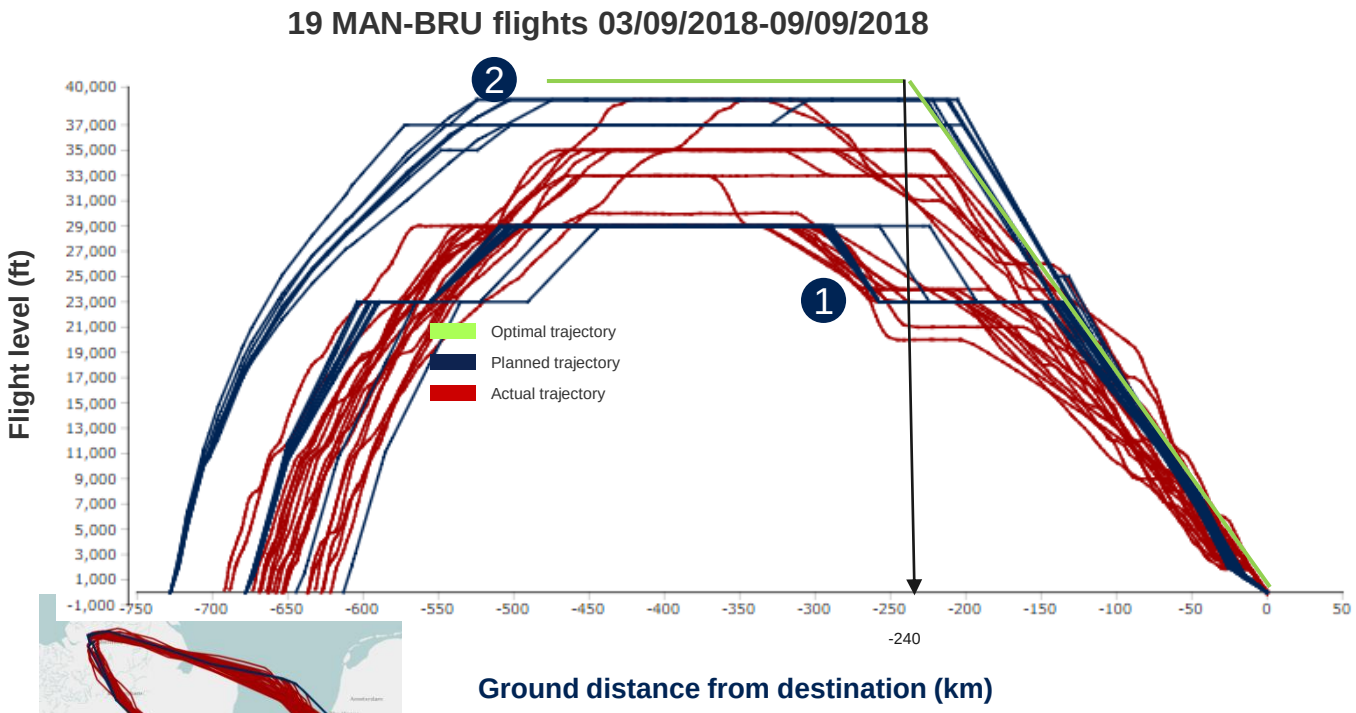
A320 SN FLIGHTS INBOUND BRU FROM WEST



1 London route

- Avg act GDis: 354NM
- Avg act max FL: 303
- Avg act trip fuel: 2573

2 Rotterdam route

- Avg act GDis: 356NM
- Avg act max FL: 350
- Avg act trip fuel: 2462

Rotterdam route more fuel efficient in planning

- London route early descent
- Rotterdam lower cruise altitude

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