

27/05/2019

Considered hypothesis



- For time flight during 2018, Canaries has been used as a reference.
- Only deviations in nominal routes or incorporating to nominal routes have been considered.
- Only crossing routes with four or more flights per month have been considered.
- Whenever time information in deviations is not known, **five minutes** has been considered.
- Pz obtained from Eurocontrol information: $Pz(1000)=9.647 \cdot 10^{-13}$
- Traffic growth hypothesis from STATFOR information (February 2019): 3,3%

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Considered hypothesis. Not published crossing routes. Canaries and SAL. Direct routes

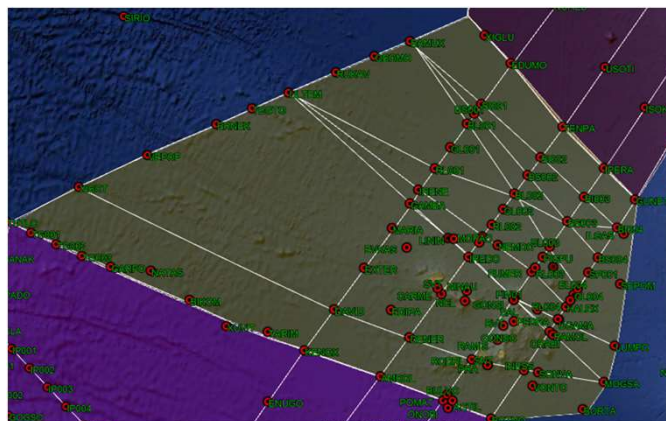


Canaries

- NORED-ETIBA

SAL

- BAMUX-LUMPO
- BAMUX-ILGAS
- ULTEM-ILGAS
- ULTEM-LUMPO
- BAMUX-SEPOM
- XIBOT-MOGSA



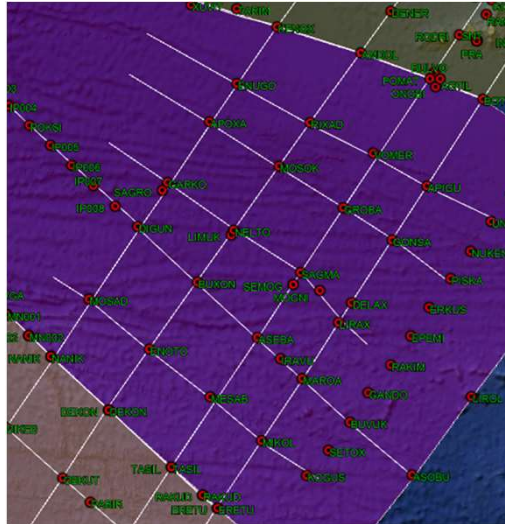
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Considered hypothesis. Not published crossing routes. Dakar. Direct routes 

Dakar

- ENUGO-APIGU
- APOXA-GONSA
- GARKO-LIRAX
- MOSAD-MIKOL



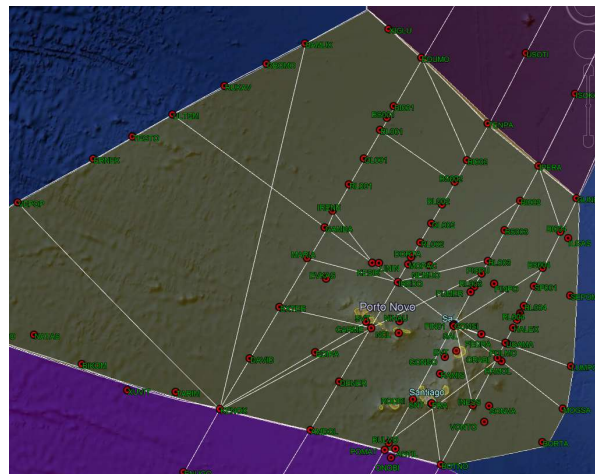
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Considered hypothesis. Not published crossing routes. SAL. 

SAL

- EDUMO-BI002
- BL002-CVS
- NEMDO-BI003
- BL003-IREDO
- IPERA-BI004
- PISPU-CARME
- CVS-BS004
- IRENE-KESIK
- CVS-UGAMA
- BL001-BS002
- MARIA-IREDO
- BOTNO-SNT
- EXTER-CARME
- BAMUX-KENOX
- VEPOP-KENOX
- CARME-KENOX
- SVT-KENOX
- ORABI-BULVO
- CVS-INESS



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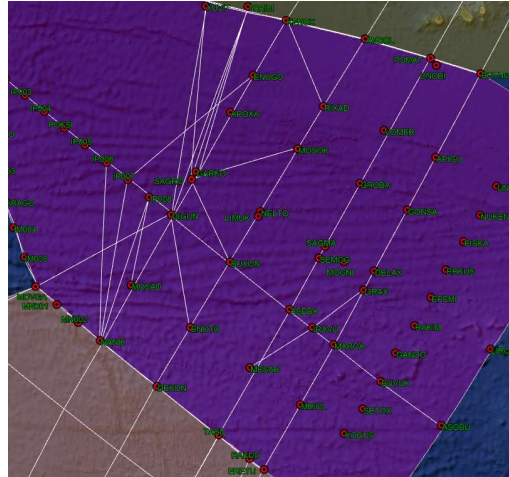
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Considered hypothesis. Not published crossing routes. Dakar.



Dakar

- XUVIT-DIGUN
- TARIM-DIGUN
- TARIM-GARKO
- TARIM-SAGRO
- KENOX-RIXAD
- LIRAX-IRAVU
- SAGRO-BUXON
- XUVIT-SAGRO
- IP006-NANIK
- IP007-NANIK
- IP008-NANIK
- IP008-MOSAD
- ENUGO-IP007
- DIGUN-MOVGA
- ENOTO-DIGUN
- IRAVU-MESAB



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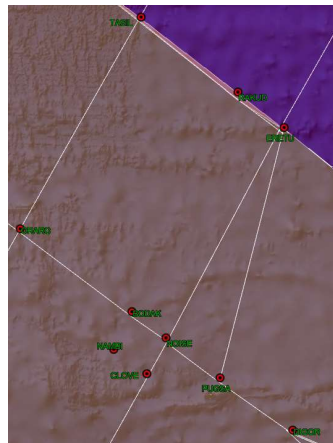
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Considered hypothesis. Not published crossing routes. Recife.

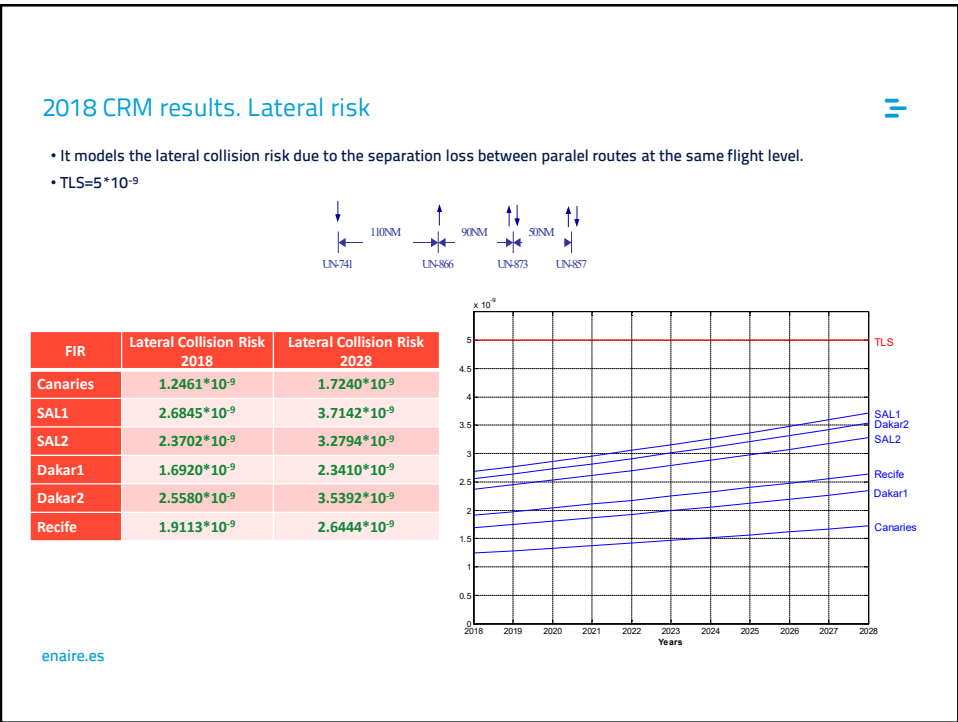
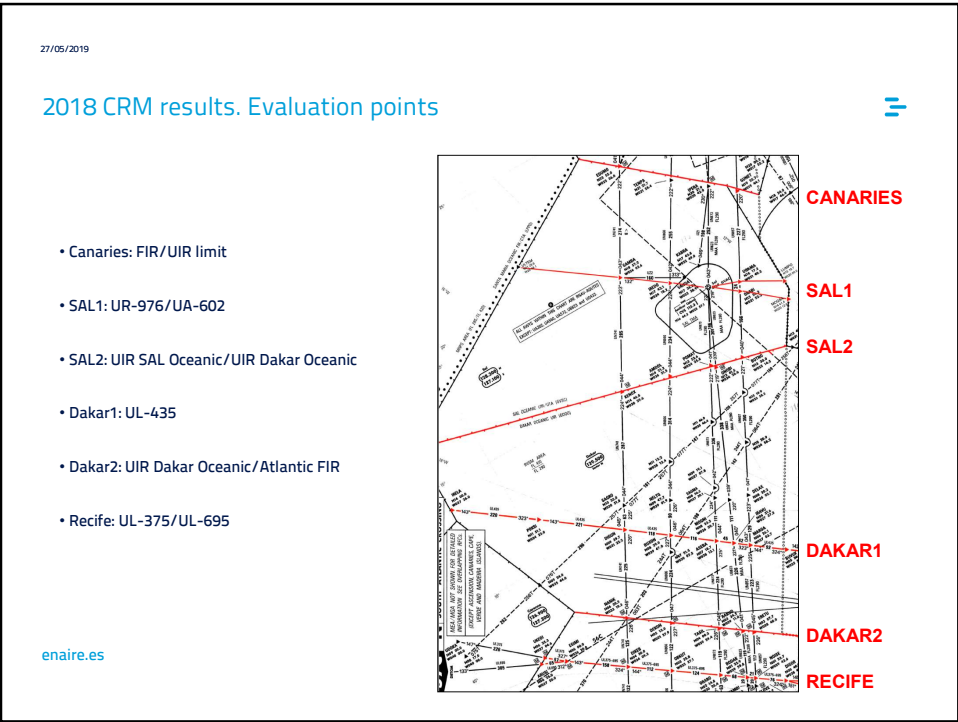


Recife

- ERETU-PUGSA



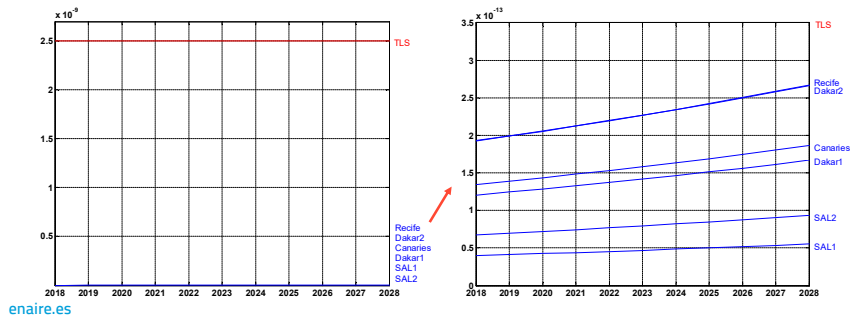
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2018 CRM results. Vertical technical risk

- Vertical risk: technical vertical risk + operational risk
 - Vertical technical risk models the risk due to vertical separation loss between aircraft at adjacent flight levels due to normal deviations
 - Operational risk models risk due to large height deviations (LHDs)
- TLS
 - Vertical technical risk: $TLS=2.5 \cdot 10^{-9}$
 - Total vertical risk: $TLS=5 \cdot 10^{-9}$

FIR	Technical Collision Risk 2018	Technical Collision Risk 2028
Canaries	$1.3458 \cdot 10^{-13}$	$1.8620 \cdot 10^{-13}$
SAL1	$3.9851 \cdot 10^{-14}$	$5.5136 \cdot 10^{-14}$
SAL2	$6.7553 \cdot 10^{-14}$	$9.3464 \cdot 10^{-14}$
Dakar1	$1.2056 \cdot 10^{-13}$	$1.6681 \cdot 10^{-13}$
Dakar2	$1.9260 \cdot 10^{-13}$	$2.6648 \cdot 10^{-13}$
Recife	$1.9301 \cdot 10^{-13}$	$2.6704 \cdot 10^{-13}$



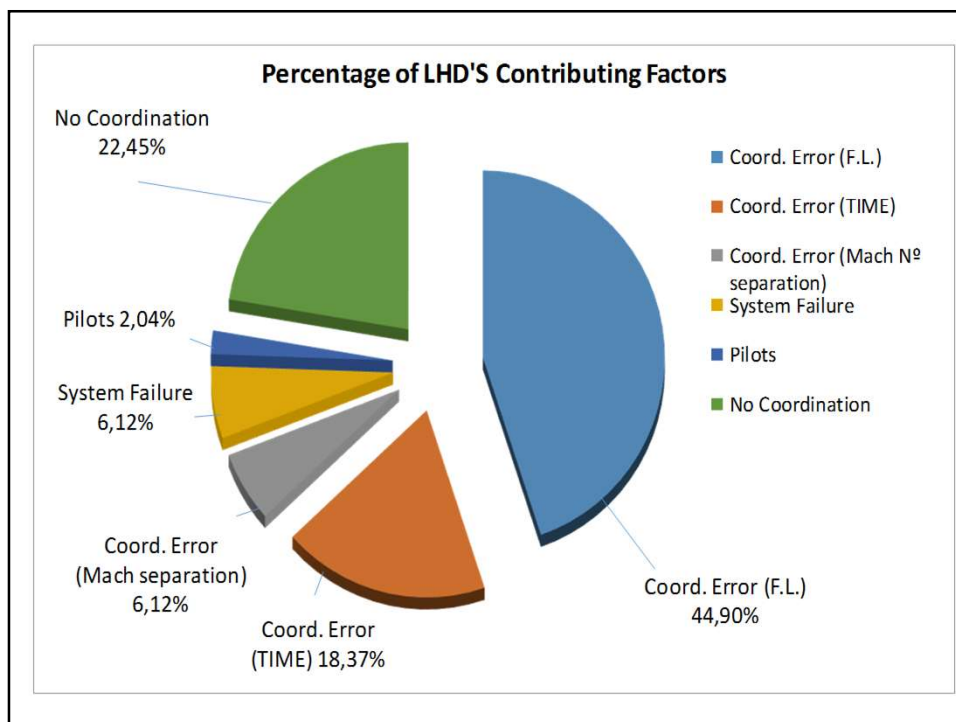
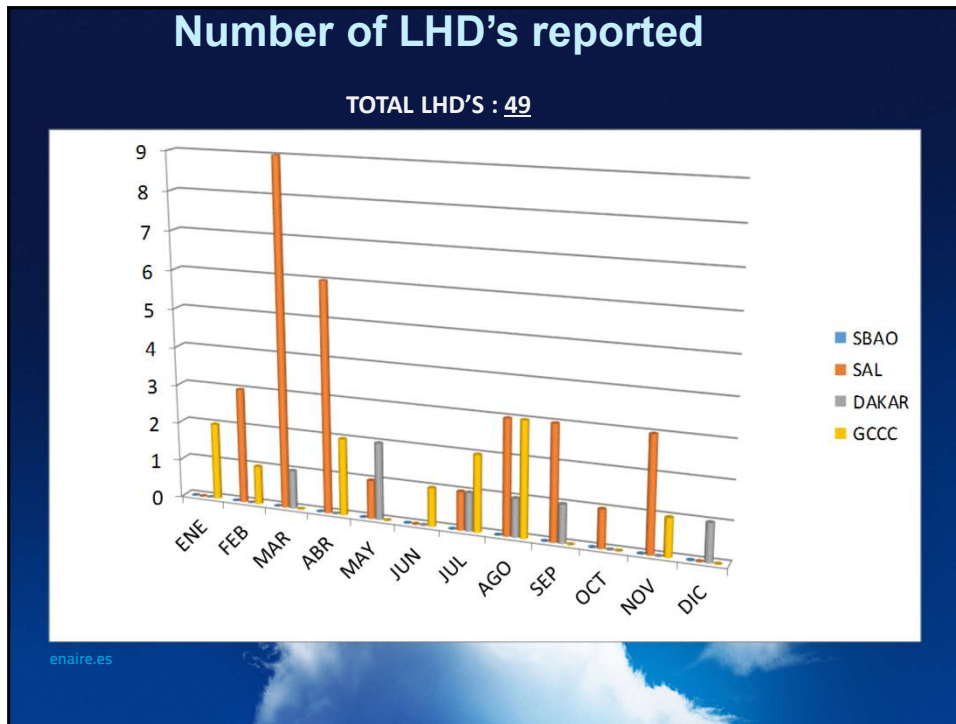
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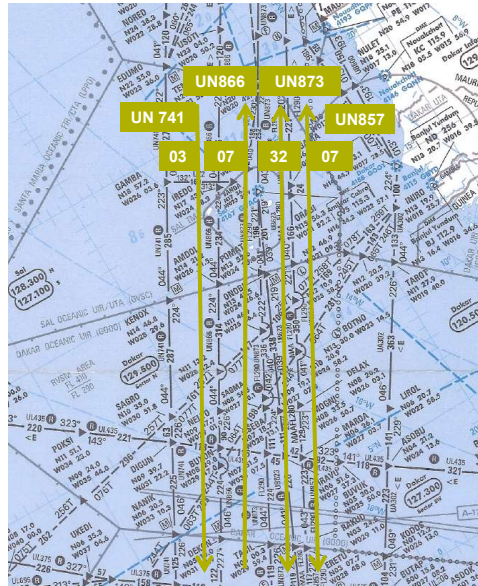
2018 CRM results. Vertical operational risk

- Operational risk includes:
 - Risk due to aircraft climbing or descending a flight level
 - Risk due to an aircraft at a wrong flight level
 - Large height deviations not involving whole numbers of flight levels
- Depends on the reported LHD by the States
- All LHDs are due to coordination errors between ATC units:
 - No transfer notified
 - Transfer at an unexpected flight level
- All reported deviations in Recife were not related to the corridor

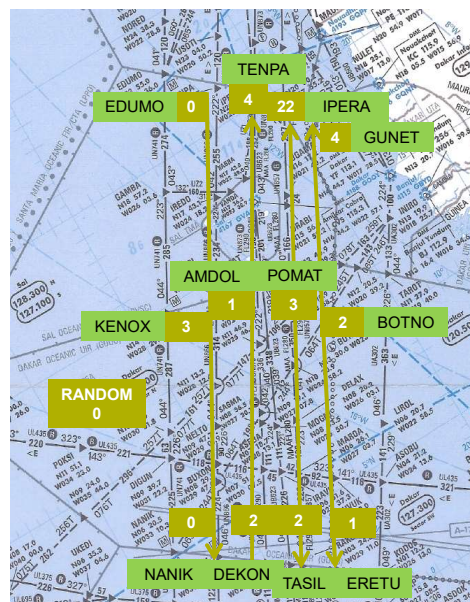
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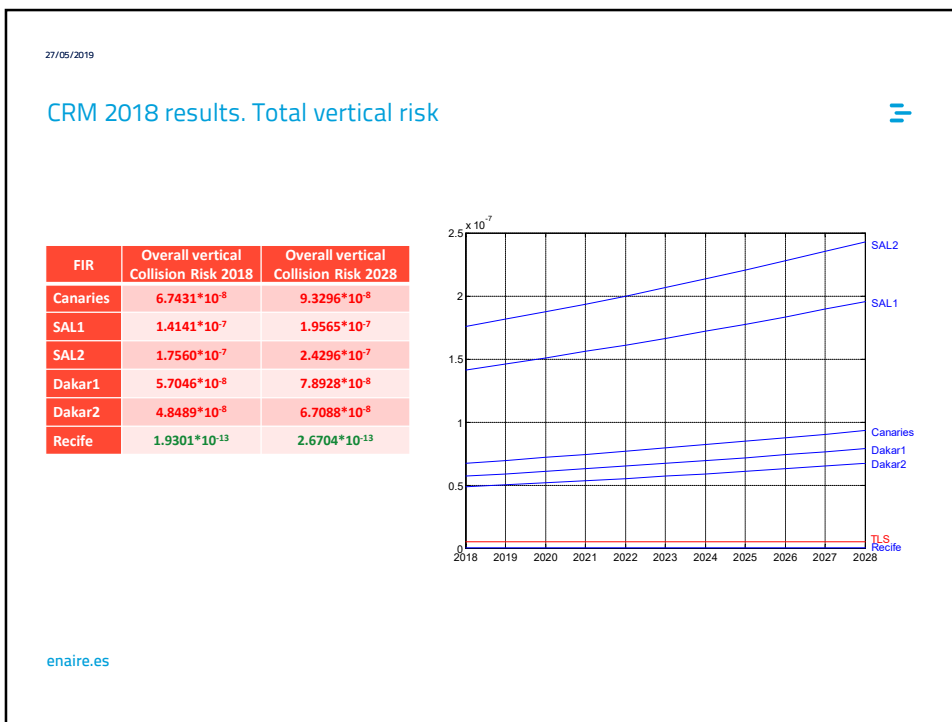


Distribution of LHD's per ATS route



Distribution of LHD per Fix Point





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Conclusions and recommendations

- Lateral risk and vertical technical risk have values below TLS.
- Vertical operational risk is above TLS (except in Recife), as it includes LHDs contribution.
- Main LHDs source is identified: coordination error between ATC units. Correction measures should be applied.
- Accuracy and reliability if the studies depend on the availability and accuracy of data: more accurate information should be made available, both for traffic measures and LHDs.

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