

# Flugmeteorologie

## Planungsprinzipien der Linienfliegerei

Dr. Fabian Fusina  
Flight Safety Investigator  
F/O A330  
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- Planungsprinzipien für den Instrumentenflug
- Wetterbedingungen
- Beispiel

→ Fokus auf die gesetzlichen Mindestanforderungen / aktueller Stand bei SWISS.

# Instrumentenflug

*Das Steuern von Luftfahrzeugen, bei dem die Fluglage ohne Bezug auf äußere optisch wahrnehmbare Anhaltspunkte mit Hilfe von Fluginstrumenten wie Navigationsinstrumente und Flugüberwachungsgeräte an Bord gehalten wird.*

## Standard Meteo-Unterlagen

- Significant Weather Chart
- Relevante En-Route Wind und Temperatur-Informationen
- Gültige Wetterprognose für alle relevanten Flugplätze
- Spezielle Informationen wie z.B. Airmet, Sigmet, Ashtam, Special Reports (falls vorhanden)



# Planungsprinzipien

Grundprinzip: Zwei Landemöglichkeiten am Zielort zu jeder Zeit aufrechterhalten!

- Ausweichflughäfen (Standart: innerhalb 60min, jedoch erweiterbar)
- Verschiedenste Planungsoptionen für den Zielflughafen und für unterwegs.
- Die Bedingungen sind vor dem Flug restriktiver als im Flug.

# Route Chart SWR14E ZRH-JFK

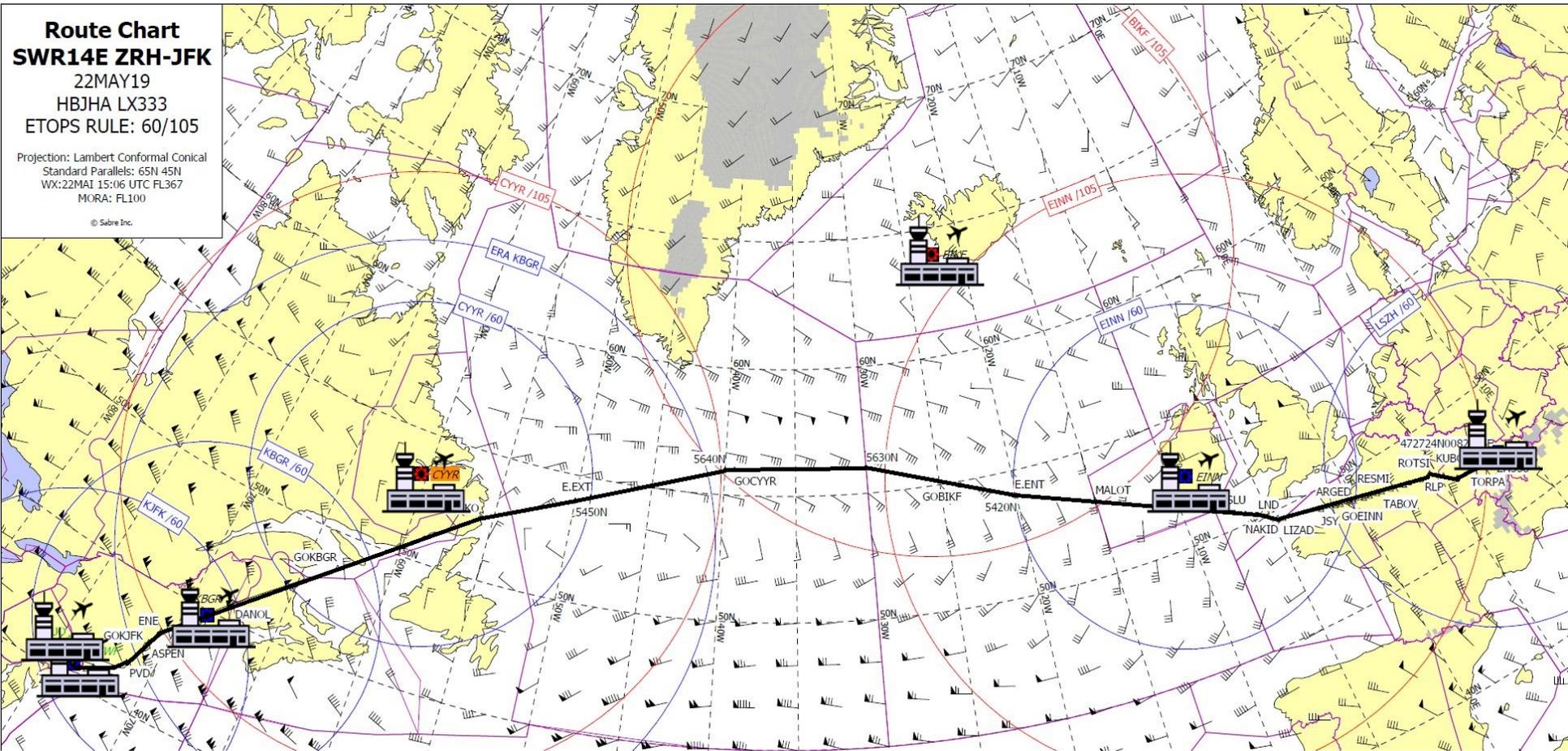
22MAY19

HBJHA LX333

ETOPS RULE: 60/105

Projection: Lambert Conformal Conical  
Standard Parallels: 65N 45N  
WX: 22MAY 15:06 UTC FL367  
MORA: FL100

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# Wetterbedingungen

- Grundsätzlich müssen die Bedingungen für ein Zeitfenster
- Low Visibility: Start: 400m VIS  
Landung: 200ft Ceiling und 550m VIS



Type of approach	Policy
Cat III / II	Visibility
Cat I	CMV / visibility
Non-precision approach	Ceiling and CMV / visibility
Circling	Ceiling and Visibility

For a low visibility take-off (LVTO) the following provisions shall apply:

required RVR (m)	required facilities
300 - 399 <sup>1)</sup>	day: REDL and runway centreline markings
	night: REDL and RENL; or RCLL and RENL
200 - 299 <sup>1)</sup>	REDL and RCLL
150 - 199 <sup>1)2)</sup> TDZ, MID, rollout	REDL and RCLL
125 - 149 <sup>1)2)3)</sup> TDZ, MID, rollout	high intensity RCLL spaced 15 m or less; and high intensity REDL spaced 60 m or less

Note <sup>1)</sup>: The reported RVR value representative for the initial part of the take-off run can be replaced by pilot assessment.

Note <sup>2)</sup>: The required RVR value must be achieved for all relevant RVRs.

Note <sup>3)</sup>: A 90 m visual segment must be available from the flight deck at the start of take-off run.

a) Applicable time period:	From the start of the TAF/TREND validity period up to the time of applicability of the first subsequent "FM..." or "BECMG" or, if no "FM" or "BCMG" is given, up to the end of the validity period of the TAF/TREND.	
b) Application of forecast:	The prevailing weather conditions forecast in the initial part of the TAF shall be fully applied with the exception of the mean wind and gusts (and crosswind), which shall be applied in accordance with the policy below. This may be overruled temporarily by a "TEMPO" or "PROB" xx" if applicable according to the table below.	
Indicator	Kind of change	Application of Aerodrome forecast
BECMG in case of:	Deterioration: Applicable from time of start of change	DEST, T/O ALTN, STOPS, ERA, 3%-ERA, DEST ALTN at ETA +/- 1 hr:  Mean wind Gusts
	Improvement: Applicable from time of end of change	Mean wind Gusts  Should be within OM B limits. May be disregarded.
FMhrmn	Applicable from time of the change	ETOPS ALTN (EA) during time frame:  Mean wind Gusts
		Mean wind Gusts  Should be within OM B limits. Crosswind shall be within OM B limits.
TEMPO or PROB30 or PROB40	Deterioration	DEST, T/O ALTN, STOPS, ERA, 3%-ERA, DEST ALTN at ETA +/- 1 hr:  Ldg minima
	Transient/showery conditions	Mean wind Gusts  May be considered to be above minimum if weather deteriorates below applicable planning minimum, however extra fuel is recommended.  May be disregarded. May be disregarded.
PROB40	Persistent conditions	Ldg minima  Mean wind Gusts
	Deterioration  - In any case	Mean wind Gusts  Should be fully applied if weather below applicable planning minimum  Should be within OM B limits. May be disregarded.  ETOPS ALTN (EA) during time frame:  Ldg minima  Mean wind Gusts
PROB TEMPO	Improvement	Mean wind Gusts  Should be fully applied if weather below applicable planning ETOPS ALTN minimum.  Should be within OM B limits. Crosswind shall be within OM B limits.
	Improvement	Should be disregarded.
Note:	Deterioration	Should be disregarded.
	Improvement	Should be disregarded.
For take-off and landing actual mean wind and crosswind gusts must be within OM B limitation with due regard to actual runway conditions.		

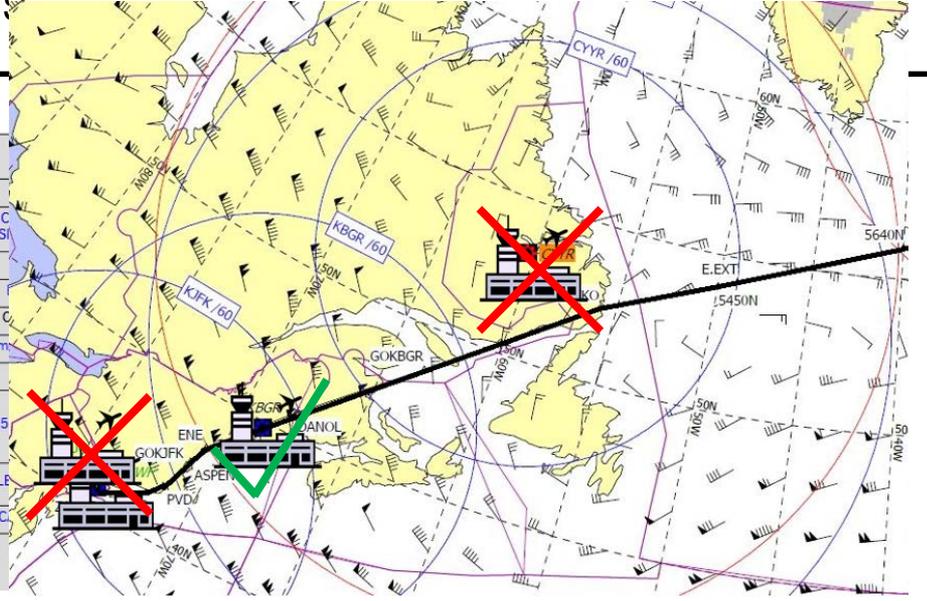
# Wetterbedingungen

- Grundsätzlich müssen die Bedingungen für ein Zeitfenster von +/- 1h legal sein.
- Low Visibility: Start: 400m VIS  
Landung: 200ft Ceiling und 550m VIS



2.5.2 Requirements for use of low visibility minima A330 and A340

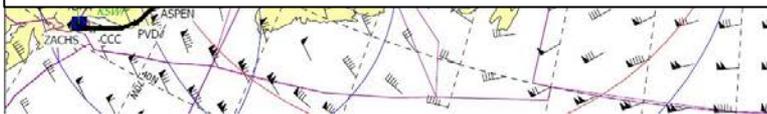
List of conditions	Height (ft)	NO (Note 1)	20
	RVR/VIS (m)	75	125
Landing capability at least		CAT III DUAL	CAT III DUAL
Engines operative	A330	2	
	A340	Both inner + 1 outer	
OEI APCH CONFIG	A330	N/A	
	A340	Config. 3 com	
Automatic rollout required (Note 2)		YES	
Maximum Wind Conditions for CAT II or CAT III Automatic Approach, Landing and Rollout. (X-wind limits due to adverse RWY conditions or technical malfunctions shall be respected).	Headwind:	35 kts	
	X-wind:	20 kts (USA: 15)	
	Tailwind:	10 kts	
Required Equipment for CAT II and CAT III (according QRH / OPS / Operational Data).		FULFILL	
ILS operational status (Cat No.).		CAT IIIb	
Runway length increment: Select "Autoland" in LDG TECHNIQUE field of the A/C configuration panel in the LPC NG LDG application.		YES	



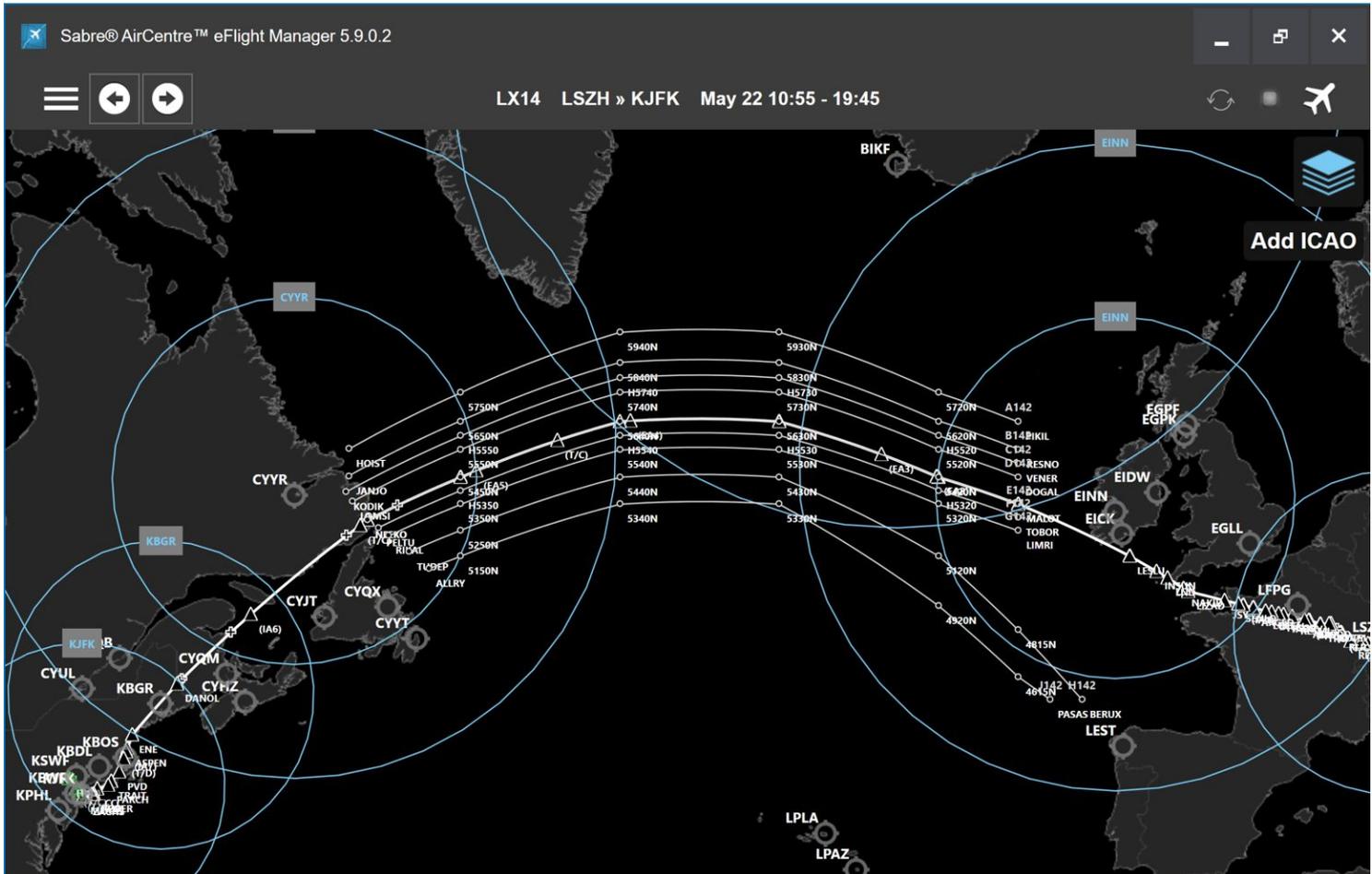
# Planung

Airport List			
LSZH	DEP	1012-1212	
LSZH	IA	1012-1423	RTE: DCT
EINN	IA	1222-1609	RTE: DCT
EINN	ETOPS	1409-1648	RTE: DCT
BIKF	ETOPS	1438-1821	RTE: DCT
CYYR	ETOPS	1604-1825	RTE: DCT
CYYR	IA	1625-1918	RTE: DCT
KBGR	IA	1717-1957	RTE: DCT
KJFK	IA	1757-2000	RTE: DCT
KBGR	ERA ALTN	1720-1958	RTE: DCT
KSWF	DEST ALTN	1831-2031	RTE: KJFK DCT HUU DCT KSWF
KJFK	DEST	1800-2000	

- Die Auswahl der Route und der Ausweichflughafen übernimmt die Planungssoftware.
- Die Cockpit-Crew überprüft die Auswahl kritisch.



# Planung



# Planung

Sabre® AirCentre™ eFlight Manager 5.9.0.2

LX14 LSZH » KJFK May 22 10:55 - 19:45

Route Airport

**CYYR/YJR GOOSE BAY (IA EA)**

IA - 16:25 - 19:18  
EA - 16:04 - 18:25

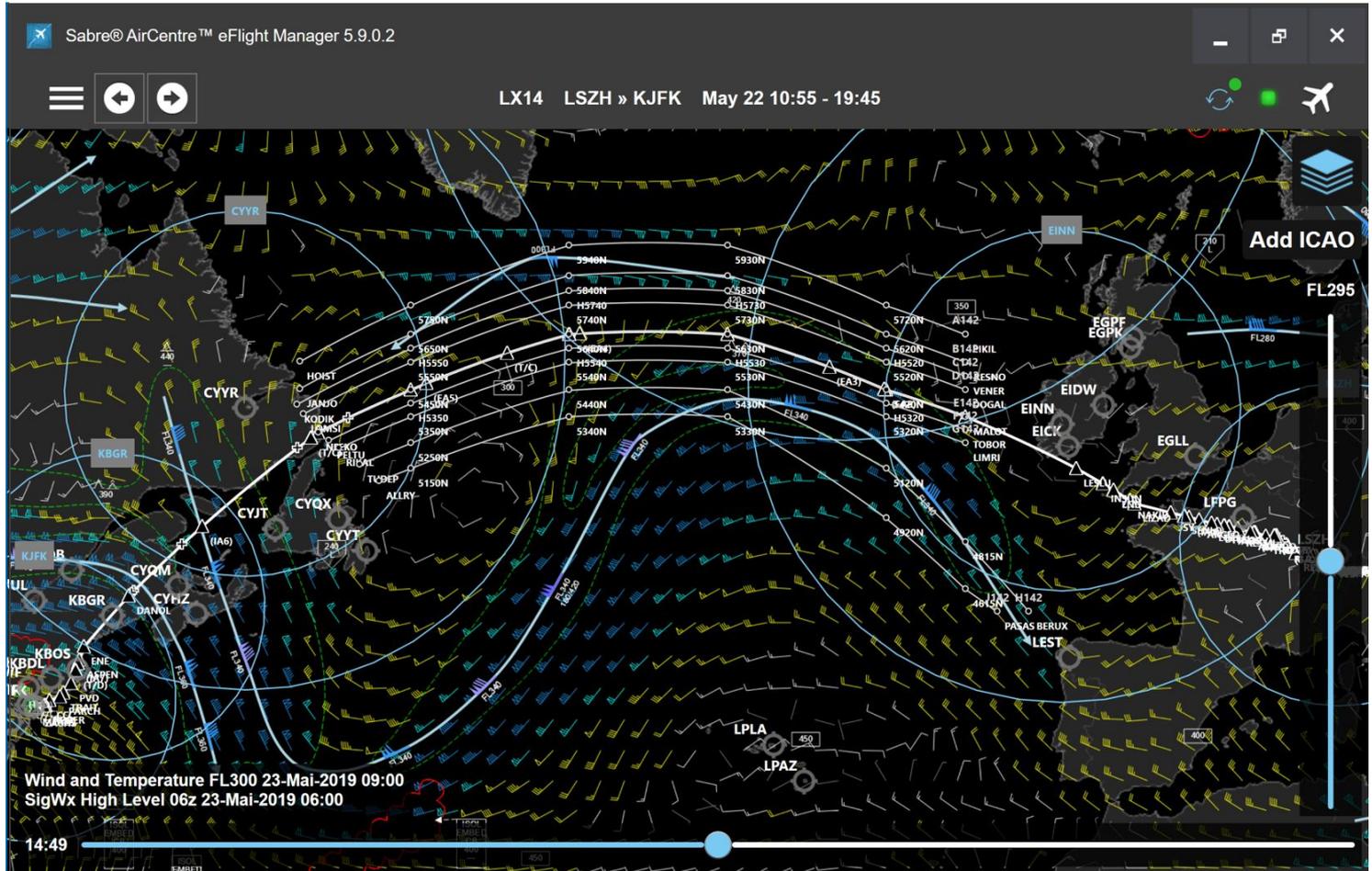
METAR  
231200Z 34004KT 15SM FEW020 FEW030 SCT062 SCT120 BKN170 BKN260 04/M02 A3015  
RMK SC1SC1SC2AC1AC2C1 SH DIST SE SLP213=

TAF  
231133Z 2312/2412 01008KT P6SM SCT030 BKN120  
TEMPO 2312/2322 FEW015 BKN030 BKN120  
BECMG 2312/2314 36012G22KT  
FM232200 01008KT P6SM FEW030 SCT100  
BECMG 2400/2402 VRB03KT  
RMK NXT FCST BY 231800Z=

NOTAMS  
CYHQ A1538/19 (2019-05-21 14:08 / 2019-05-22 07:14) VALID 2019-05-21 14:01 - 2019-08-17 23:59  
RWY 08, 26 AND 34 NOT AVBL  
FOR ACFT WITH TIRE PRESSURE OF 1.0MPa (145 PSI) OR GREATER AND  
ACFT WITH ACN/PCN OF 40 OR GREATER, EXC MEDEVAC AND AVBL AS  
EXTENDED RANGE TWIN-ENGINE OPS (ETOPS) ALTERNATE

Map showing flight route from CYYR to KJFK and other airports (KBGR, CYQM, CYHZ, DANOL, CYJT, (IA6), KJFK, UL, KBDL, ENE, ASPEN (VTD), PVD, TARTI, GUNBE R, LPLA, LPAZ, EINN, EGPF, EGPM, DW, EDDL, LFPG, LSZH).

# Planung



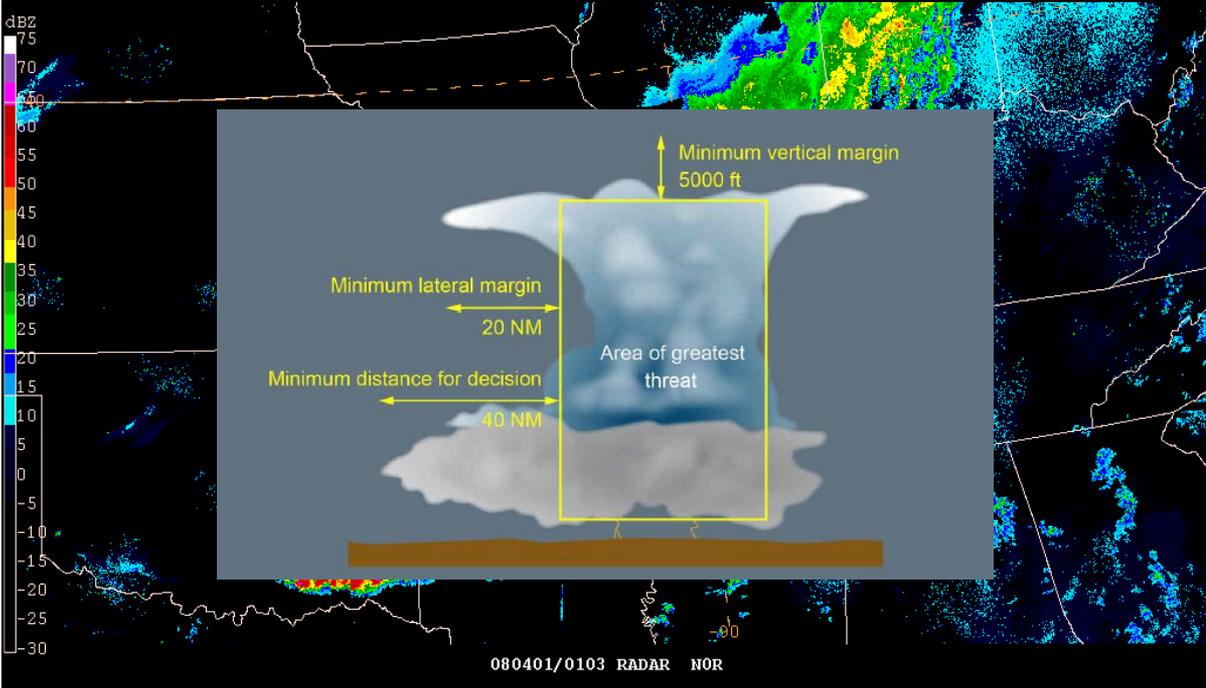
# Planung

Die Berücksichtigung meteorologischer Gefahren ist teilweise reglementiert.



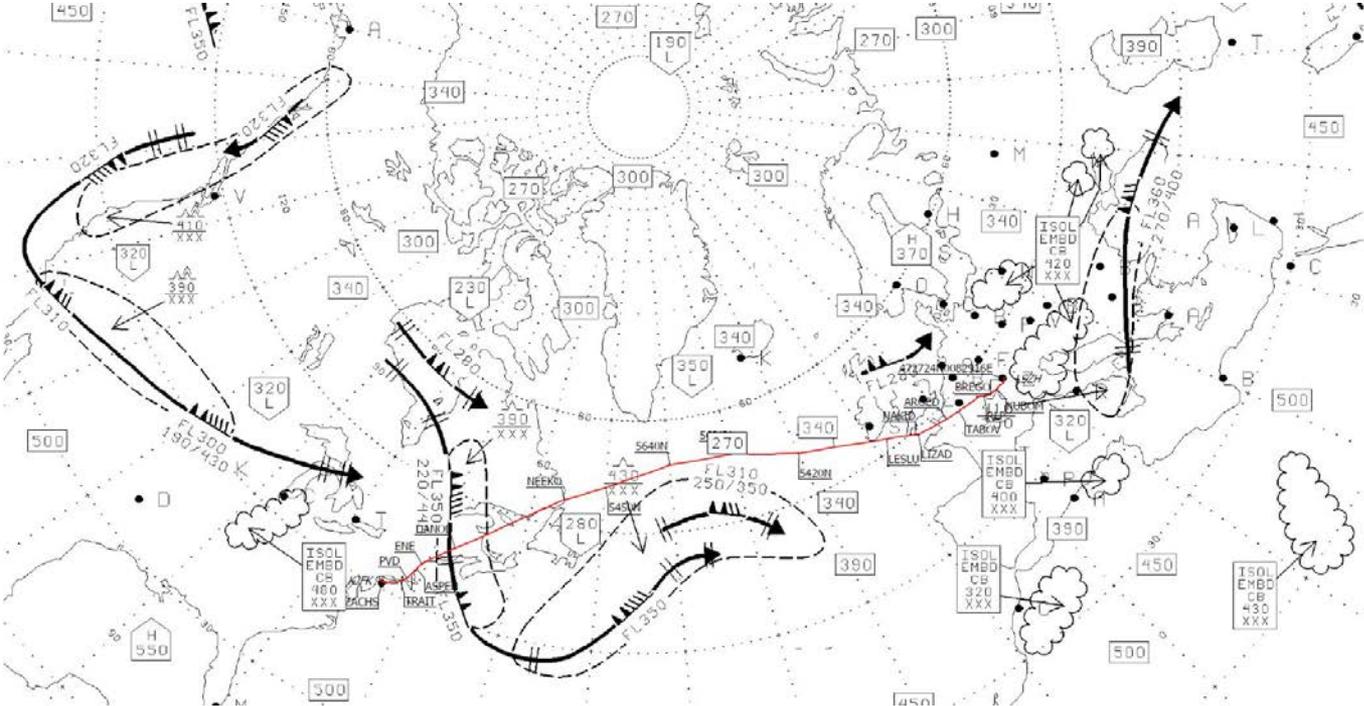
# Planung

Berücksichtigung meteorologischer Gefahren!



# Planung

## Significant Weather Chart



# Operational Flight Plan

Abschluss der Planung:

- Wetter ok
- Flugplätze ok
- Flugzeug ok
- Luftraum ok
- Fuel-Planung ok

→ Verfügbare Zeit für die Planung: **ca. 20min!**

LX14		22May19Z		ZRH/JFK		RLS 4 / 22May19 09.30z		1/7	
SWR14E	LSZH/ZRH	10.55z	Taxi out	.17					
HBJHA	KJFK/JFK	19.45z	Taxi in	.10					
A333		08.50	Est. Blk	08.15					
Remarks									
MEL/CDL: ITEMS AFFECTING OFF NOT CONSIDERED									
Route ID: Q16 AWY NATE CVRPF-   APPL DIVERSION TIME: 105MIN									
DIST 3558   GCI 104   CP T7									
MIN TEMP M58 @ (N4434.4 W06913.5)   MAX SHR 7 @ (N4549.2 W06736.9)									
Speed: CIO									
Steps: F180 LASUN/F220 TORPA/F240 REKLA/F280 RLP/F320 TRO/F360 5640N/F380									
NEEKO/F400 CCC/F30									
N4727.5E00832.9 1417ft FL180/M18/33635 Wind 334/009					Departure ATIS				
					A2FW	ATOW	TRIM	SOB	AFOB
ZFW	156160	1750008	Performance						
TOF	49490								
TOW	205650	2330008	ATC Departure Clearance						
TRIP	41869								
LW	163781	187000	Arrival ATIS						
REMF	7621								
REMT	1.36								
38ERA KBGR					PERF +0.00				
TAXI	510	.17	IFR   ETOPS						
KJFK	41869	7.48	T/O ALTN NIL						
CONT3t	1257	.14							
KSWF	2674	.31	EF95 P273kg / 4min						
ADDE					MAX TCAP 73.2t				
CF									
FR	2295	.30							
REQ	48605	9.03							
EXT	1395	.17							
ACT	50000	9.20							
Tankering: LOSS FOR EXTRA FUEL: -217 USD/T									
Next Leg: n/a									
+1t	/+184kg/+0.00		CI080	/+669kg/-0.10		-1 FL Step	/+370kg/+0.00		
Optional DEST ALTN: Not analysed for critical fuel scenario.									
ADDNAR	47079/1148		KEWR	48965/3034		KFHL	49100/3169		
KBOS	50139/4208		CYUL	51927/5996					
CMD			CRP			F/O		DISP	



# In-Flight

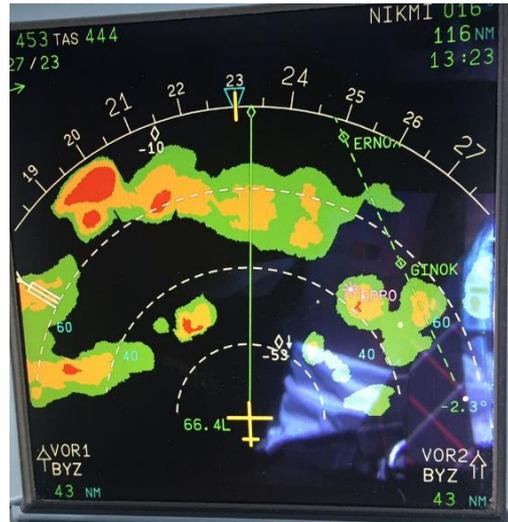
Ständige Wetter-Updates mit den verfügbaren Mitteln:

```
ACARS BEGIN - 18/08/01 00:12:22
18/08/01 00:12:07 OPEN

EDDK ENR ATIS N
2350Z
ATIS EDDK N METAR 312350
EXPECT ILS APCH
RWY 32R 06 32L
TRL 60
34004KT
CAVOK
T20 DP14
QNH1020
TREND NOSIG

END OF ATIS N

ACARS END
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Thank you

