

ANALYZING AND MITIGATING TCAS RA'S

AN OPERATOR'S PERSPECTIVE

NOV.2023



AGENDA

- STATISTICS
- AIRCRAFT SYSTEM FINDING
- HVR EVENT SIMULATIONS
- MANAGING TCAS RA EVENTS
- ANALYSIS TCAS RAS





TCAS RA'S

Traffic Collision Avoidance System (TCAS) is a system designed to reduce the risk of mid-air collisions between aircraft. When TCAS issues a Resolution Advisory (RA), it provides the pilots with recommended vertical maneuvers to avoid a potential collision with another aircraft.

STATS

- 58.7% of cases Flight crews reacted correctly to a TCAS Resolution Advisory (RA).
- 29.8% of cases, the flight crew reacted by modifying the aircraft trajectory but did not reach the expected target.
- 11.5% of cases, the flight crew did not react, or they reacted excessively and sometimes had the opposite reaction to what the RA requested.



Figure 1. Flight crew response to TCAS Resolution Advisories (data from EUROCONTROL)

STATS

- Updated SAUDIA SEASONAL STATS and QUARTERLY STATS to be included as a Bar Chart
- Correlation between good aircraft performance and Season



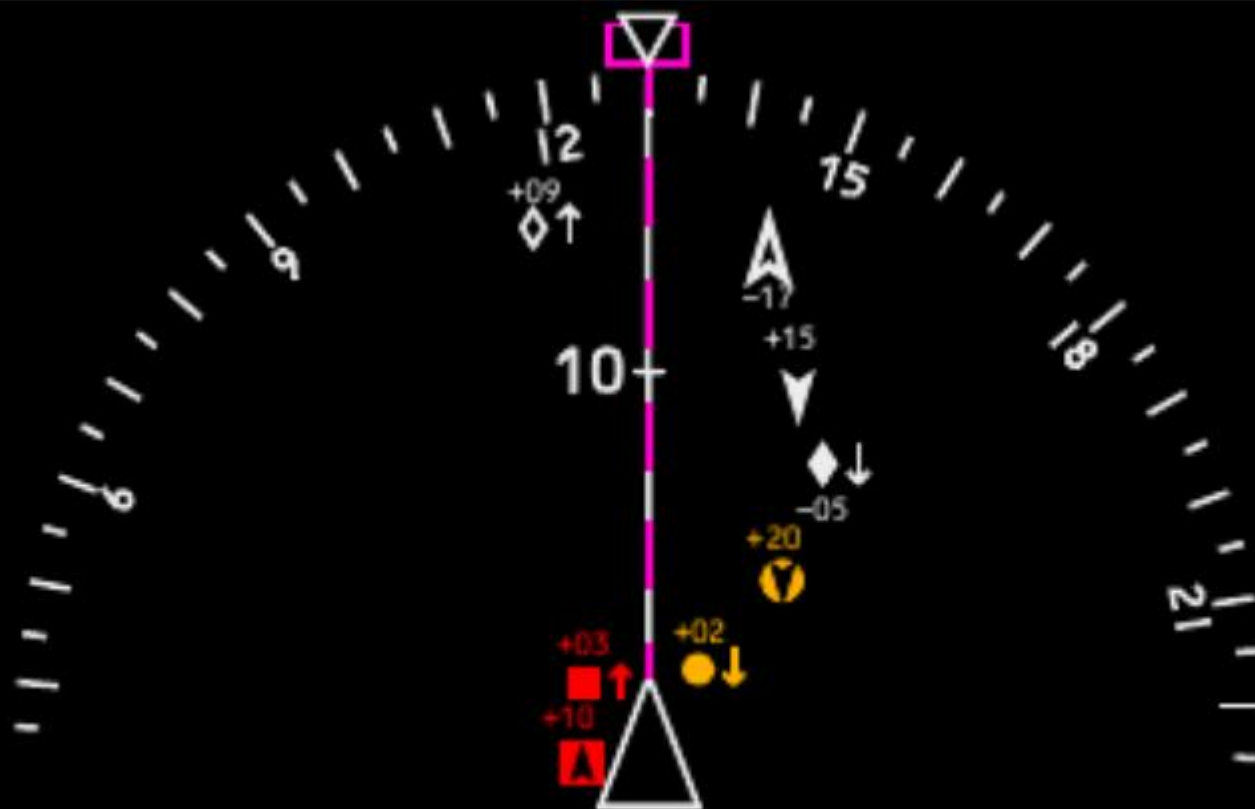
AIRCRAFT SYSTEMS

TCAS INDICATIONS

AIRCRAFT SYSTEMS

GS 482 TAS 475

LACKR
1522.7z
147NM

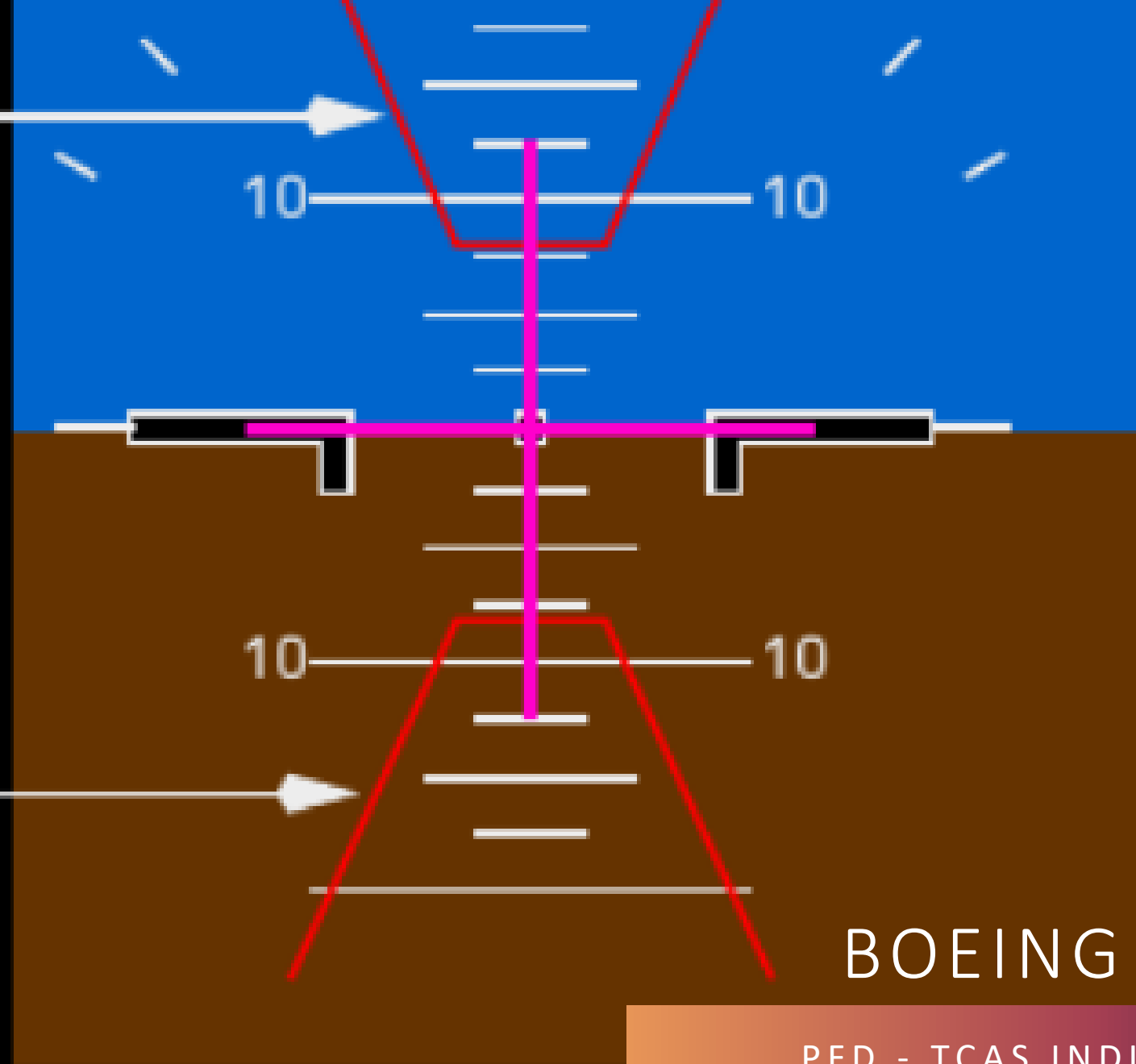


OFFSCALE
TRAFFIC

TFC-ALL

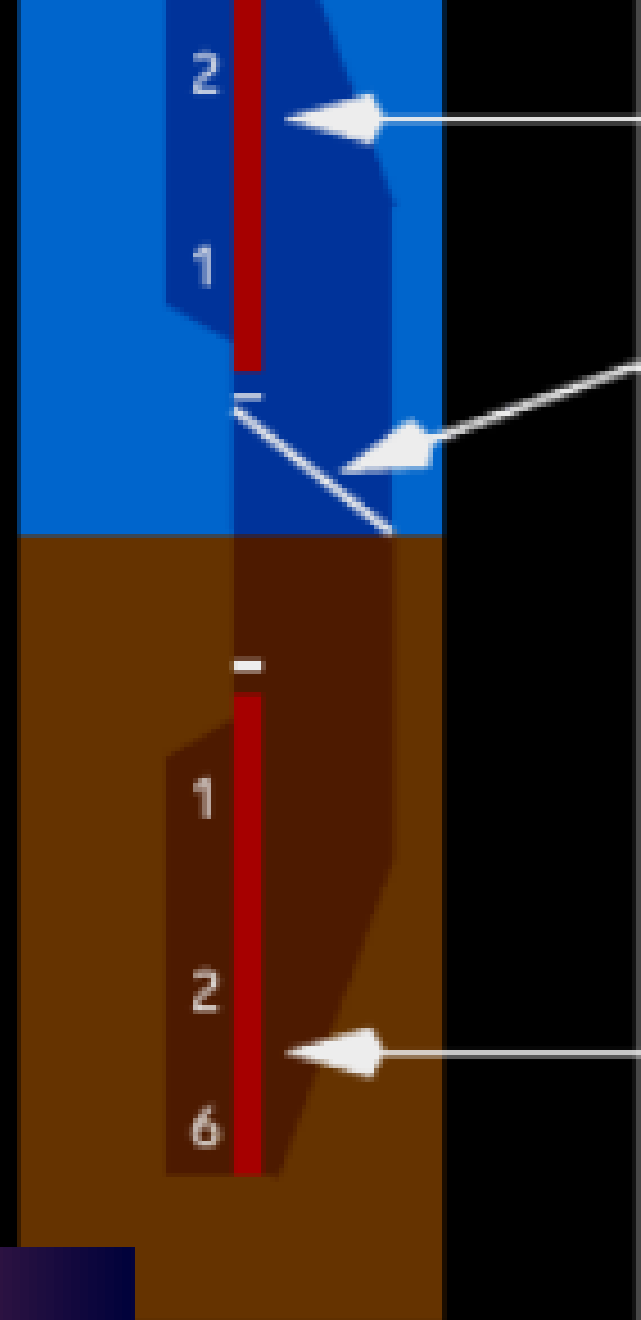
SEL HDG 130

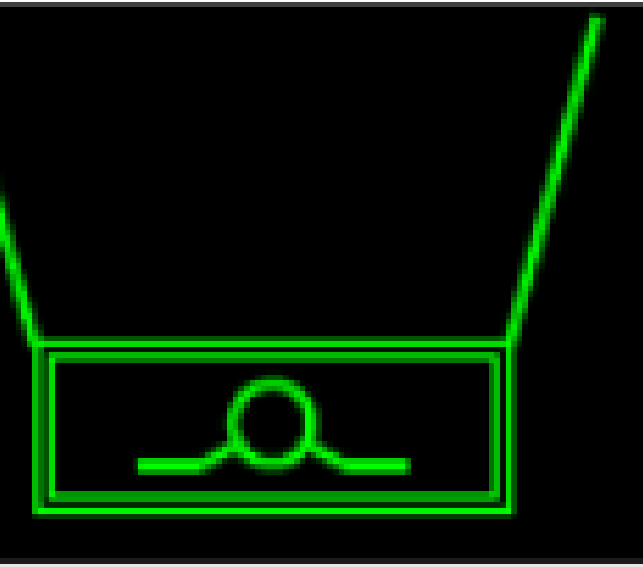
MAG



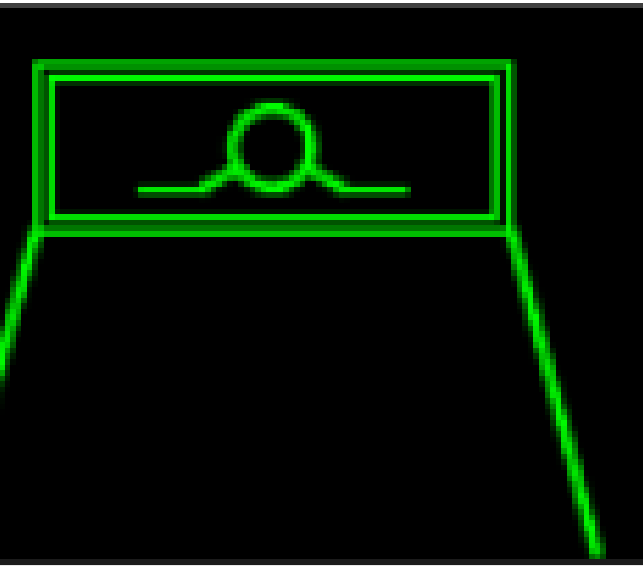
BOEING 787

PFD - TCAS INDICATIONS





Descend corrective

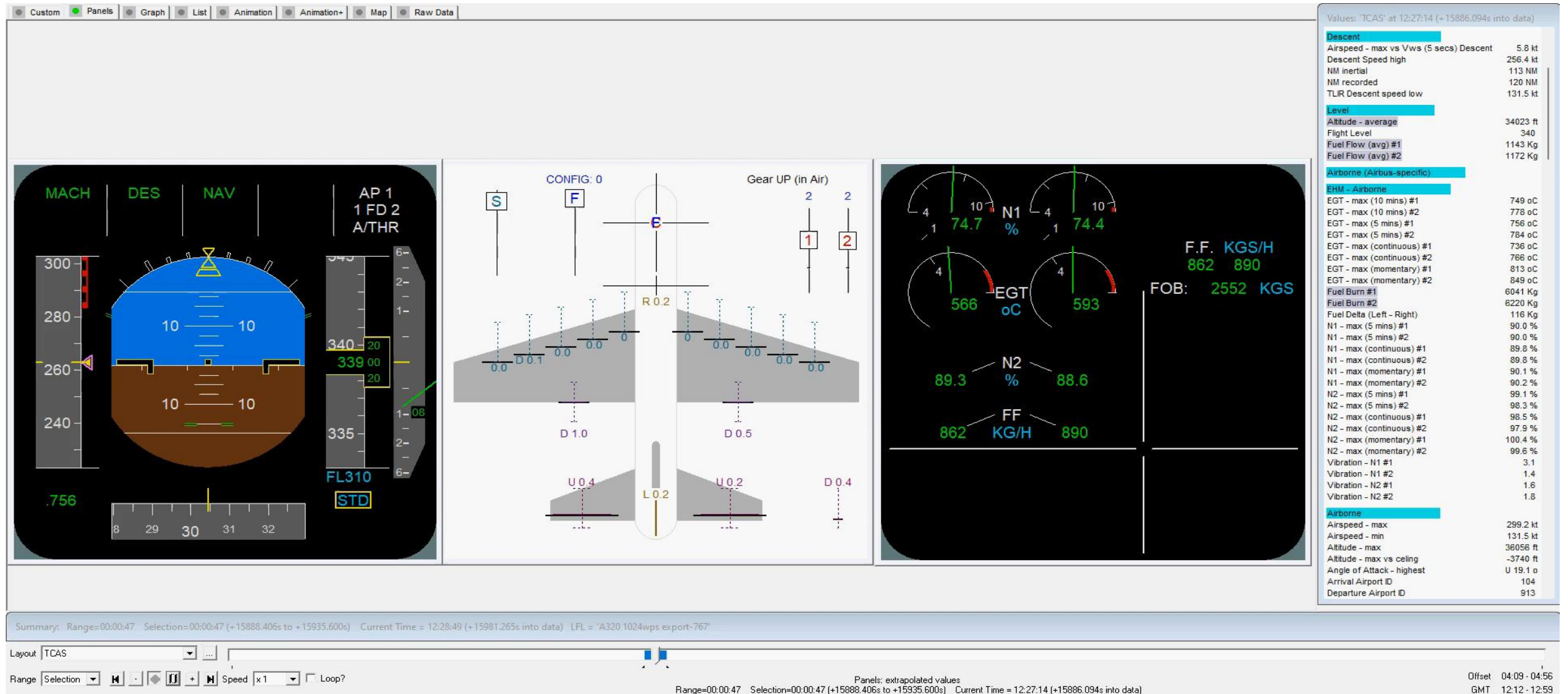


Climb corrective

BOEING 787

HUD - TCAS INDICATIONS

TCAS RA EVENT 1



TCAS RA EVENT 2

FCMs were attempting to comply with ATC instructions regarding the minimum rate of descent while operating in unstable weather conditions. ATC advised the FCMs to expedite descent multiple times, FCMs acknowledged the instruction and utilized the Speedbrake to increase their rate of descent up to 2500ft/min within 460ft of the cleared flight level, resulting in the TCAS-RA “level off” event.

This event may be attributed to improper ATC instructions, as they had requested the crew to expedite descent while approaching the assigned level, as well as the crew attempting to comply by increasing the rate of descent within a short margin to the cleared flight level.

TCAS RA EVENT 2

- Second Simulation to be included regarding ATC request and Sub-Standard pilot action



MANAGING TCAS RA'S



BULLETINS



SAFETY, AVIATION SECURITY & QUALITY

Jan 2023



Safety Bulletin

Purpose

This Flight Safety Bulletin, in accordance with SAUDIA Safety Management Manual's (SMM) Safety Communication and Promotion Process, is issued in an effort to raise FCM's awareness and enhance SAUDIA organizational learning culture in regard to the following event: **TCAS-RA**

Background

Flight Safety had recently observed an increase TCAS-RA events, which could be attributed to a high vertical rate (HVR). During one of these events, the FCMs were attempting to comply with ATC instructions regarding the minimum rate of descent while operating in unstable weather conditions. ATC advised the FCMs to expedite descent multiple times, FCMs acknowledged the instruction and utilized the speedbrake to increase their rate of descent up to 2500ft/min within 460ft of the cleared flight level, resulting in the TCAS-RA "level off" event. This event may be attributed to improper ATC instructions, as they had requested the crew to expedite descent while approaching the assigned level, as well as the crew attempting to comply by increasing the rate of descent within a short margin to the cleared flight level. On another flight FCMs were attempting to avoid weather during the climb phase, and due to the congested traffic around the airport, a TCAS-RA "level off" event was triggered.

Safety Recommendation

- Advise the ATC when unable to comply with the given clearance for any reason.
- TCAS RA events are designated as Mandatory Reports per the company policy and regulation. (crew members have been late to report such incidents until they are requested)
- FCMs shall notify the ATC regarding TCAS-RA events according to FCOM and GOM, as one of the foreign authorities had indicated that the crew did not advise them of the RA, until minutes after, when the ATC explicitly asked if they had encountered an RA event.
- FCMs must comply with GM flying Bulletin No: 941/130/377/22 in regard to the (HVR).

Wish You Safe Flights!
The Flight Safety Department

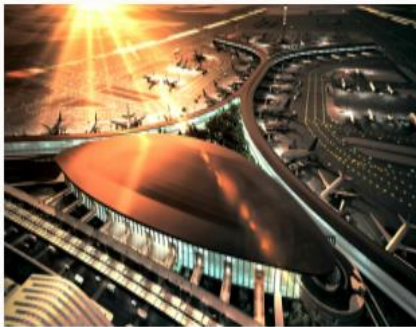
BULLETINS

- Chart showing effectiveness of bulletin

FLIGHT SAFETY DASHBOARD

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simplify the data down to the essentials, and to present a coherent picture to the involved parties in a meaningful way so they can understand the issues and take effective decisions to overcome the developing issues before they affect on operations.



eAirport



Airport Closure



Risk Register



TCAS RA Locations

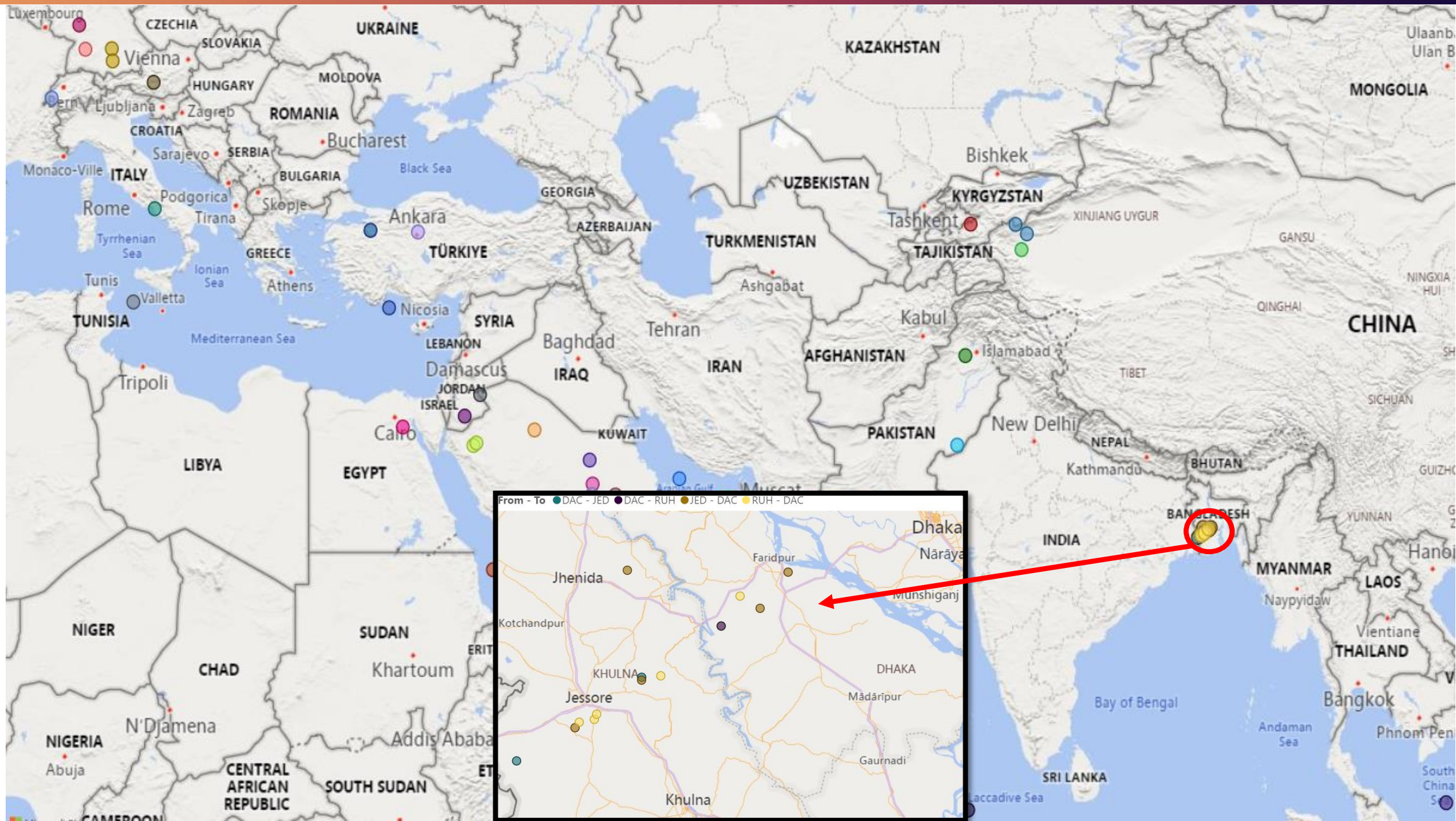


GPS Jamming Locations

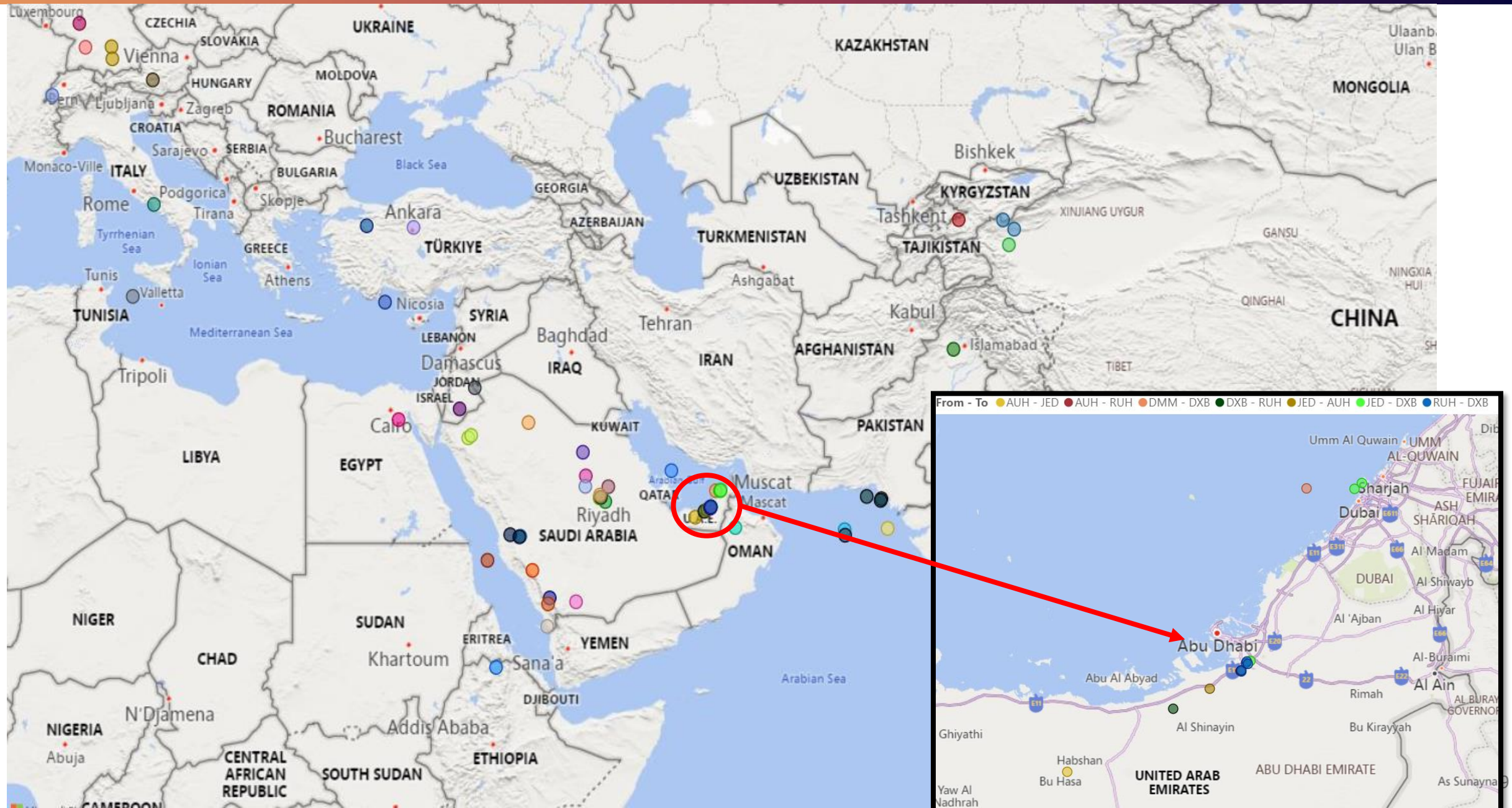


Birdstrike Locations

HOTSPOTS



HOTSPOTS



THANK YOU



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