EUROCONTROL

SUPPORTING EUROPEAN AVIATION

NM Weather Workshop 2025

12 March 2025

CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER

FOUNDING MEMBER sesar JOINT UNDERTAKING

NETWORK MANAGER

We'll be covering the EUROCONTROL NM Weather Workshop 2025 on our social media channels – please let the event photographer or one of the event organisers know if you do not want to appear in any published photographs.

When taking any close-up or small groups, we'll make sure to ask for consent when **taking the photo**.

PROGRAMME

Introduction and opening remarks

- **Iacopo Prissinotti,** Director Network Management
- **Adrian Florea,** Chairman of the Network Directors of Operations working group
- **Yolanda Portillo**, Head of Network Manager Operations Centre

The CBCF Contribution to Network Weather

Clemens Weidemann on behalf of EUMETNET

NMOC Statistics

Melike Atik, EUROCONTROL

Pre-Tactical Round Table

06:00 – 09:00, 21st July 2024

TMA Disruptions due to Weather - Barcelona TMA

Jesús A. García, ENAIRE

Weather Impact on Airport Operations

Jaume Bauza Sule, AENA

PROGRAMME

09:00 – 12:00, 21st July 2024

LFMM Feedback on Weather Management

Sophie Gaudiot, DSNA

Managing Weather Disruptions: Vueling iOCC's Approach

Jorge Franco, Vueling

12:00 – 15:00, 21st July 2024

Adverse Weather and Air Traffic Control

Björn Lommer, DFS

15:00 – 18:00, 21st July 2024

AO's Perspective – TUI Airline

Björn Tiffert, TUI

Weather avoidance: Pilot's Perspective

Cpt. Daniele Veronelli, European Cockpit Association

PROGRAMME
18:00 – 21:00, 21st July 2024
LOVV Feedback on Weather Management **Anita Eder,** AustroControl
Airport Curfews **Fabrice Vanliefferinge,** EUROCONTROL
21:00 – 00:00, 21st July 2024
Review of Weather and Forecasts on 21.07.2024 **Clemens Weidemann** on behalf of EUMETNET
Summer 2025
Enhancing Pre-tactical and Tactical Demand Capacity Balancing **Yolanda Portillo,** EUROCONTROL
SESAR MET **Oznur Uygur,** SJU

Each session includes Q&A time

using the **QR code** or

go to **ectrlvote.eu** and log in with **eurocontrol521**

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EUROCONTROL Network Manager Weather Workshop 2025

The CBCF Contribution to Network Weather

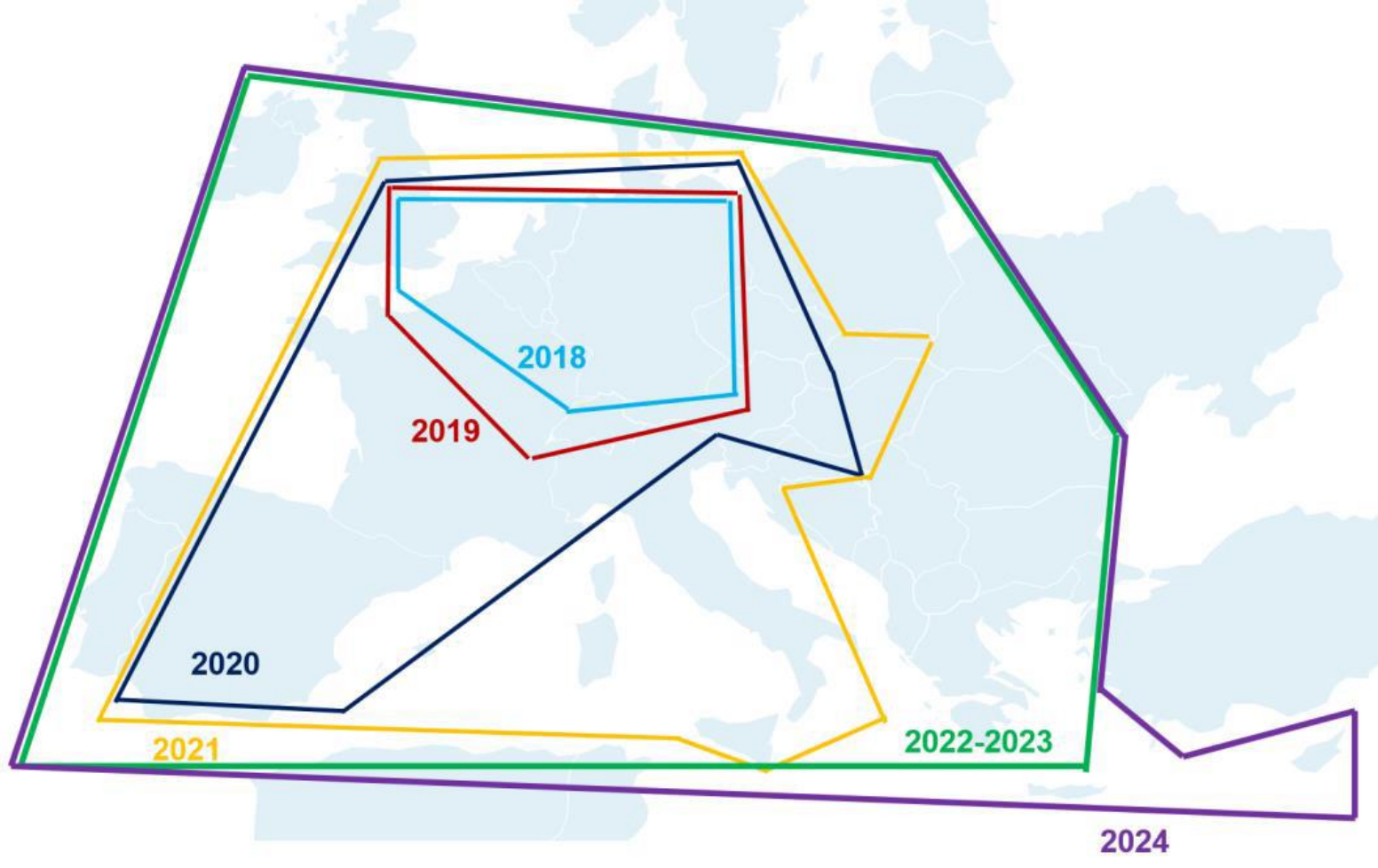
Brussels

12 March 2025

By Clemens Weidemann on behalf of EUMETNET

EUMETNET

Cross Border Convection Forecast (CBCF) to Support NM, ANSPs, Airlines and other stakeholders



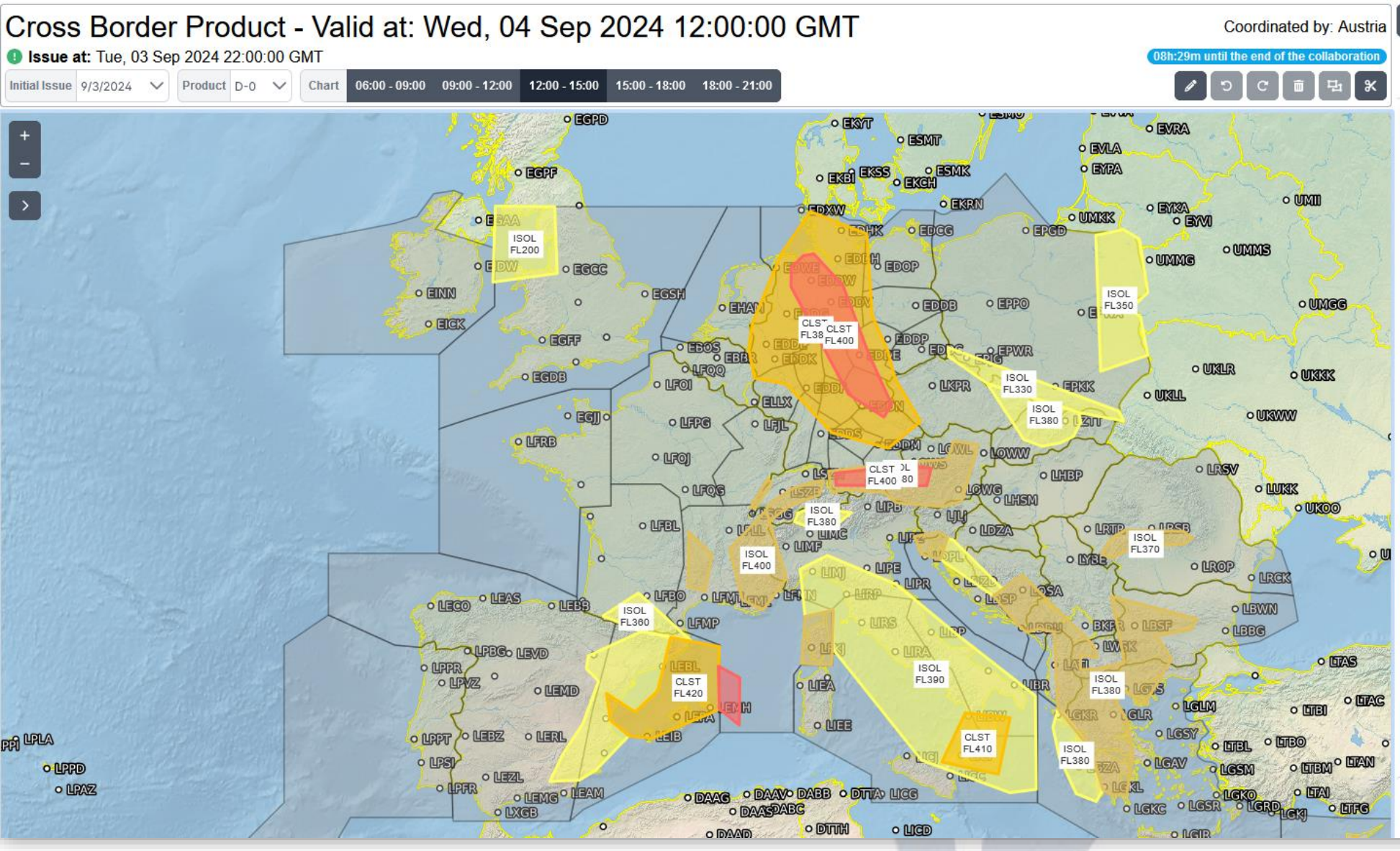
CBCF as EUMETNET Module

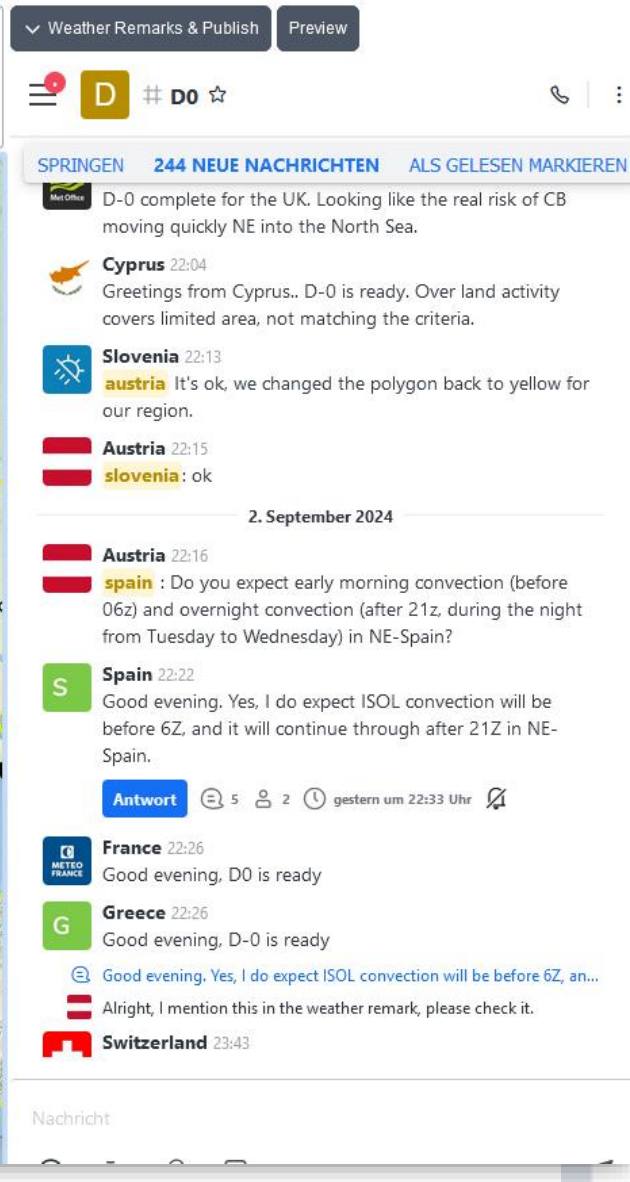
Goal:

Convey official local MET information to network level,

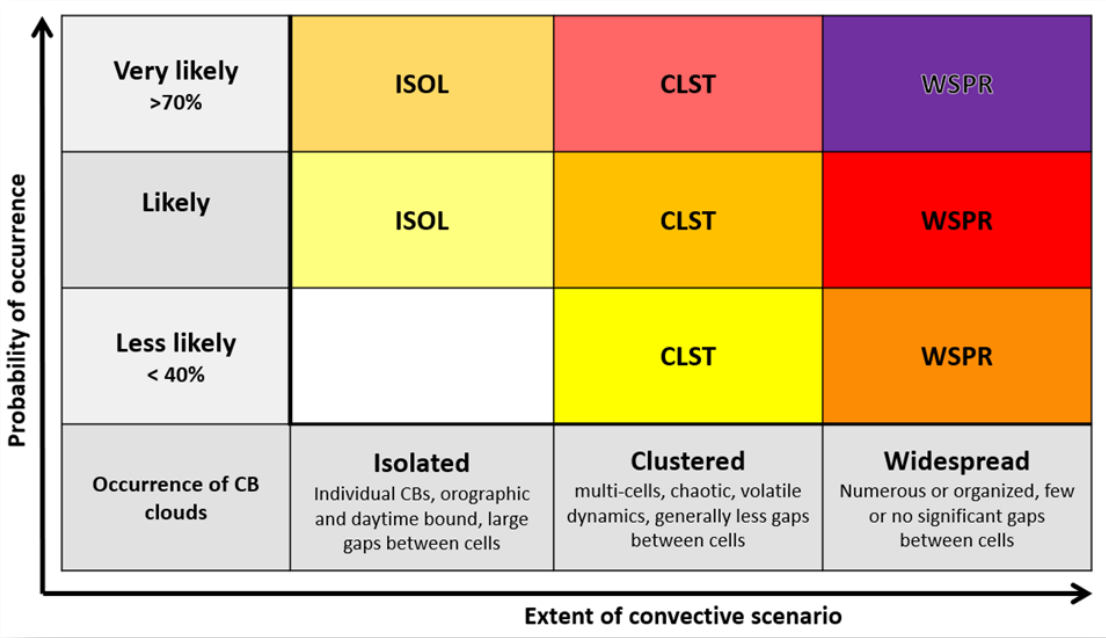
enabling common decision making

- CBCF is organized as optional EUMETNET Module
- 25 participating states, 10 acting as Coordinators
- Expert Team with approx. 70 operational managers and senior experts
- Common cloud-based production system (EuFoCS), highly available and stable
- Designation as SWIM-Service for network information as per „Common Project 1“ (2021/116) Regulation


Cross Border Product - Valid at: Wed, 04 Sep 2024 12:00:00 GMT
Issue at: Tue, 03 Sep 2024 22:00:00 GMT
Coordinated by: Austria
08h:29m until the end of the collaboration
Initial Issue 9/3/2024
Product D-0
Chart 06:00 - 09:00 09:00 - 12:00 12:00 - 15:00 15:00 - 18:00 18:00 - 21:00
ISOL FL200
ISOL FL350
ISOL FL330
ISOL FL380
ISOL FL400
ISOL FL360
ISOL FL370
ISOL FL390
CLST FL380
CLST FL400
CLST FL420
CLST FL410


Weather Remarks & Publish
Preview
D0
SPRINGEN
244 NEUE NACHRICHTEN
ALS GELESEN MARKIEREN
D-0 complete for the UK. Looking like the real risk of CB moving quickly NE into the North Sea.
Cyprus 22:04
Greetings from Cyprus.. D-0 is ready. Over land activity covers limited area, not matching the criteria.
Slovenia 22:13
austria It's ok, we changed the polygon back to yellow for our region.
Austria 22:15
slovenia: ok
2. September 2024
Austria 22:16
spain : Do you expect early morning convection (before 06z) and overnight convection (after 21z, during the night from Tuesday to Wednesday) in NE-Spain?
Spain 22:22
Good evening. Yes, I do expect ISOL convection will be before 6Z, and it will continue through after 21Z in NE-Spain.
Antwort
gestern um 22:33 Uhr
France 22:26
Good evening, D0 is ready
Greece 22:26
Good evening, D-0 is ready
Good evening. Yes, I do expect ISOL convection will be before 6Z, an...
Alright, I mention this in the weather remark, please check it.
Switzerland 23:43
Nachricht

CBCF in 2024



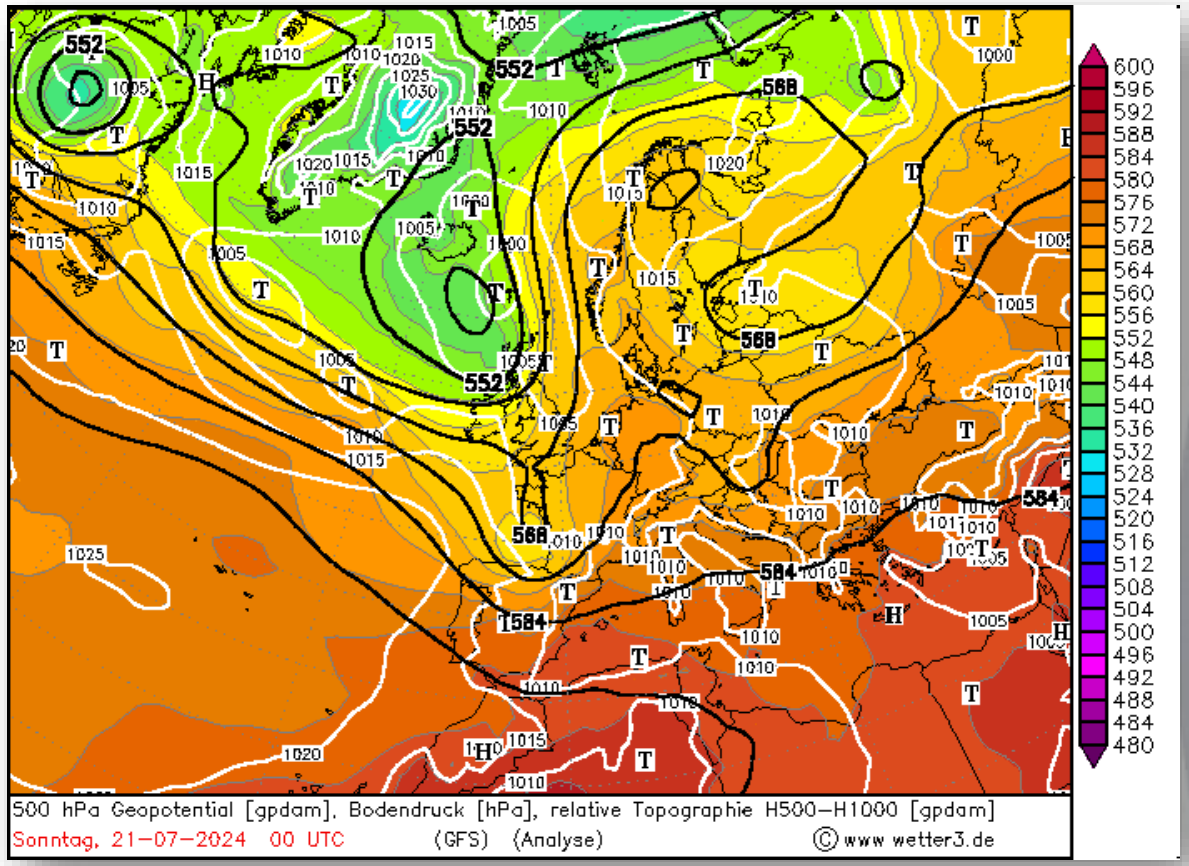
- **168 days** of CBCF production
- **388** forecasts sent
- **25** MET ANSPs with approx. **250** forecasters involved
- **19,671** polygons produced „by hand“
- Approx**. 45 organizations** consuming CBCF forecasts

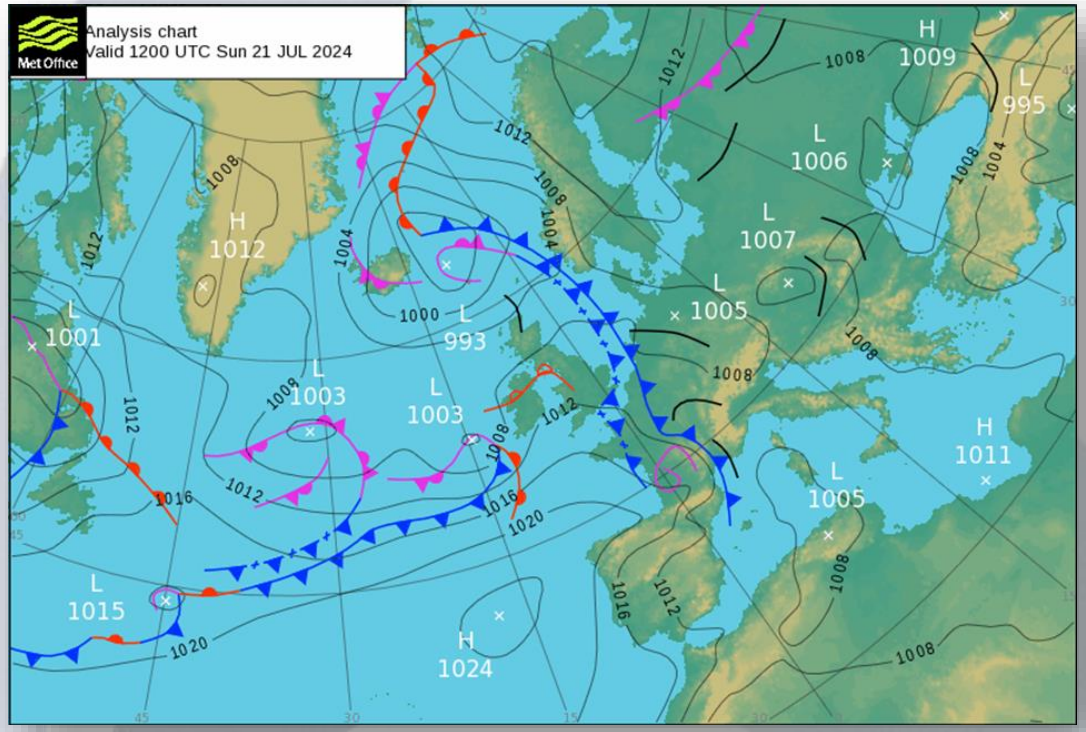
The challenge of forecasting convection

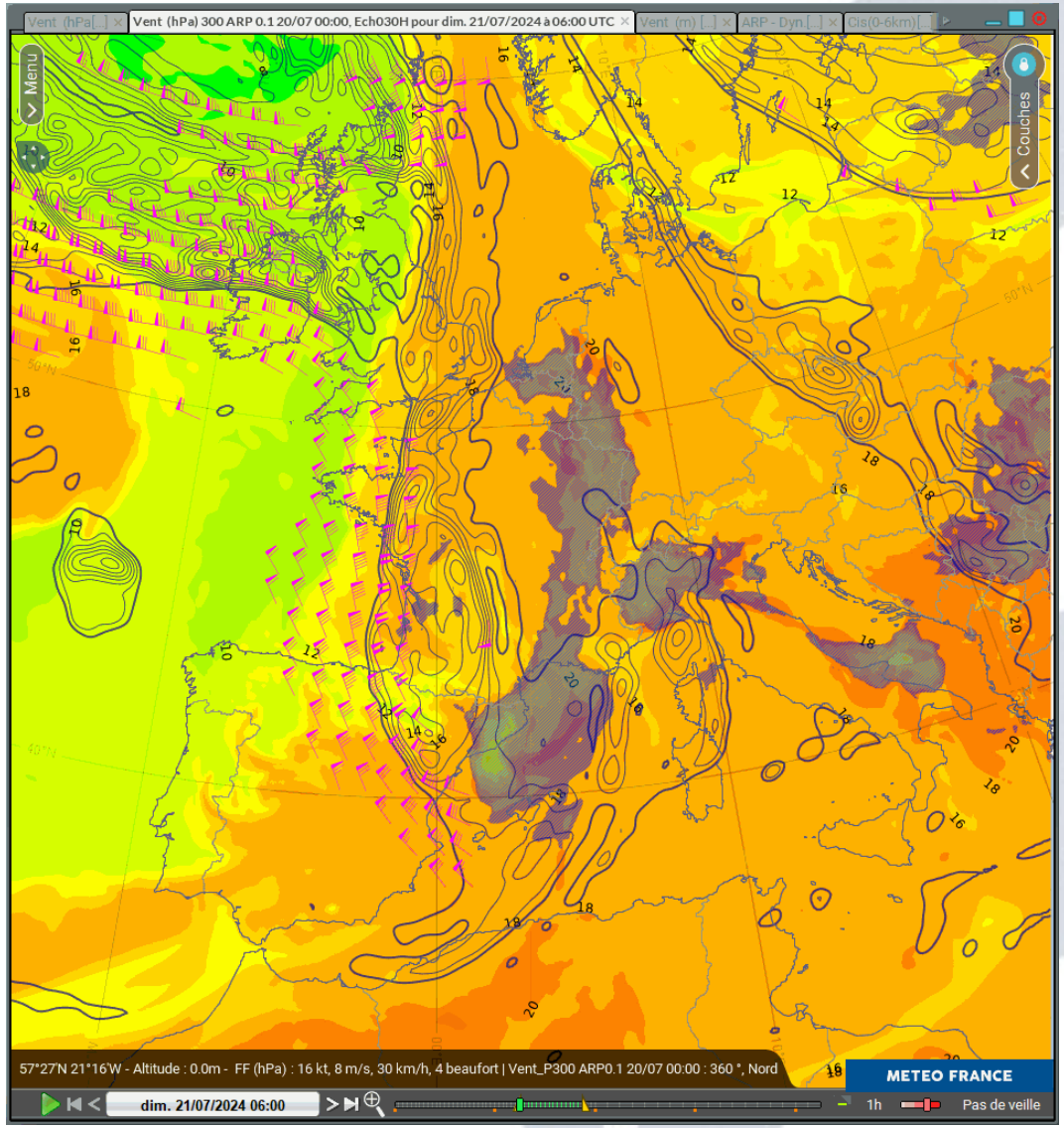
- Convection is highly chaotic and dynamic
- Convective clouds (**CB**, **TCU**) can only be simulated by high-resolution weather models
    - Alternatively, conditions prone for convective developments can be predicted
- There is not the single best data source, the forecasters compare and assess their usage of numerical predictions day by day

Source: University Wageningen

Weather Situation on 21/07/2024



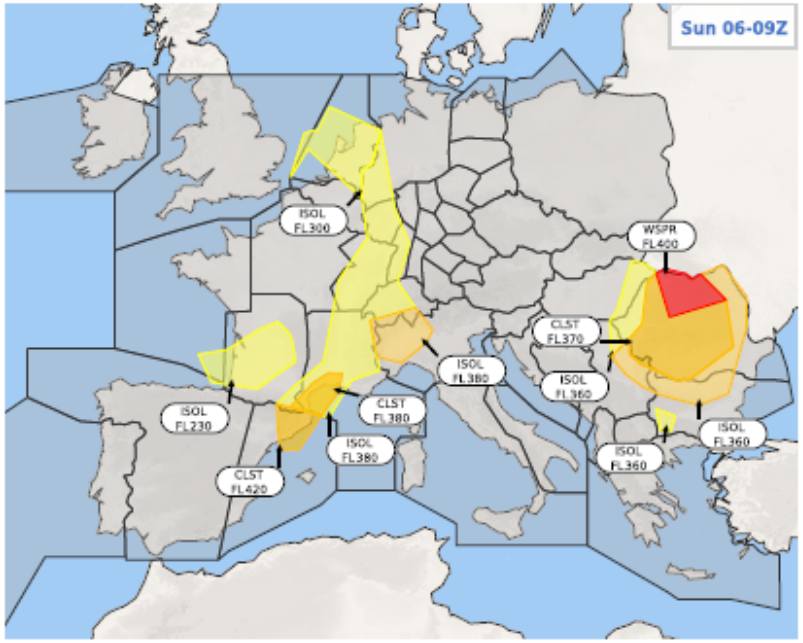


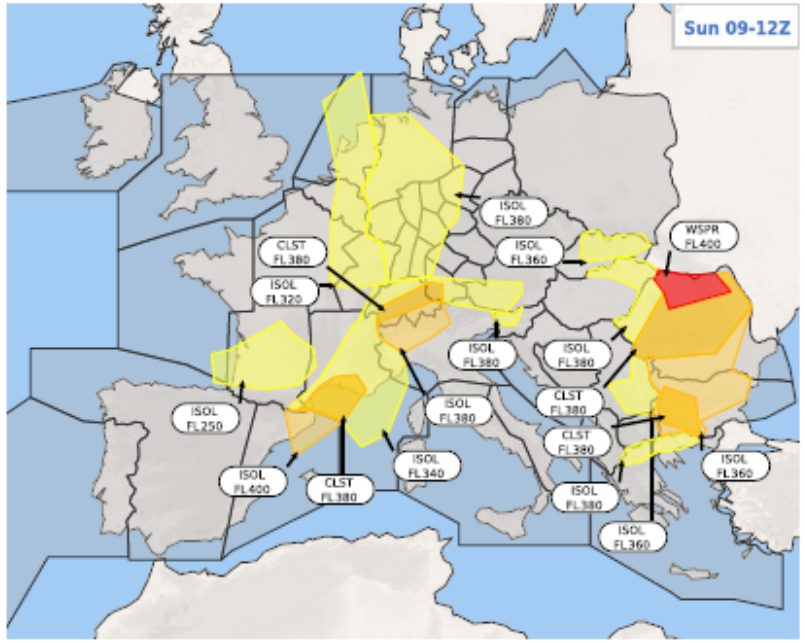

Vent (hPa) 300 ARP 0.1 20/07 00:00, Ech030H pour dim. 21/07/2024 à 06:00 UTC
Menu
Couches
57°27'N 21°16'W - Altitude : 0.0m - FF (hPa) : 16 kt, 8 m/s, 30 km/h, 4 beaufort | Vent_P300 ARP0.1 20/07 00:00 : 360 °, Nord
METEO FRANCE
dim. 21/07/2024 06:00
1h
Pas de veille

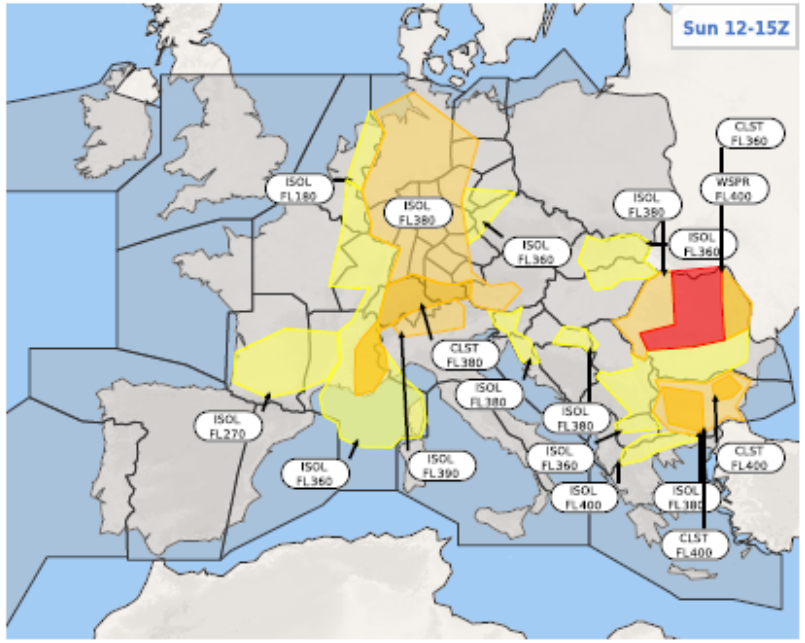
D-1 Cross Border Convection Forecast
issued 20/07/2024 07:00 UTC, valid 21/07/2024

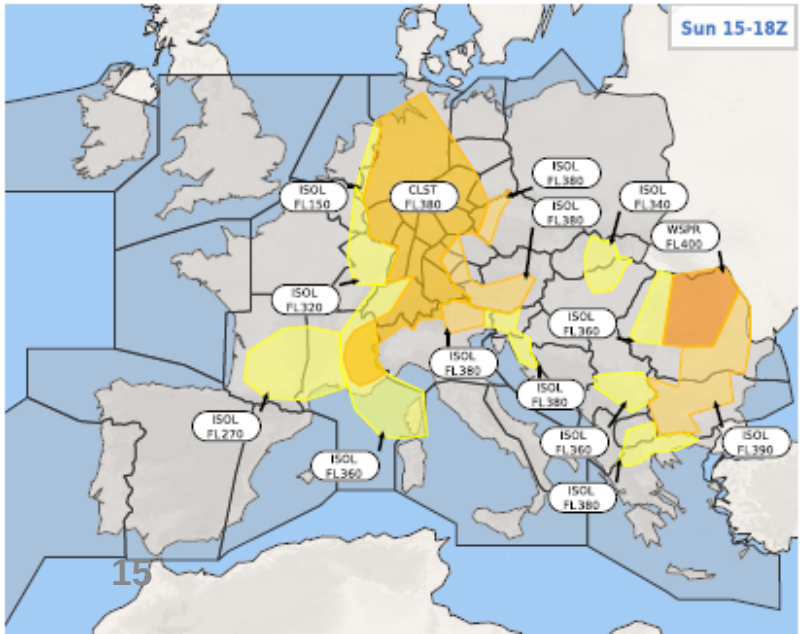
EUMETNET

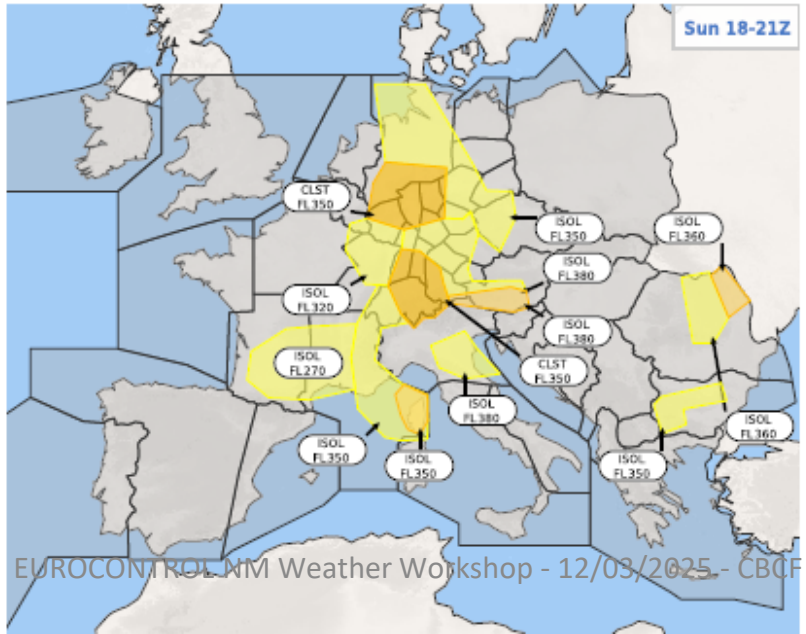
Coordinated by:
United Kingdom











Convection over W & Central Europe, at first mainly ISOL with CLST confined to French/Spanish border. Later Convection over Germany intensifies and a fairly large CLST risk area will spread across large parts of Germany and the Alps.

Convection(mainly ISOL) is expected over Hungary, Italy, Slovenia and Slovakia.

In SE Europe Romania and Bulgaria have the highest risks with CLST or even WSPR possible.

Collaboratively provided by the EUMETNET Cross Border Convection Forecast participants.

For planning purposes only

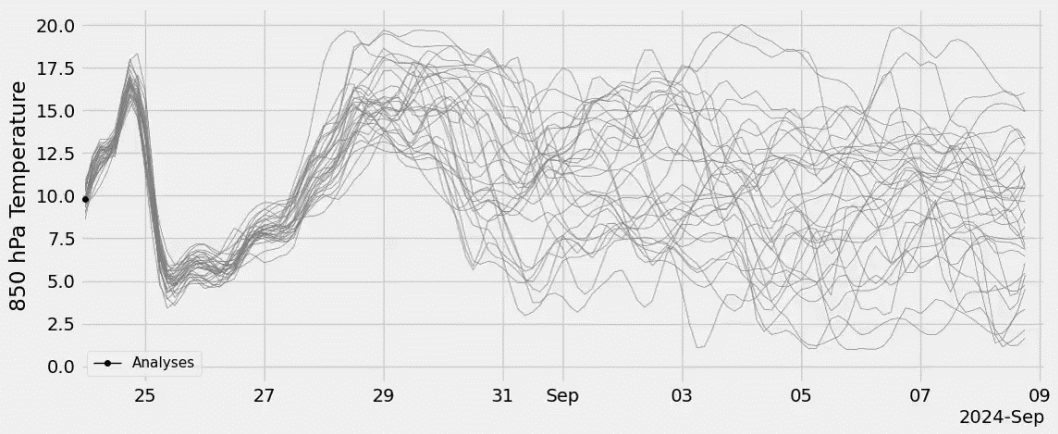
For more information contact cbcf.contact@eumetnet.eu

created at 20/07/2024 06:52 UTC

Very likely	ISOL	CLST	WSPR
Likely	ISOL	CLST	WSPR
Less likely		CLST	WSPR
CB clouds	Isolated	Clustered	Widespread

Limitations of CBCF

- Clearly aimed at network level weather awareness
- 3 hour intervals, pan-European scope and infrequent updates limit granularity
- Timing horizon up to T+38h!



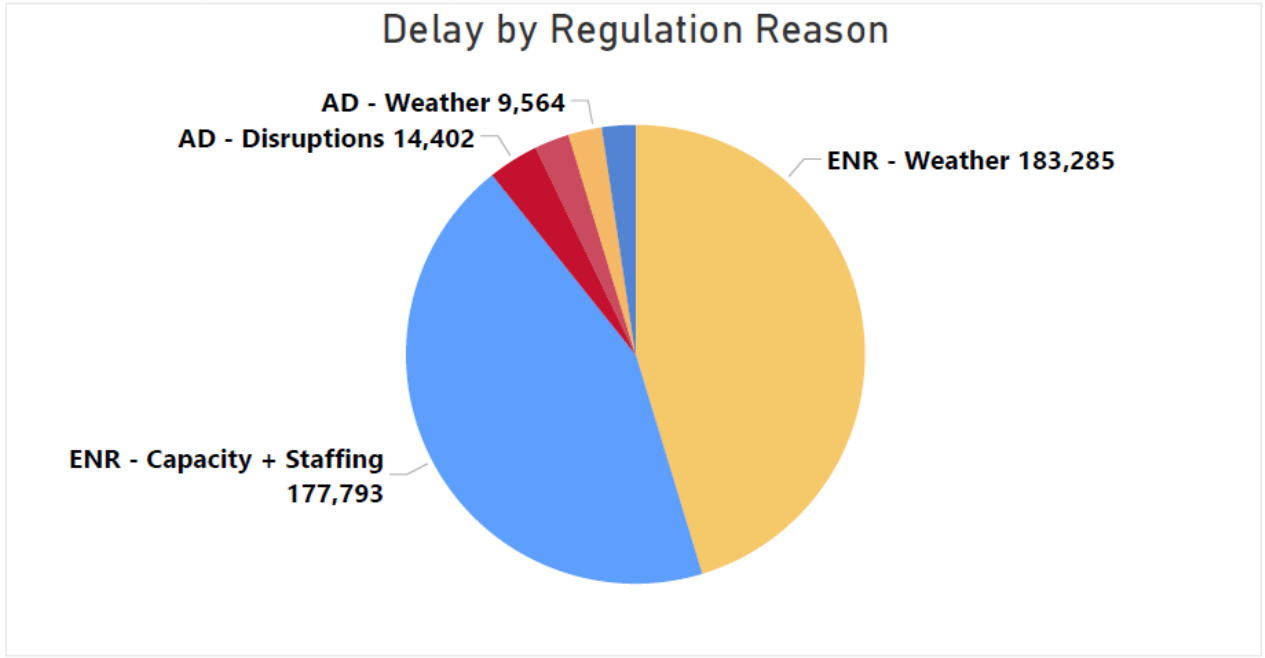
Source: Guido Cioni

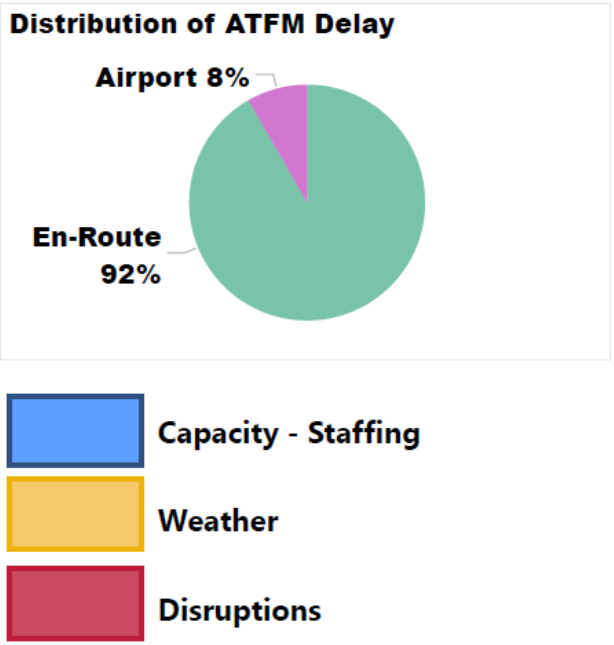
→ CBCF is regarded as initiator for more in-depth review and discussion about potential weather impact

Why 21st July?

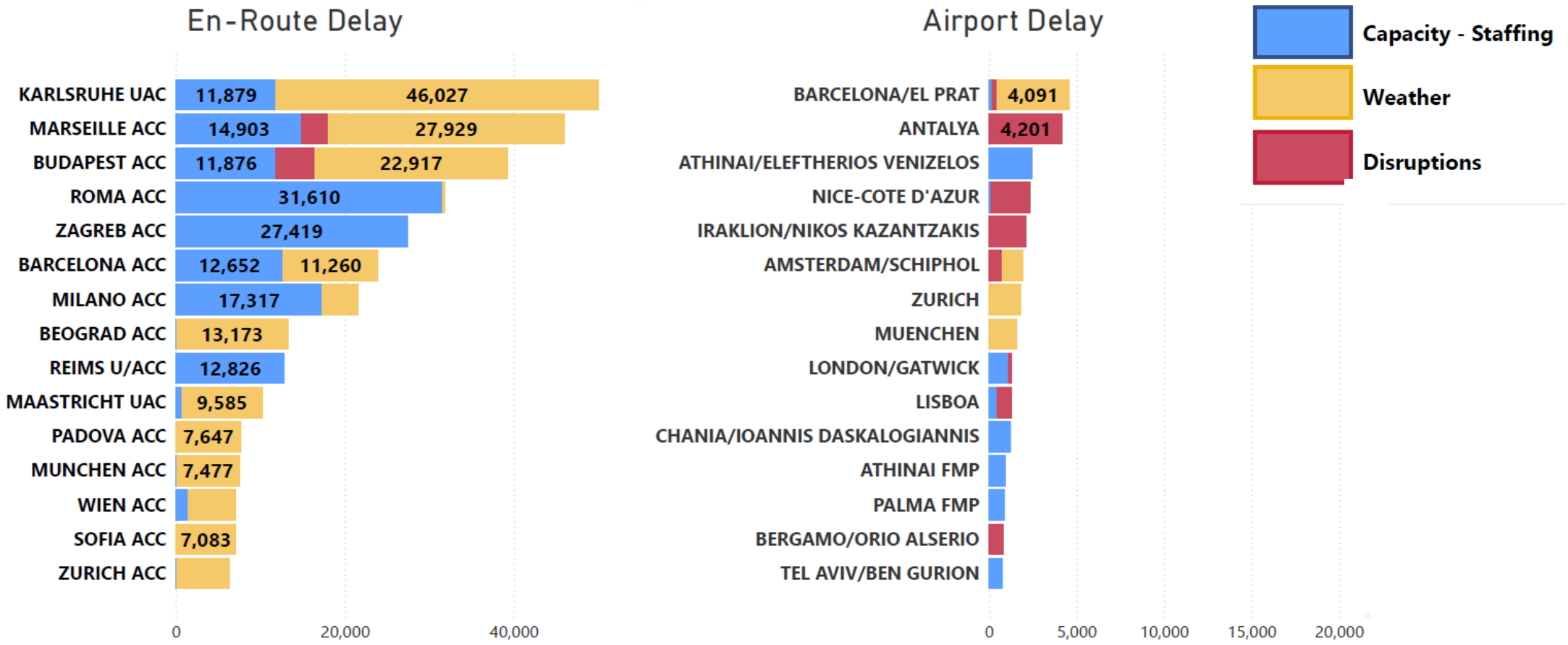
Traffic	% of Previous Year Traffic	WoW Traffic Difference	WoW % Change	Total Diversions	Delayed Traffic
33,417 Last. year: 32,443 (+974)	103.0%	-708	-2.1%	60	13,063

Total Delay [min]	En-Route Delay [min]	Airport Delay [min]	ATFM Delay per Flight [min/flt]	Delay per delayed flight	Weather Delay [min]
404,467	371,023	33,444	12.28	34.78	192,849





Both South-East and South-West Axes Impacted



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Weather Delay

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All ATFM Delay

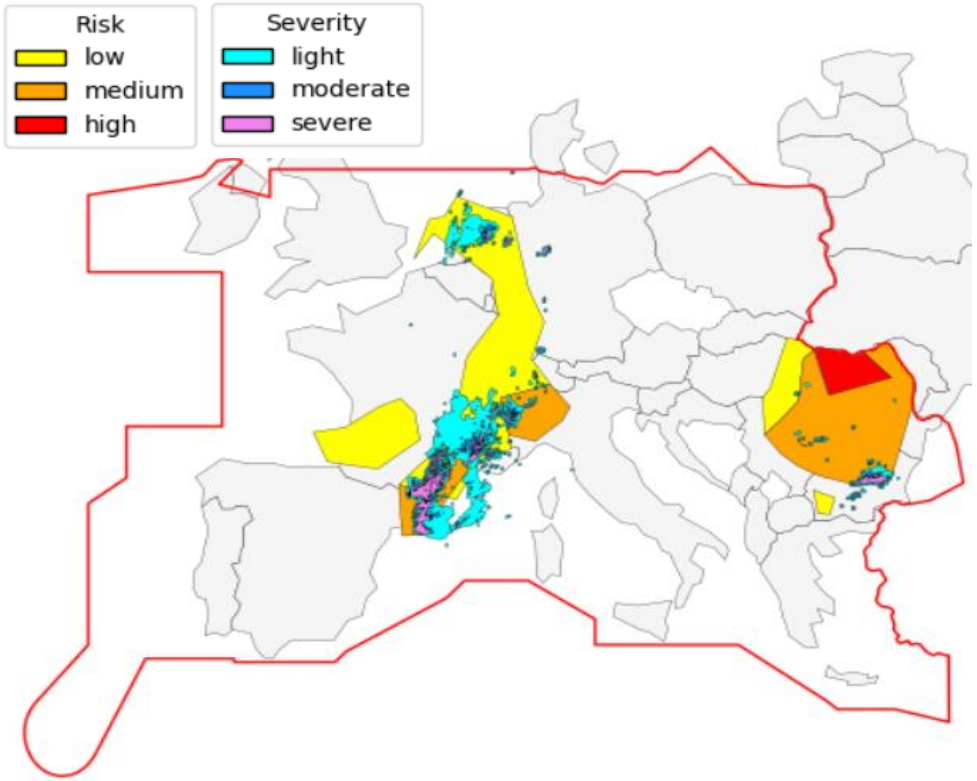
Non-Operated Schedules, Cancellations

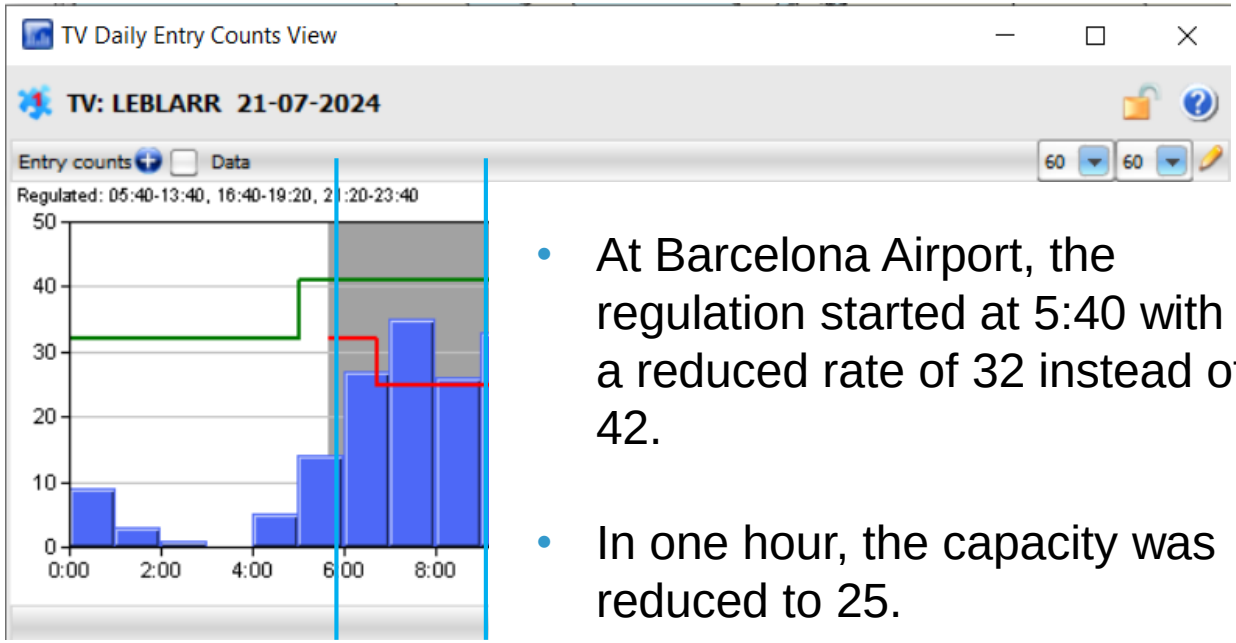
- Impacting more than 500 flights
  - Several flights were caught in the curfew hours
  - Lots of cancellations

Pre-tactical Planning Discussion

06:00-09:00

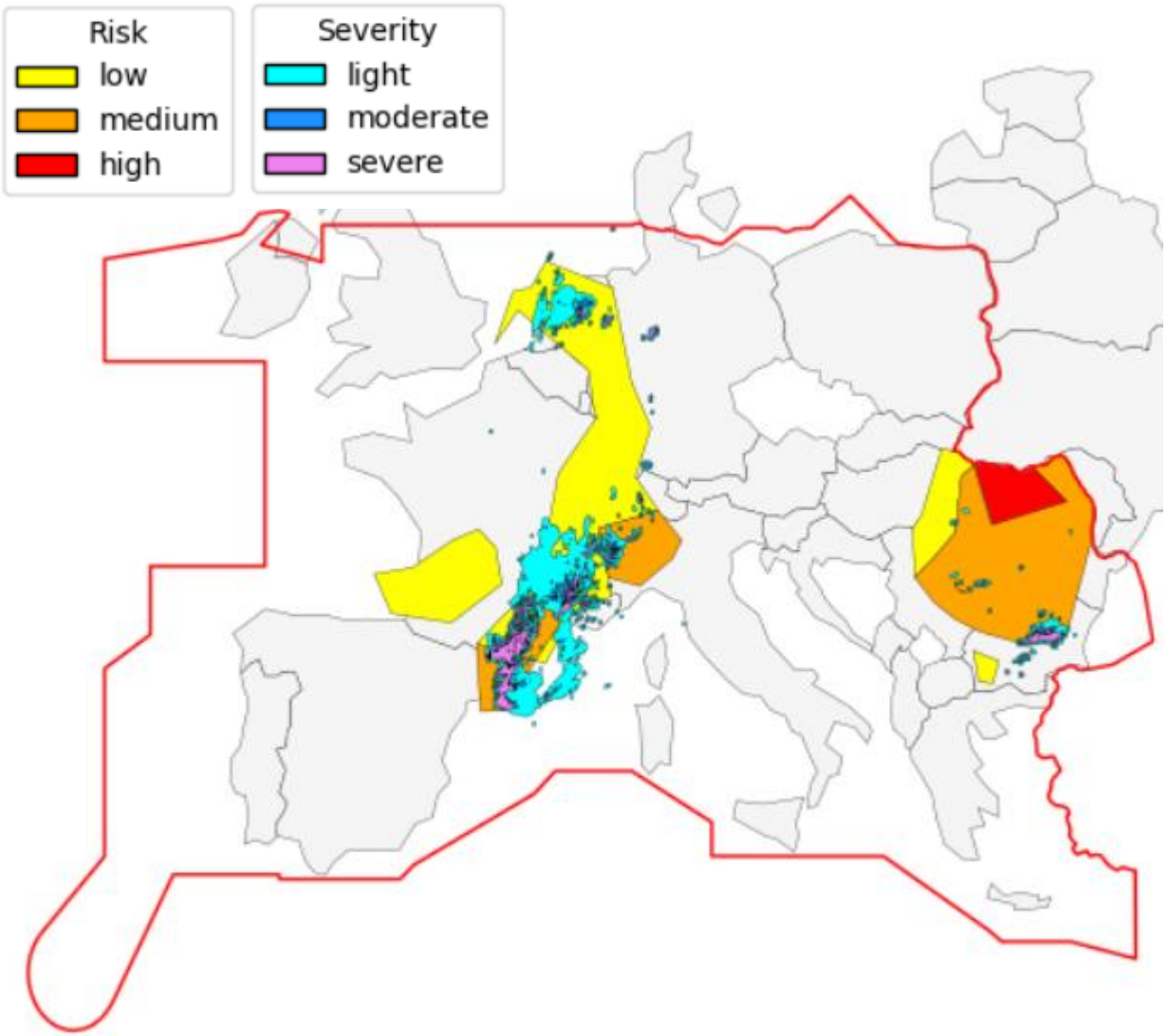
- Precautionary regulations were applied in the SE Axis without capacity reduction which led to low delays.
- The main effect of weather was on Barcelona ACC and airport.



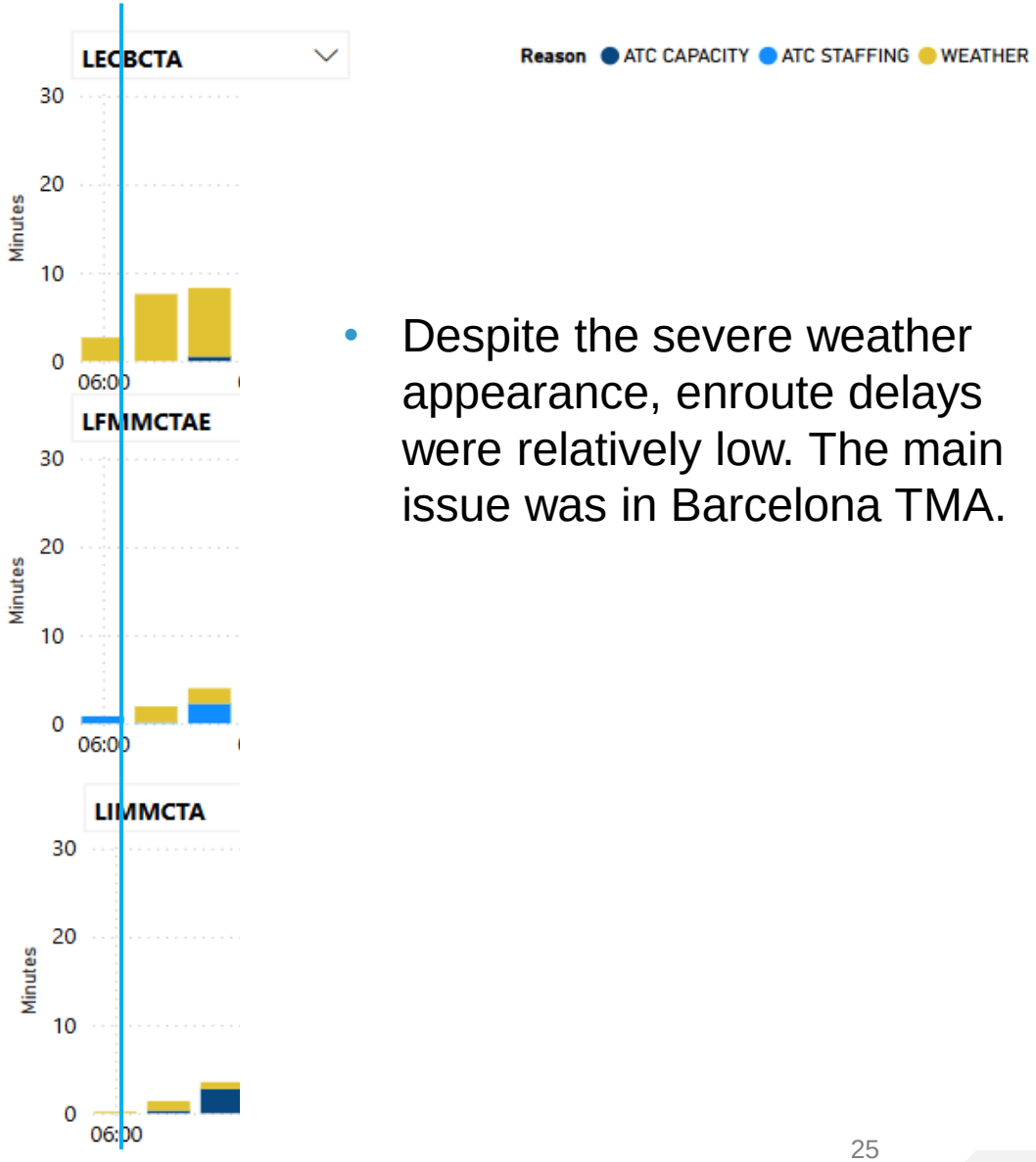


- At Barcelona Airport, the regulation started at 5:40 with a reduced rate of 32 instead of 42.
- In one hour, the capacity was reduced to 25.

6:00-9:00

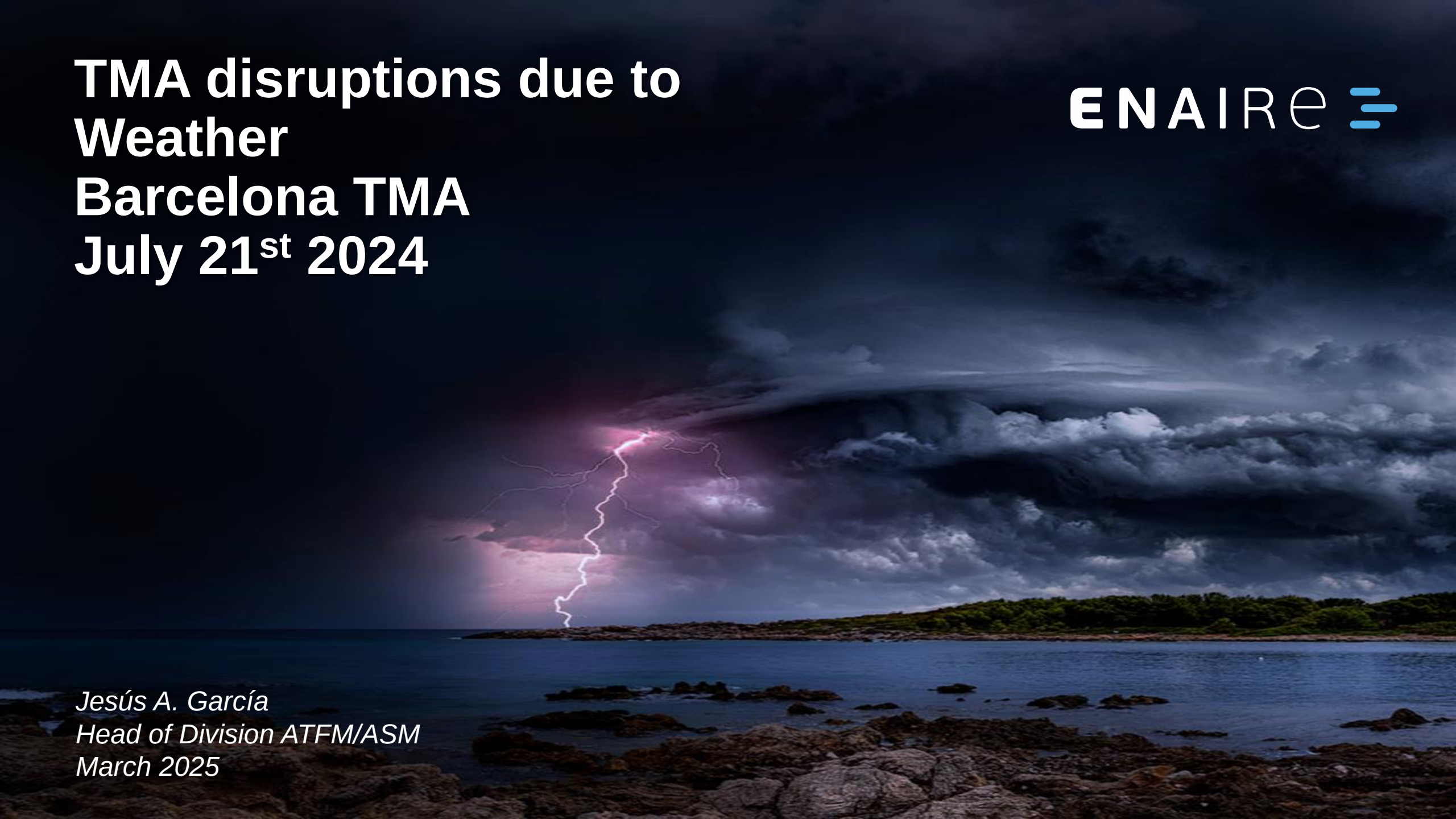


Hourly Delay Per Flight



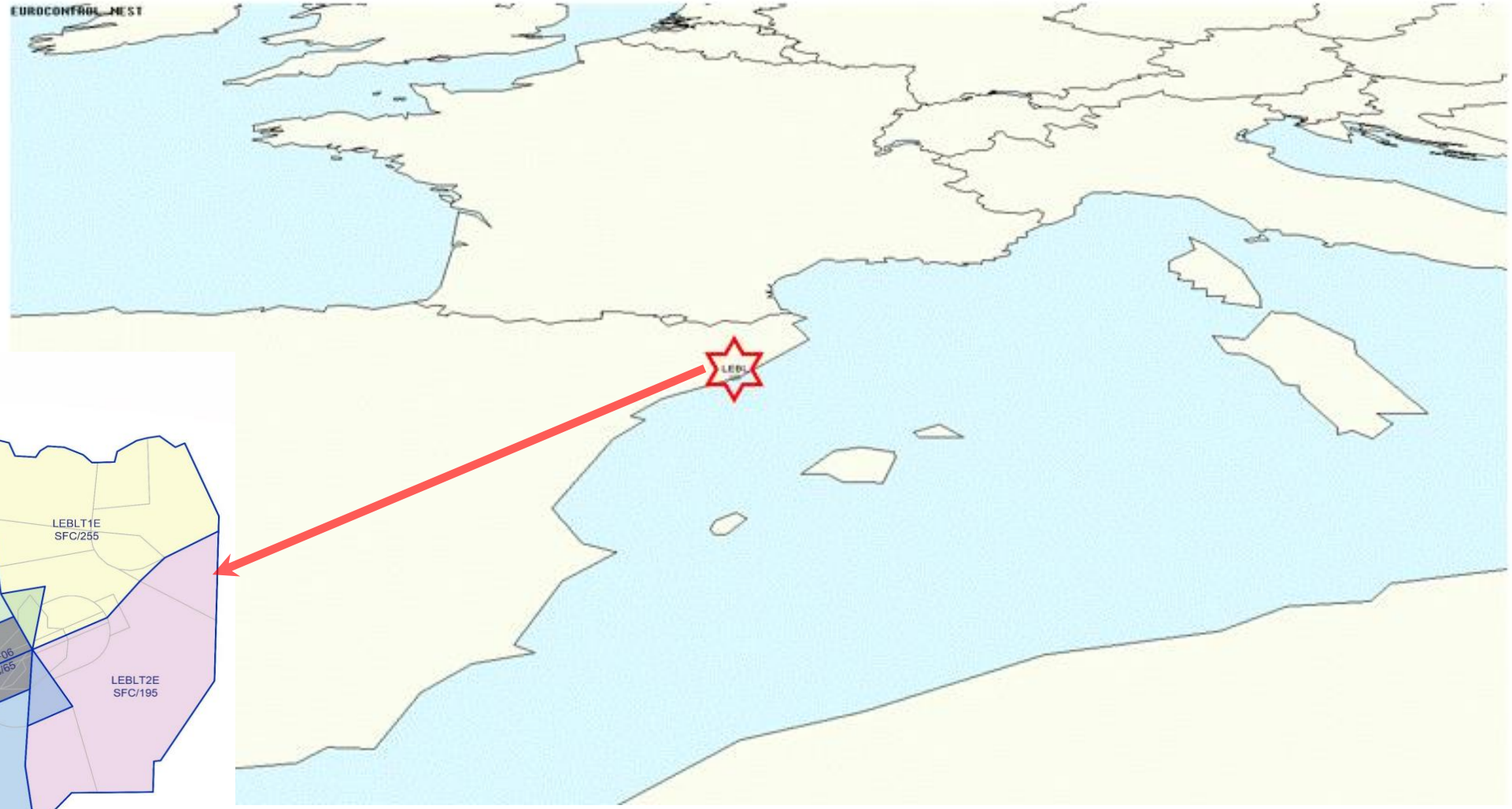
- Despite the severe weather appearance, enroute delays were relatively low. The main issue was in Barcelona TMA.

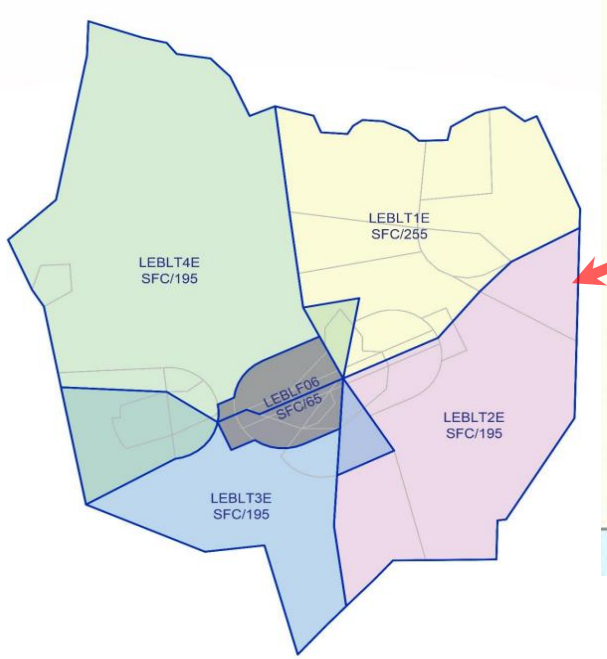
TMA disruptions due to Weather
Barcelona TMA
July 21st 2024



Jesús A. García
Head of Division ATFM/ASM
March 2025

BARCELONA TMA SECTORIZATION – CONFIGURATION “E”





TMA vs En Route: COMPARISON

- ✓ **Confined space:** relatively small (20-50 NM rad.), 1.500-15.000 ft vs FL200 – FL600, less flexibility for deviations and strategic adjustments.
- ✓ **High traffic density,** limited maneuvering space: terrain proximity, obstacles.
- ✓ **Dynamic environment:** frequent changes in heading, speed & altitude: less predictable trajectories and less stable traffic flow.
- ✓ **Complex operations:** traffic in evolution, managed through radar vectors.
- ✓ **Highly sensitive to bad weather:** local weather phenomena less predictable and manageable than large-scale, with more inmediate operational impact. Changes in weather conditions can disrupt operations rapidly

MAIN OPERATIONAL EFFECTS IN TMA

- **Runway changes** increase in number (wind intensity and variation).
- **Diversions** to alternate aerodromes.
- High probability of activating **massive diversion procedures** affecting already congested airports.
- Significant increase in **missed approaches.**
- **Flight paths very different** from the standard.
- **Inability to perform standard published holds** (due to thunderstorm activity and turbulence).
- Emergencies – **Fuel shortages.**
- Significant **increase in workload** and **frequency saturation**.
- **Reduction of available capacity**: limited splitting options, runway changes.
- Potential **Safety** risks.

METEOROLOGIST & FLOW CONTROLLER REPORT. July 20th

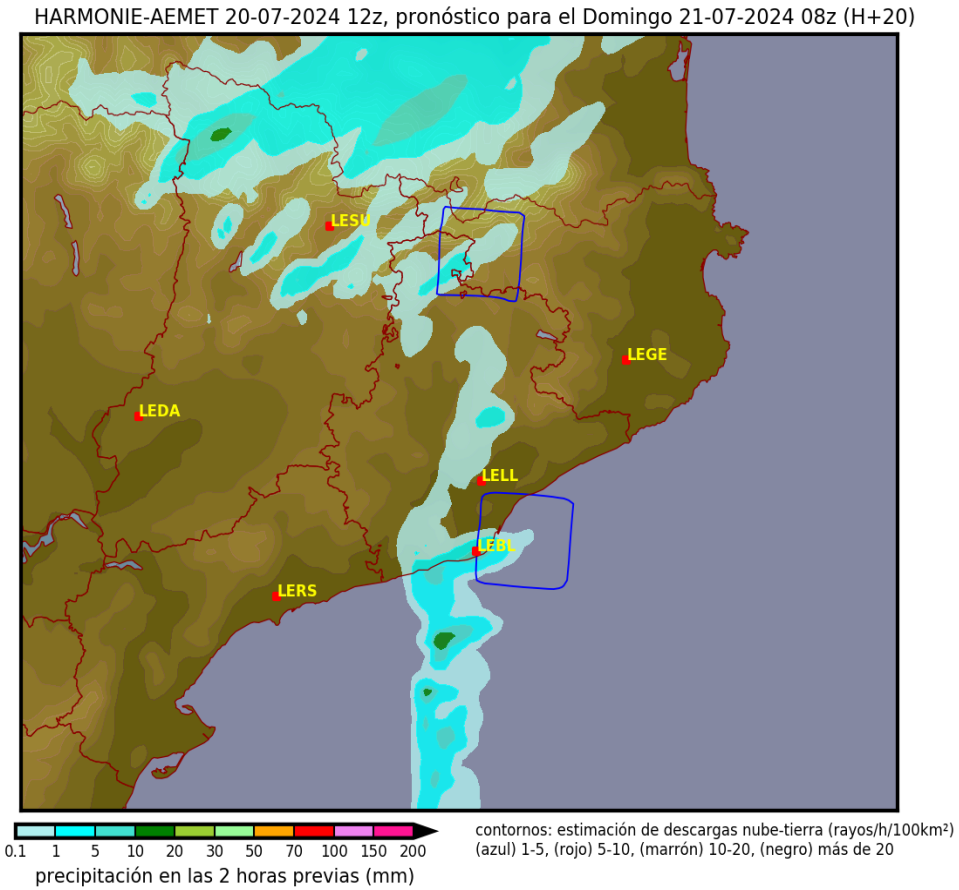
- **21:40:** *"Bad weather expected tomorrow. Considering regulating LEBLARR from 05:40-08:00 at rate 28/60."*

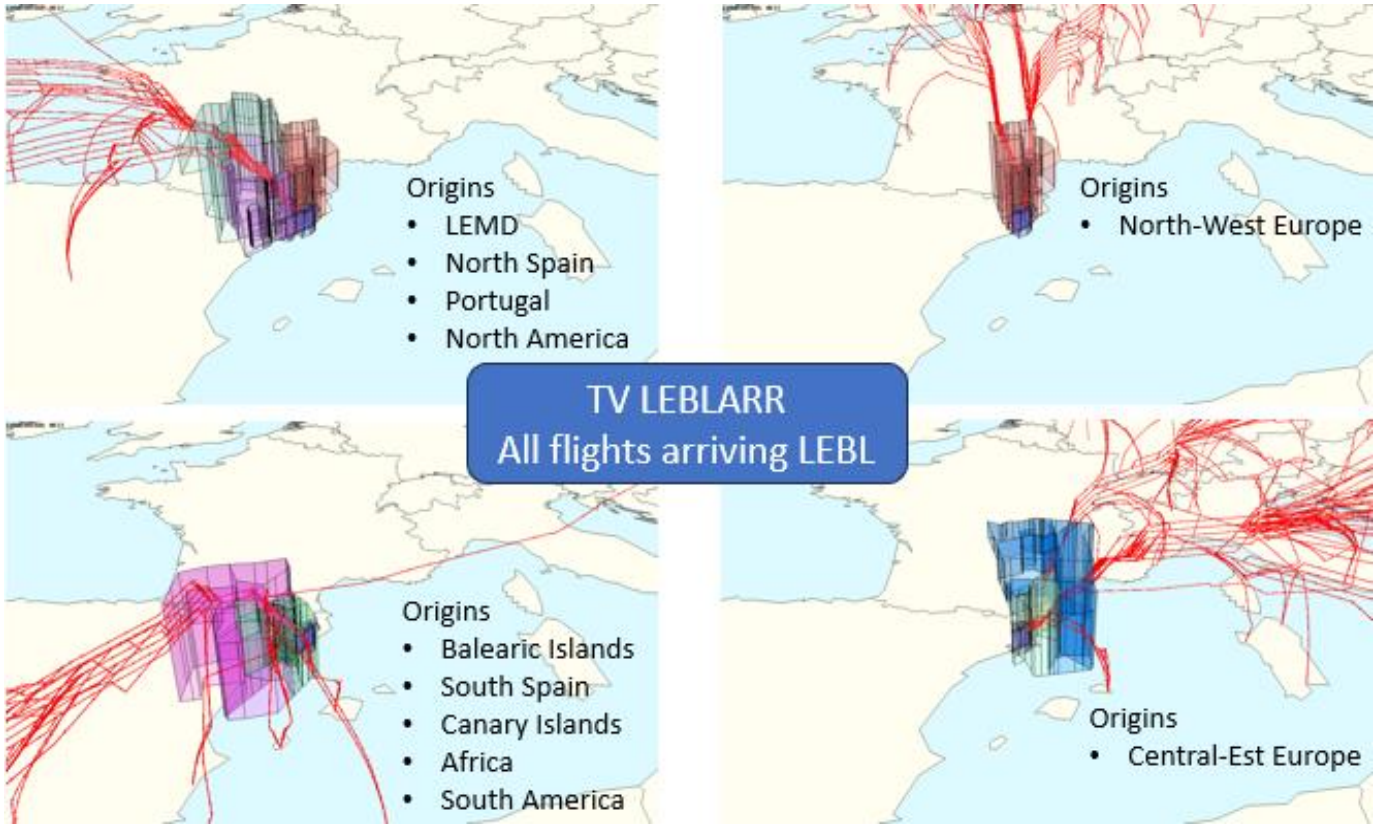
Key idea: Proactivity & pre-tactical planning

✓ Minimize reactive decision-making on the day D.

✓ Regulation applied to TV LEBL ARR.

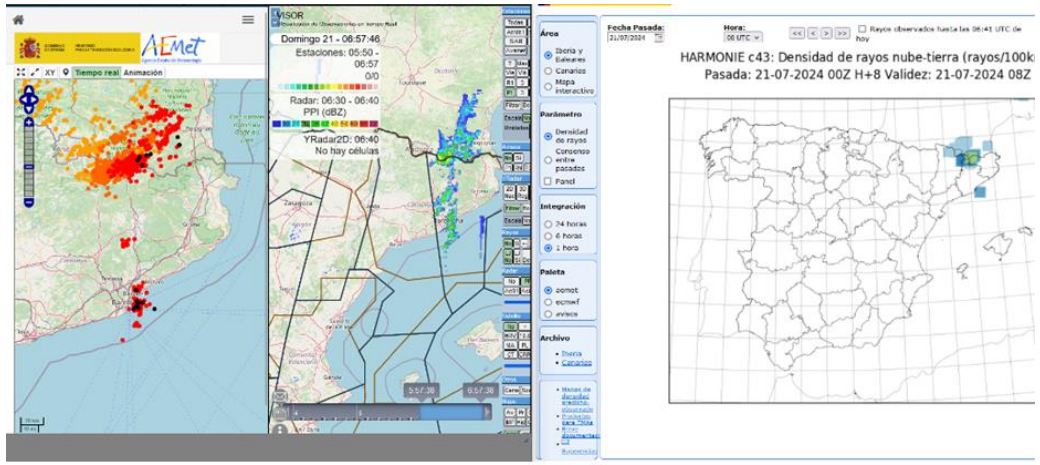
✓ Set at 28/60 ARR (standard: -40% (25).





METEOROLOGIST & FLOW CONTROLLER REPORT. July 21st

- 05:05: *"TS expected near LEBL starting 07-08Z"*
- **05:10:** *"**Increase regulation rate for LEBLARR to 32/60 until 07:00** and **extend it until 09:00.**"*
- **06:05:** "**T1E with over-demand at 08:40**. Given the weather forecast, **it is regulated (rate 33).**"



- **06:30:** *"**Weather expected to deteriorate in the coming hours (**tailwind conditions, SHRA or TS and clouds affecting DEP". "TWR requests **6NM delivery spacing** to protect MAP (DEP diverted immediately after takeoff. **LEBLARR rate lowered (25)**."*

Regulaciones durante el servicio						
Las regulaciones deben monitorizarse de forma constante y, al menos, cada hora registrar en observaciones si se realiza alguna acción o no es necesario.						
Hora Solicitud	TV	Regulación	Rate	Hora inicio	Hora fin/cancela	Minutos demora Inicial
20-22:54	LEBLARR	LEBLA21E	28	05:40	08:00	203
05:15			32	05:40	07:00	
			28	07:00	09:00	
06:30			25	0640	11:00	
08:15			25		12:00	
				11:40	13:40	
06:15	LEBLT1E	LET1E21M	33	08:40	12:00	1210

KEY IDEA

✓ **D- Day dynamic adjustments**

On day D, the rate established in pre-tactical planning is assessed based on the updated forecast and adjusted up or down: fine tunning of the pre-áctical Regulations.

METEOROLOGIST & FLOW CONTROLLER REPORT. July 21st

- **07:45:** "TS in LEBL will persist until 11Z, moving eastward but at a very slow pace. "

  "LEBLARR regulation until 11:00 to gradually **increase the rate as conditions improve**".
- **08:20:** "LEBLARR Regulation **extended until 12:00 as the forecast does not improve as initially expected**."
- **09:00:** "**Tactical balancing ARR** through T2E."
- **09:32:** "**Increase the LEBLARR rate** to full capacity starting from 11:40"
- …
- **14:07:** "**LEBLARR regulated** from 16:40-18:00, rate 41." (**Demand shift** due to prior Wx Regulations).
- **16:18:** "LEBLARR Regulation extended (overload)."

KEY IDEAS

✓ **Close monitoring of the weather and operational context.**

✓ **Dynamic ATFCM measures**

to adapt to short-term forecasts, weather evolution and demand shift, minimizing delay impact: Regulations adjustments, Demand – Capacity Balance, Flight Exclusions.

14:07 16:18	LEBLARR	LEBLA21A	41	16:40	18:00 19:20	22 326

SUMMARY: KEY POINTS FOR THE MANAGEMENT OF SEVERE WEATHER

- ✓ **Proactivity** and **pre-tactical planning**.
- ✓ **Proactive adoption of ATFM measures:** minimize reactivity .
- ✓ **Dynamic management of ATFM measures**: fine tunning.
- ✓ **Safety** & **Efficiency**.
- ✓ Enhanced **real time collaboration** among stakeholders.
- ✓ **Meteorologist** & advanced forecasting tools.
- ✓ **More complex & reduced capacity scenario**.
- ✓ Airspace & ATCOs **flexibility.**

WEATHER IMPACT ON AIRPORT OPERATIONS

aena aeropuertos para ti

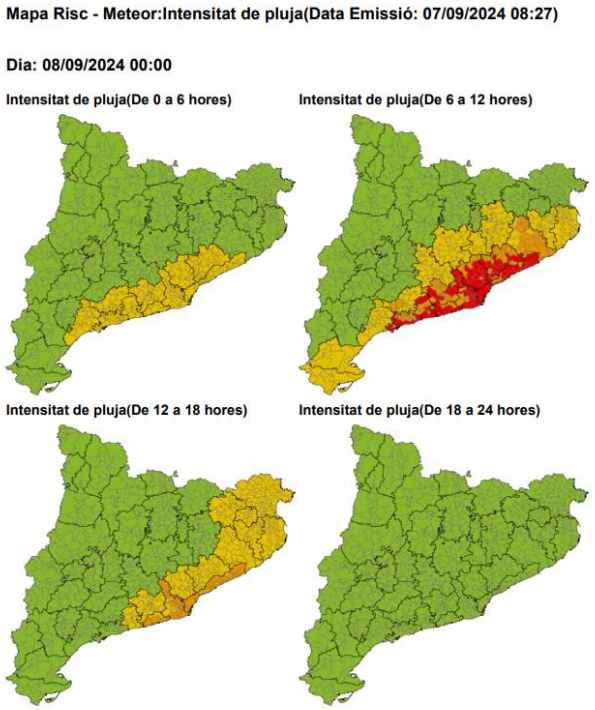
Weather impact on Airport Operations

EARLY WEATHER FORECASTING IMPORTANCE

- Helps airlines, handlers, and AIRPORT services activate **contingency plans**.

- Ensures infrastructure maintenance (drainage systems, runways, etc.).

- Improves response times to extreme weather events.



ANTICIPATION & PREPAREDNESS CAN MINIMIZE DISRUPTIONS

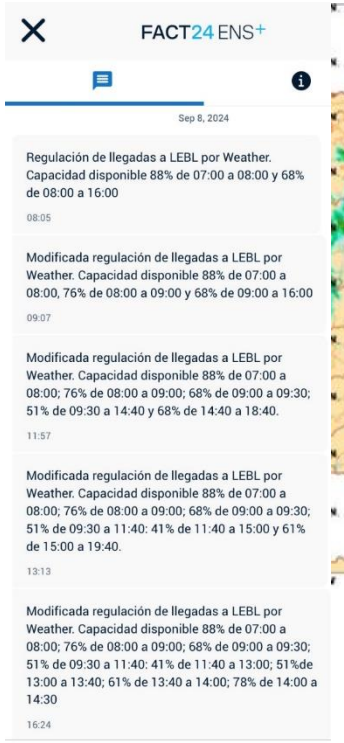
Weather impact on Airport Operations

INFORMATION SHARING & COMMUNICATION TOOLS

- *Lesson learned*: Sharing all available information in Real Time is KEY.

- *Tools used*:

  - FACT24 ENS+
  - Email to pre-activate ‘Chaotic Situation’ Committee



INFORMATION SHARING IMPROVES OPERATIONAL READINESS

Weather impact on Airport Operations

AIRPORT PROCESSES AFFECTED BY WEATHER EVENTS

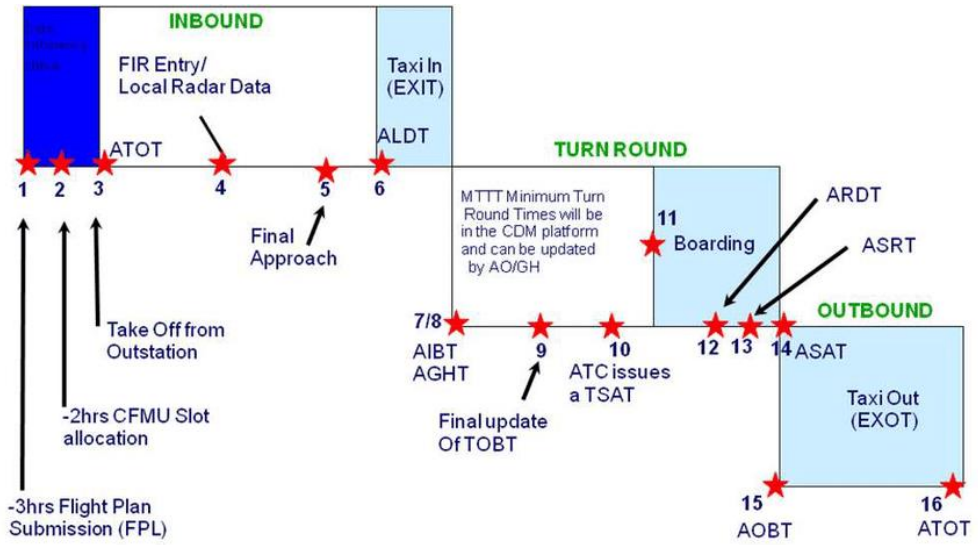
- *Check-in & security / passport control process*
- *Airport services disruption*
- *Aircraft parking availability*
- *Ground handling work challenges*
- *Cancellation passenger allocation*

WEATHER IMPACTS ALL AIRPORT OPERATIONS, REQUIRING A HOLISTIC APPROACH

Weather impact on Airport Operations

RESPONSIBLE USE OF CDM (COLLABORATIVE DECISION MAKING)

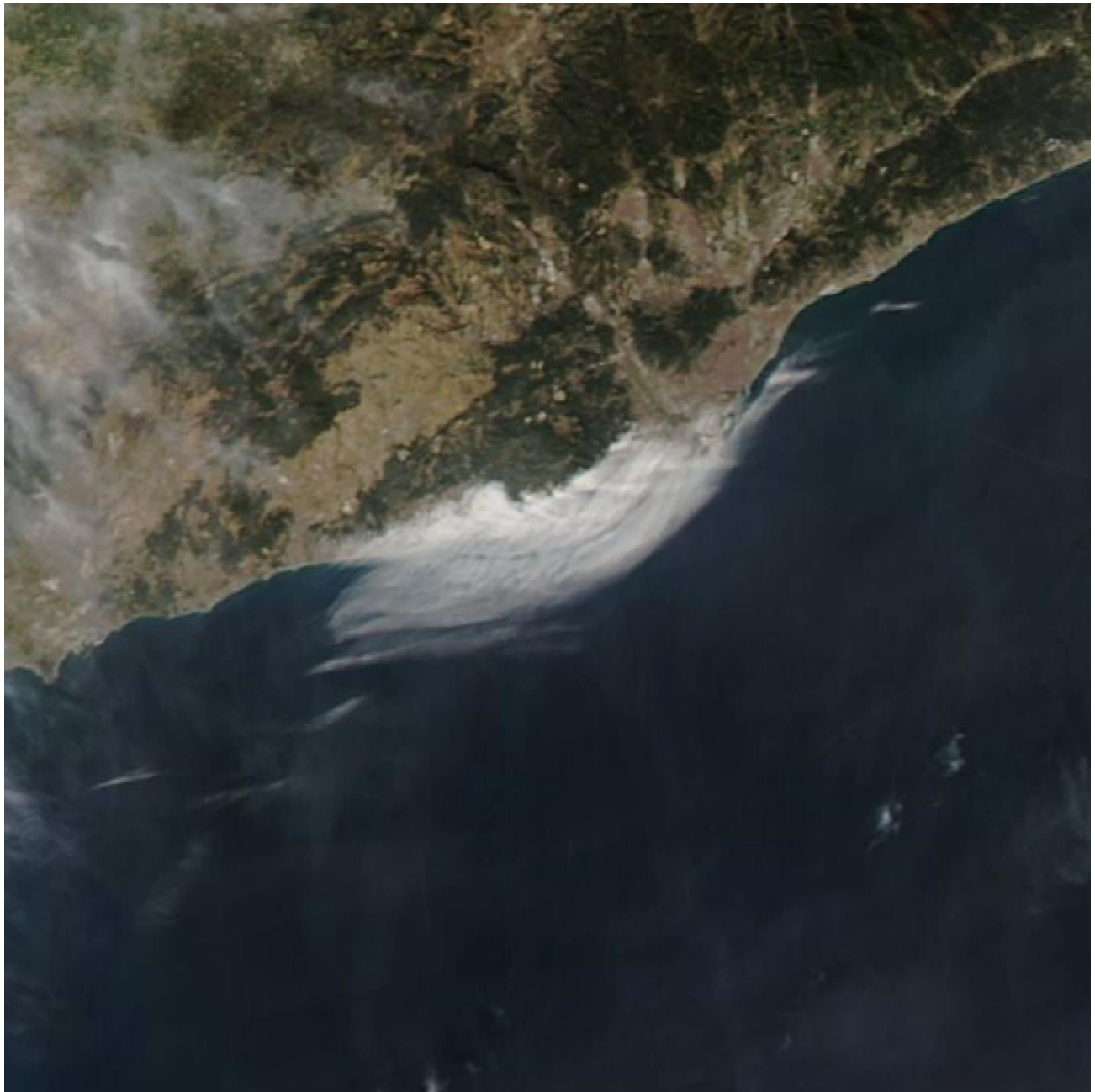
- Ensures all stakeholders update real-time information (FPL & TOBT)
- Reduces delays and improves reallocation of resources.
- Keeps airport information as updated and accurate as possible



ACCURATE DATA IN CDM LEADS TO BETTER AIRPORT MANAGEMENT AND REDUCED DELAYS

- Convective storms with towering clouds are the main weather phenomena affecting Barcelona airport in fall.
- Waterspouts and thunderstorm rains are expected.
- TWYs can be flooded.

- Average sea temperature in summer will be above 27º Celsius during the day.
- CBs and TCUs affect APP and DEP.
- STARs and SIDs can´t be flown.
- Difficult impact prediction

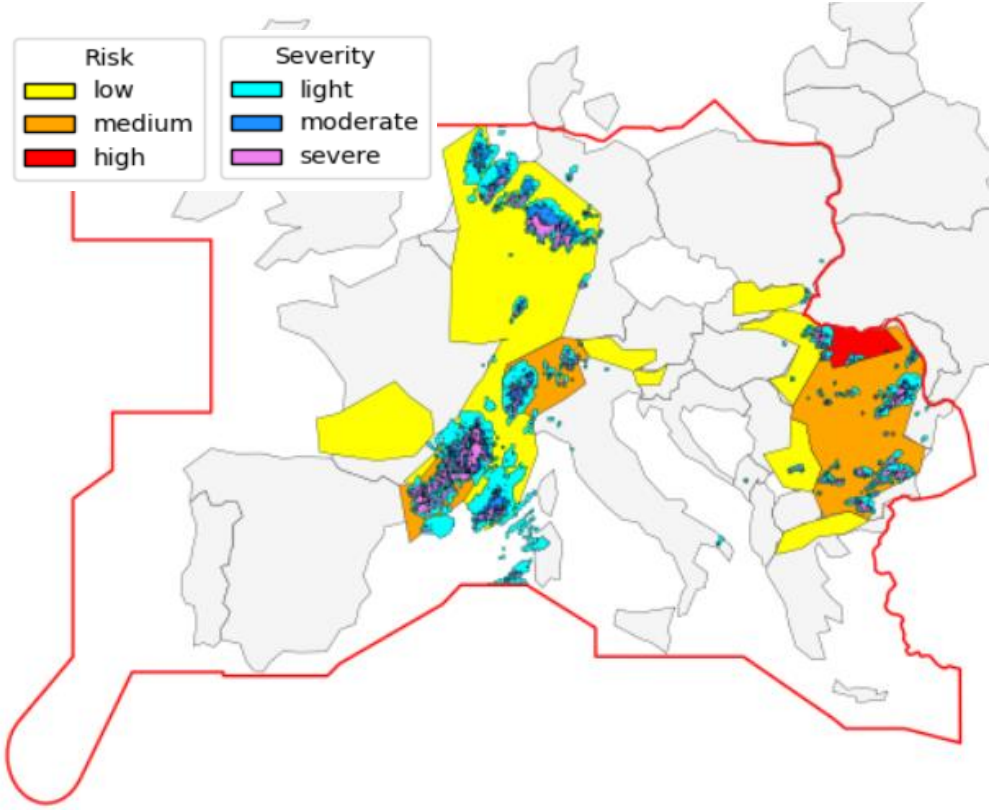


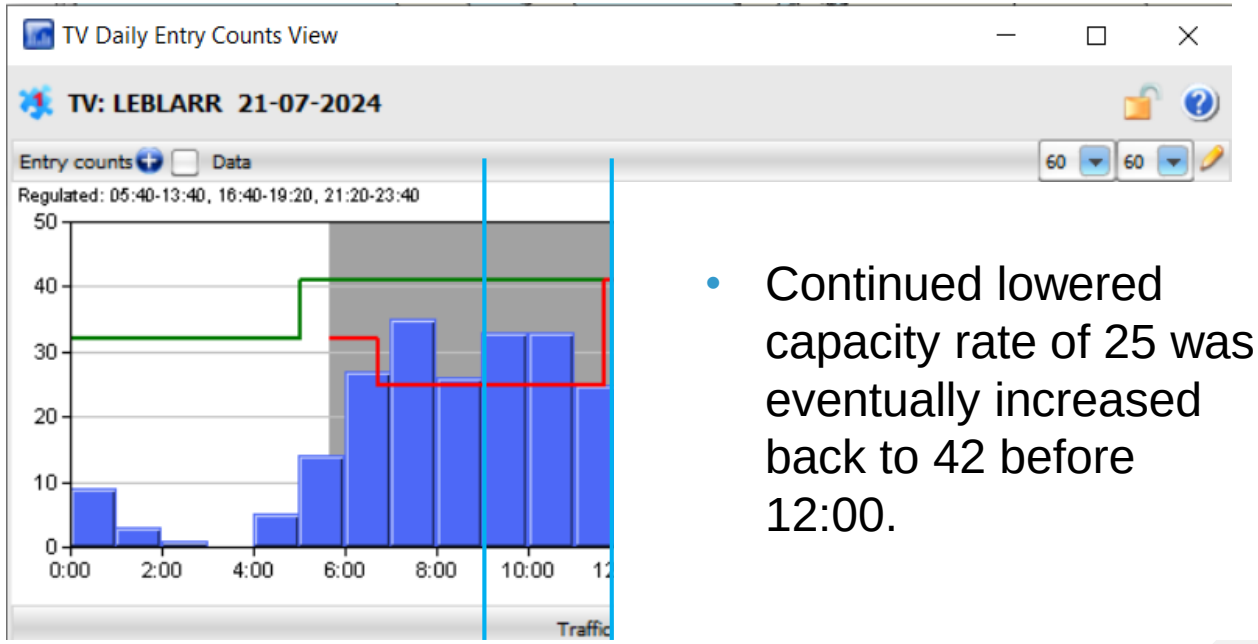
- Advection fog can be expected in Winter early morning.
- Usually affecting departure RWY 24L/06R.

Use the **QR code** or
go to **ectrlvote.eu** and
log in with **eurocontrol521**

09:00-12:00

- Increased delay in SE Axis and unplanned entries
- The main effect of weather was on Barcelona ACC and airport.

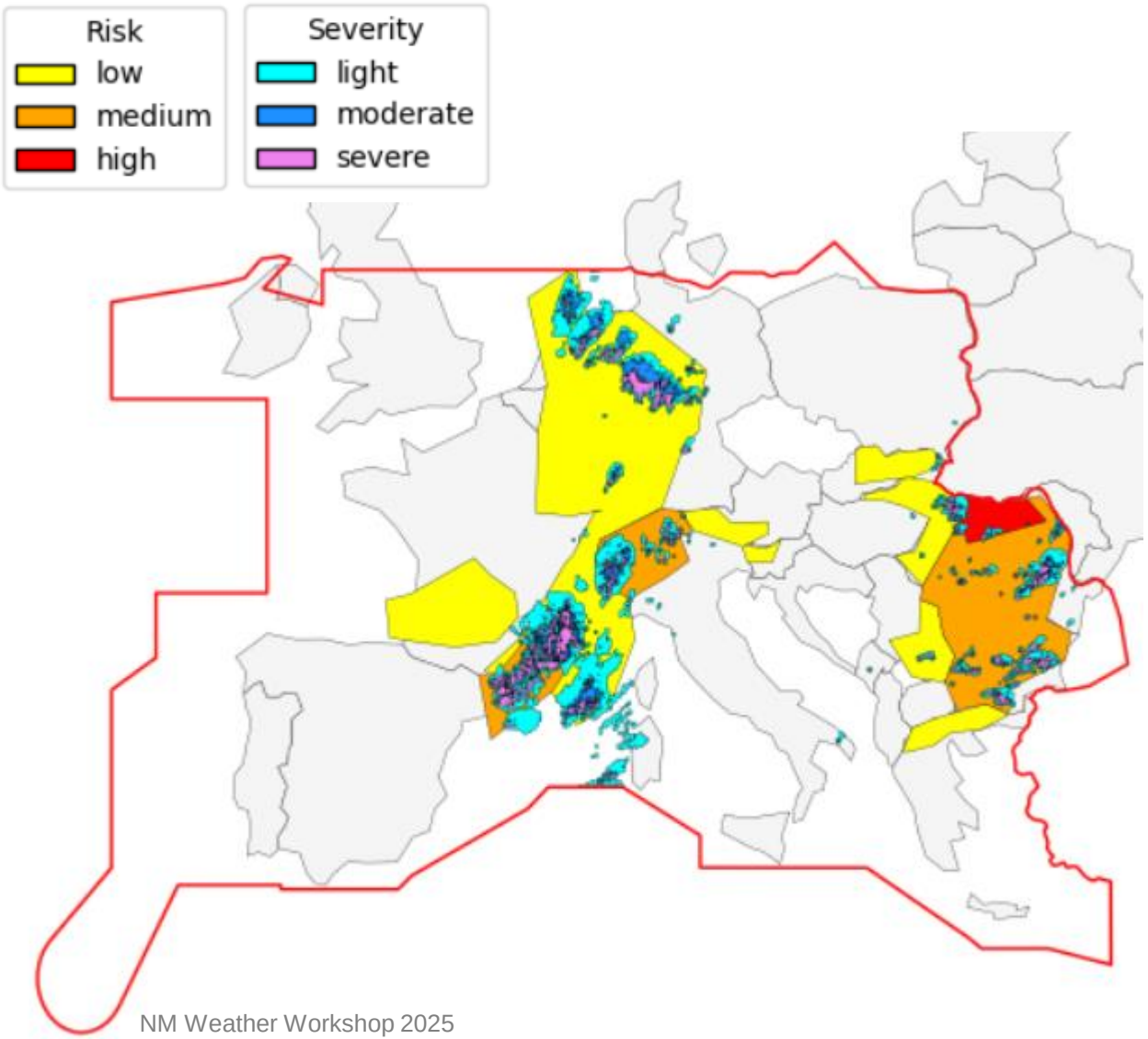




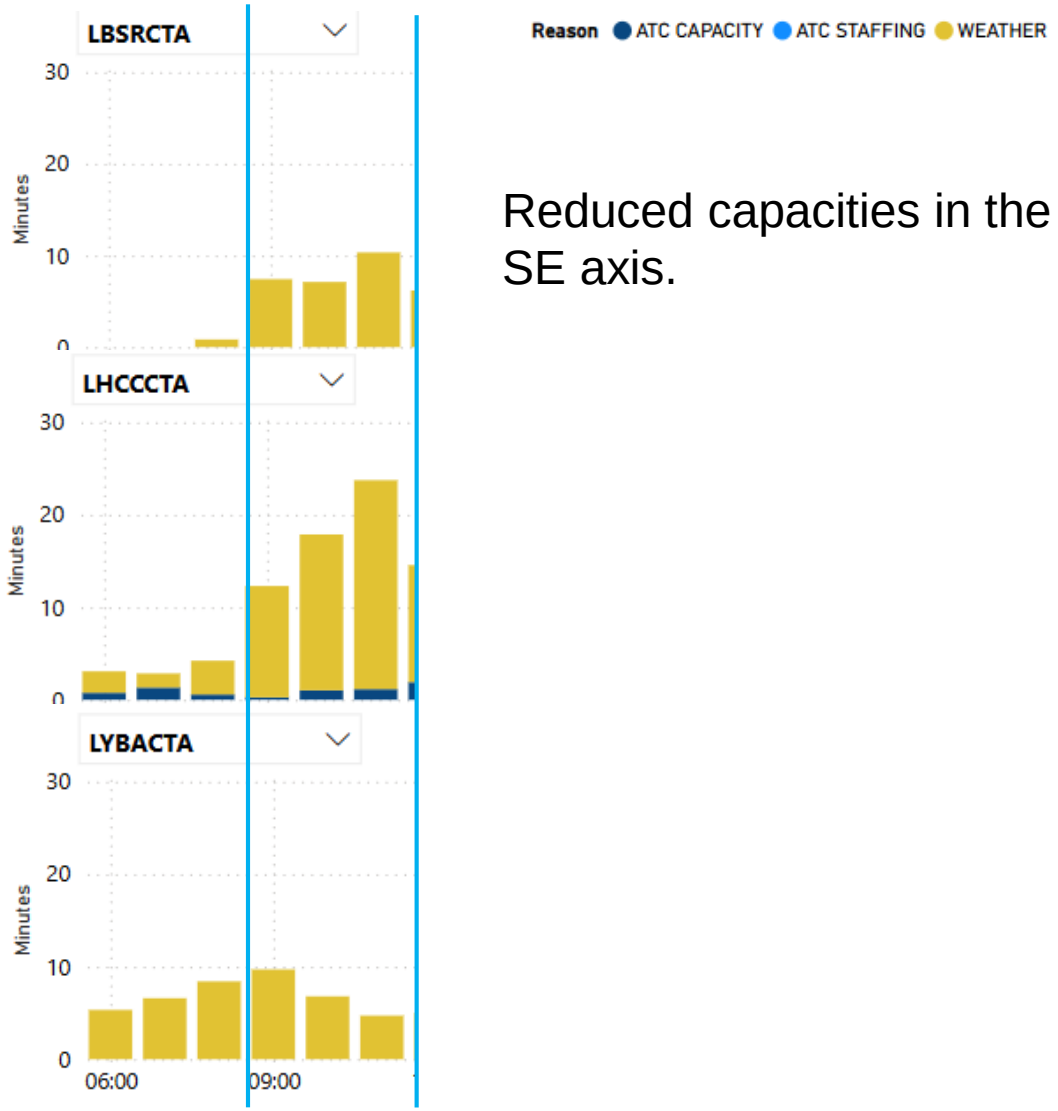
- Continued lowered capacity rate of 25 was eventually increased back to 42 before 12:00.

9:00-12:00

Reduced capacities in Serbia, Hungary

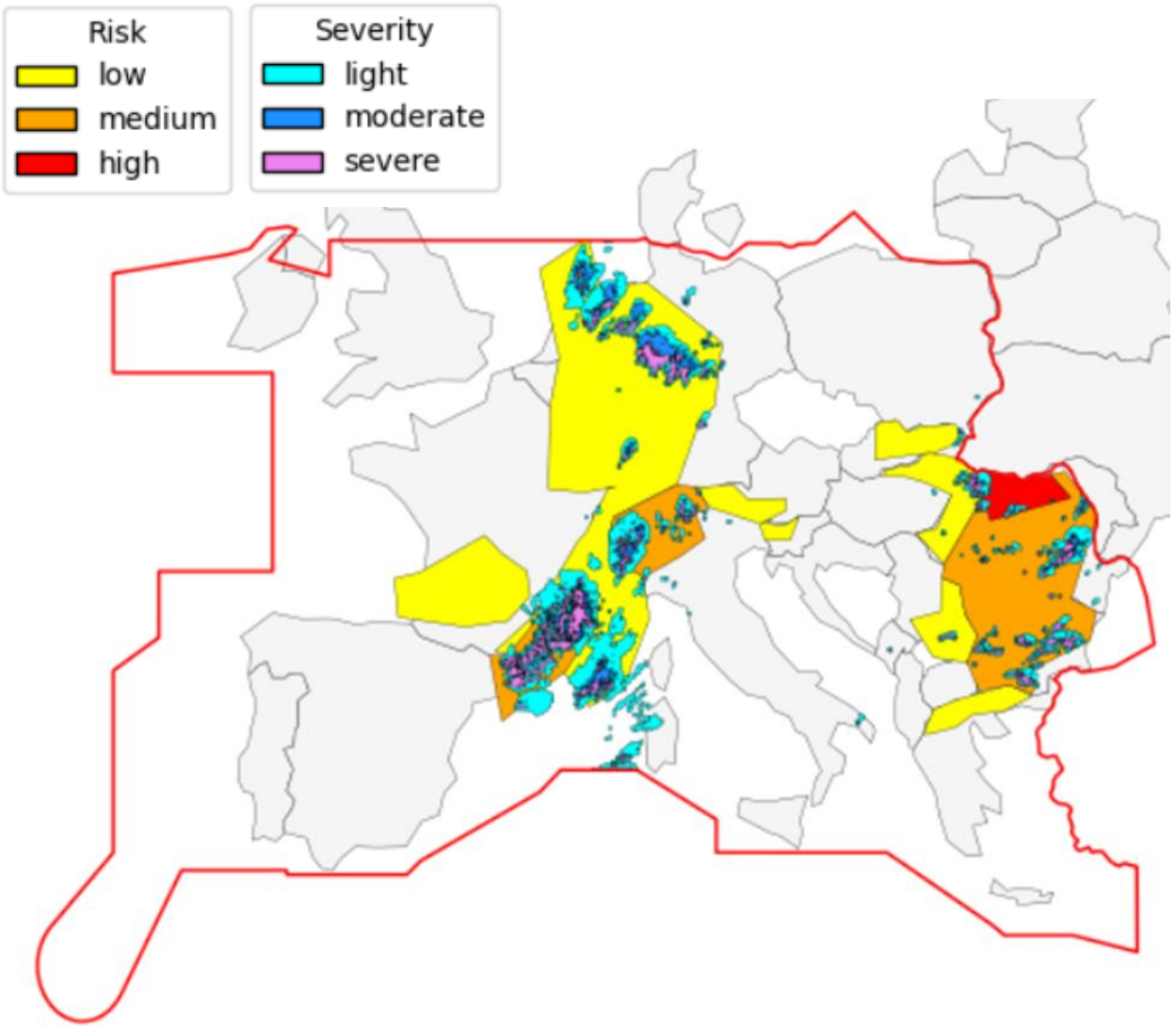


Hourly Delay Per Flight

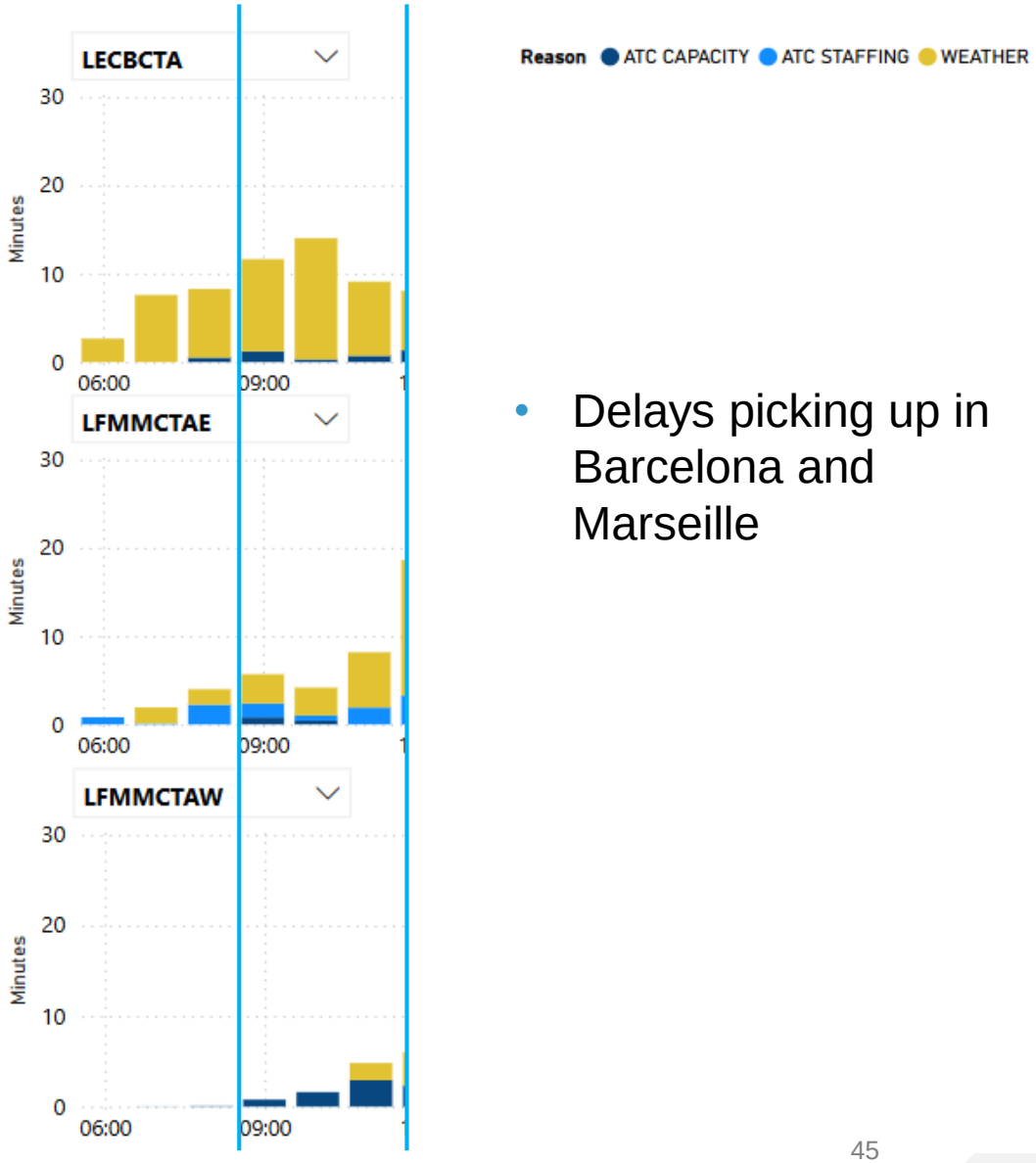


Reduced capacities in the SE axis.

9:00-12:00

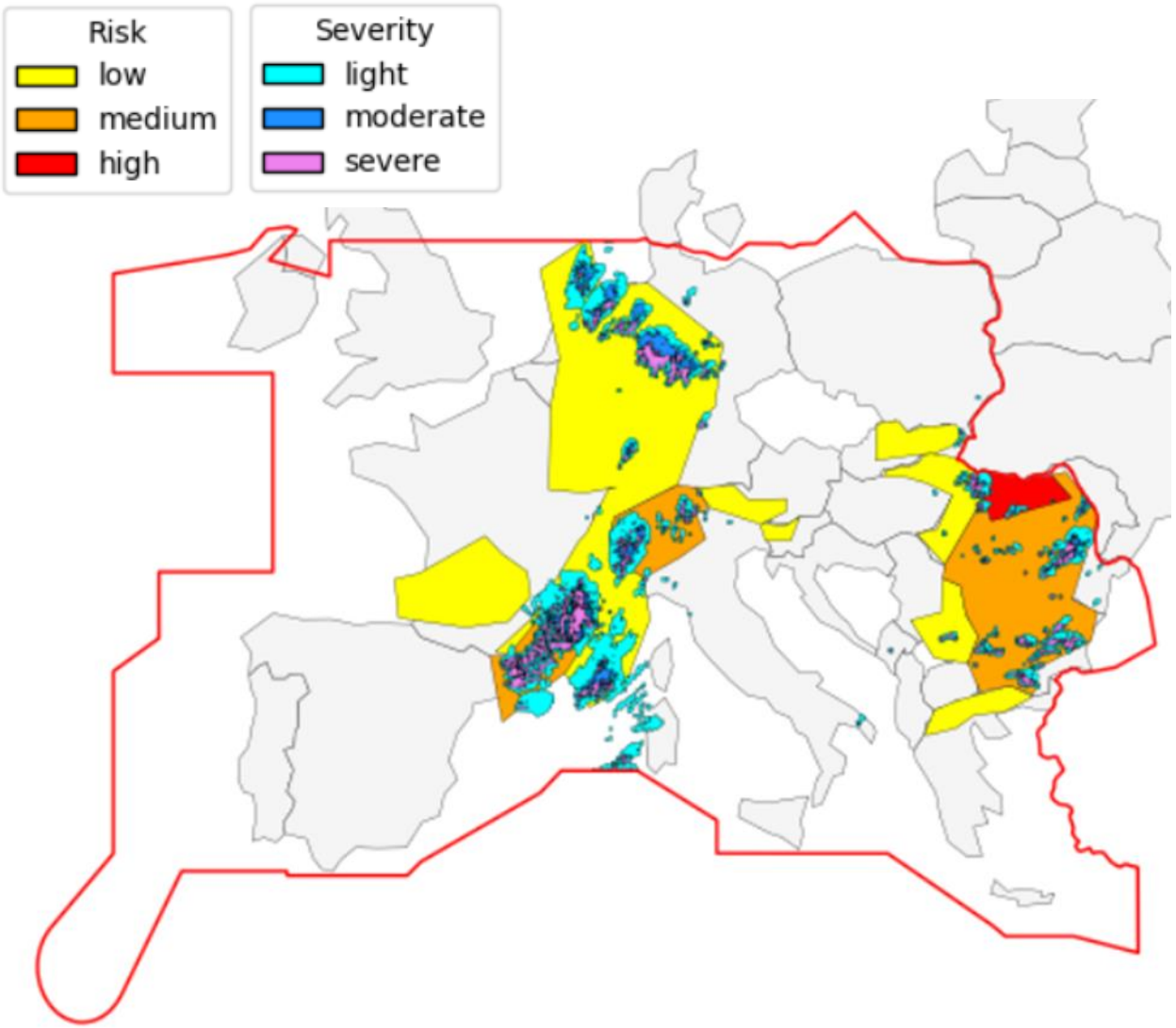


Hourly Delay Per Flight

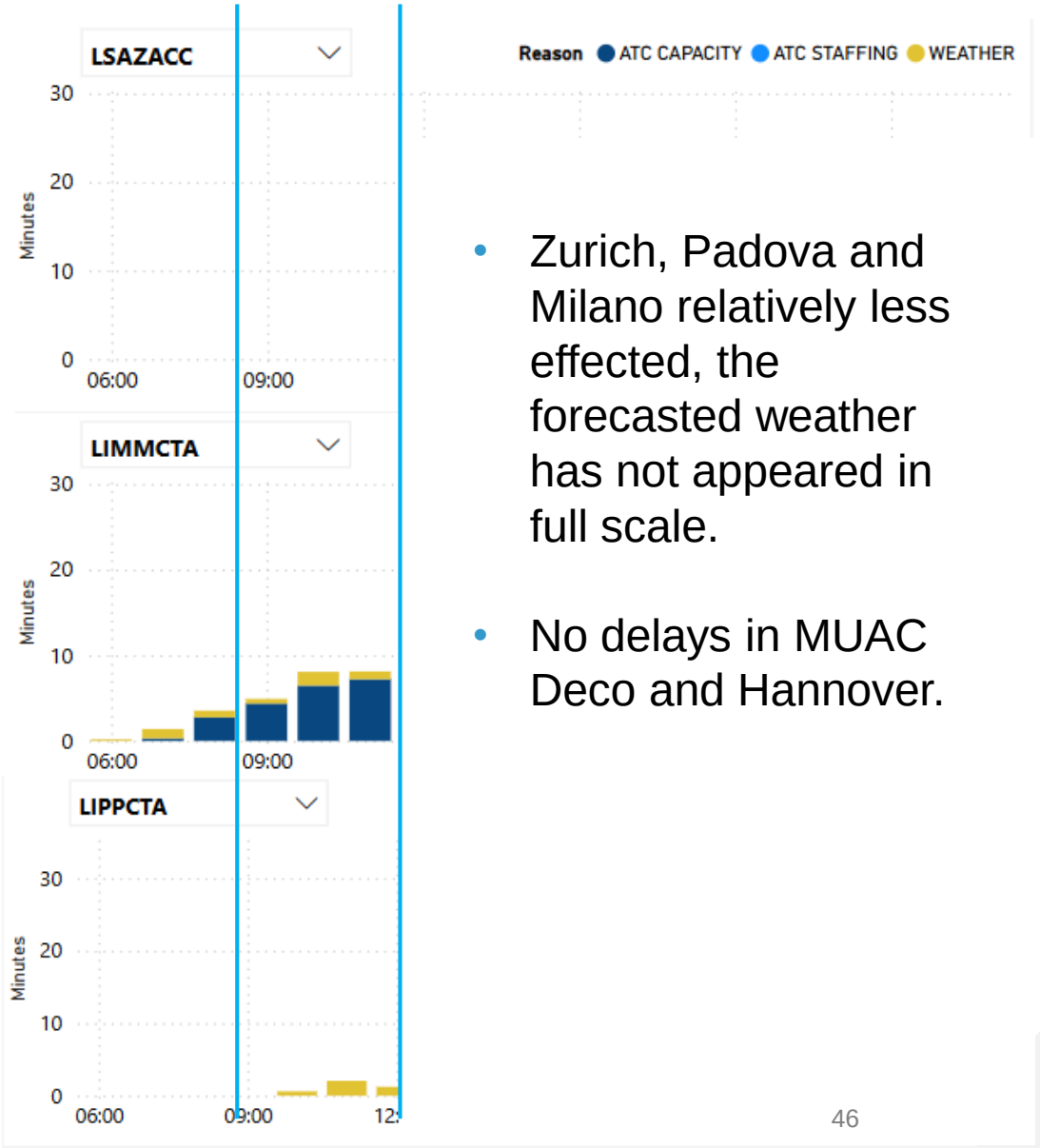


- Delays picking up in Barcelona and Marseille

9:00-12:00



Hourly Delay Per Flight



- Zurich, Padova and Milano relatively less effected, the forecasted weather has not appeared in full scale.
- No delays in MUAC Deco and Hannover.

LFMM Feedback on Weather Management

Sunday July 21st 2024

LFMM Pretactical Briefing

Sent by FMP office on Friday – for FMP Ops and Supervisors

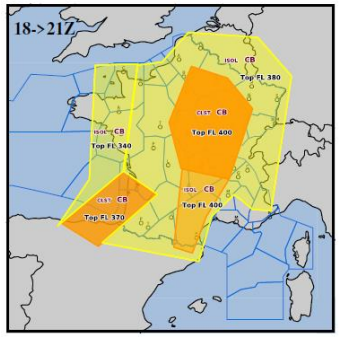
Information shared:

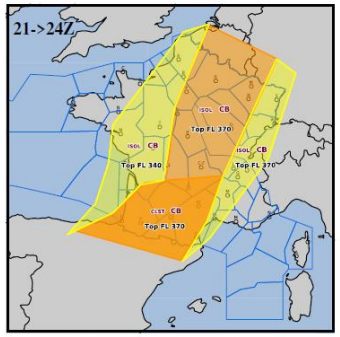
- Staffing
- Weather forecast
- Hotspots
- Military activities or special events

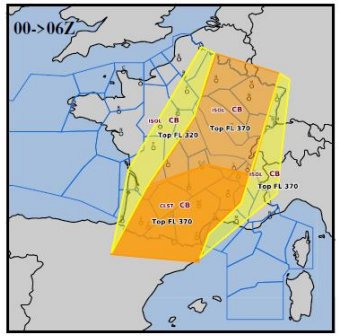
Reminders, Advises and feedback to handle trafic

Meteo France Forecast – worst than expected

Bulletin de pré-alerte orages (20/07/24 18 au lendemain 06Z)





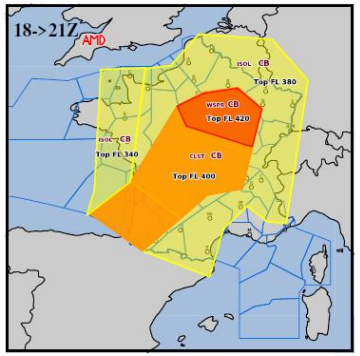


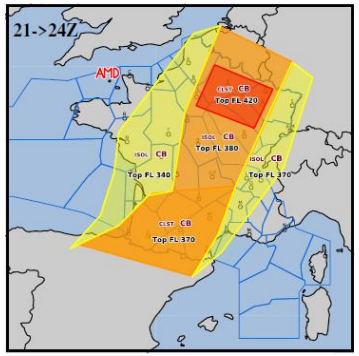
COMMENTAIRES / COMPLEMENTS

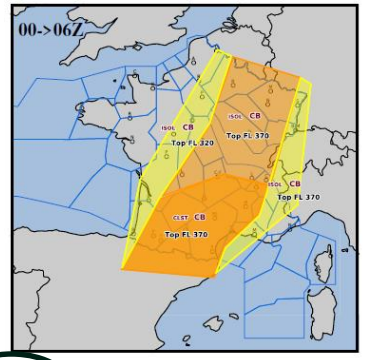
Comme prévu, l'instabilité est en train de se renforcer en cette fin d'après-midi.
L'amas orageux actuellement positionné sur le nord/nord-est du Massif Central remonte vers le nord et le nord-est ce soir (cf. CLST orange foncé).
Une autre dégradation orageuse est en train de se former sur le sud du golfe de Gascogne, et va circuler sur le Sud-Ouest ce soir et cette nuit.

Actualisé le 20/07 16h12 UTC

Bulletin de pré-alerte orages (20/07/24 18 au lendemain 06Z)







COMMENTAIRES / COMPLEMENTS

AMENDEMENT AMENDEMENT WSPR / CLST SUR NORD DU PAYS

Comme prévu, l'instabilité est en train de se renforcer en cette fin d'après-midi.
L'amas orageux actuellement positionné sur le nord/nord-est du Massif Central remonte vers le nord et le nord-est ce soir (cf. WSPR puis CLST Rouge)
Une autre dégradation orageuse est en train de se former sur le sud du golfe de Gascogne, et va circuler sur le Sud-Ouest ce soir et cette nuit. (CLST ORANGE)

é le 20/07 20h04 UTC

LFMM tactical weather management

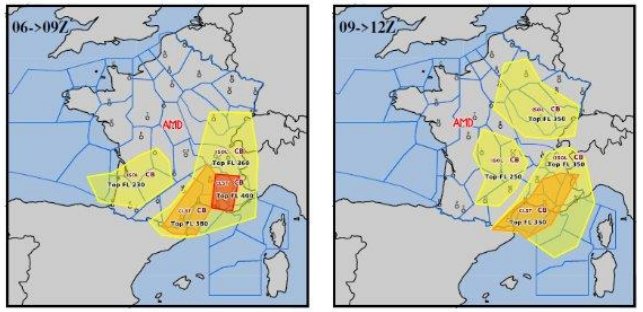
To keep in mind :

- A lot of amendements in wx forecasts
- Expected staffing issues
- Supervisors and FMP ops are "captains on board" the day of operations

Meteo France Weather Update 21st of July

Bulletin de pré-alerte orages (21/07/24 06->21Z)

METEO FRANCE



COMMENTAIRES / COMPLEMENTS

AMD: ligne de grain sur les secteurs A et M du CRNA SE entre 06 et 09z

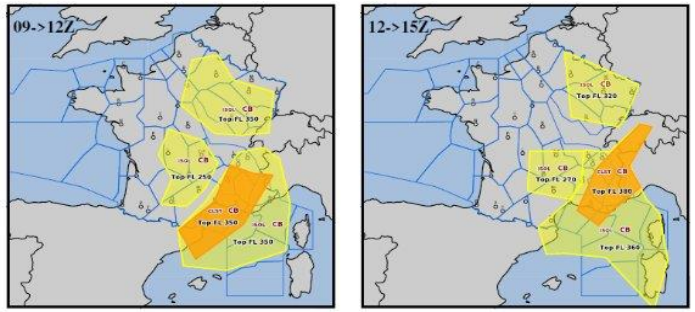
La situation reste encore instable.
-Des orages isolés circulent sur le sud-est, parfois organisés en cluster des Pyrénées vers les Alpes et la Corse (M A B du CRNA SE en journée et secteur K en soirée).
-Sur le sud-ouest, CB isolés avec des TOP plus bas.
-Quelques CB isolés sont encore présents sur le nord-est toute la journée (risque très faible).

-Par ailleurs, zone de turbulence localement sévère sur le nord en matinée. Risque d'ondes sévères sur l'est des Pyrénées en fin de journée (H du CRNA SW).

Actualisé le 21/07 06h22 UTC

Bulletin de pré-alerte orages (21/07/24 09->21Z)

METEO FRANCE



COMMENTAIRES / COMPLEMENTS

La situation reste encore instable, notamment sur le sud-est du pays.
-Des orages circulent sur le CRNA SE, parfois organisés en cluster des Pyrénées vers les Alpes puis la Corse (H, M, A, B,Y du CRNA SE en journée et secteur K e soirée).
-Sur le sud-ouest, CB isolés avec des TOP plus bas.
-Quelques CB isolés sont encore présents sur le nord-est possibles toute la journée

-Par ailleurs, zone de turbulence localement sévère sur le nord en matinée. Risque d'ondes sévères sur l'est des Pyrénées en fin de journée (H du CRNA SW).

Actualisé le 21/07 08h00 UTC

Regulations

East zone:

- 16 regulations > 250 min of delays
- No pretactical ones
- A lot of changes
- Short notices

West zone:

- 10 regulations > 250 min of delays
- No pretactical ones
- A lot of changes
- Short notices

Staffing

East zone :

- 14 sect opened / 14 sect available

West zone :

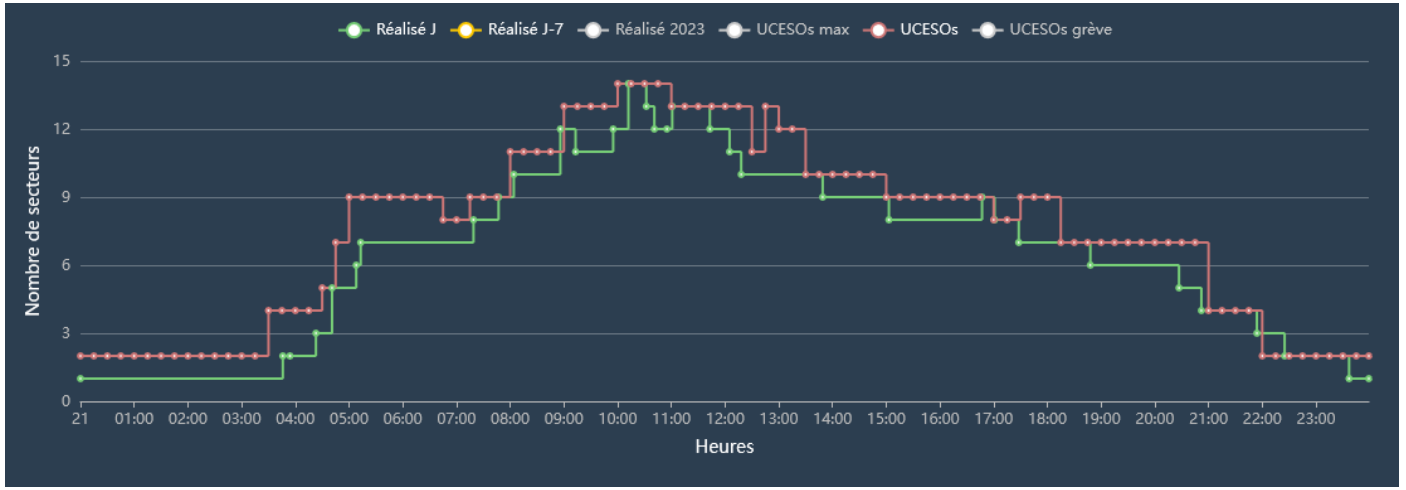
- 12 sect opened / 13 sect available

MINISTÈRE CHARGÉ DES TRANSPORTS

East :

14/14 sectors

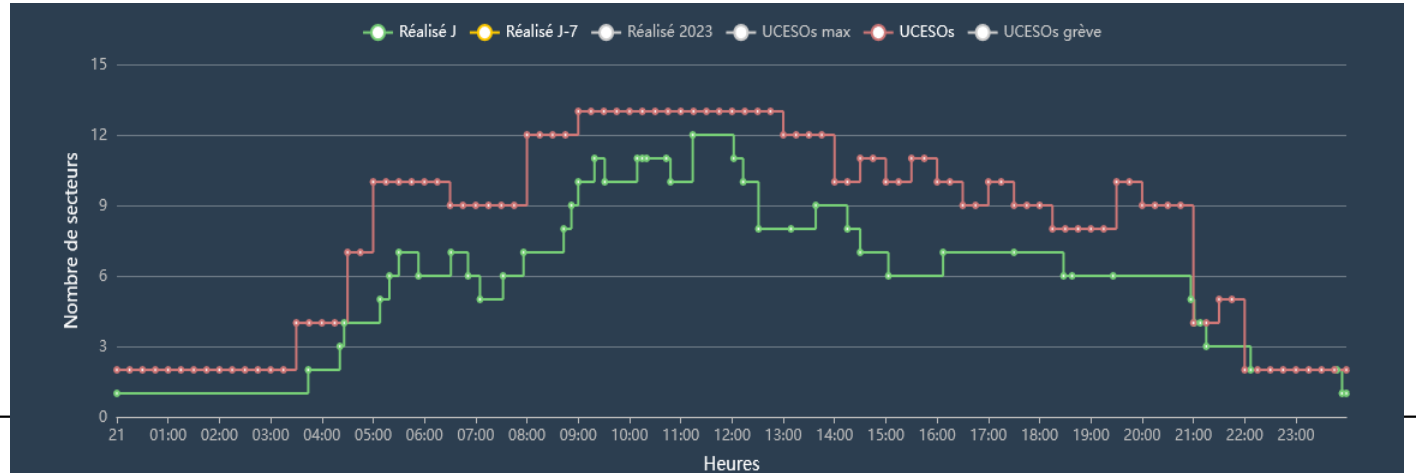
Heures UTC	0	30	1	30	2	30	3	30	4	30	5	30	6	30	7	30	8	30	9	30	10	30	11	30	12	30	13	30	14	30	15	30	16	30	17	30	18	30	19	30	20	30	21	30	22	30	23	30
Nb PC	4	4	4	4	4	4	4	4	5	5	5	5	9	9	9	9	10	15	19	19	19	19	19	19	19	17	17	18	18	18	23	23	23	23	26	26	26	26	28	28	28	28	27	27	27	27	26	26	23	27
Demi UC									½	½	½	½	½	½	½	½	½		½	½	½	½	½	½	½	½					½	½	½	½									½	½	½	½						
UCESOs max	2						4		5	7	9		8		9		11		13		14		13		11	13	12		10		9				8		9		7				4		2			
UCESOs	**2**						**4**		**5**	**7**	**9**		**8**		**9**		**11**		**13**		**14**		**13**		**11**	**13**	**12**		**10**		**9**				**8**		**9**		**7**				**4**		**2**			



Rosters and opened sectors
East 86% /
West 70 %

ATC_STAFFING : 10053 mn
ATC_CAPACITY : 1527 mn
WEATHER : 20890 mn
ATC_IND_ACTION : 3138 mn
Total delay : 35608 mn

Heures UTC	0	30	1	30	2	30	3	30	4	30	5	30	6	30	7	30	8	30	9	30	10	30	11	30	12	30	13	30	14	30	15	30	16	30	17	30	18	30	19	30	20	30	21	30	22	30	23	30
Nb PC	4	4	4	4	4	4	4	4	4	5	5	5	5	9	9	9	9	15	15	20	20	20	20	20	20	19	19	19	19	19	24	24	25	25	27	27	27	27	27	27	27	27	27	27	27	27	25	25	24	24
Demi UC									½	½	½	½	½	½	½	½	½	½							½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½		
UCESOs max	2								4		7		10				9		12				13								12		10		11		10		11		10		9		10		9			
UCESOs	**2**								**4**		**7**		**10**				**9**		**12**				**13**								**12**		**10**		**11**		**10**		**11**		**10**		**9**		**10**		**9**			



West :

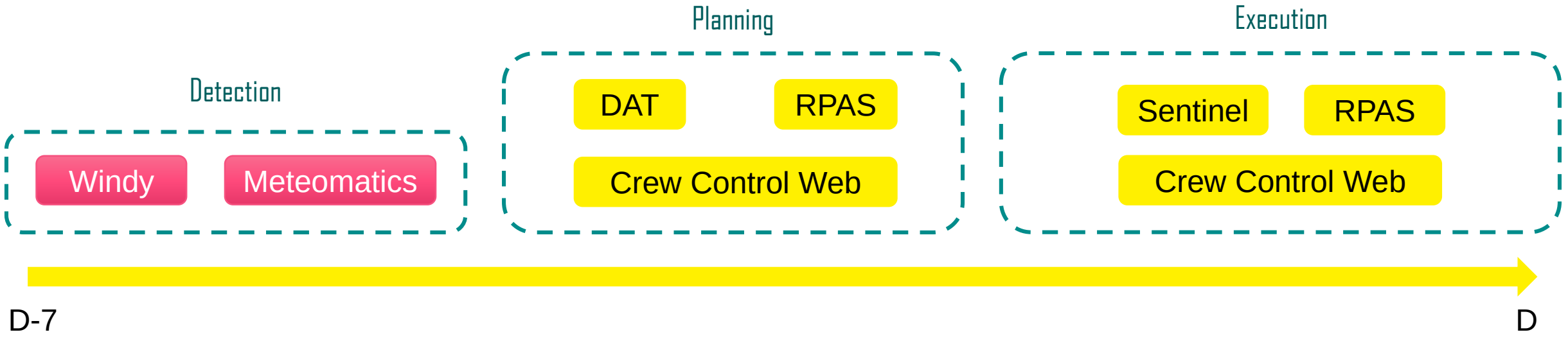
12/13 sectors

ATC_CAPACITY : 1594 mn
WEATHER : 7039 mn
ATC_STAFFING : 1719 mn
Total delay : 10352 mn

Managing Weather Disruptions:

VLG iOCC's Approach

12MAR25 NM HQ



In-house tool

External tool

DETECTION

Tactical Planner

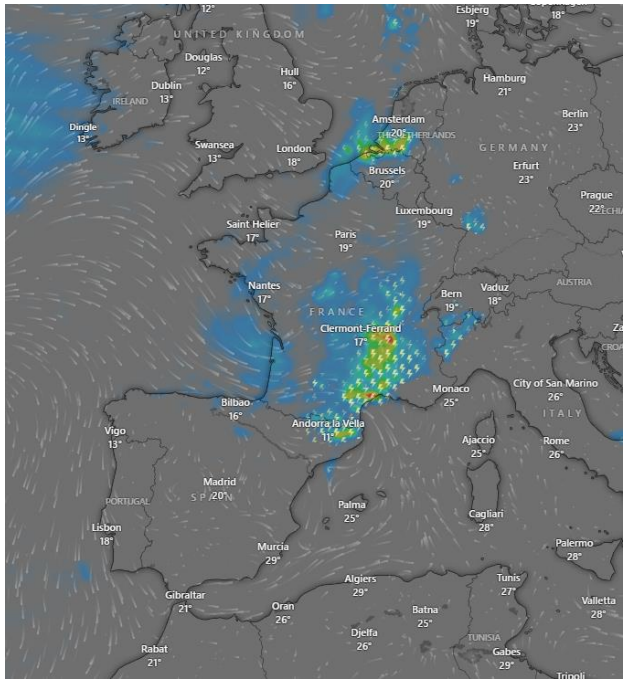
Readiness

Operational Manager

Duty Manager

Windy.com

meteomatics



Wind Warning

Lightning

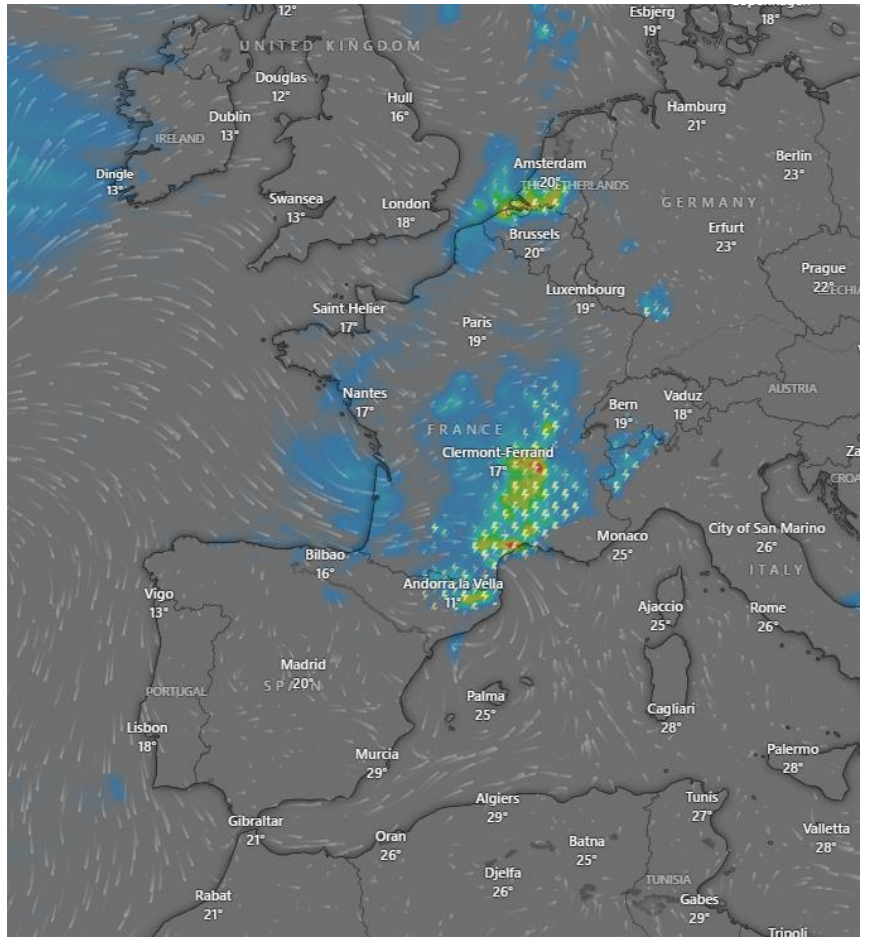
Precipitation

CAPE

DETECTION

D-1 D-2 OPS

- OPERATIONAL MANAGER will inform about the Airports with Low visibility & TS expected. And if it is needed extra Weather holding.
- CREW CONTROL will inform about the standby Crew Resources avaialble for the next day. And identify Critical routes to be splitted.
- TACTICAL PLANNER iwll inform about the number of backups available for next day.
- MOC MAINTENANCE will inform about the AOG situation.



(1) Footnotes and sources
(2) Footnotes and sources
(3) Footnotes and sources

PLANNING

Crew Control
Ground OPS
Flight Dispatch
Operational Manager
Maintenance
Tactical Planner
Readiness
Customer Response

RPAS

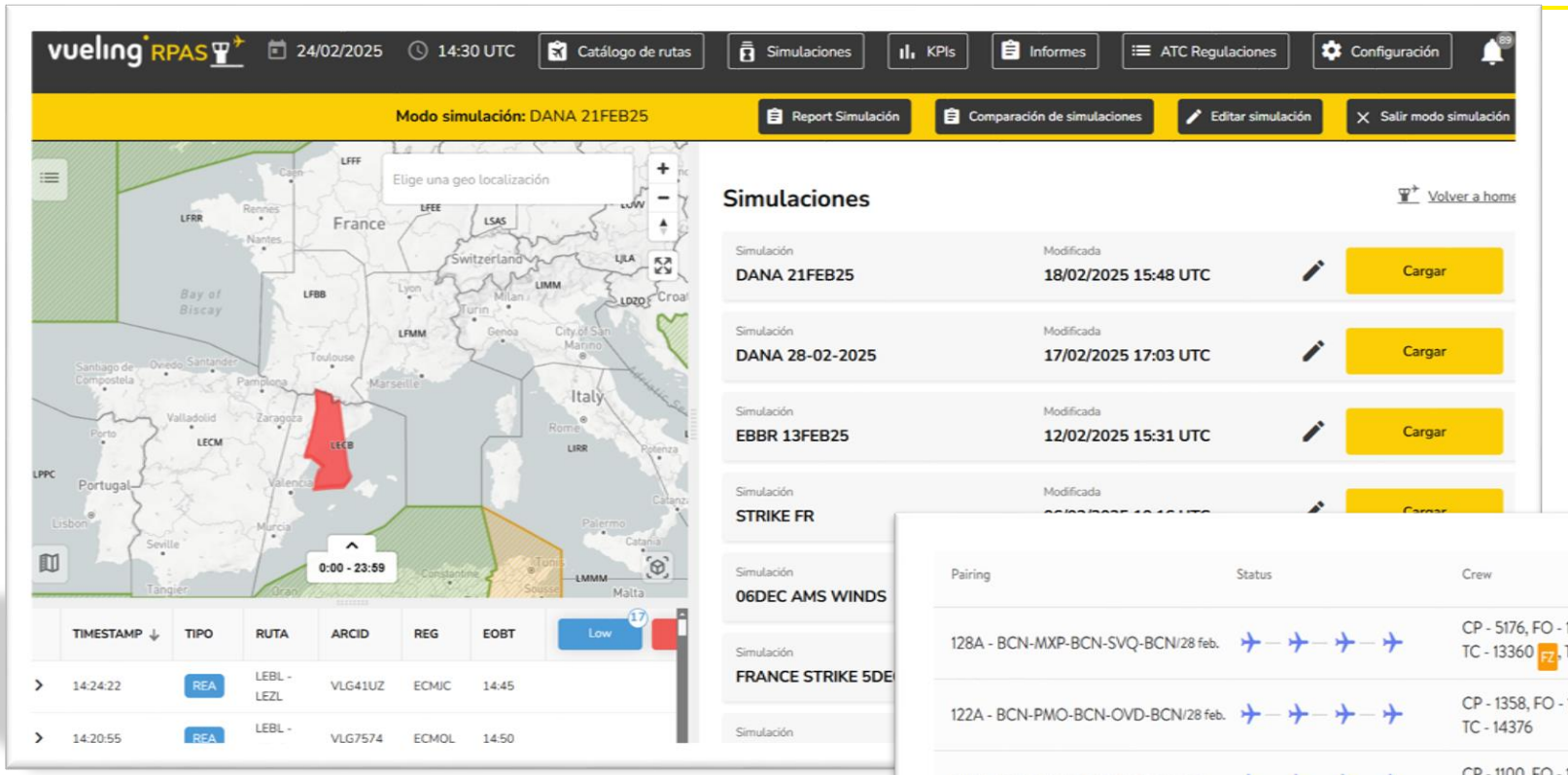
RPAS Tool will allow to create a simulation at any Airspace or Weather situation in the past (NMIR)

DAT

Dynamic Allocation Tool will represent the Simulation applied.

Crew Control Web

Crew Control Web will allow to see which potential problems we will experience with Maximum Duty Time allow for Crews.



Pairing	Status	Crew	Firma	Fin Duty	Margen	Regulación M.	Comentarios
128A - BCN-MXP-BCN-SVQ-BCN/28 feb.		CP - 5176, FO - 13742, FO - 14464, JC - 8908, TC - 11020, TC - 13333, TC - 13360 FZ, TC - 14092	13:40	23:55	01:20	-00:05	
122A - BCN-PMO-BCN-OVD-BCN/28 feb.		CP - 1358, FO - 10717, FO - 14463, JC - 6217, TC - 14104, TC - 14160, TC - 14376	13:20	23:45	01:25	-00:05	
1101A - BCN-DBV-BCN-LYS-BCN/28 feb.		CP - 1100, FO - 10712, JC - 4904, JC - 5633, TC - 13289, TC - 14039, TC - 14591	10:30	22:00	00:50	-00:10	
126A - BCN-SDR-BCN-LGW-BCN/28 feb.		CP - 1339, FO - 6804, FO - 14462, JC - 4956, TC - 13141, TC - 13479, TC - 14390	13:30	00:10	00:55	-00:15	
1FL6C - FLR-BCN-FLR-LGW-FLR/26 feb.		CP - 1543	11:15	22:20	01:15	-00:15	
FL04C - FLR-BCN-FLR-LGW-FLR/28 feb.		FO - 13731, JC - 6727, TC - 12890	11:15	22:20	01:15	-00:15	
FLR01 - FLR-BCN-FLR-LGW-FLR/27 feb.		TC - 12904	11:15	22:20	01:15	-00:15	
FC04A - FCO-BCN-FCO-VLC-FCO/28 feb.		CP - 6242, FO - 8729, JC - 7894, TC - 7881, TC - 7956, TC - 9213	11:45	22:45	01:20	-00:20	

vueling

FDP CREW

SLOTS

CREW DHC

REACCOM

CAPACITY INCREASE TO IMPROVE

PAX

CREW RESOURCES

FLIGHT LIST:
To be protected
Potential cancellations

FLEET RESOURCES

CREW IN TRAINING

MX SWAPS

CREW REST

CHARTERS/VIPS/TTOO

CURFEW

MISSCONNECTIONS

EXECUTION

Operational Manager
Duty Manager
Readiness
Customer Response
Crew Control
Tactical Planner
Flight Dispatch
MOC
VAS
Airport Managers

Sentinel

Sentinel Tool will detect:
- Punctuality Recovery (OTP)
- Flight Prioritization
- Smart Cancellation
- Passenger Centricity in every decision

RPAS

RPAS Tool will detect considering non confirmed regulations and confirmed regulations:
- Potential Curfew Infringements
- Potential FDP Infringements

Crew Control Web

CC Web will monitor:
- Crew FDP

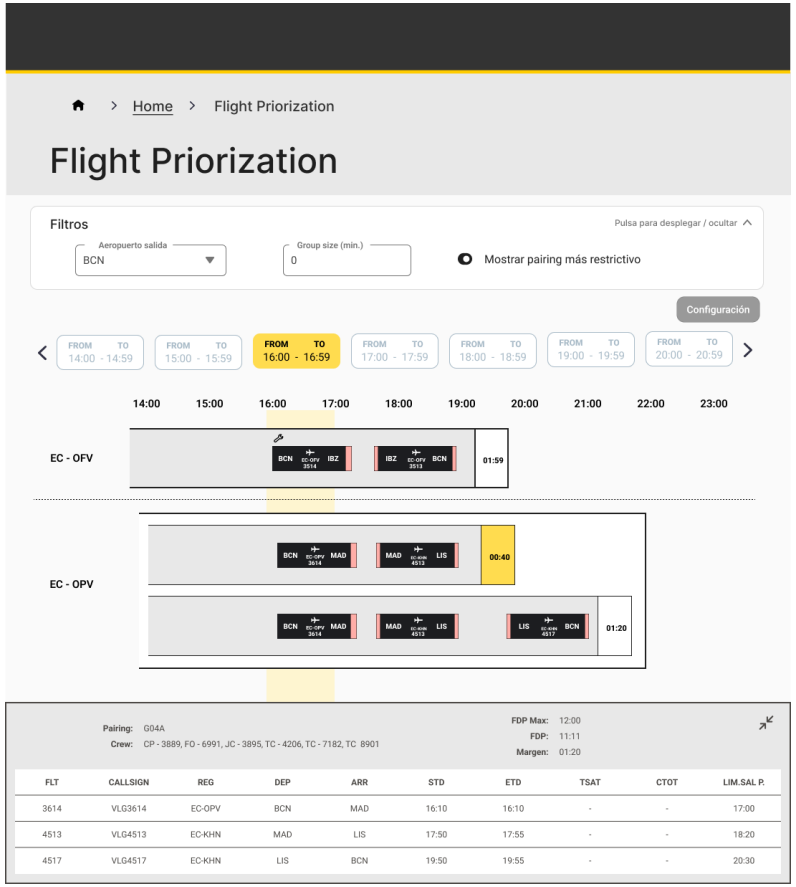
Today's flights

Flight	ARCID	EOBT	CTOT	DEP	ARR	Regulations	Alt. CTOT		
VLG3RK	ECLVS	10:05	10:56*	LEBB	EHAM	A 41 min	N/A	CURFEW	Open
VLG6206	ECMGF	11:30	12:49*	LIRQ	EGKK	A 59 min	N/A	FDP CURFEW	Open
VLG77TU	ECODJ	11:50	12:13*	EHAM	LEAL	R 7 min	OUT REG	FDP	Open
VLG6307	ECMCU	11:55	13:01*	LEBB	EGKK	A 59 min	N/A	CURFEW	Open
VLG34LB	ECJTQ	12:25	13:34*	LEBL	EGKK	A 54 min	N/A	FDP	Open

RPAS Tool will detect as soon as possible potentials impacts with Curfew and FDP.

Pairing	Status	Crew	Firma	Fin Duty	Margen	Regulación M.	Comentarios
128A - BCN-MXP-BCN-SVQ-BCN/28 feb.		CP - 5176, FO - 13742, FO - 14464, JC - 8908, TC - 11020, TC - 13333, TC - 13360 FZ, TC - 14092	13:40	23:55	01:20	-00:05	
122A - BCN-PMO-BCN-OVD-BCN/28 feb.		CP - 1358, FO - 10717, FO - 14463, JC - 6217, TC - 14104, TC - 14160, TC - 14376	13:20	23:45	01:25	-00:05	
1101A - BCN-DBV-BCN-LYS-BCN/28 feb.		CP - 1100, FO - 10712, JC - 4904, JC - 5633, TC - 13289, TC - 14039, TC - 14591	10:30	22:00	00:50	-00:10	
126A - BCN-SDR-BCN-LGW-BCN/28 feb.		CP - 1339, FO - 6804, FO - 14462, JC - 4956, TC - 13141, TC - 13479, TC - 14390	13:30	00:10	00:55	-00:15	
1FL6C - FLR-BCN-FLR-LGW-FLR/26 feb.		CP - 1543	11:15	22:20	01:15	-00:15	
FL04C - FLR-BCN-FLR-LGW-FLR/28 feb.		FO - 13731, JC - 6727, TC - 12890	11:15	22:20	01:15	-00:15	
FLR01 - FLR-BCN-FLR-LGW-FLR/27 feb.		TC - 12904	11:15	22:20	01:15	-00:15	
FC04A - FCO-BCN-FCO-VLC-FCO/28 feb.		CP - 6242, FO - 8729, JC - 7894, TC - 7881, TC - 7956, TC - 9213	11:45	22:45	01:20	-00:20	

vueling

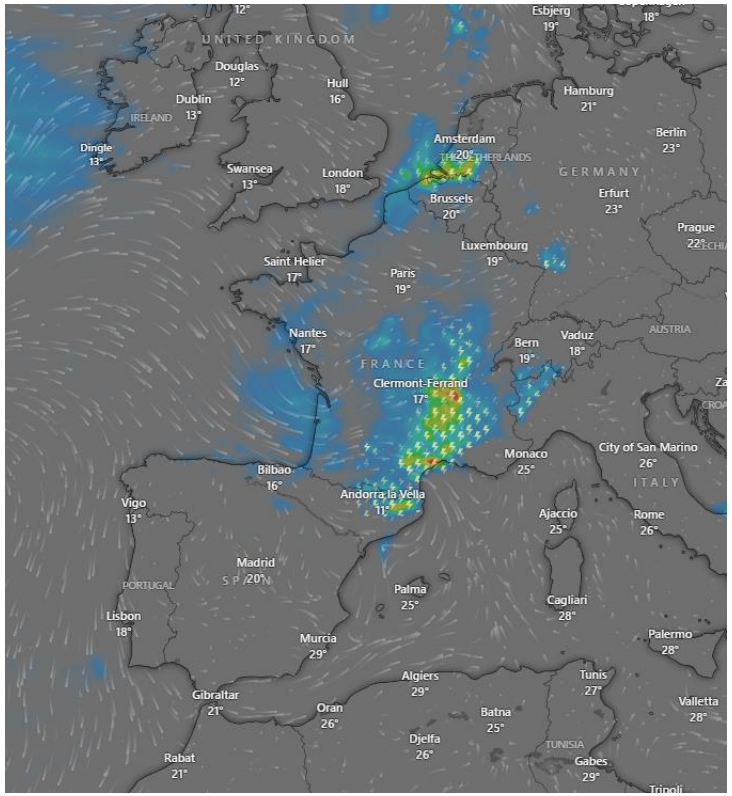


SENTINEL will allow us to monitor:

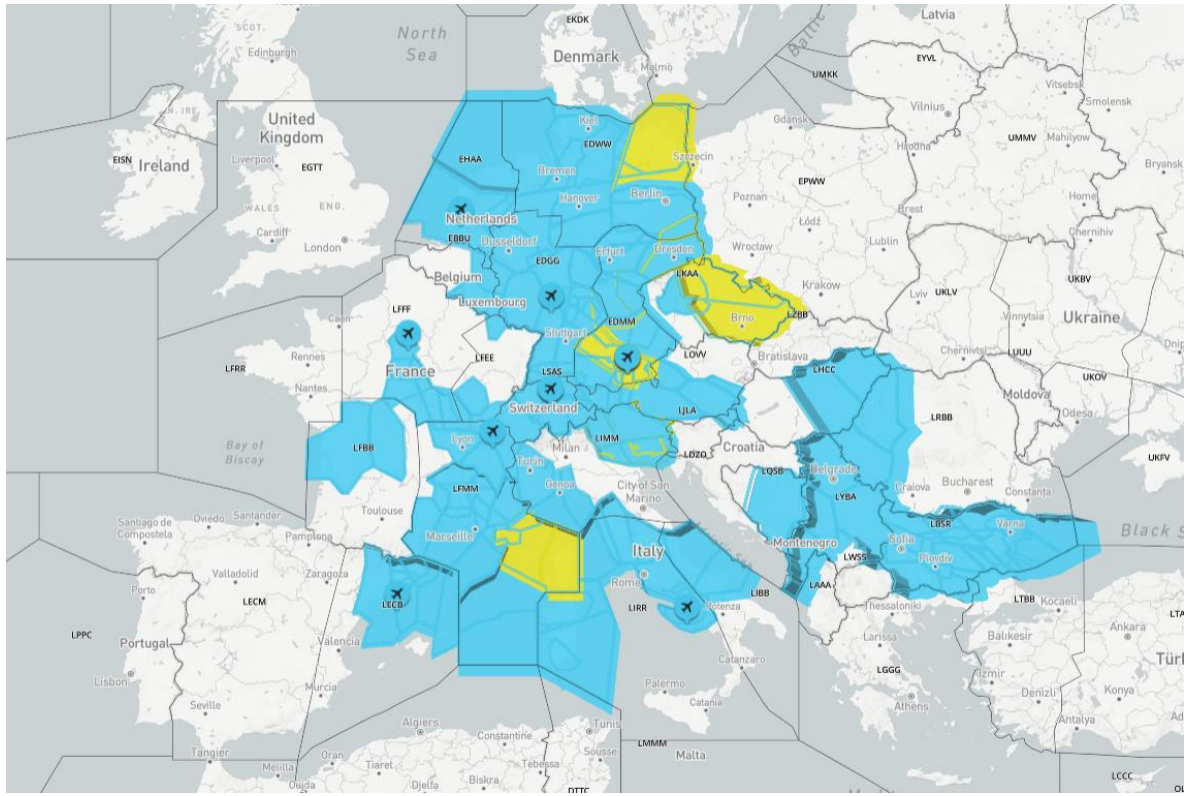
- Flight Priorization
- AOG monitoring
- OTP 180
- Weather: Below Minima & Crosswind
- Canceller

POST-MORTEM

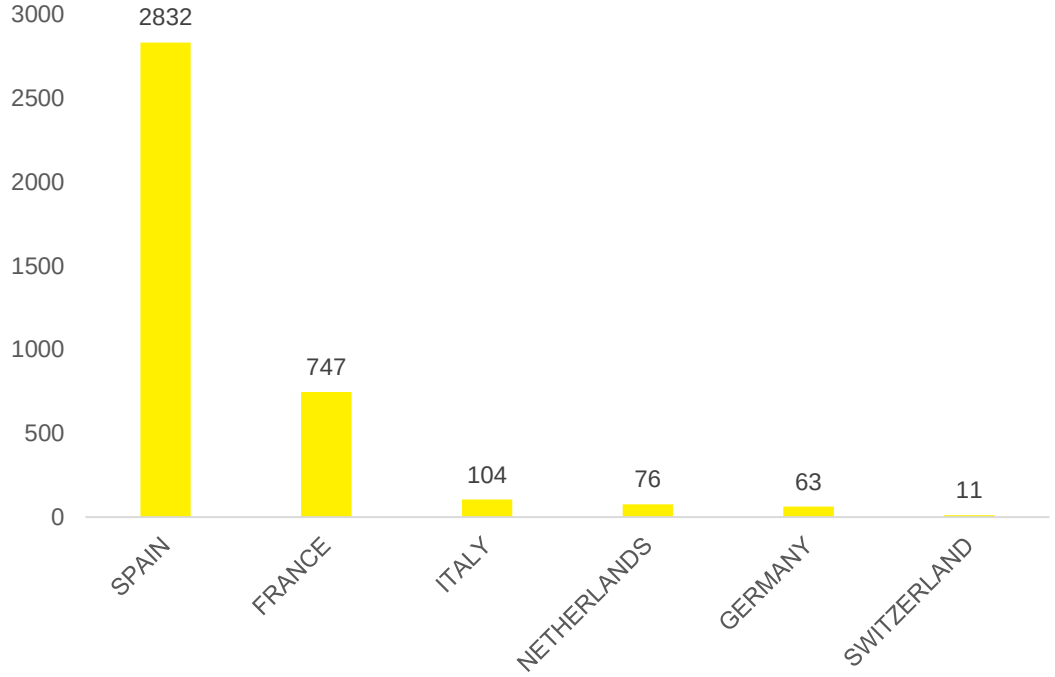
OPS D-1

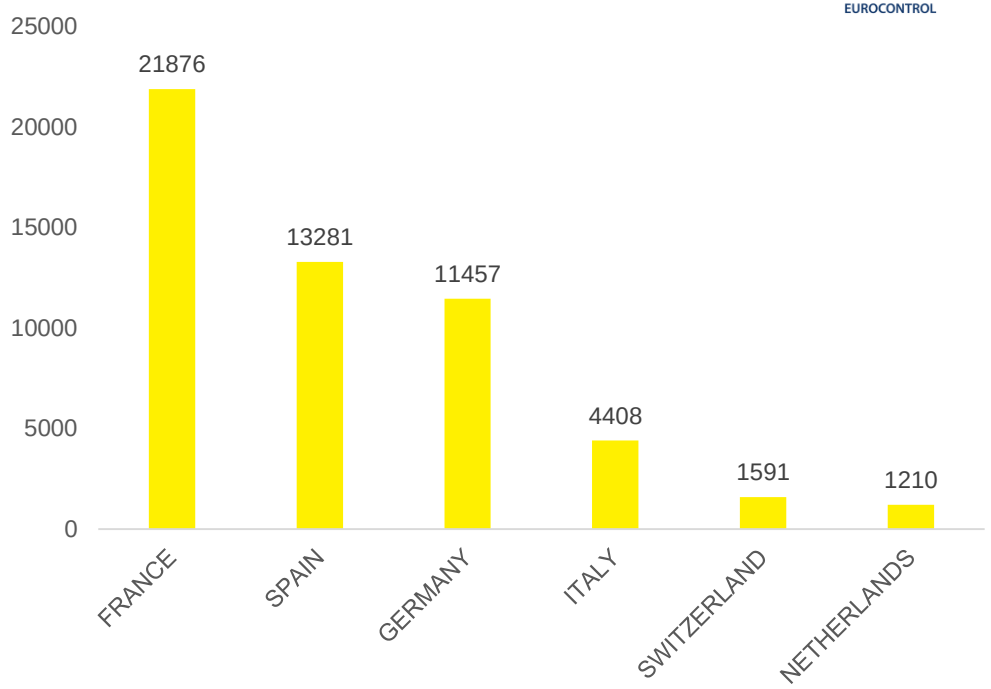


DAY OF OPERATION

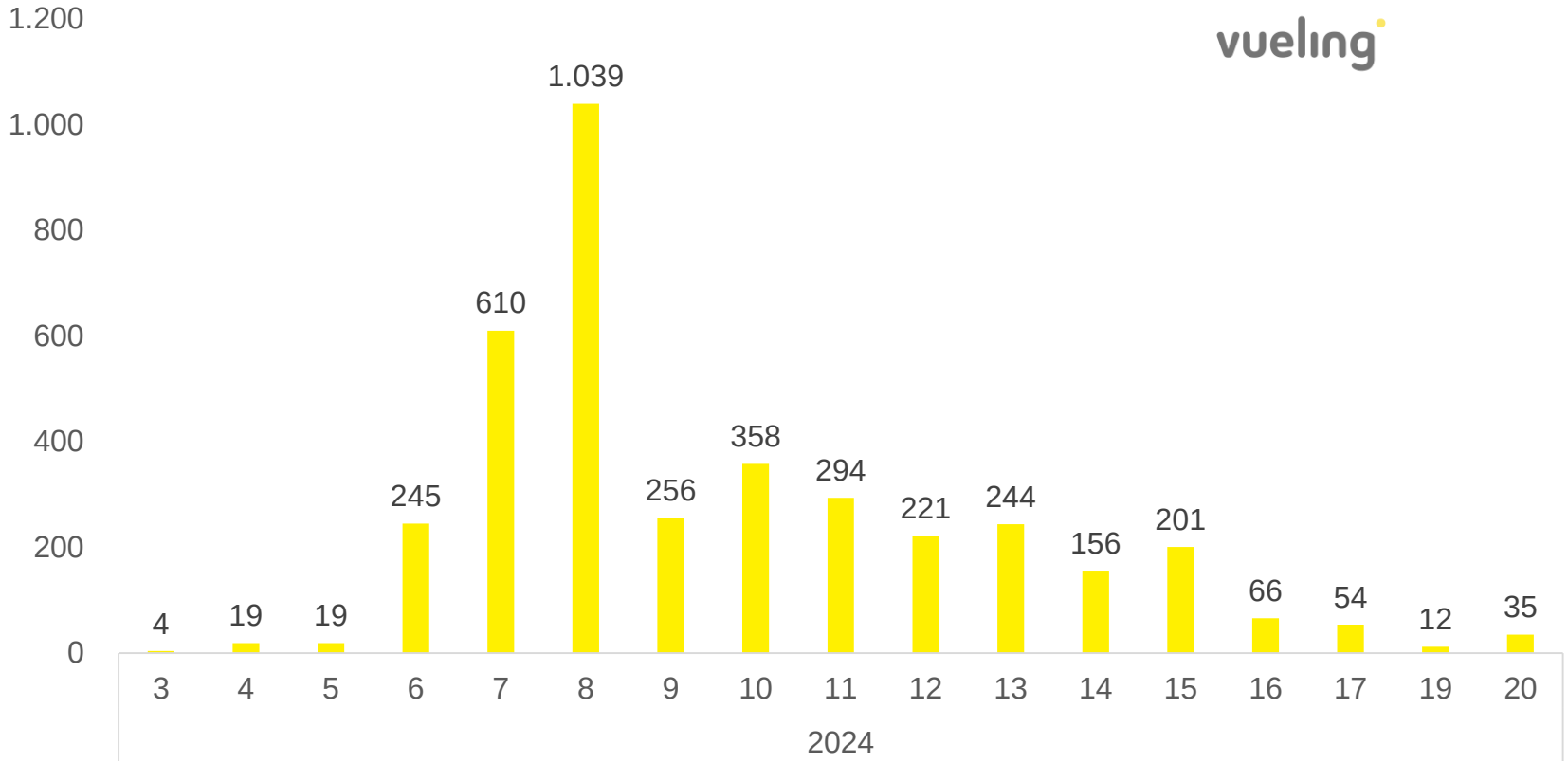


WEATHER REGULATIONS (21JUL24)





IMPACT BY HOURS (21JUL24) - Weather (VLG)



CONSEQUENCES

- FLIGHTS: 714
- OTP15: 50%
- CANCELLATIONS: 11 FLIGHTS
- RECOVERY FOR NEXT DAY

AFFECTED AIRPORTS & CITYPAIRS

DESTINATION AIRPORTS

DAY	ADES	FLIGHTS
21/07/2024	LEBL	83
21/07/2024	EHAM	7
21/07/2024	LFPO	7
21/07/2024	LFPG	5
21/07/2024	LEBB	4
21/07/2024	LIRF	4
21/07/2024	EGKK	3
21/07/2024	LFMN	3
21/07/2024	LIMC	3
21/07/2024	EBBR	2
21/07/2024	EKCH	2
21/07/2024	LEPA	2
21/07/2024	LIRQ	2
21/07/2024	REST	26

CITYPAIRS

CITYPAIR	FLIGHTS
EGKK-LEBL	5
LEMH-LEBL	5
LEIB-LEBL	4
LEPA-LEBL	4
LFPO-LEBL	4
LEBL-EGKK	3
LEBL-LFMN	3
LEBL-LFPG	3
LIRF-LEBL	3
EHAM-LEBL	2
LDDU-LEBL	2
LEAS-LEBL	2
LEBL-EBBR	2
LEBL-EHAM	2
LEBL-EKCH	2
LEBL-LFPO	2
LEBL-LIRF	2
LEMG-LEBL	2
LEPA-LFPO	2
LEST-LEBL	2
LEZL-LEBL	2
LFMN-LEBL	2
LIMC-LEBL	2
REST	91

POTENTIAL IMPROVEMENTS

To be considered

AIRLINES

- Airlines opened to receive instructions to modify Routes & approaches.
- Keep EOBT UpToDate and Flight Levels adherence.
- Deviations from route is not only manager by Flight Crew, in some it is also managed by Flight Dispatchers

EUROCONTROL

- Meetings with Eurocontrol/ANSP with medium/high weather disrupted situations.
- E-Helpdesk: Better understanding for this kind of unpredicted weather situations.
- Be focused on Curfew and Flight Duty Times (FDP)

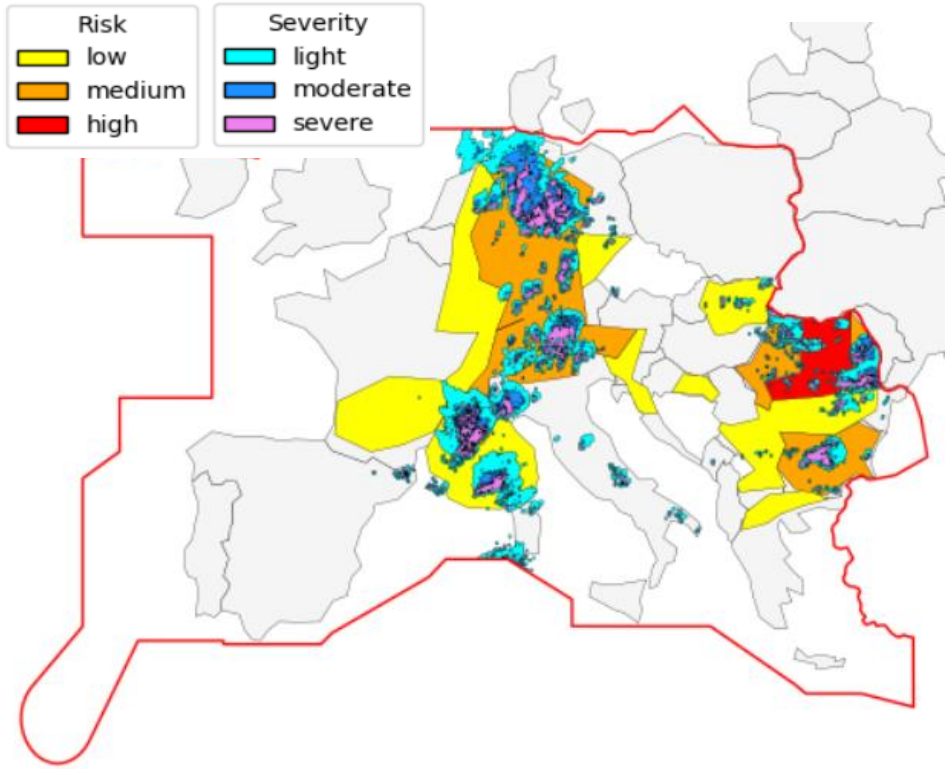
WEATHER

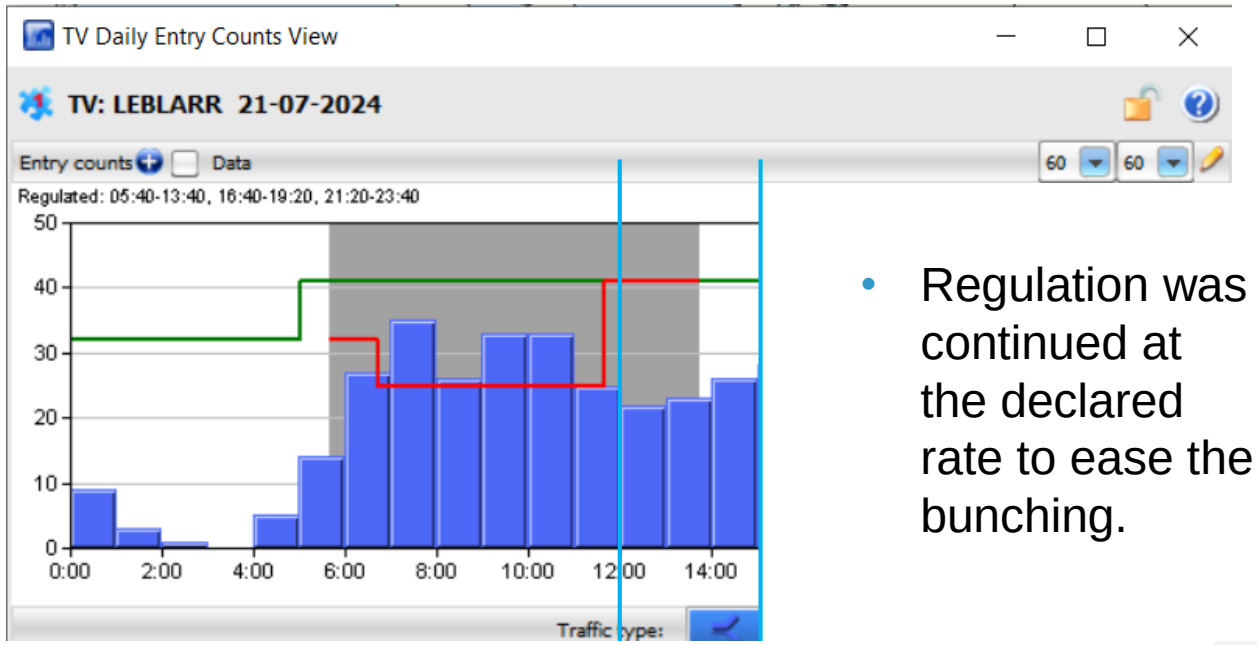
- Explore news methods of weather detection.
- The Mediterranean Sea zone is a weather bomb, and new tools are needed to monitor it.
- Support ANSP on weather situations.

Use the **QR code** or
go to **ectrlvote.eu** and
log in with **eurocontrol521**

12:00-15:00

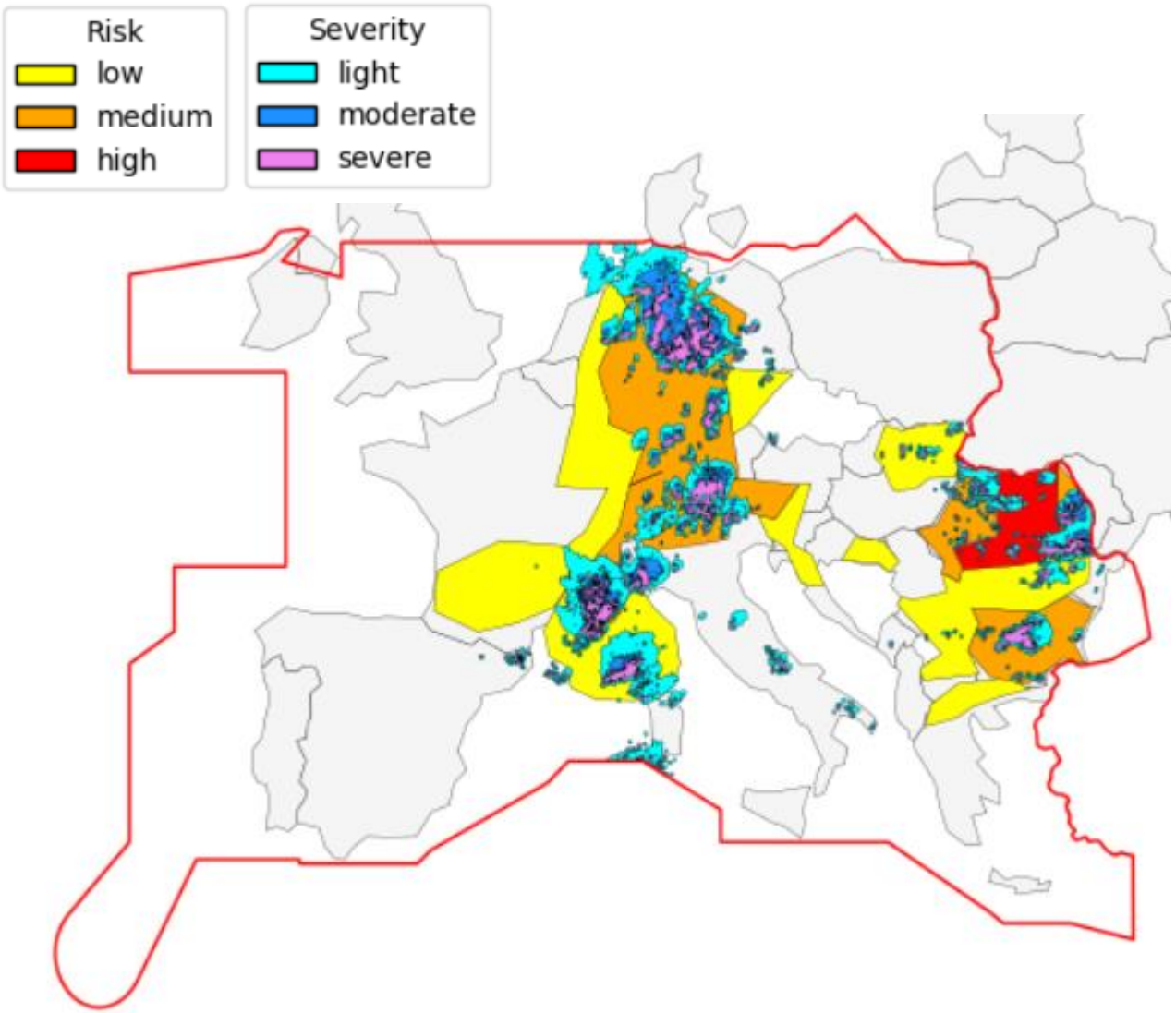
- The weather system moved east to Marseille East and Karlsruhe sectors.
- Barcelona ACC and airport started recovery.



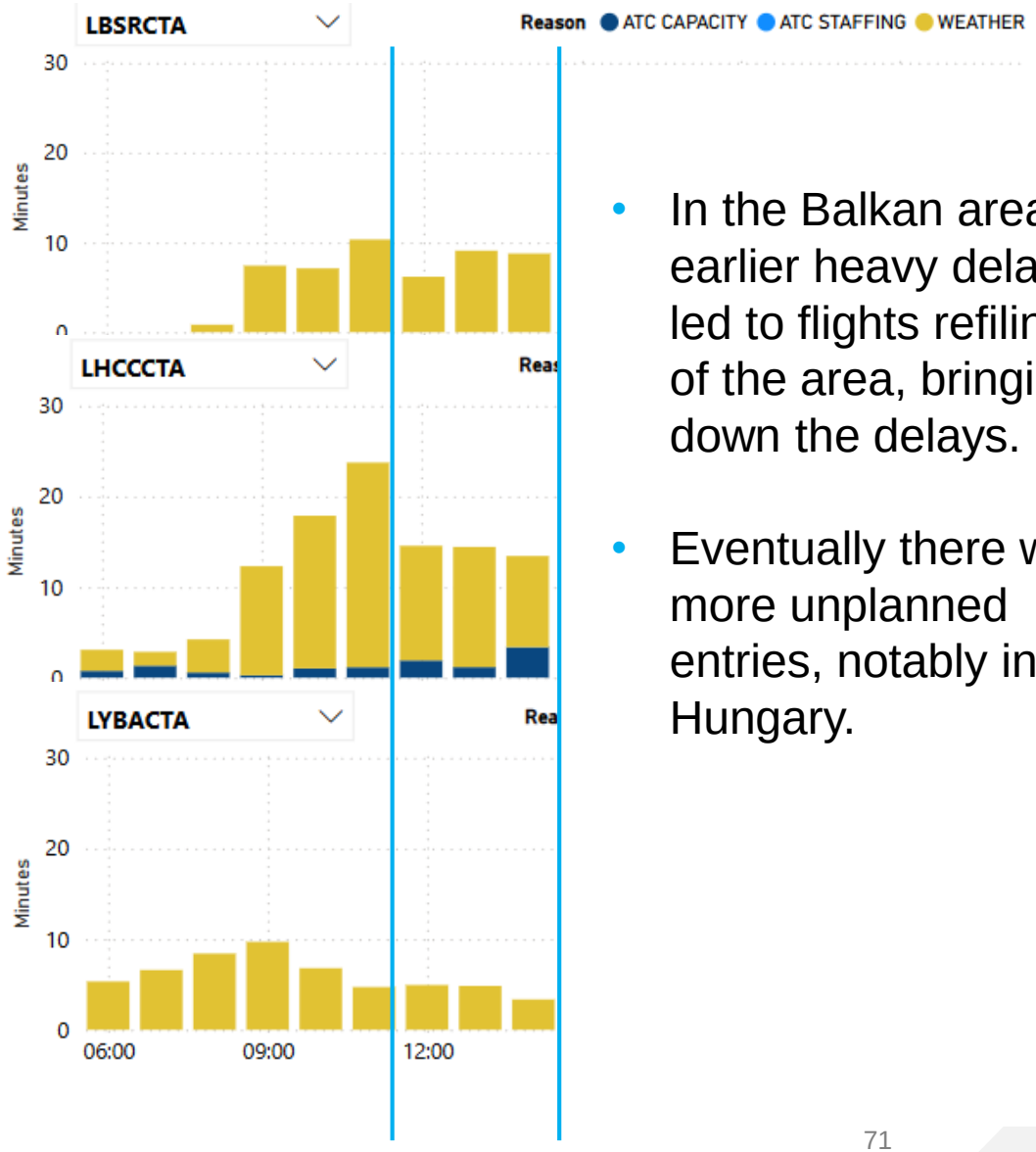


- Regulation was continued at the declared rate to ease the bunching.

12:00-15:00

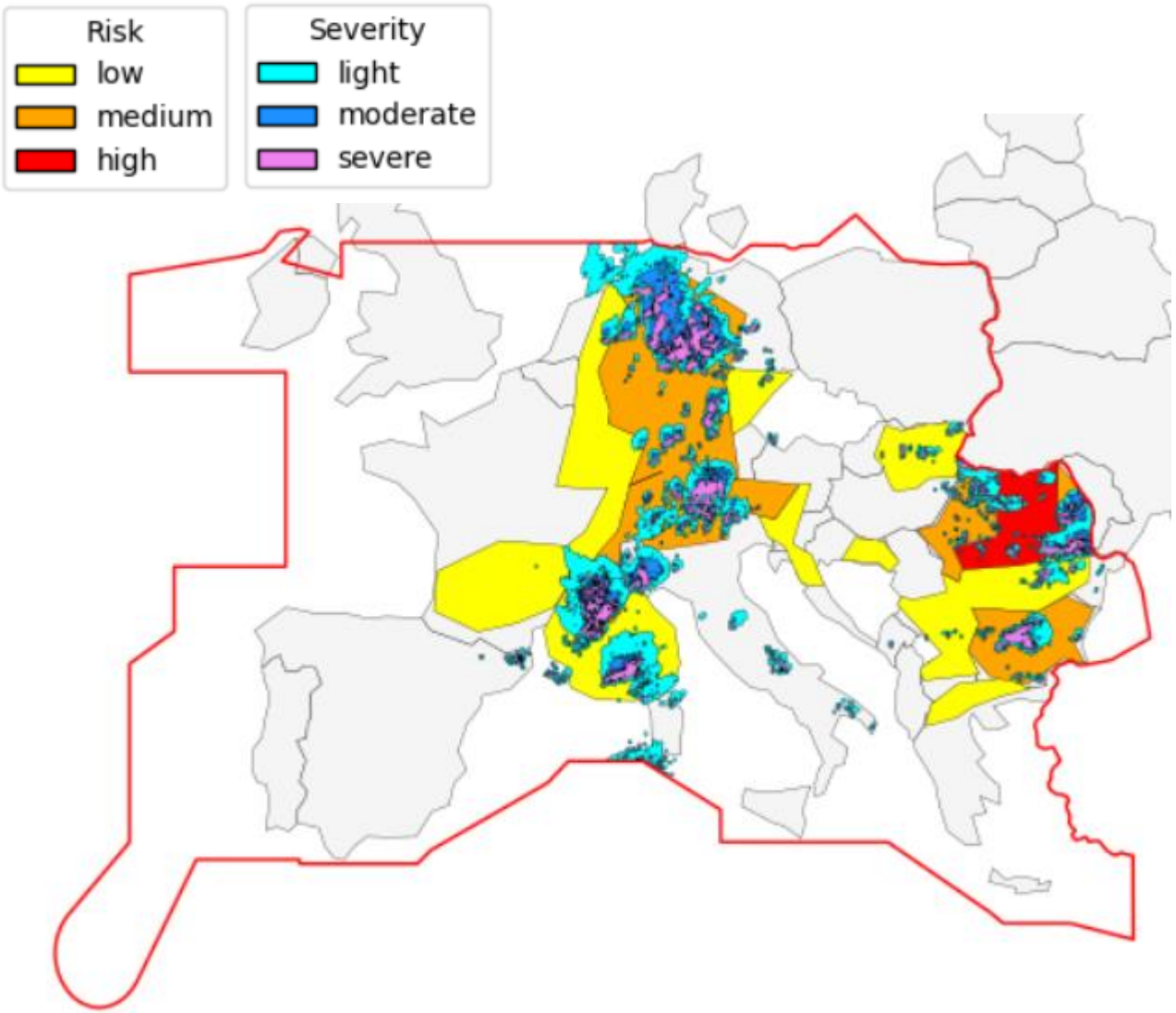


Hourly Delay Per Flight

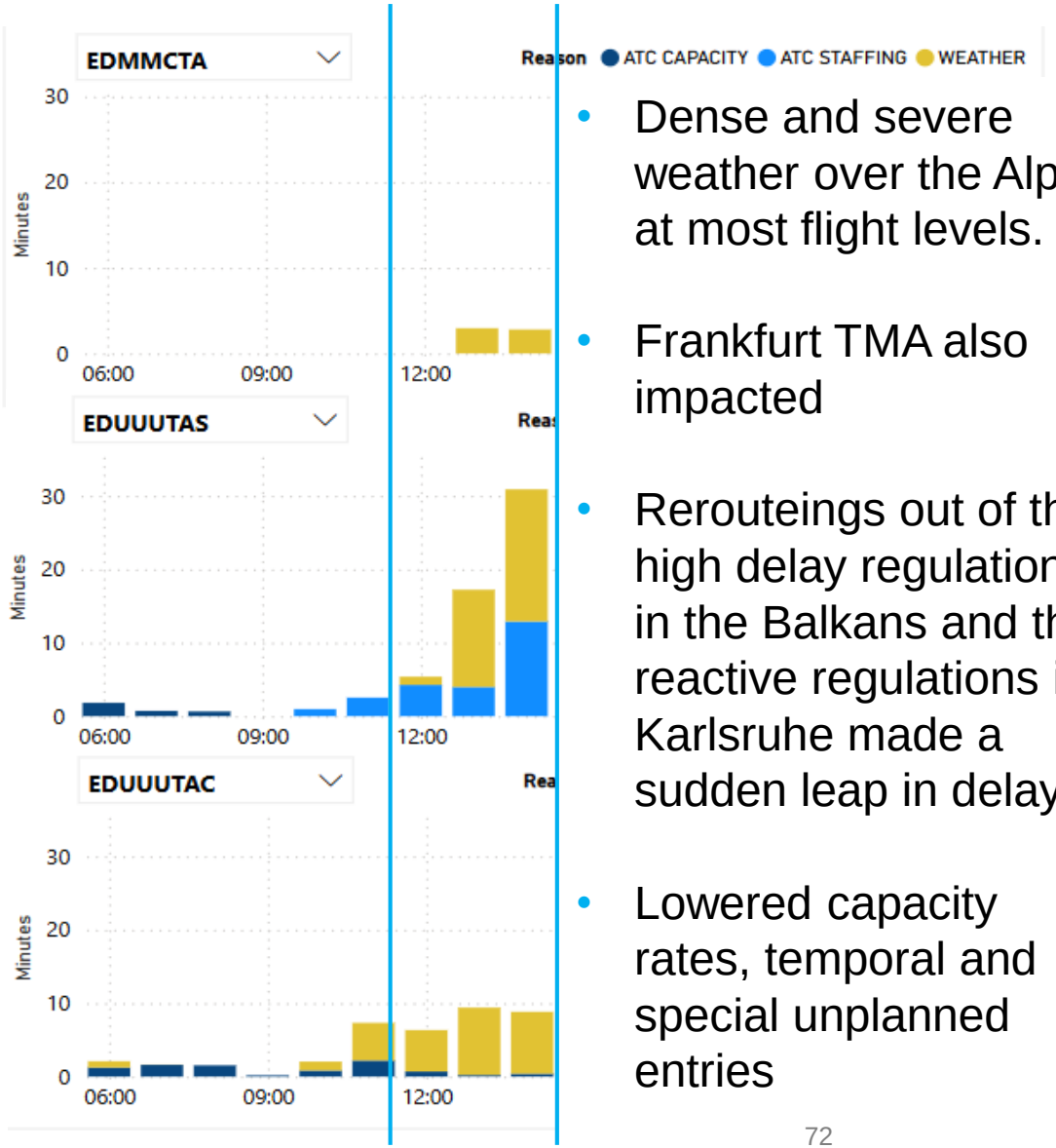


- In the Balkan area, the earlier heavy delays led to flights refiling out of the area, bringing down the delays.
- Eventually there were more unplanned entries, notably in Hungary.

12:00-15:00

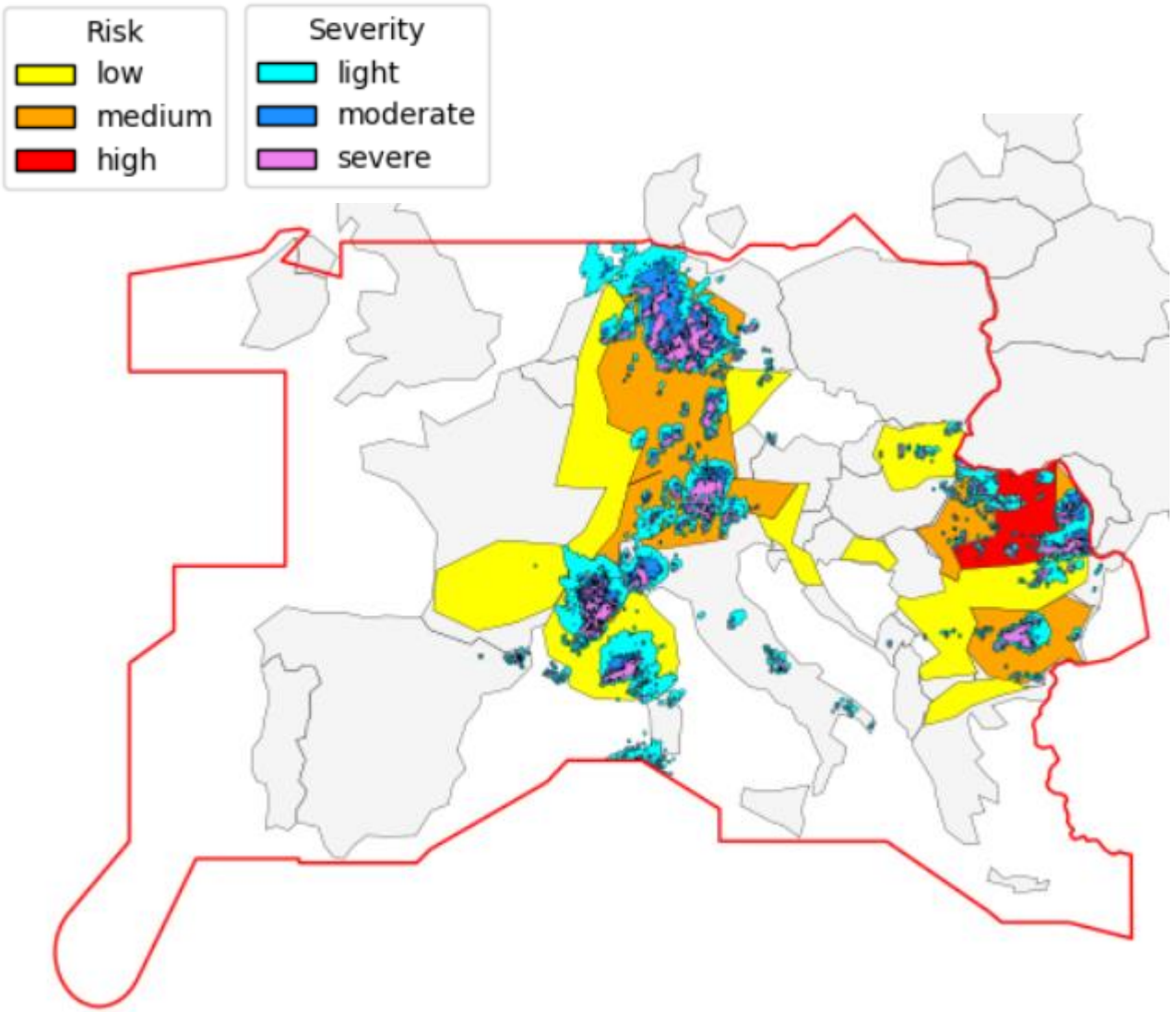


Hourly Delay Per Flight



- Dense and severe weather over the Alps at most flight levels.
- Frankfurt TMA also impacted
- Rerouteings out of the high delay regulations in the Balkans and the reactive regulations in Karlsruhe made a sudden leap in delays.
- Lowered capacity rates, temporal and special unplanned entries

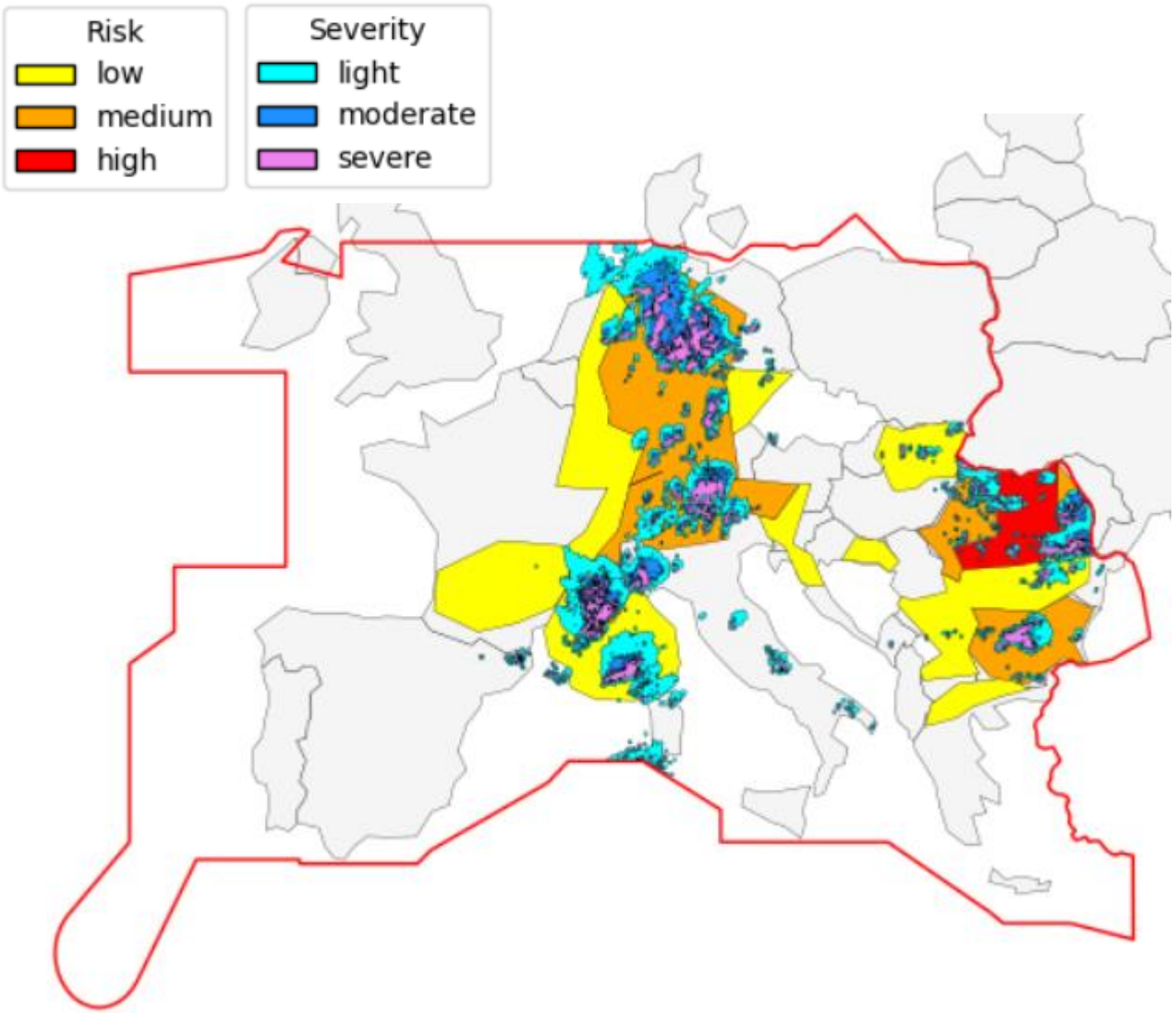
12:00-15:00



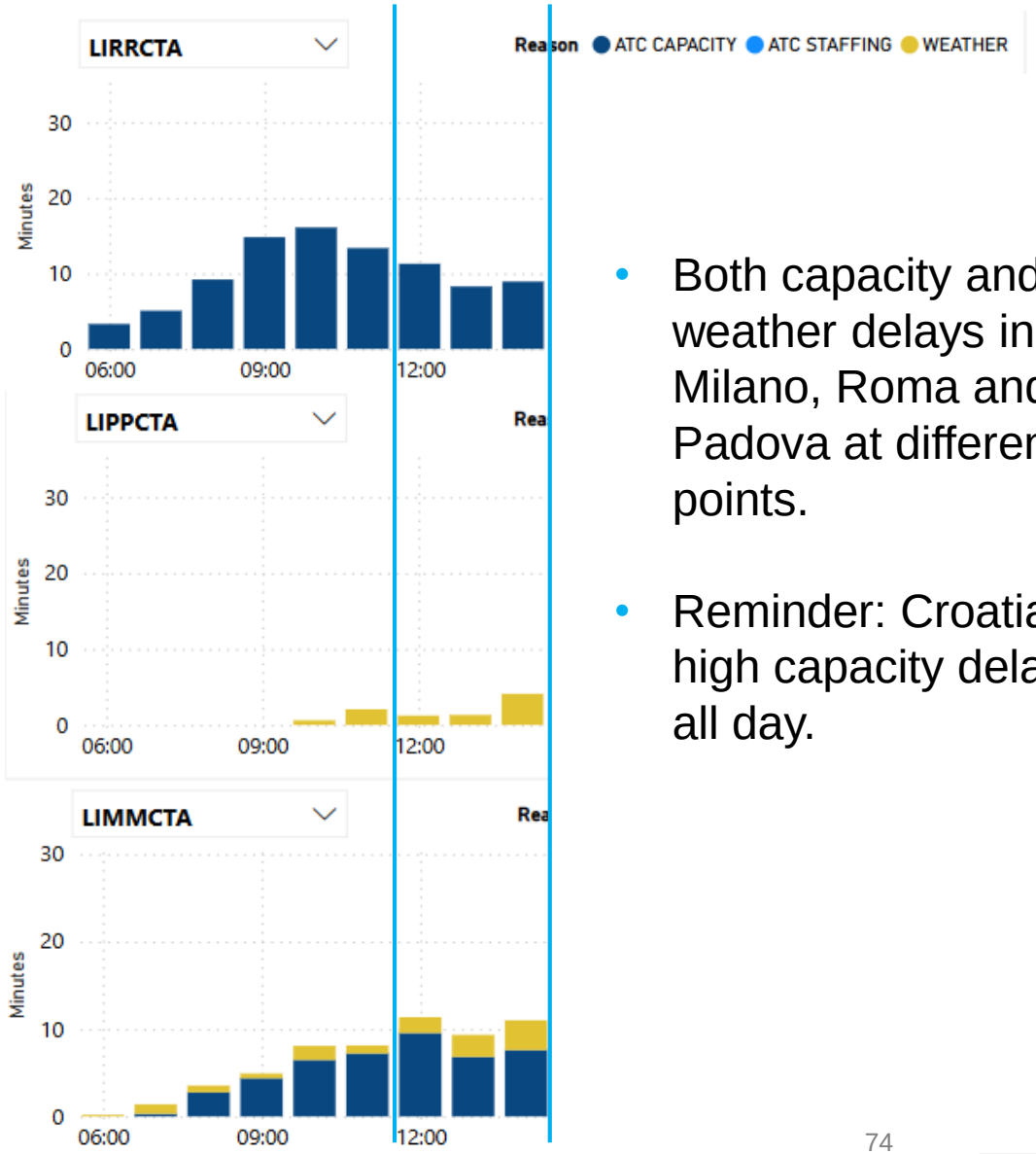
Hourly Delay Per Flight

- Vienna takes precautionary measures mainly for unplanned entries
- Zurich impacted

12:00-15:00

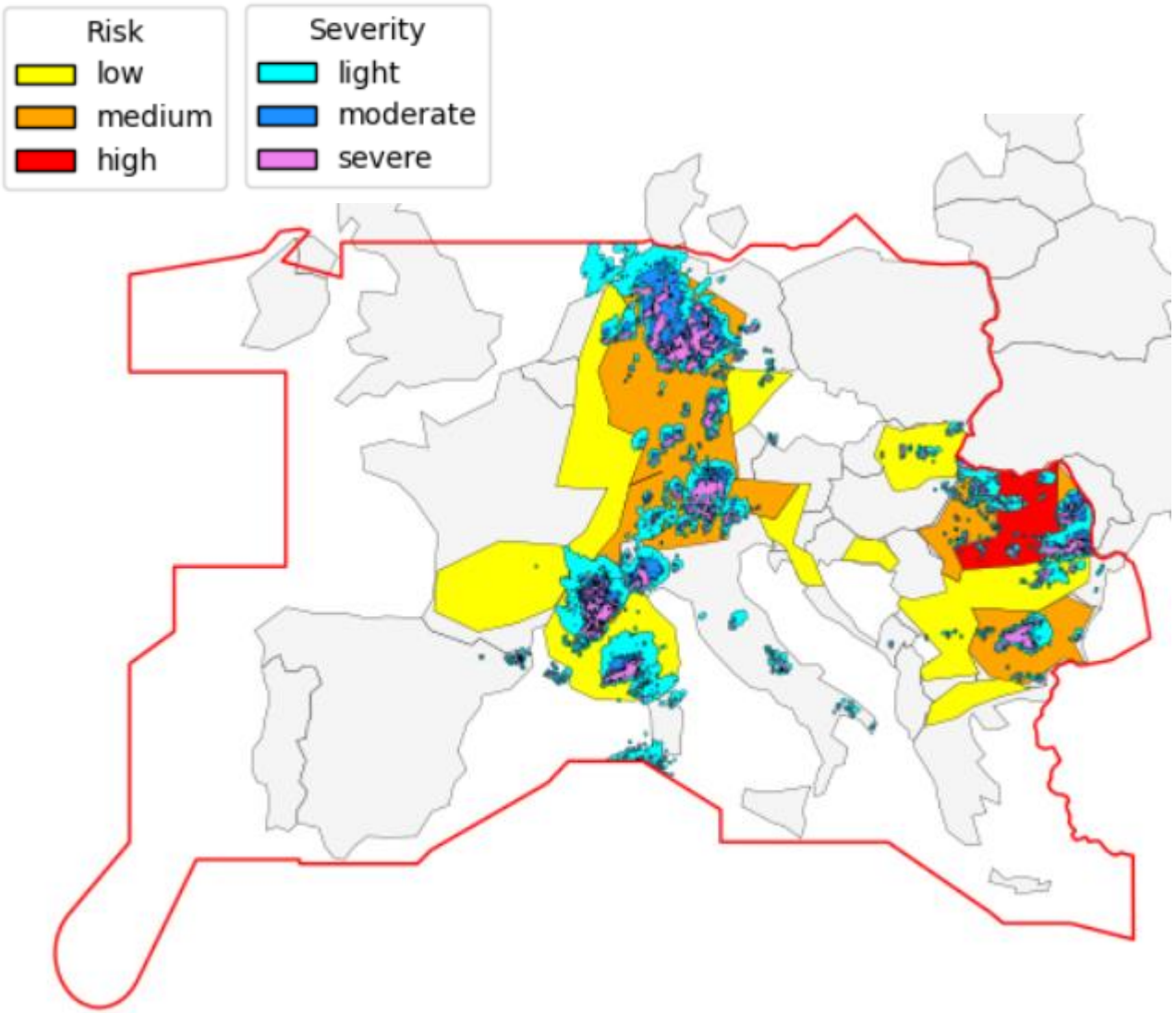


Hourly Delay Per Flight

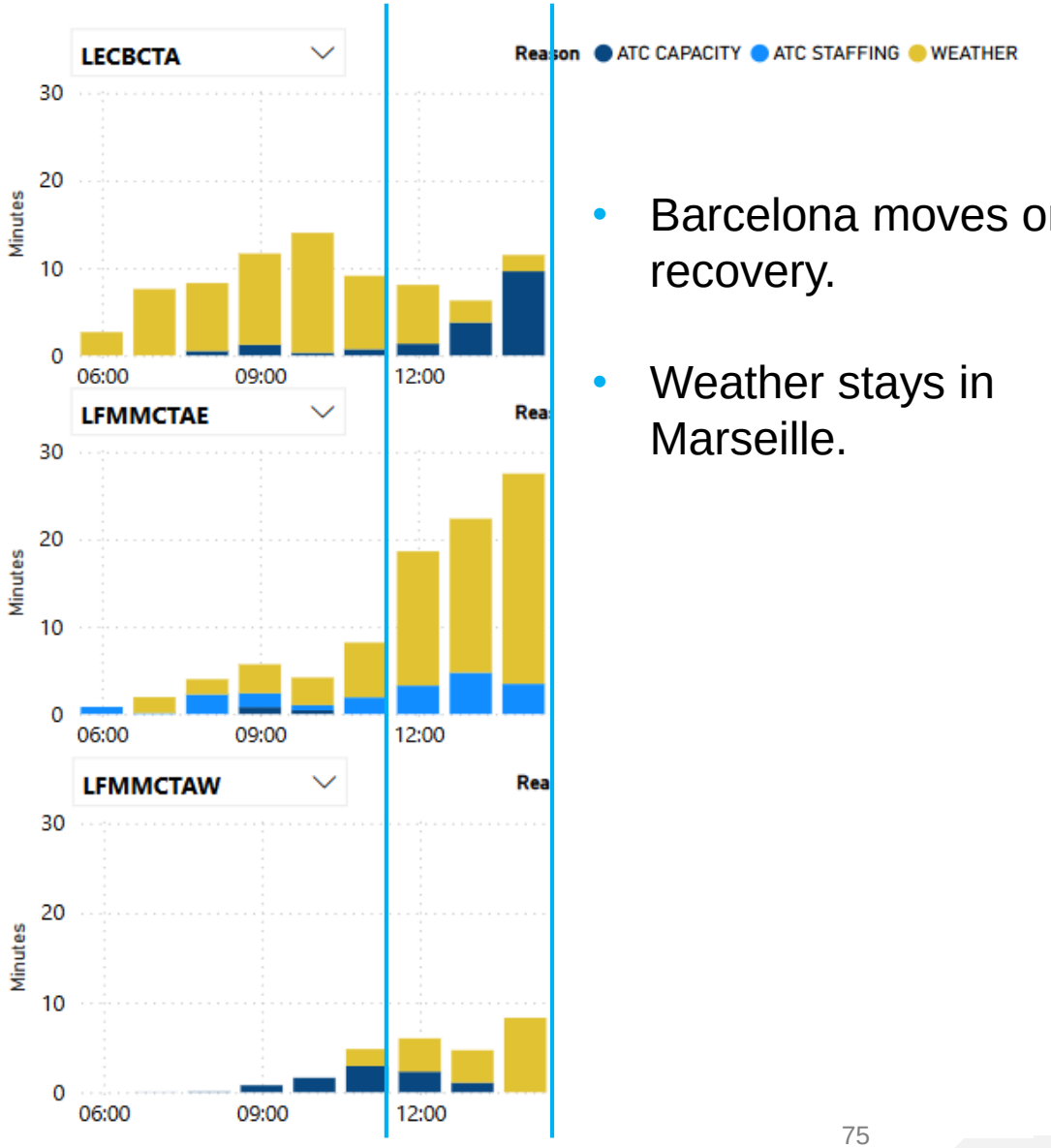


- Both capacity and weather delays in Milano, Roma and Padova at different points.
- Reminder: Croatia high capacity delays all day.

12:00-15:00

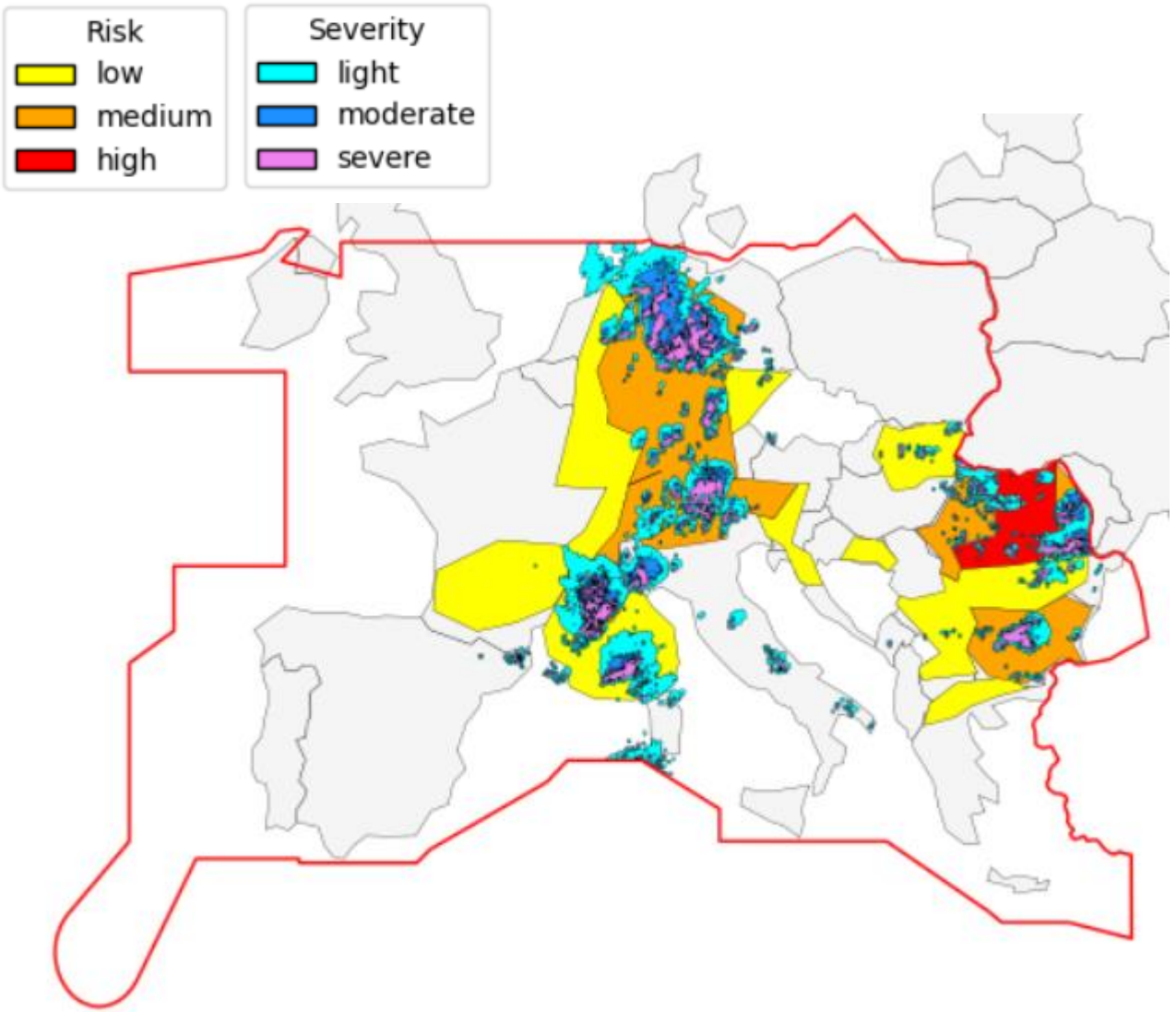


Hourly Delay Per Flight

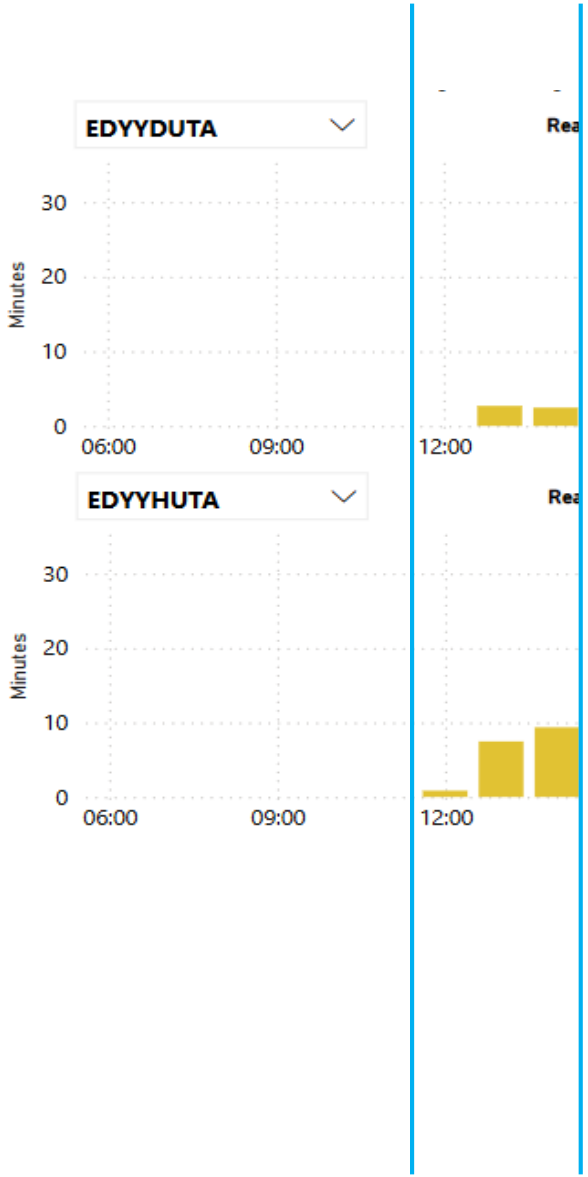


- Barcelona moves on to recovery.
- Weather stays in Marseille.

12:00-15:00



Hourly Delay Per Flight



- Minor delays in MUAC.

Eurocontrol NM Weather Workshop 2025
Adverse Weather and Air Traffic Control

Brussels, March, 12th 2025

DFS Deutsche Flugsicherung

Introduction

DFS Deutsche Flugsicherung

Weather Avoidance

From preplanning to reaction

– The working conditions of air traffic controllers are completely different to normal operations

– Without weather you are able to plan your traffic in advance, you know the conflicts and crossing points of your sector

– The beginning of avoidance action lies **always** with the pilot, the weather radar in an aircraft is much more precise than our systems on ground

– Controllers have to react to the turn and level requests and need to ensure the separation on the new flight path

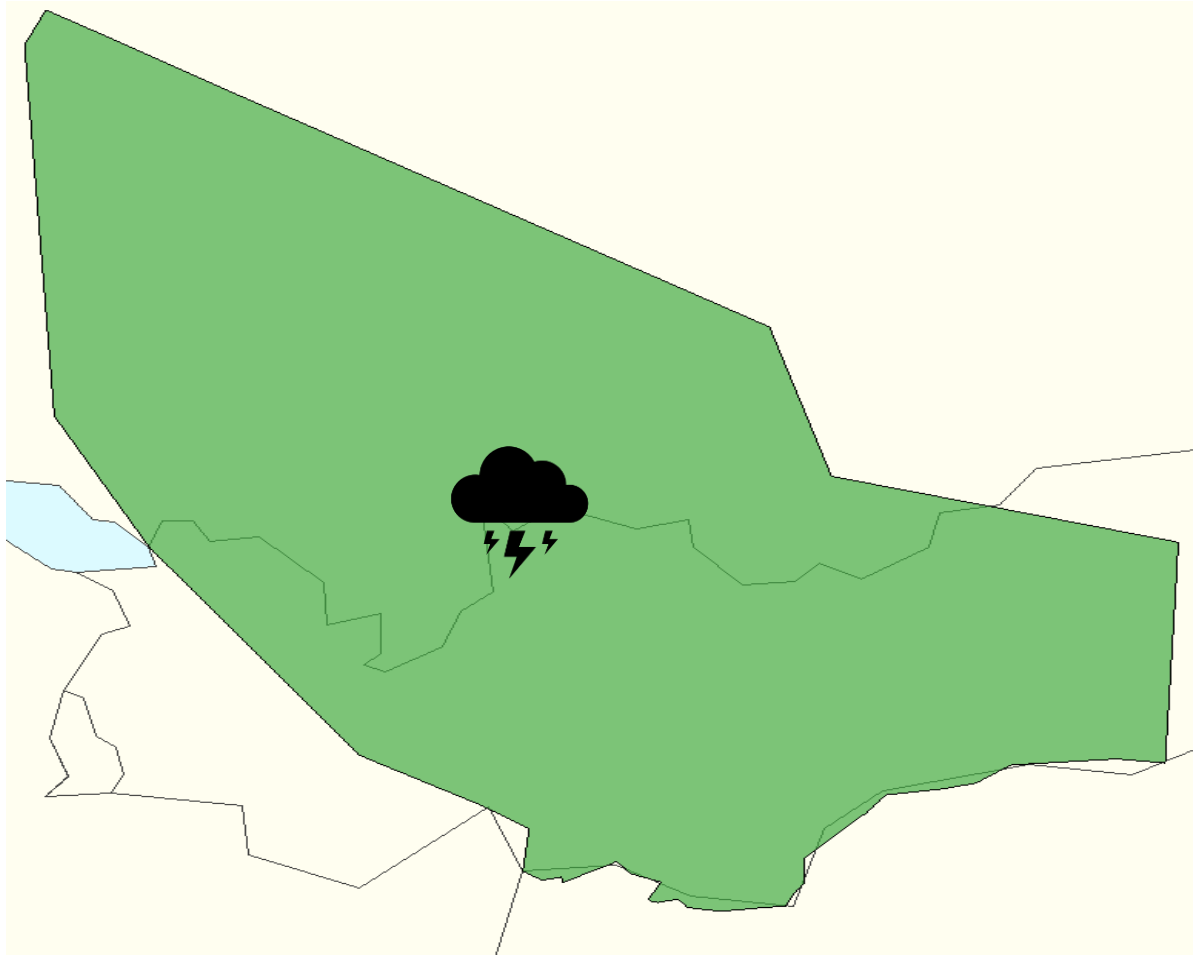
Types of Weather

Stable and moving slowly

– This kind of weather is more plannable and easier to handle

– Traffic is quite predictable, the controller can prepare for the movements

– Additional traffic can be taken into consideration due to quite similar flight paths



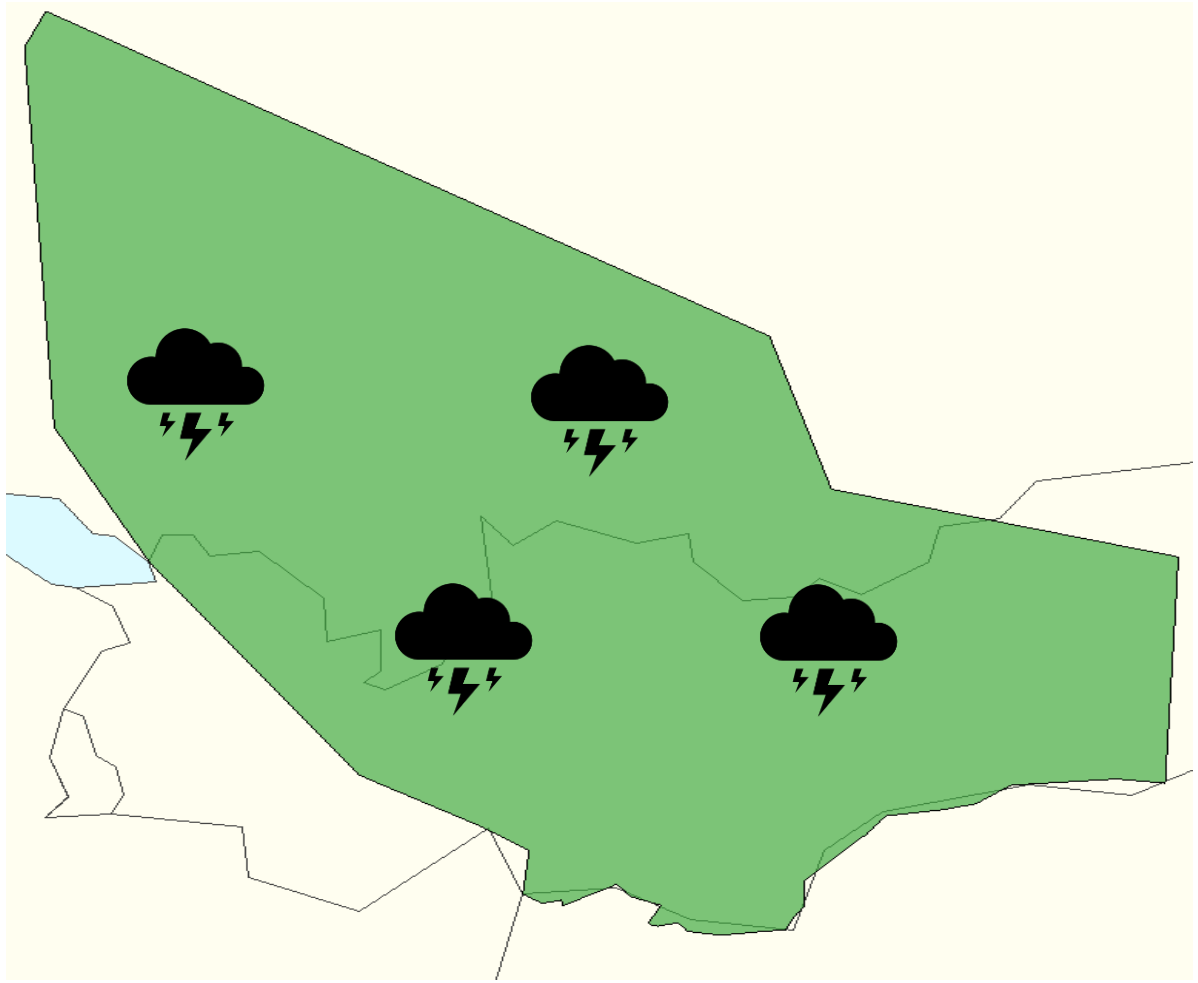
Types of Weather

Changing and moving fast

– This kind of weather is unpredictable and changing all the time during the day

– The controller is not able to predict the movements requested by pilots

– Additional traffic has to be taken into consideration on the network level, traffic appears on very short notice



Key Challenges with Adverse Weather

DFS Deutsche Flugsicherung

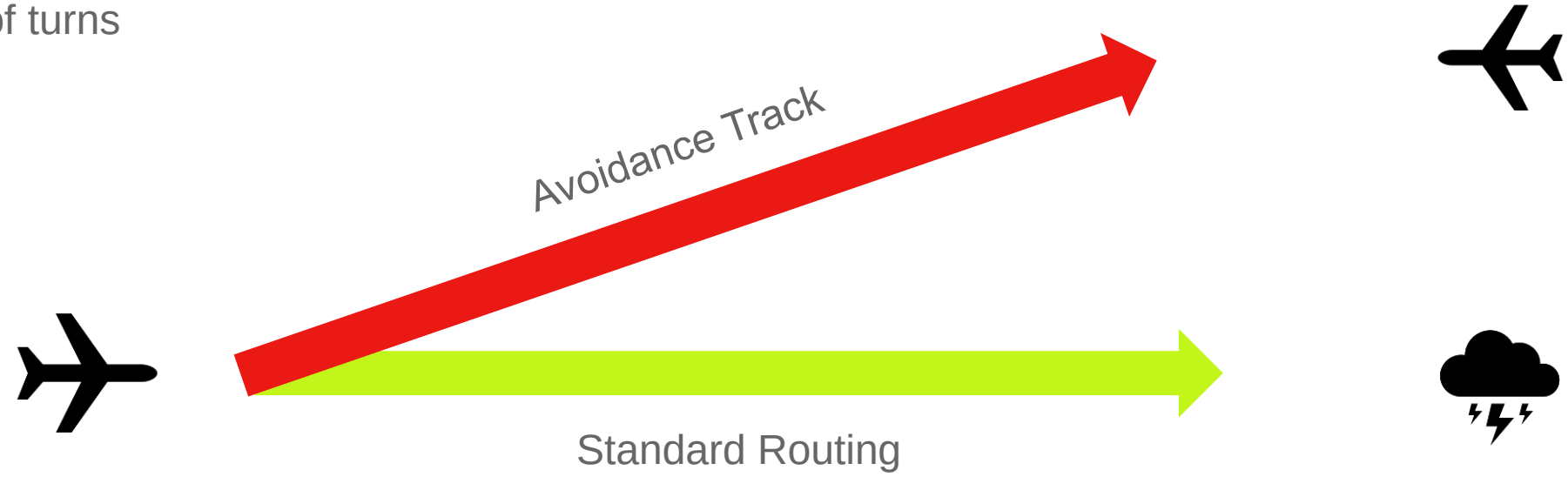
Types of Conflicts

Lateral Conflicts

– Standard Routes are designed to keep a certain amount of same level flights clear

– With weather avoiding there is no normal procedure possible anymore, so the controller has to widen his range to a bigger scale of potential conflicting routes

– You prefer to have all the flights in different levels, so vertical separation is assured regardless of the direction of turns



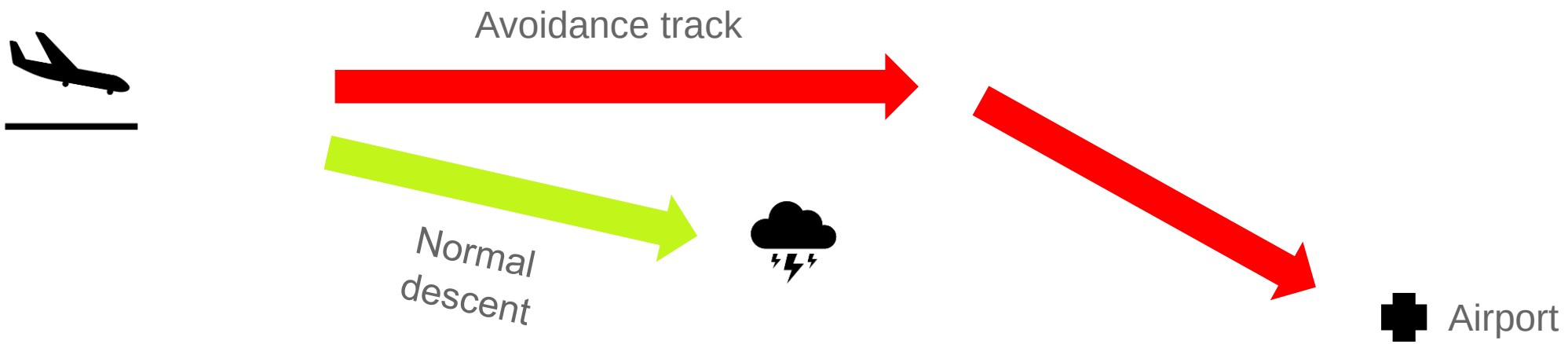
Types of Conflicts

Departure/Inbound Conflicts

– Even with a lot of avoiding traffic, departures in the upper airspace can be stopped or rejected at any time on the tactical level

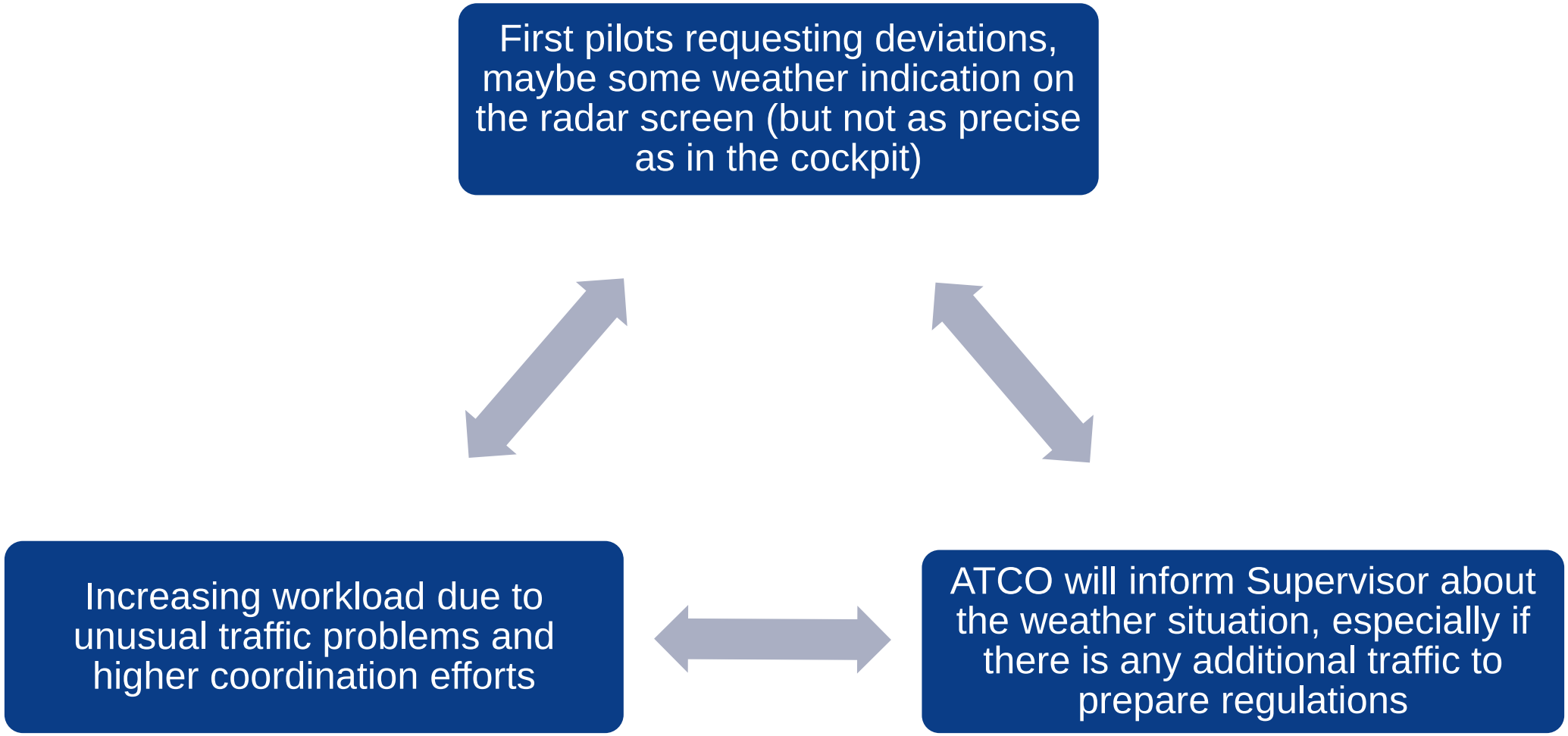
– Inbounds can increase the workload a lot, if they are not able to descent soon enough

– Especially inbound traffic, which is normally below your own sector leads to a lot of extra coordination work with the lower sectors



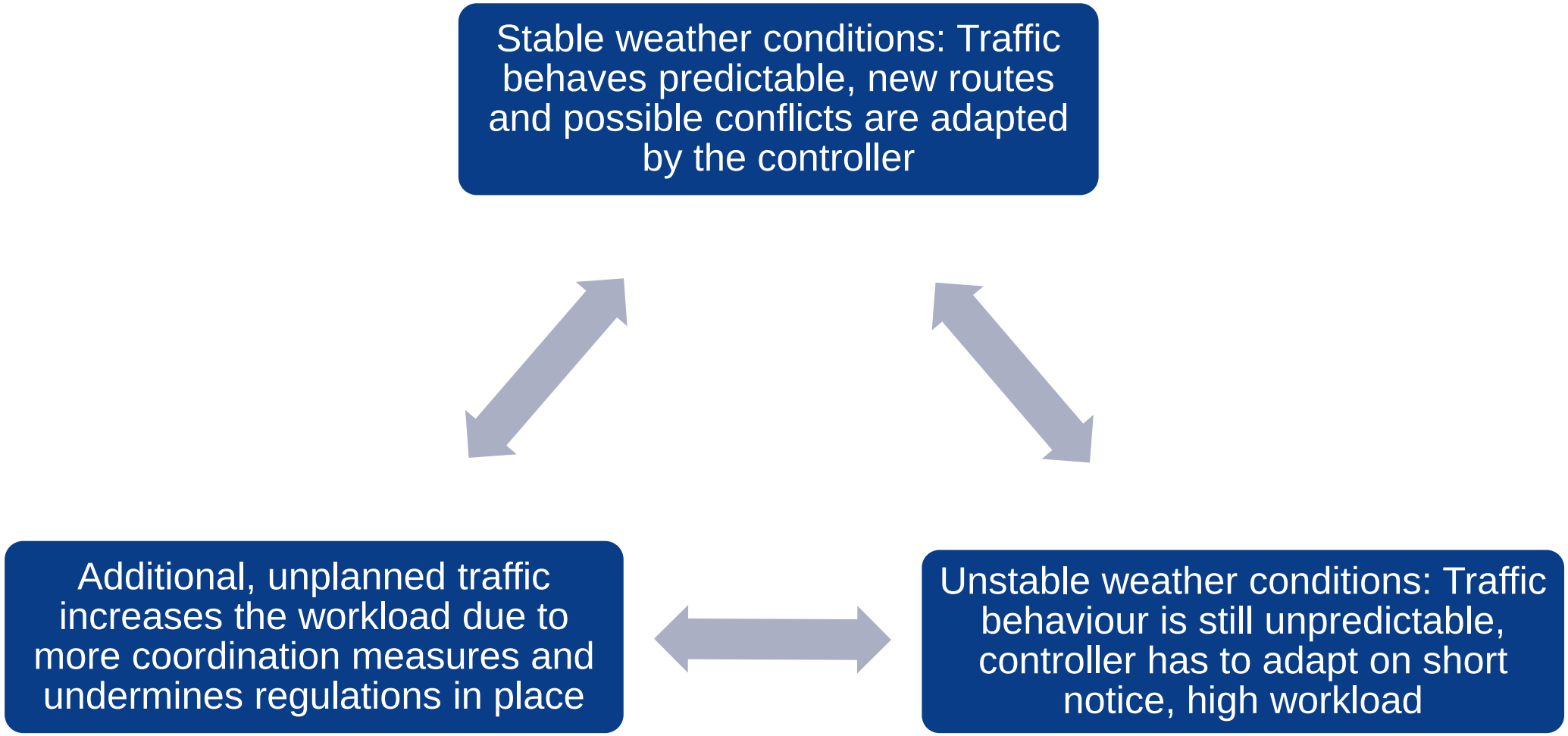
Increase of Workload

Early Stage



Increase of Workload

Mid Stage



Increase of Workload

Mid Stage

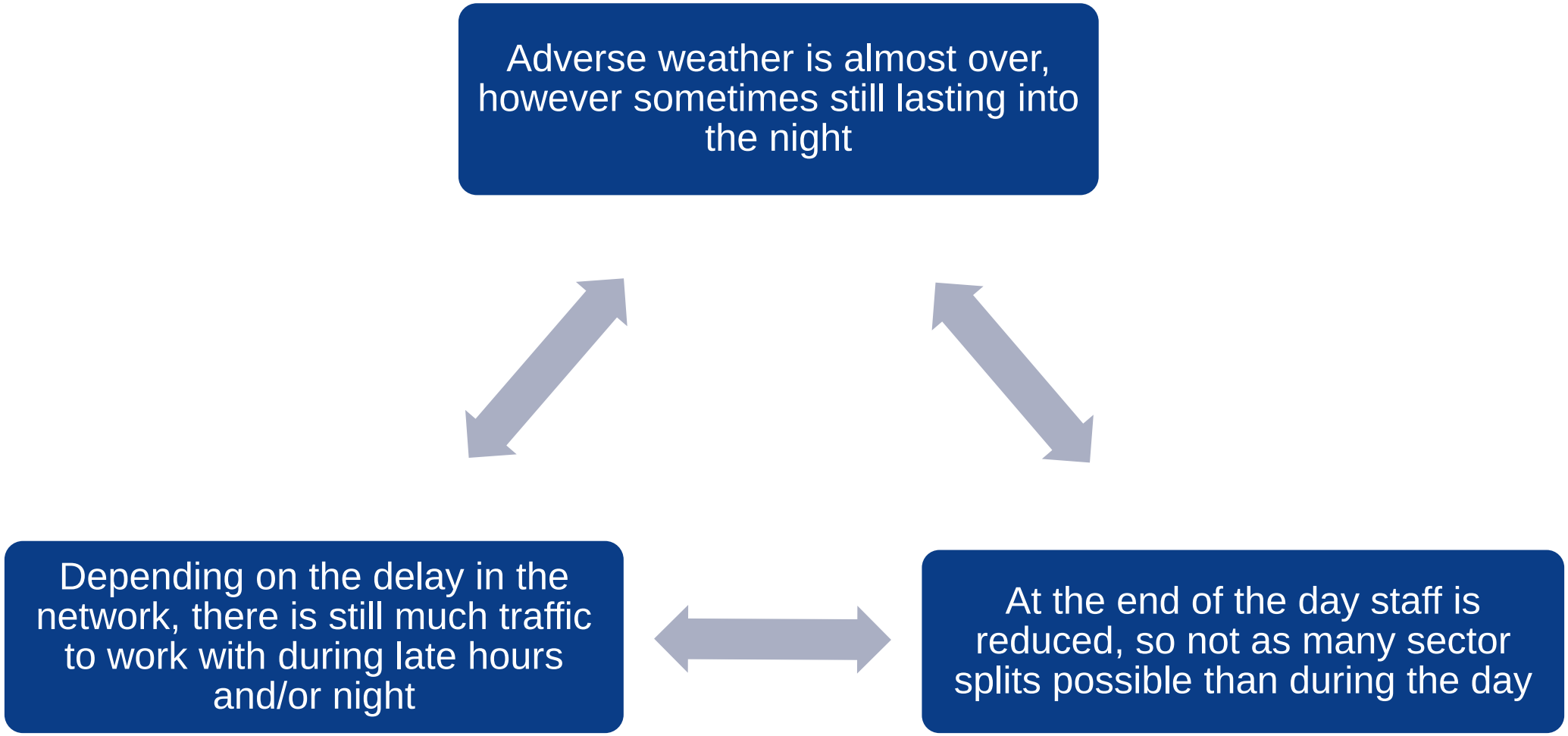
Stable weather conditions: Traffic behaves predictable, new routes and possible conflicts are adapted by the controller

Unstable weather conditions: Traffic behaviour is still unpredictable, controller has to adapt on short notice, high workload

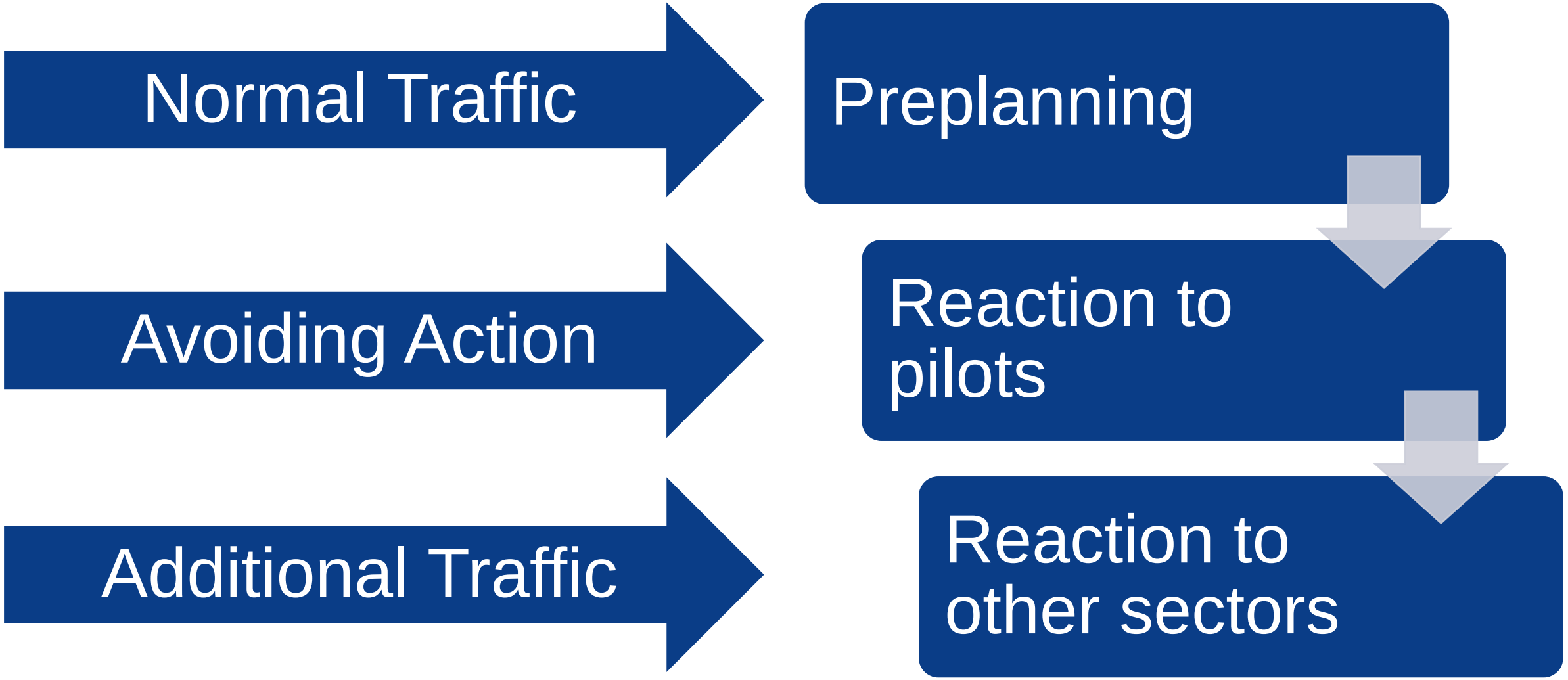
Additional, unplanned traffic increases the workload due to more coordination measures and undermines regulations in place

Increase of Workload

Late Stage



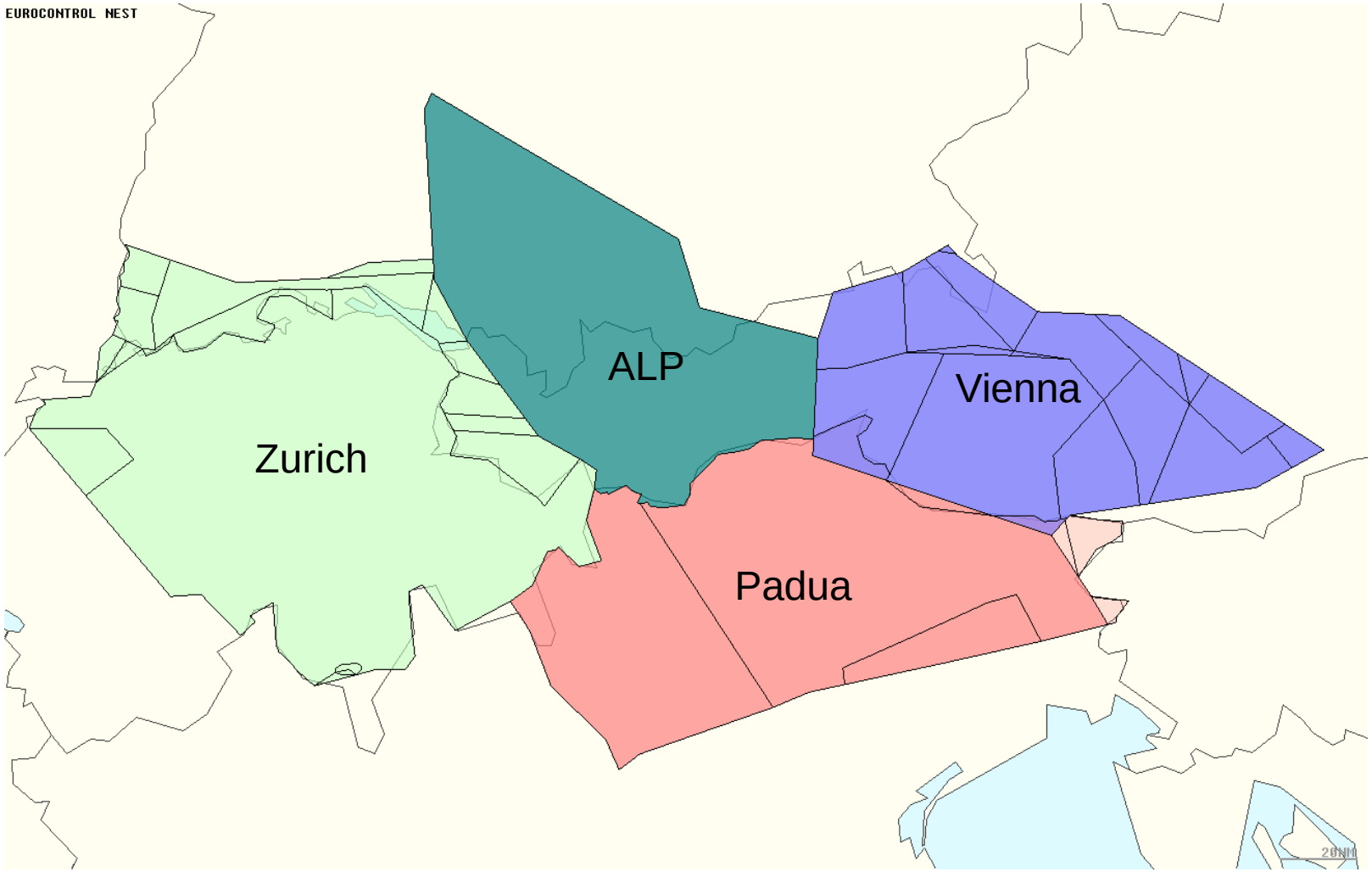
Workflow with Adverse Weather



DFS Deutsche Flugsicherung

Example ALP-Sector

Adjacent Sectors ALP



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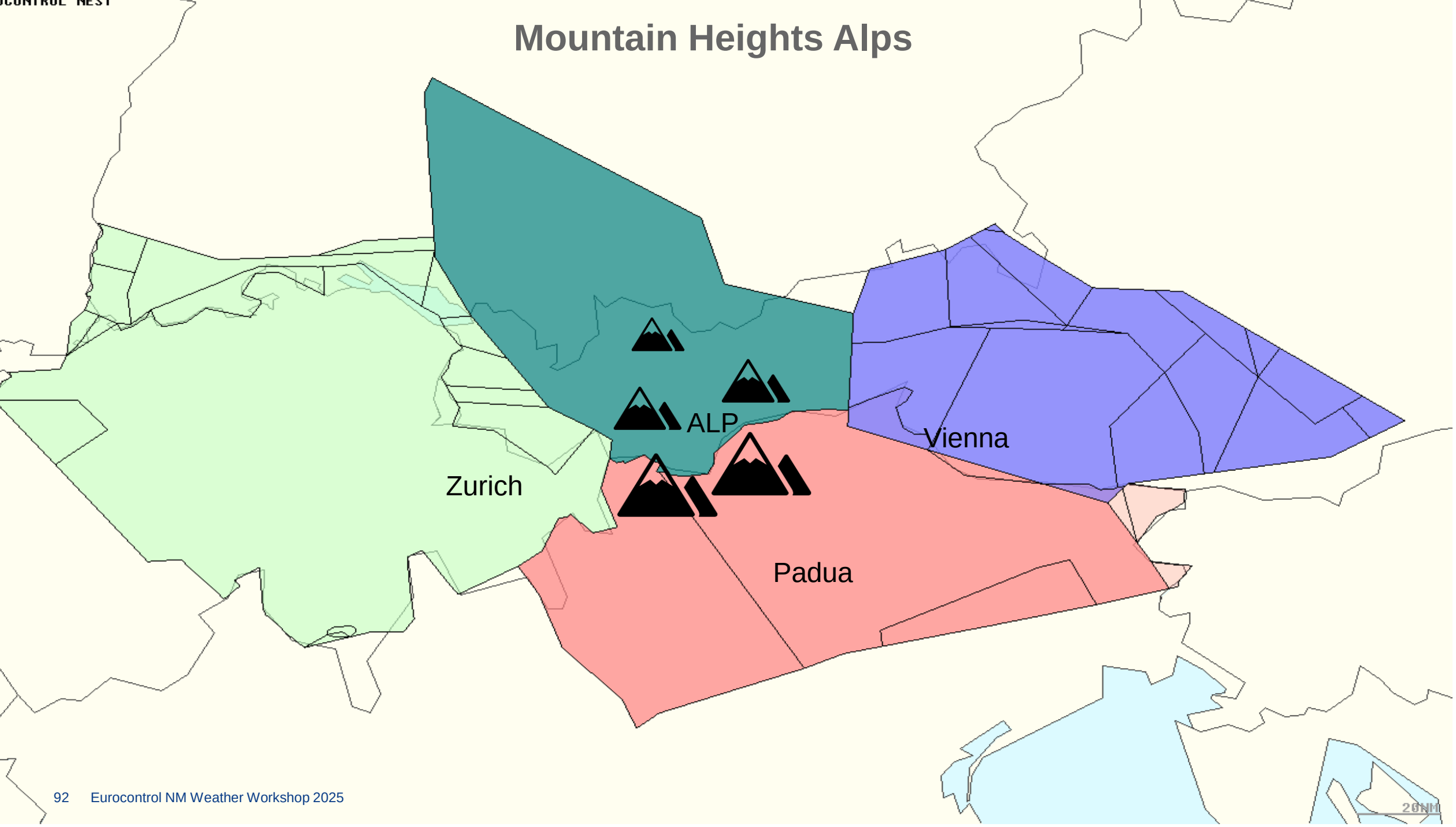
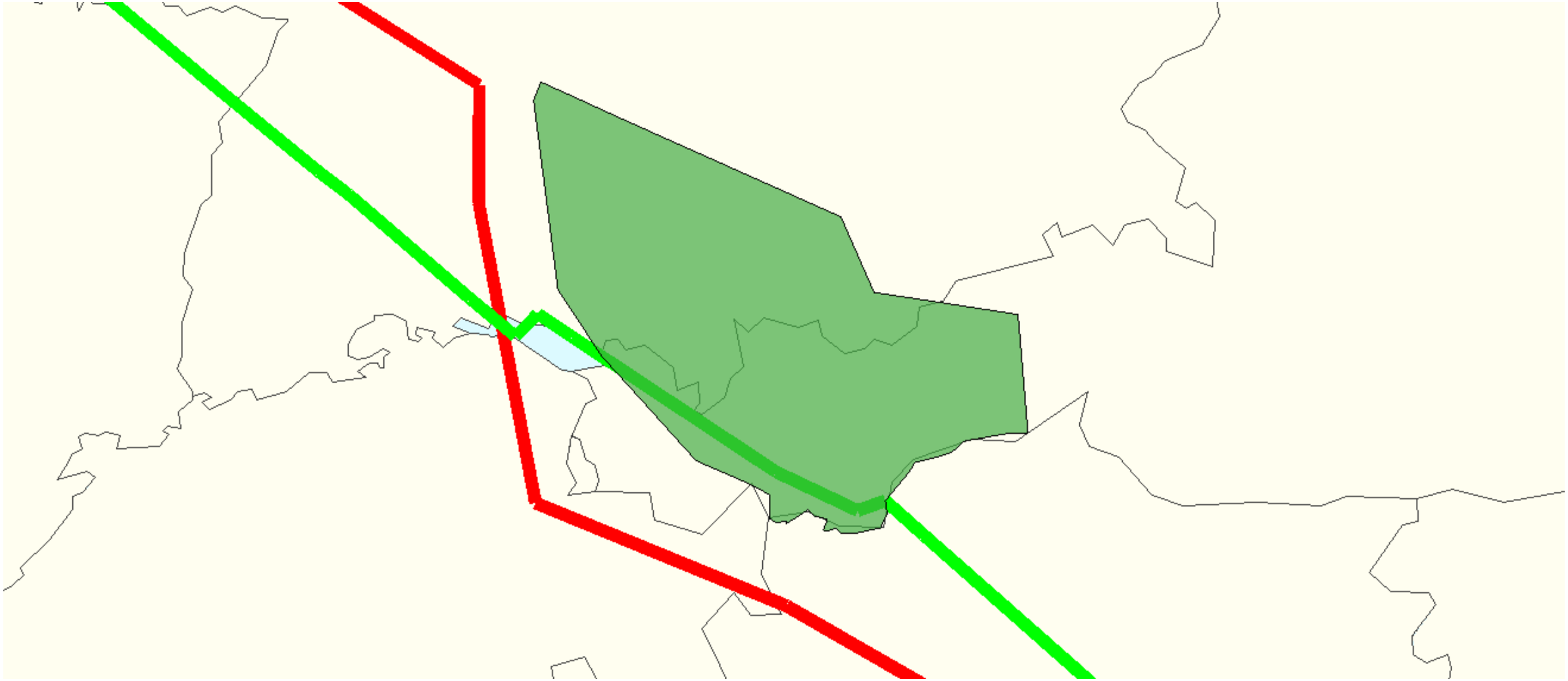
Mountain Heights Alps



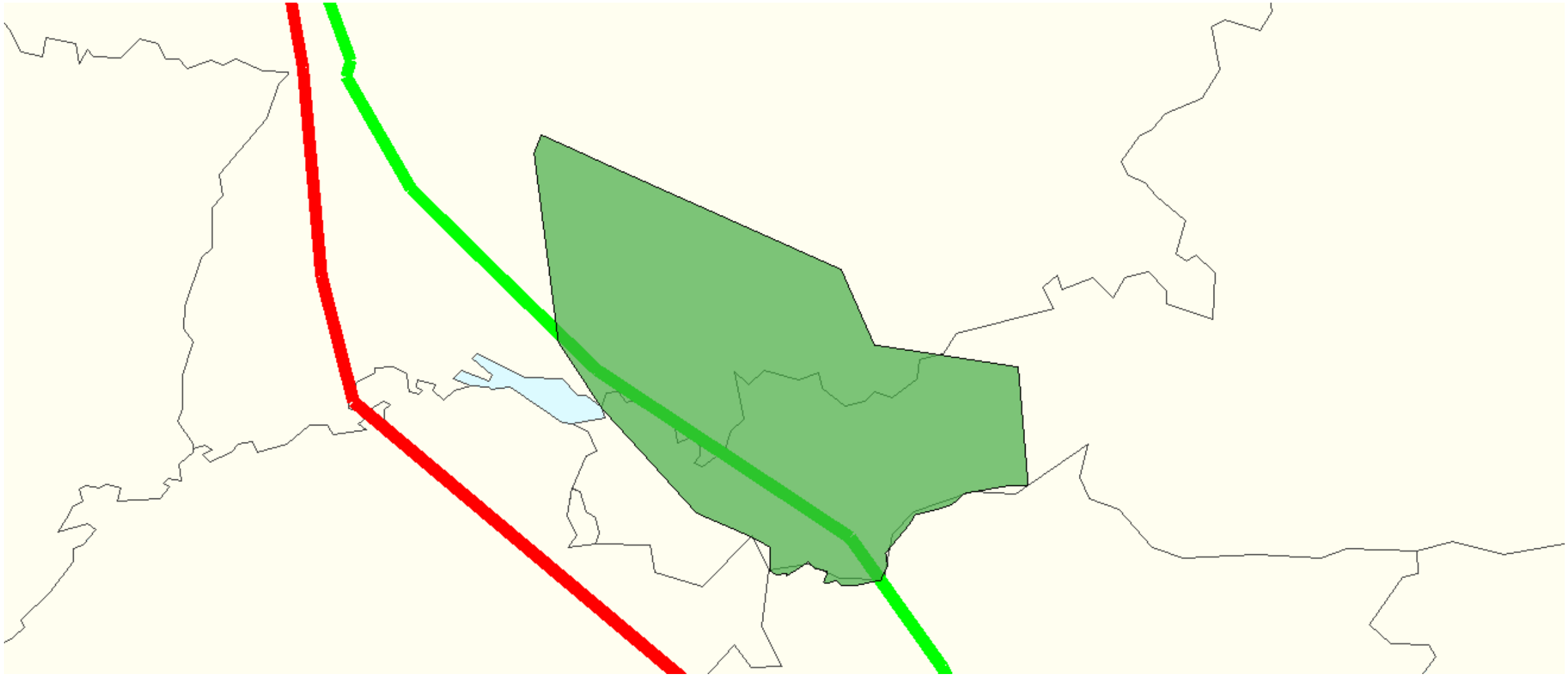
Possible Sources of Additional Traffic

KLM from Split to Amsterdam (July, 21th 2024)



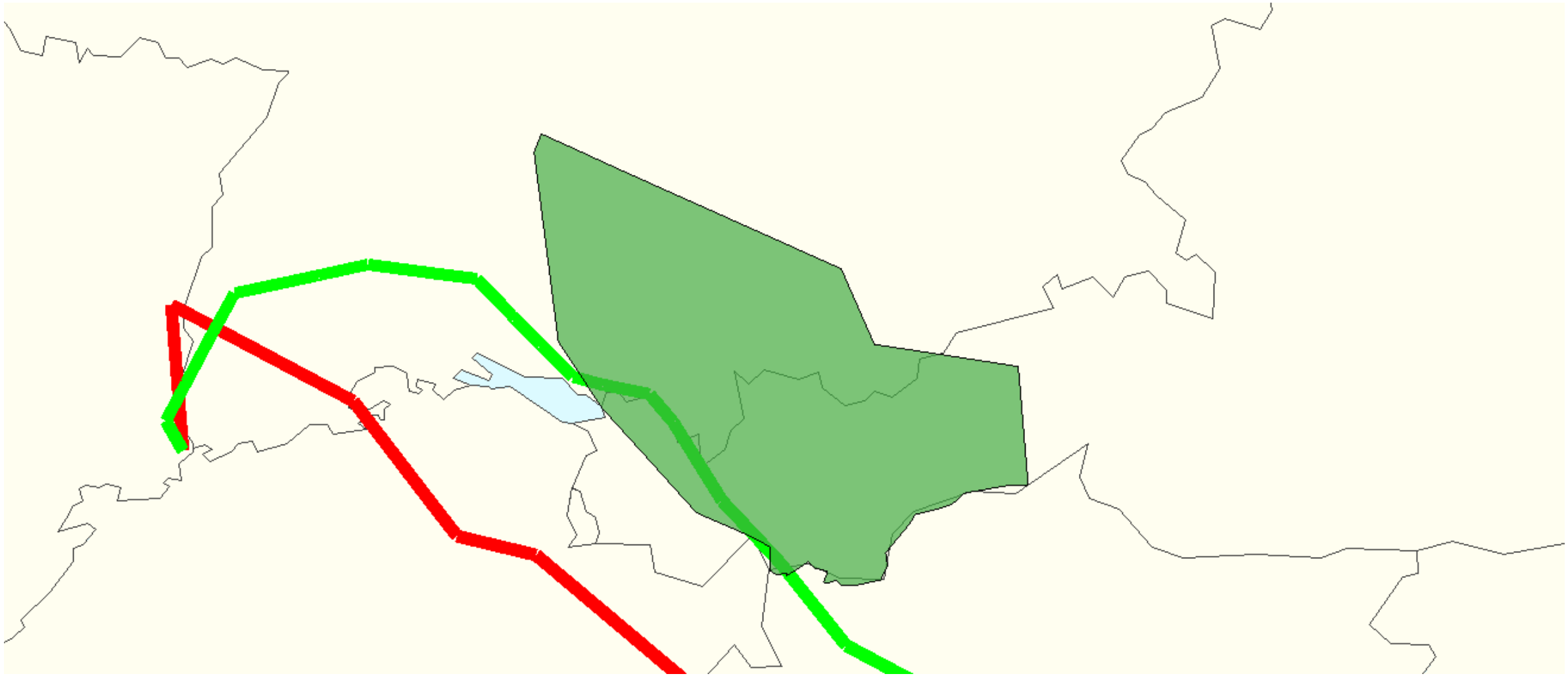
Possible Sources of Additional Traffic

Condor from Düsseldorf to Split (July, 21th 2024)



Possible Sources of Additional Traffic

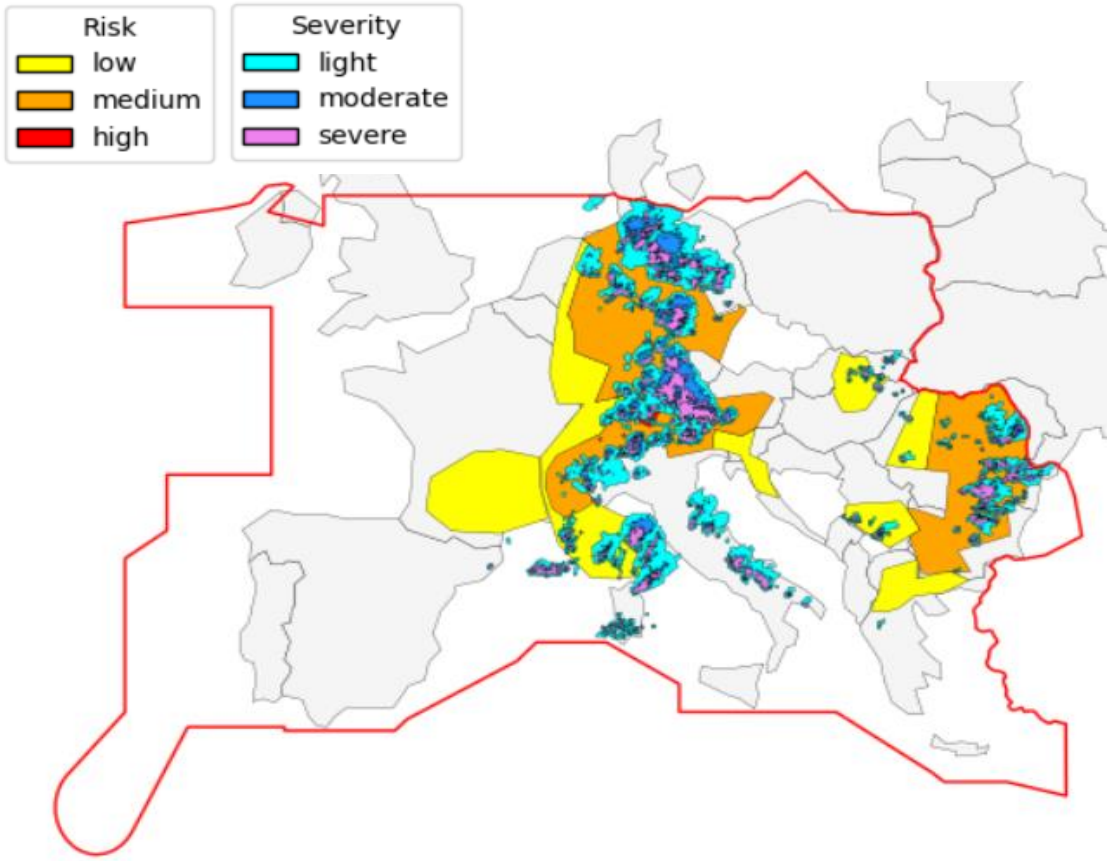
Turkish Airlines from Istanbul to Basel (July, 21th 2024)



The key to safe and efficient operations during adverse weather is the early preplanning of additional traffic on the network level and to avoid any surprises to the controllers working the sector.

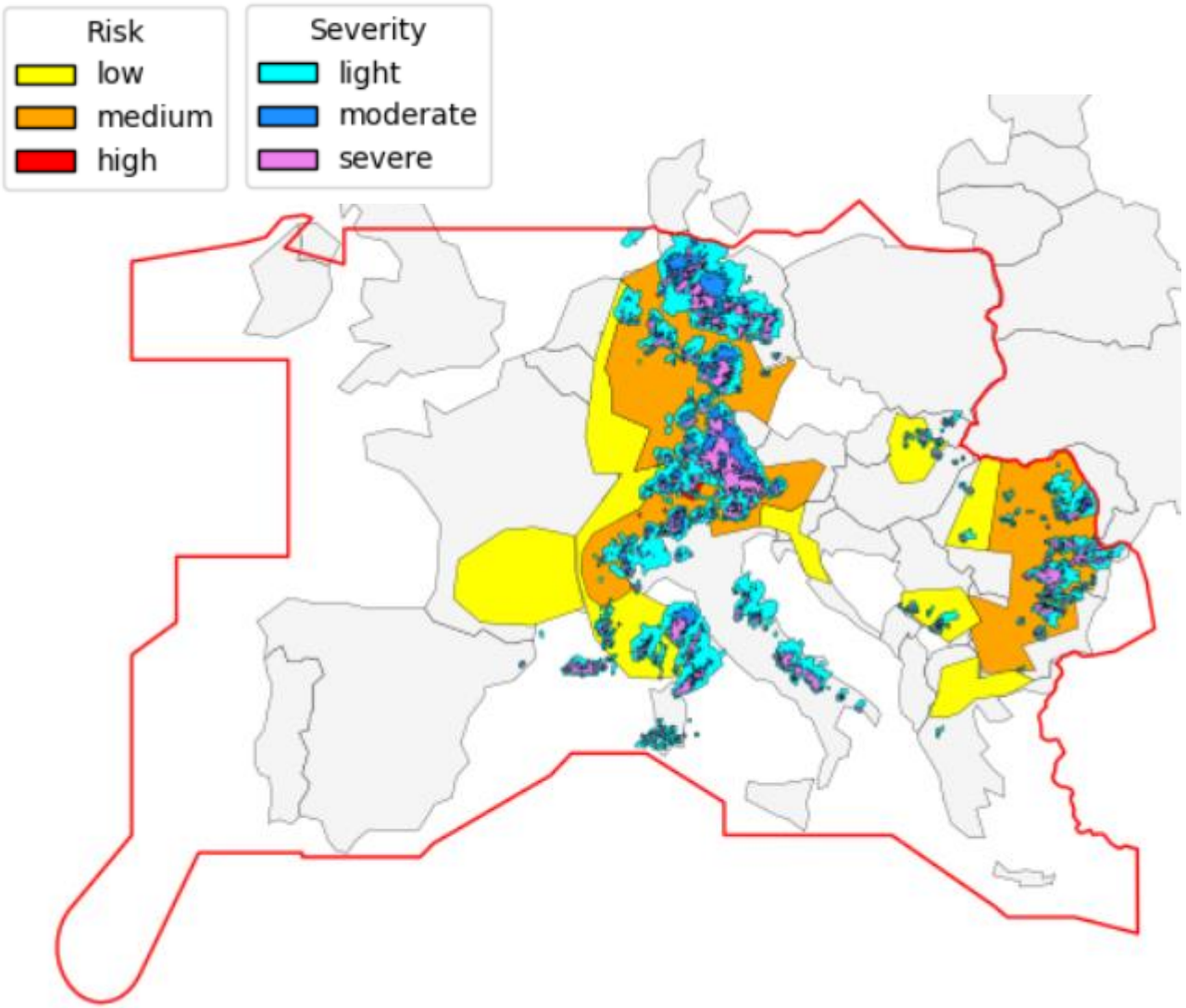
Use the **QR code** or
go to **ectrlvote.eu** and
log in with **eurocontrol521**

15:00-18:00

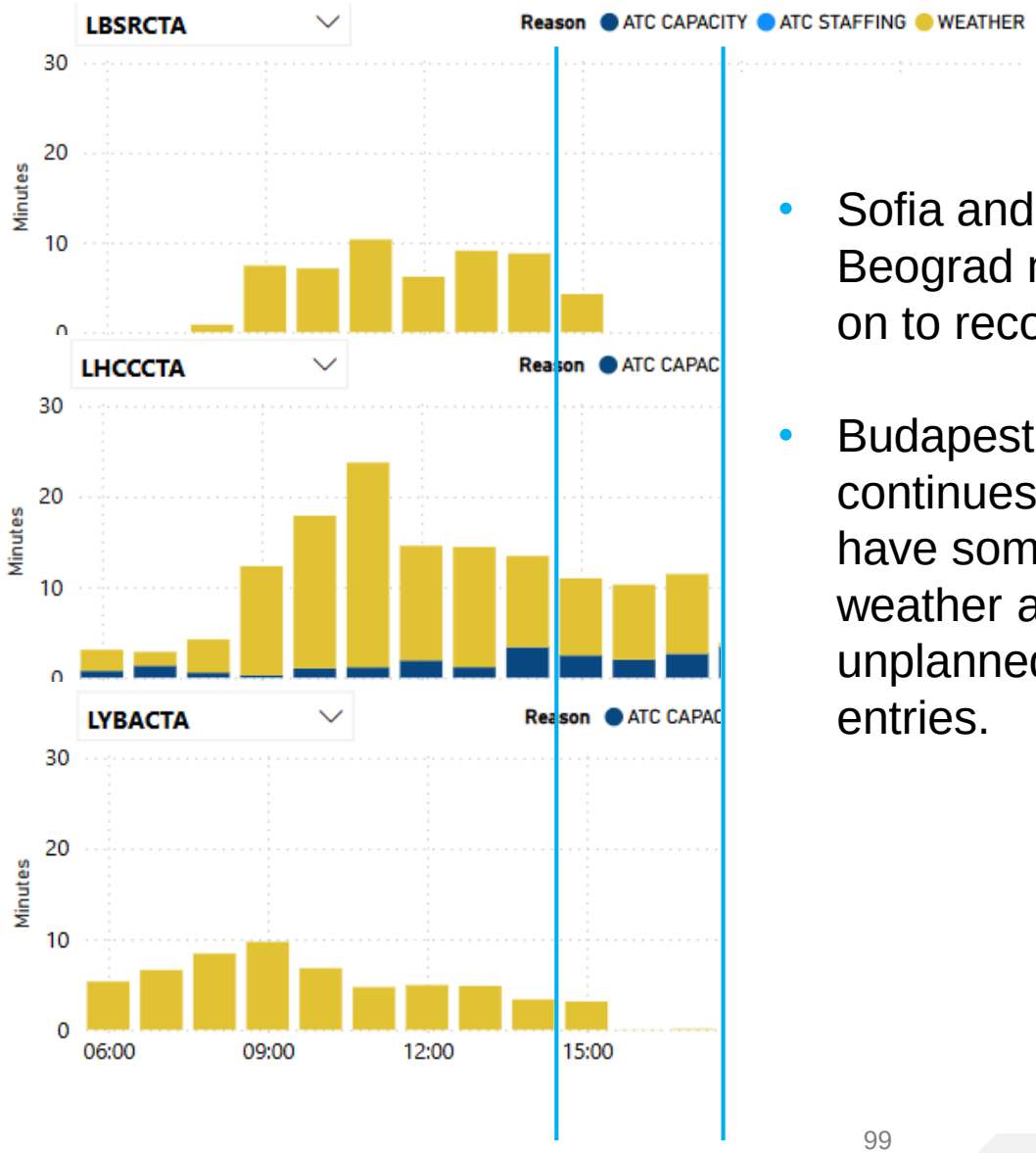


- Recovery in South East Axis
- Weather leaves Barcelona but stays in Marseille
- CBs intensify over Germany

15:00-18:00

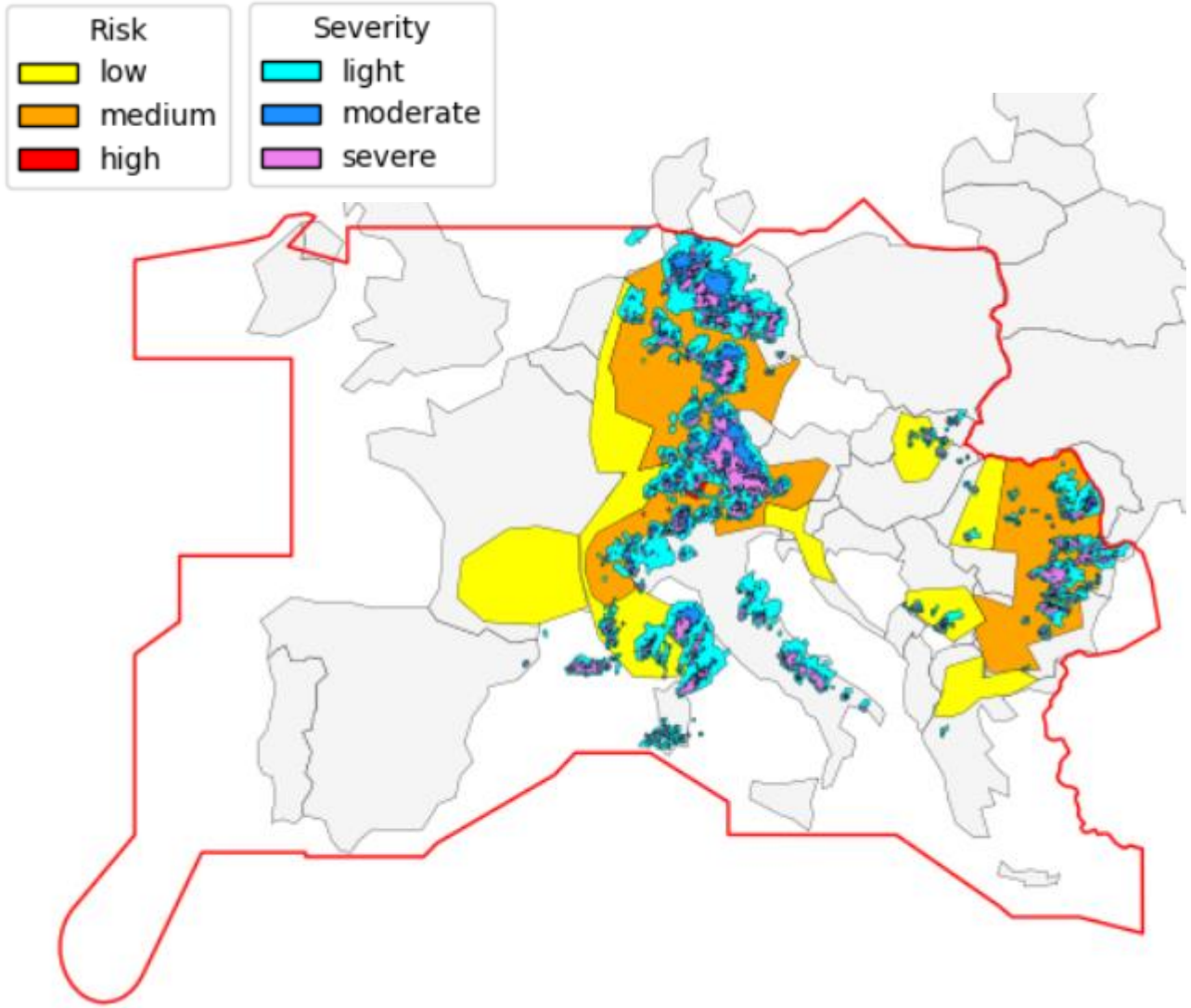


Hourly Delay Per Flight

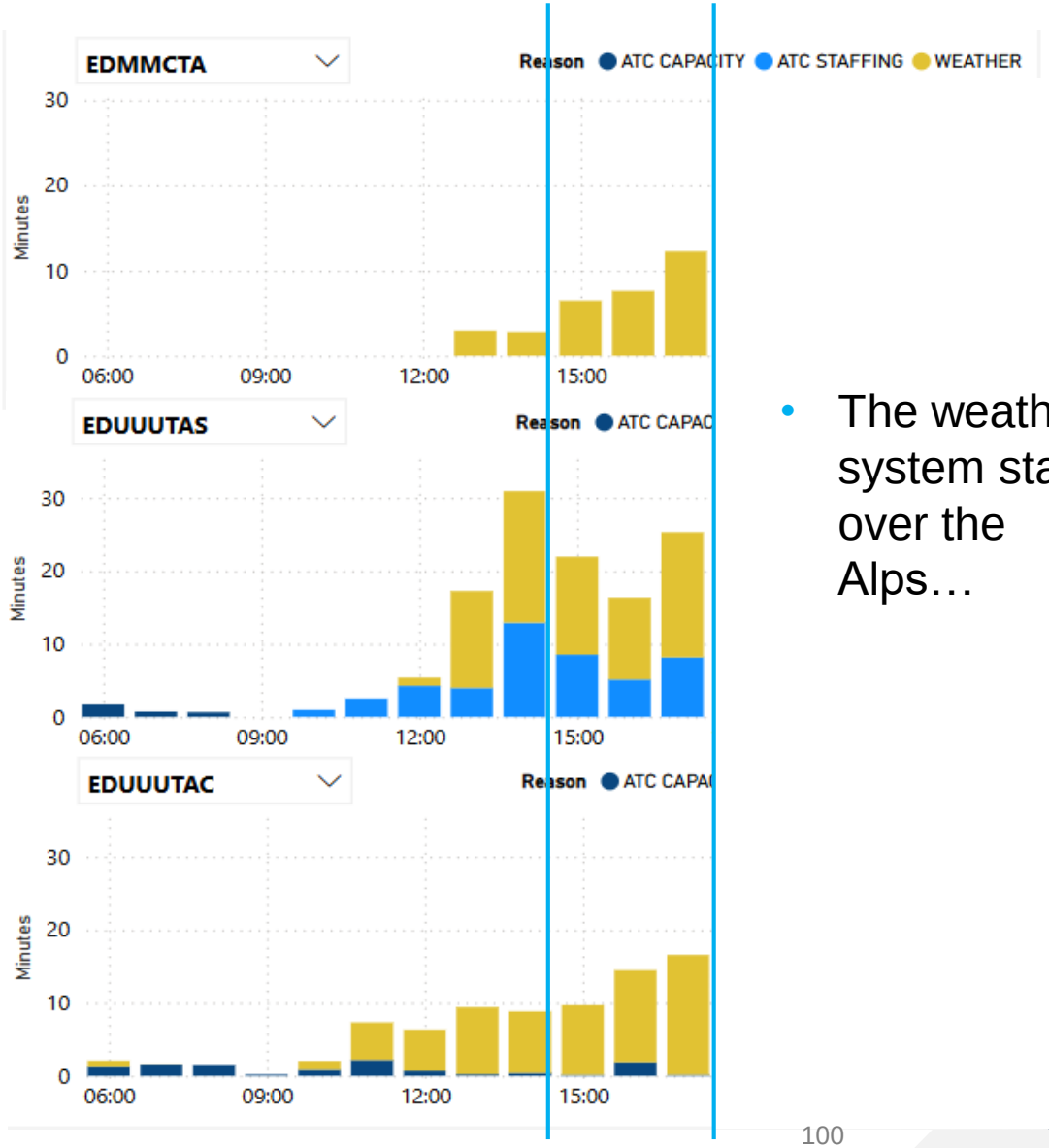


- Sofia and Beograd move on to recovery.
- Budapest continues to have some weather and unplanned entries.

15:00-18:00

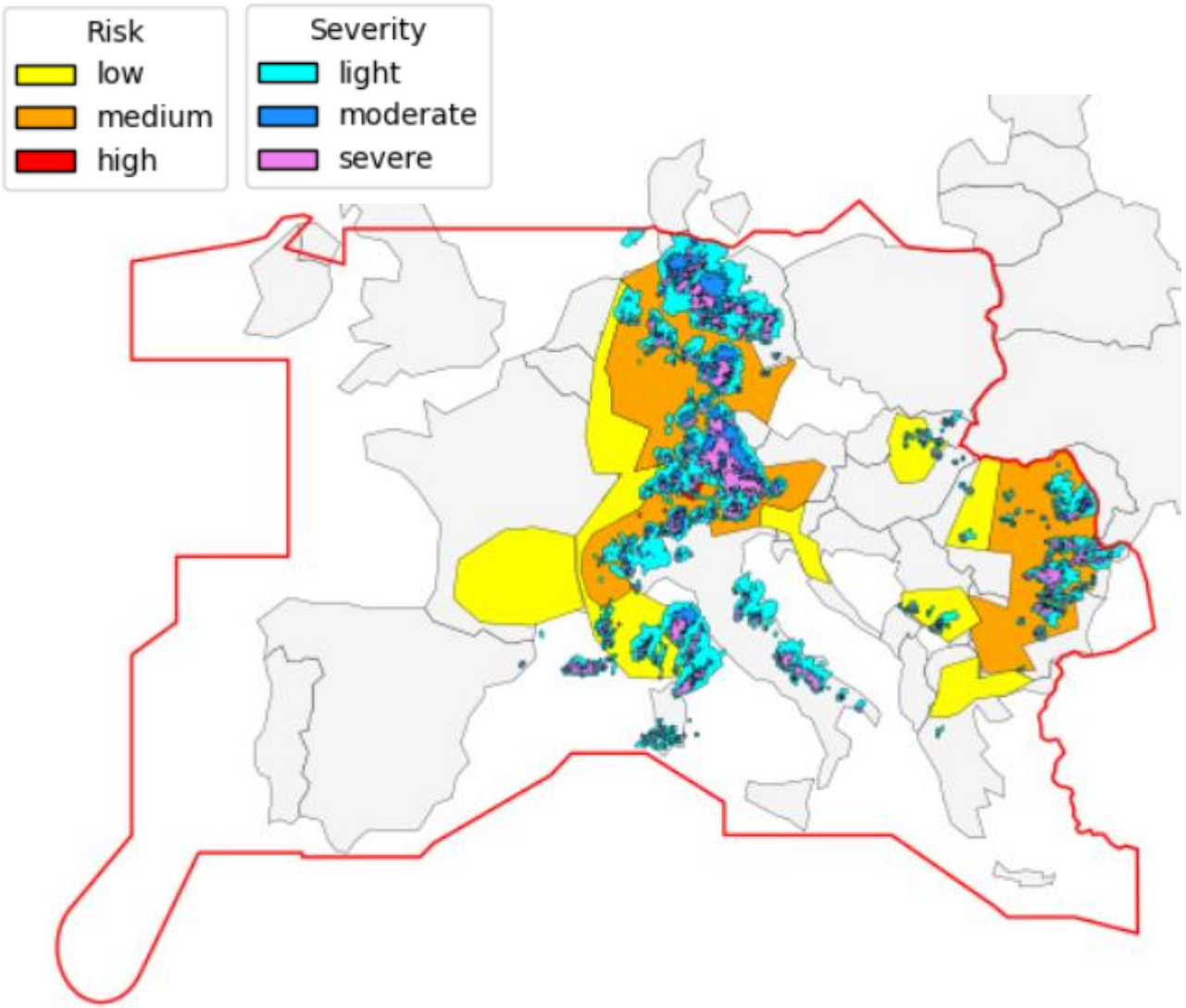


Hourly Delay Per Flight

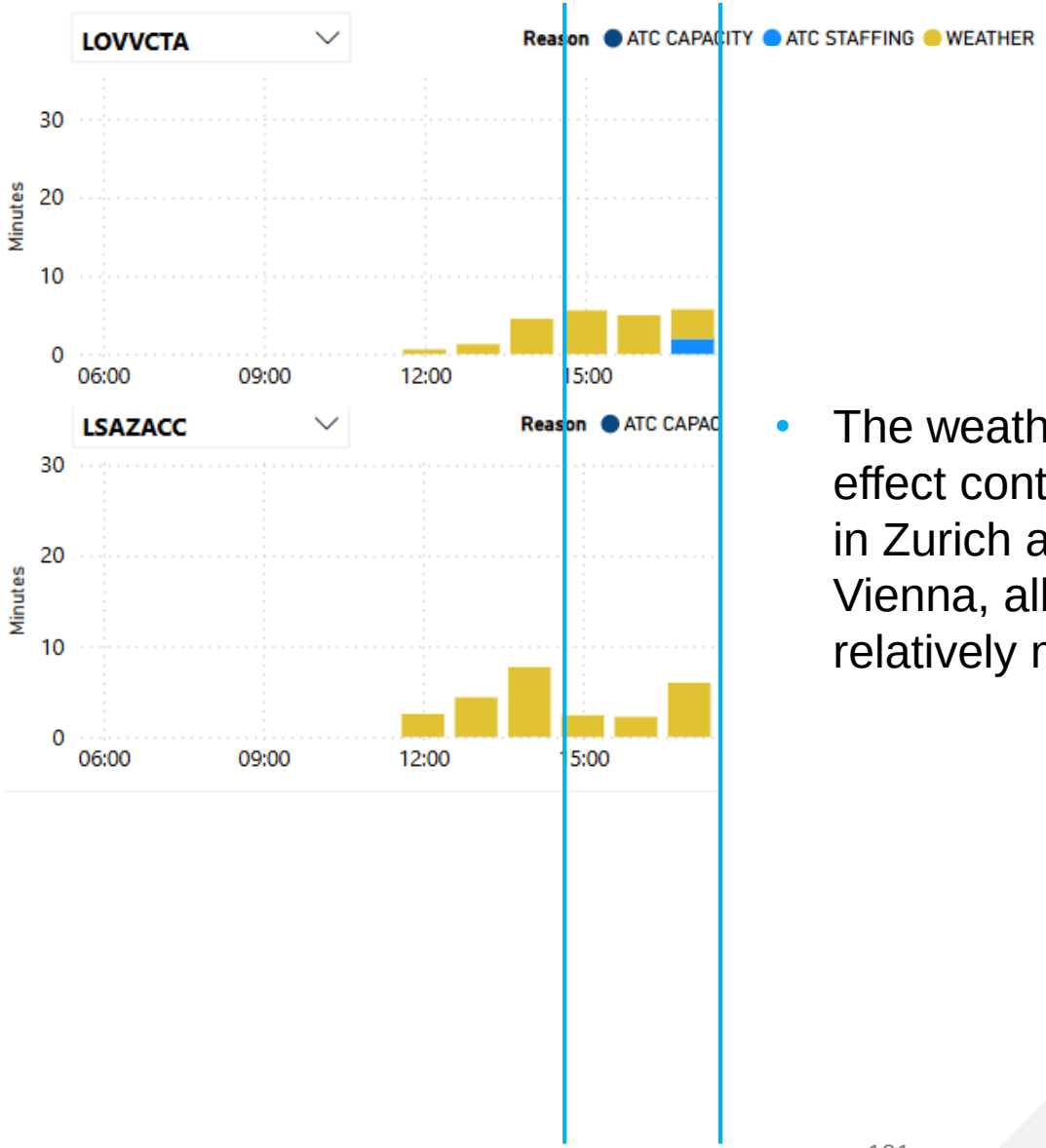


- The weather system stays over the Alps…

15:00-18:00

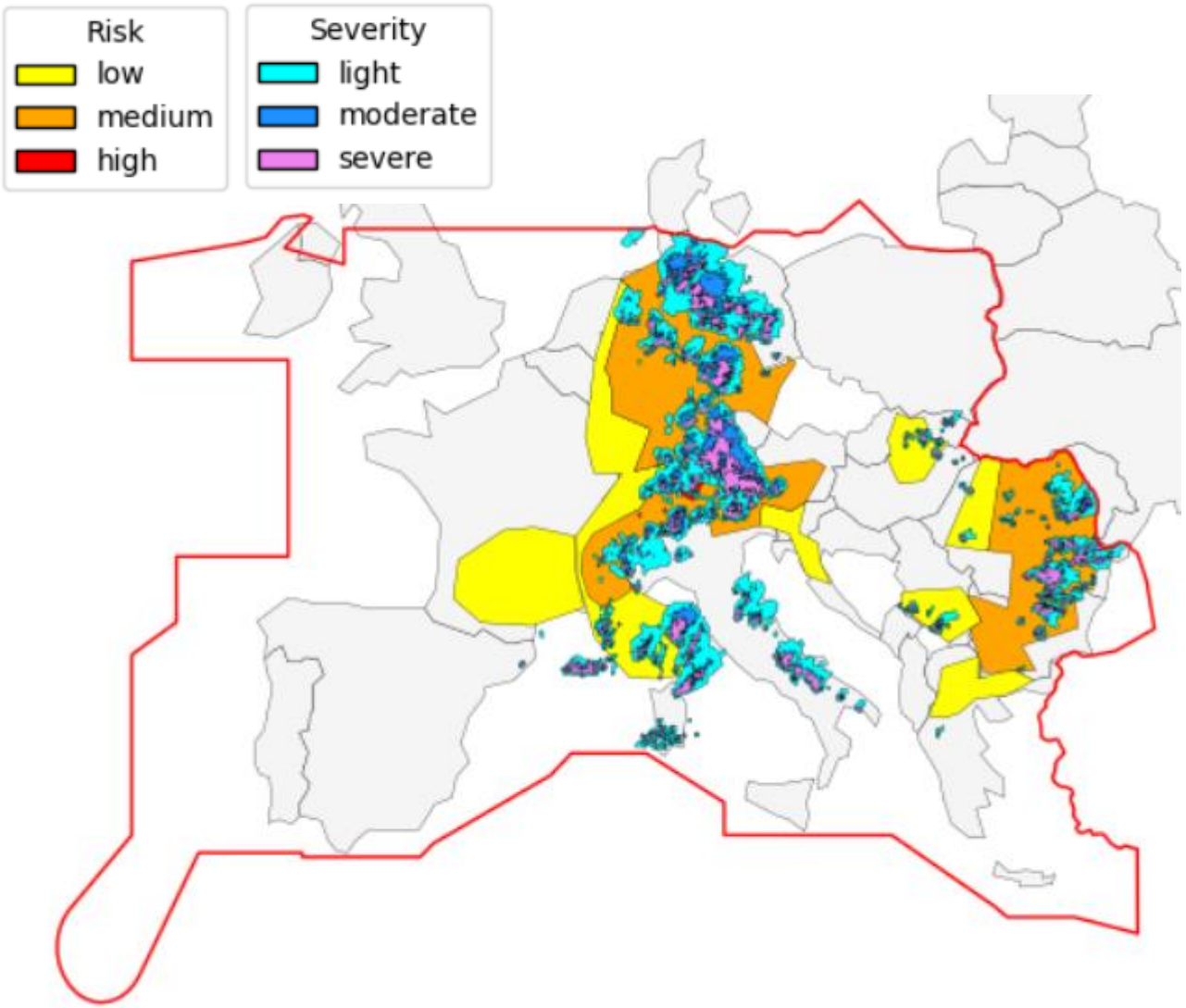


Hourly Delay Per Flight

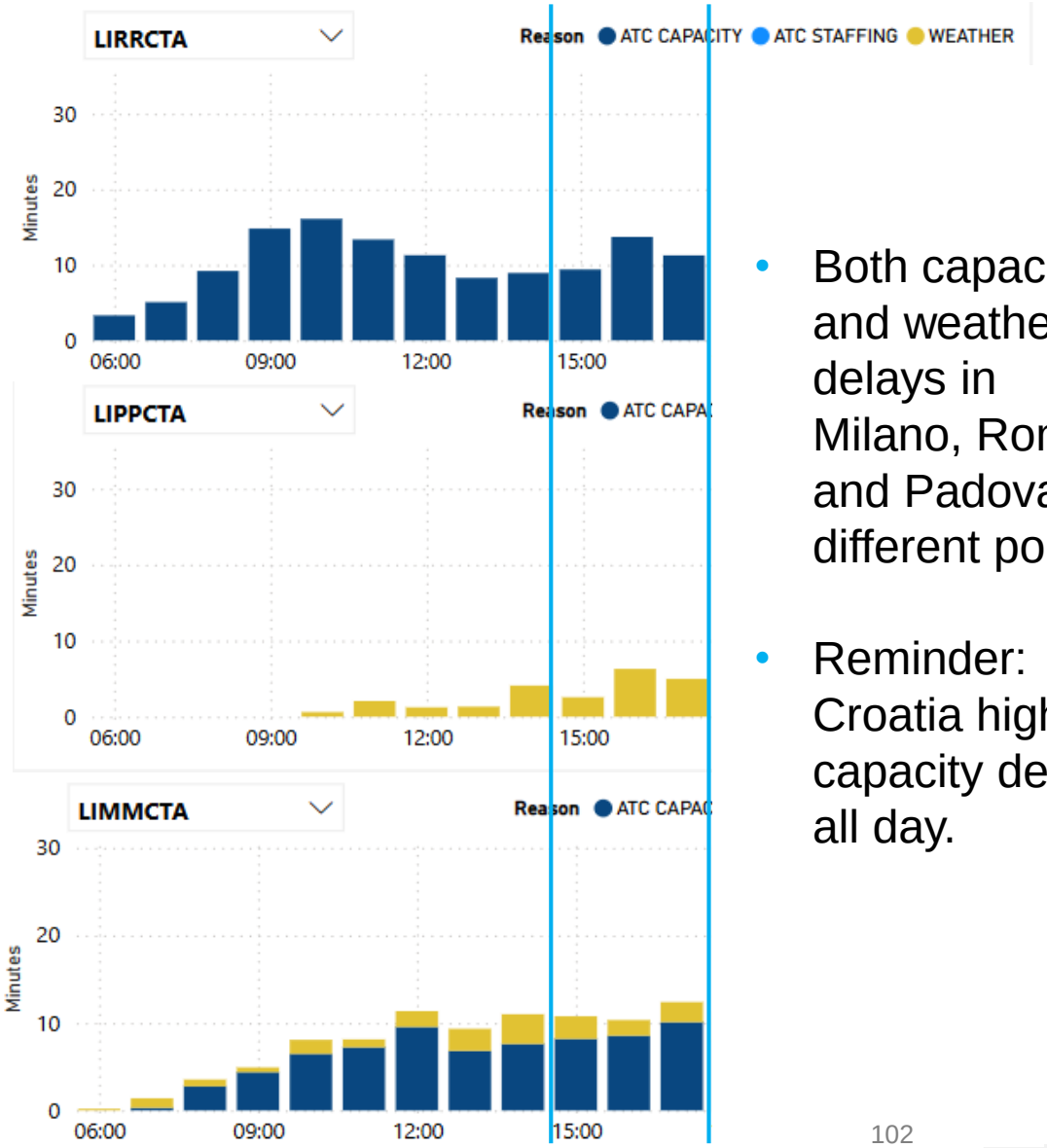


- The weather effect continues in Zurich and Vienna, albeit relatively mildly.

15:00-18:00

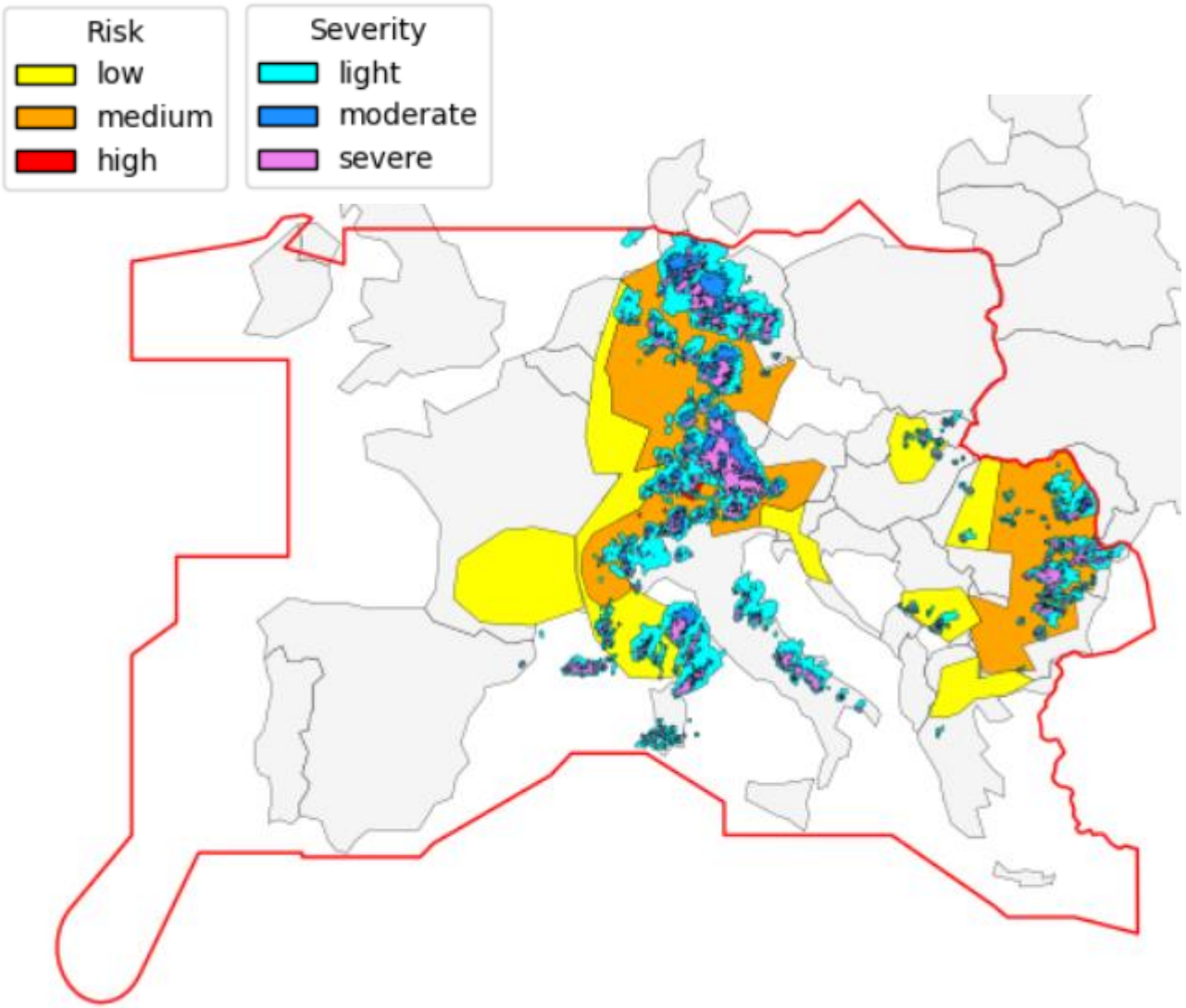


Hourly Delay Per Flight



- Both capacity and weather delays in Milano, Roma and Padova at different points.
- Reminder: Croatia high capacity delays all day.

15:00-18:00



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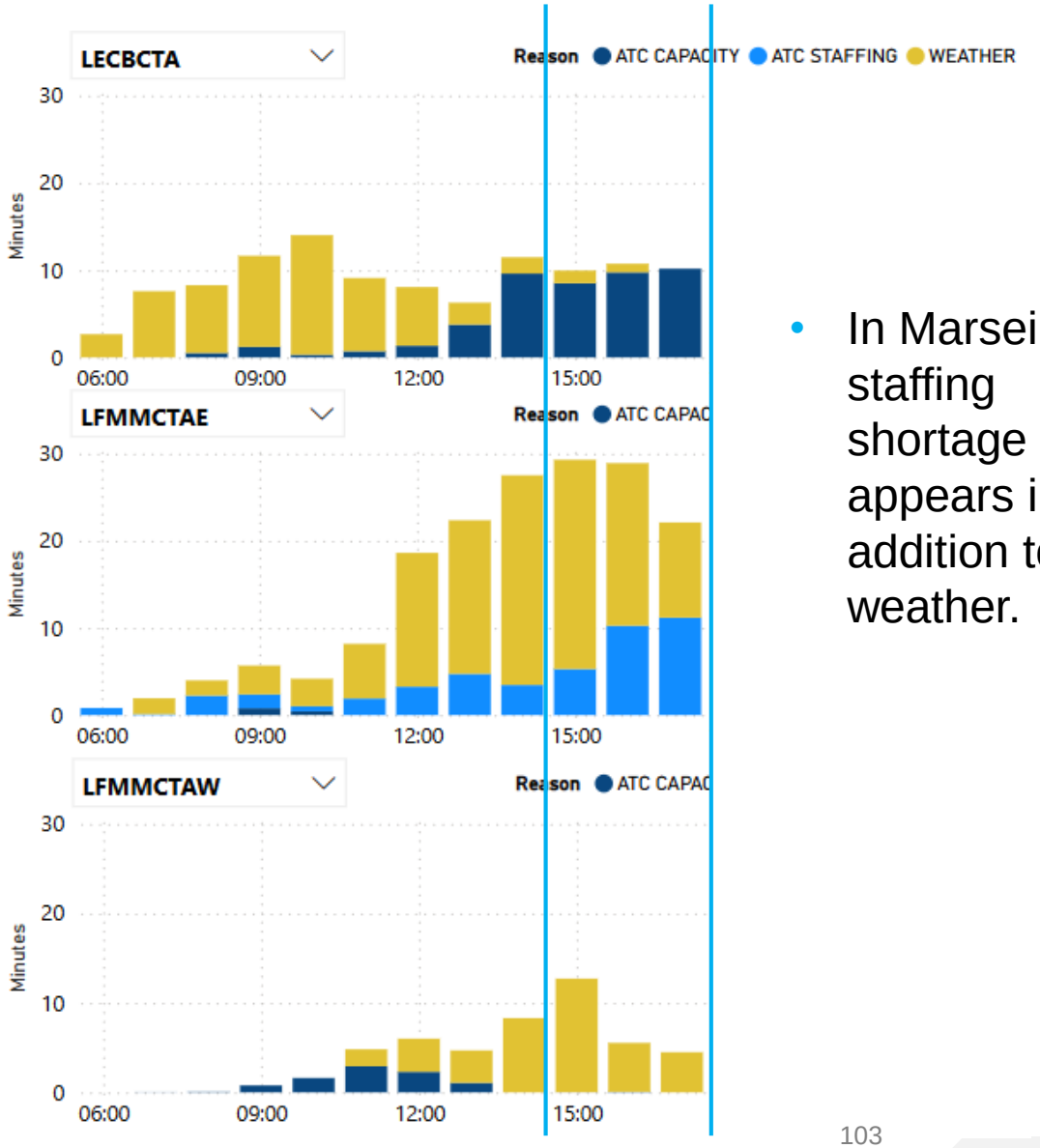
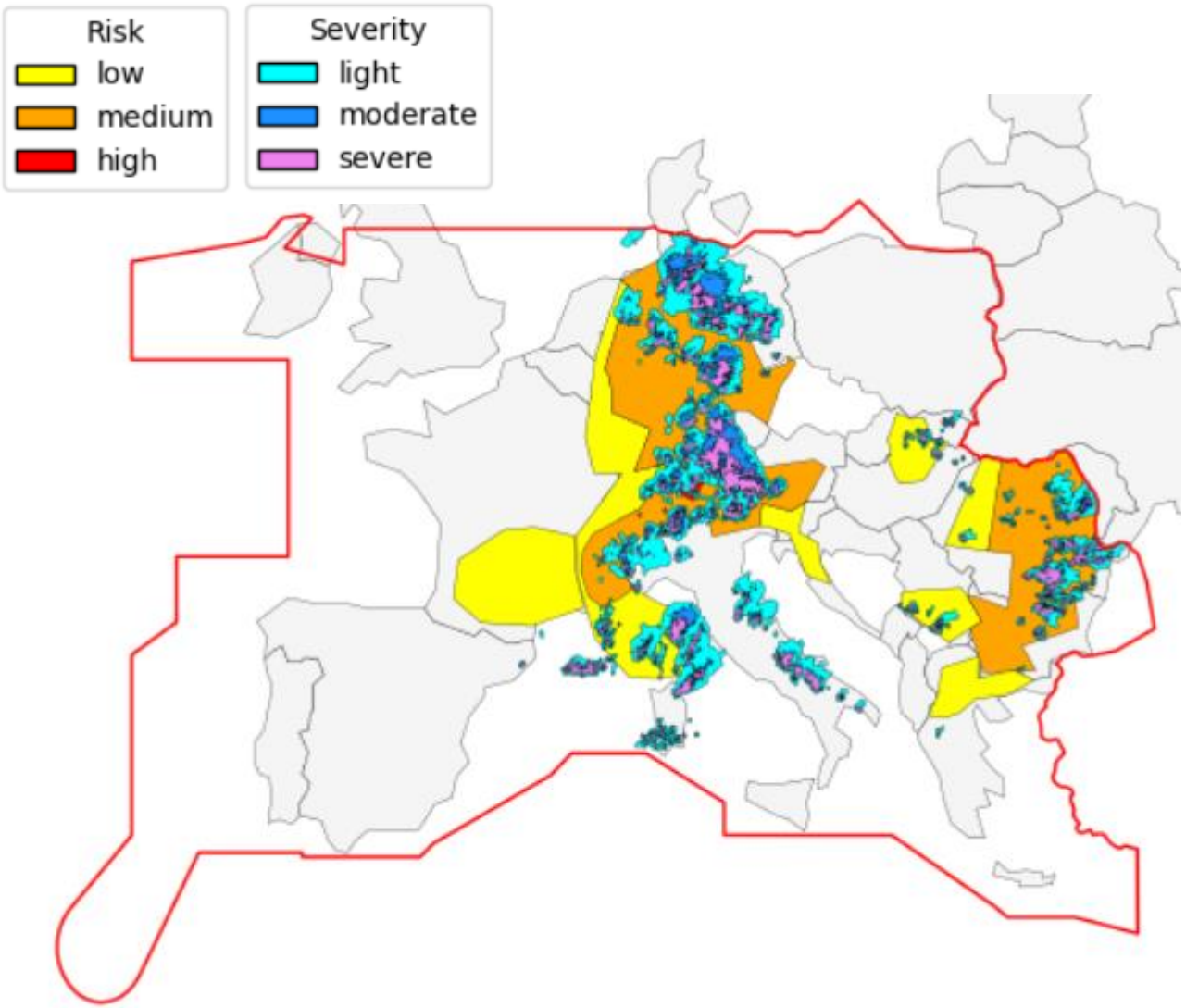
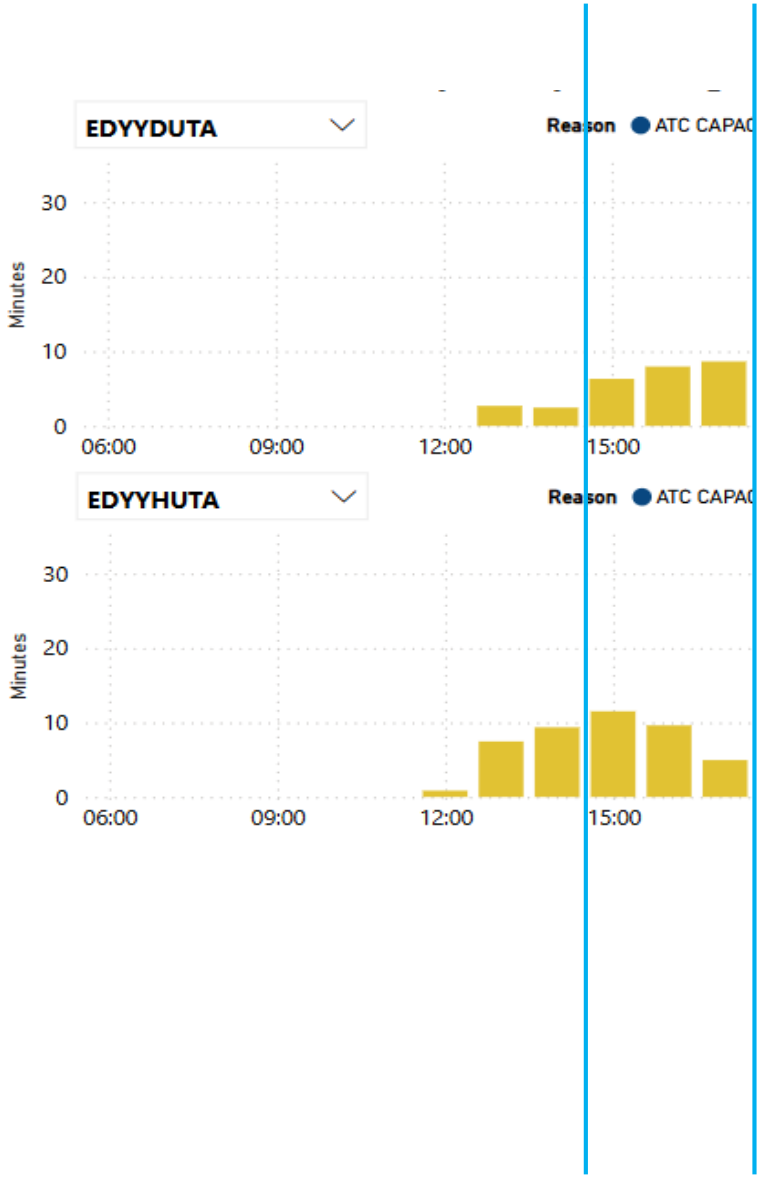


- In Marseille, staffing shortage appears in addition to weather.

15:00-18:00



Hourly Delay Per Flight



- Relatively mild delays in Maastricht Deco and Hannover.

NM Weather Workshop 03/2025
AO Perspective – TUI Airline

Pre-Tactical Preparation

Assessment of available information

- SigWX charts & other MET information
- NM Initial Network Plan

Preparation of flight planning system

- Closing areas of forecast SigWX for flight planning
- Potentially closing sectors with forecast high delays due to SigWX

Automated flight plan calculation

- Starts at EOBT-12h, full re-optimization at EOBT-9/6/3h
- Only routings with FPL validity of >15 minutes after EOBT accepted
- Manual intervention & correction if no valid routing found

Issues

- Quality of available information at D-1 & required interpretation
- No network coordination & risk of bunching in other sectors
- Limited alternative routing options due to continuing ANSP staffing & capacity issues

Tactical Reaction

- **Adaptation of settings for automated re-calculations, if**
  - more precise information about areas of SigWx has become available
  - overall network delay situation changes

- **Manual adaptation of individual flight plans, based on**
  - operational requirements
  - network delay situation
  - crew feedback (e.g. en route weather observed on the previous flight leg)
  - RRPs received, assessed and considered favorable

- **Needed from other stakeholders before/at 15:00 UTC:**
  - **NM**:
    - reliable forecast of delay situation for the rest of the day and information for AOs on offload sectors/ACCs with sufficient capacity
    - RRPs & effective e-Helpdesk actions for maximum delay saving on flights marked as critical and/or rotations running against a night curfew
  - **ANSPs**:
    - shortcuts (at least in ACC of destination aerodrome) on crew request for aircraft rotations running against a night curfew or being flight time critical
  - **Airports:**
    - Focus on timely departures
    - Pre-check with authorities on night curfew extensions where possible

Room for Improvement

TUI Airline	• use better meteorological products in operations (e.g. AI-based forecasting models) • eliminate the need for human / individual interpretation of forecasts • prepare staff for and adapt processes to rolling CDM processes (should they be introduced)
NM	• introduce a rolling CDM process (i.e. have staff / means of coordination & comms) to avoid uncoordinated re-routings and bunching in other sectors / ACCs • cherry-pick flights reducing delays and provide RRPs for those flights via NM B2B
ANSPs	• increase flexibility in providing capacity for affected- and onloaded sectors / ACCs • reduce the number of RAD-rules to the minimum required for a safe operation to enable re-routings by AOs • ensure FMP positions are staffed H24 to allow for a rolling CDM process
CFSPs	• enable avoidance of individual ATC sectors (if not yet available) • enable multiple automated re-optimizations of flights to account for changing data • ingest RRPs via NM B2B and present results to Dispatchers • create the ability to ingest and apply scenarios

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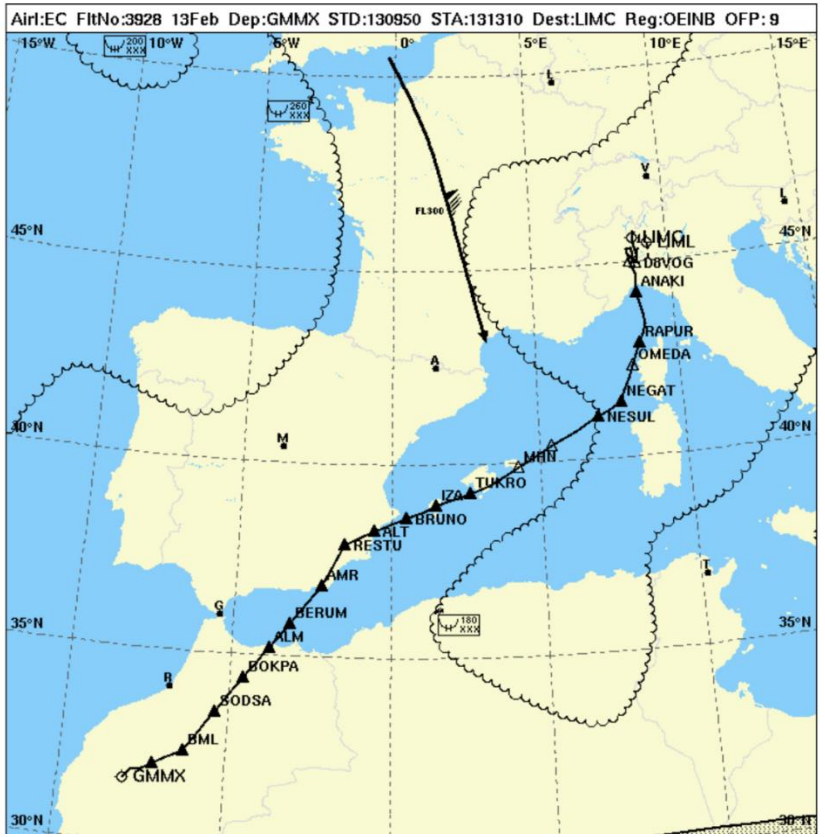
Weather avoidance: pilot's perspective

Cpt. Daniele Veronelli

Flight preparation

Tools available for weather assessment before departure are:

- METAR, TAFs, SIGWX, etc
- Weather app



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Fuel planning

- The main usage of weather data on the ground is **fuel planning**
- Extra fuel is tipically taken in case of: **convective weather, LVPs, winter operations, turbulence**.

```
TAXI            64   (0.06) .....  .....
TRIP          8981    3.48  .....  .....
CONT 5%        449    0.11  .....  .....
ALTN          1012    0.27  .....  ..... LI
FINRES        1037    0.30                ..
EXTRA            0    0.00
ADDNL            0    0.00  .....  .....
-------------------------------------------
TOTAL        11543    4.56  .....  .....
-------------------------------------------
TANKER           0          .....
-------------------------------------------
PLN BLK      11543    4.56  .....  .....  F
-------------------------------------------
DISC
FUEL (L4658)                .....  .....
-------------------------------------------
FINAL BLK                   .....         S

TOW CORR    +1000 PLN BLK +115 / -1000 PL
ECON CI50           TRIP +153 / TIME  3.
ECON CI20           TRIP  +34 / TIME  3.
2000 BELOW          TRIP +113 / TIME  3.
4000 BELOW          TRIP +283 / TIME  3.
```

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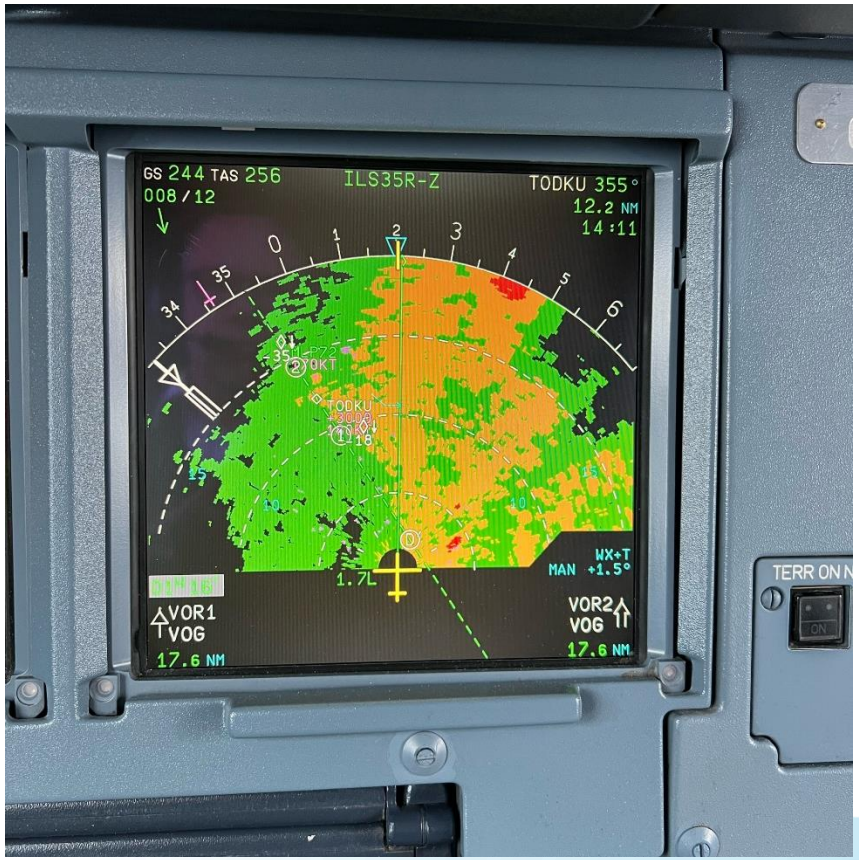
Weather management in flight



Once airborne, the available tools for weather avoidance are:

- **weather radar**
- **ATC reports**
- **datalink and aircraft connectivity (if available).**

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Different equipment = different readings

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Convective weather avoidance on route

There are criteria stated in the manuals, but a big role is played by the experience of the pilots and the type of equipment on board.

Overflight

Avoid overflying thunderstorms unless a minimum of 5000 ft clearance above the storm top is ensured. When possible, detour between the storm cells of a squall line rather than directly above them. Keep the radar antenna tilted down during overflight to properly assess the most severe cells, which may be masked by clouds formations.

Lateral avoidance

At altitudes above the freezing level, supercooled rain and hail may indicate as only weak radar echoes, which can mask extreme thunderstorm intensity. Avoid weak radar echoes associated with thunderstorms by the following minimum distances:

Altitude	Lateral avoidance
20000 ft	10 NM
25000 ft	15 NM
30000 ft	20 NM

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Weather management on arrival

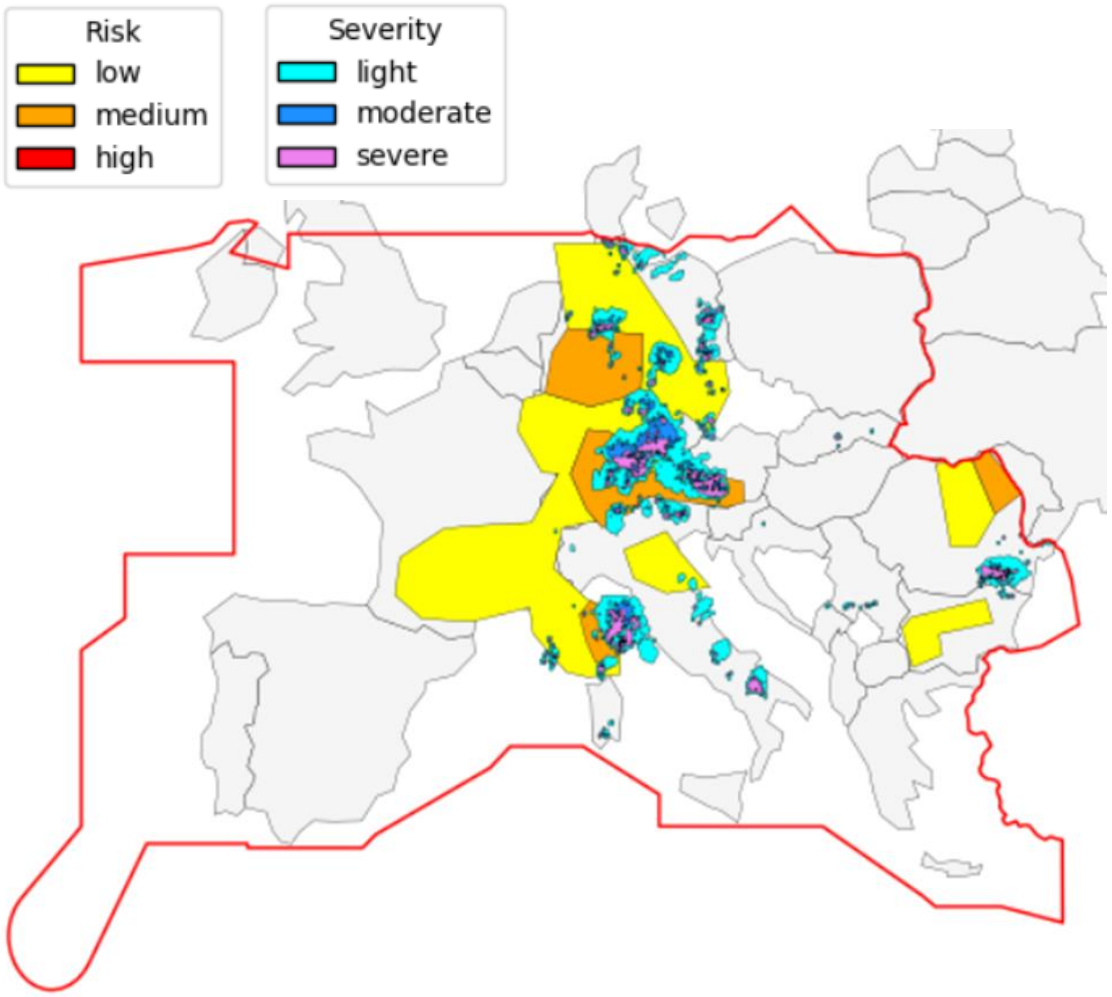
Strictly related to **aircraft handling and fuel on board.**

Handling: wind limitations, breaking action.
Fuel on board: to cope with delays related to convective weather, LVPs or winter ops.

A wise selection of the alternate airport and a timely decision of its usage is vital to prevent unsafe scenarios.

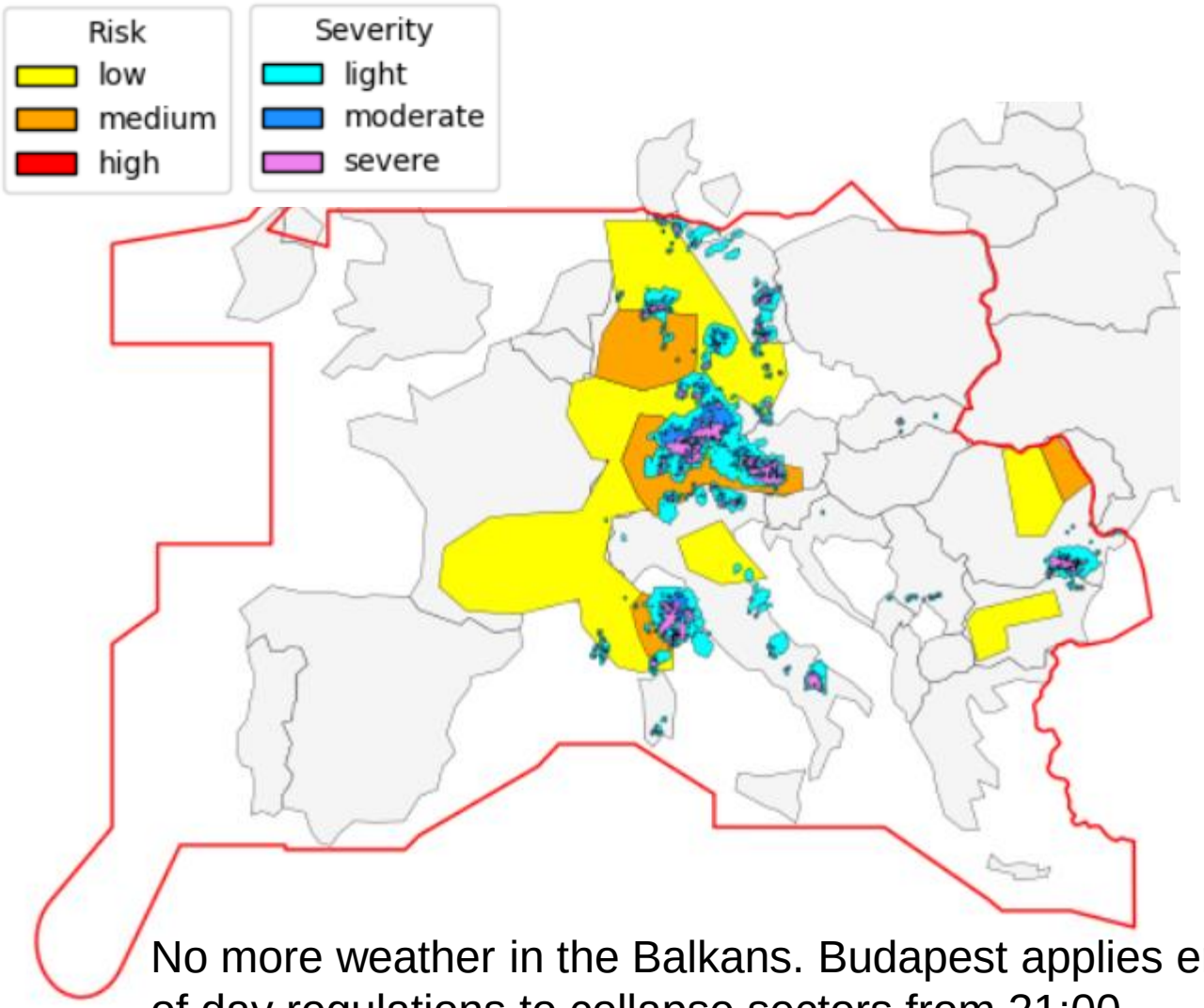
Use the **QR code** or
go to **ectrlvote.eu** and
log in with **eurocontrol521**

18:00-21:00

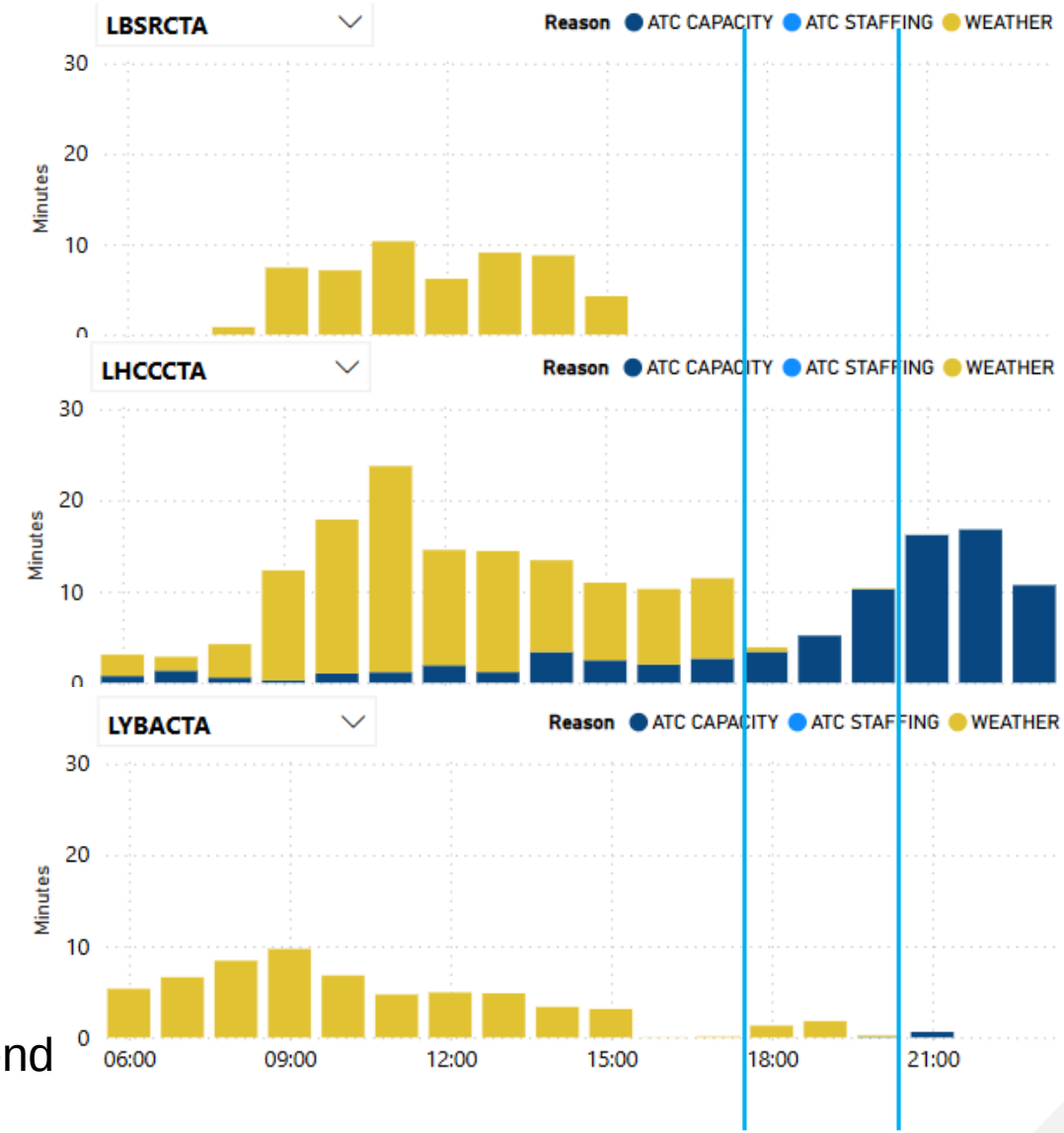


- The weather system continues in Germany and Marseille.
- Continued capacity delays in Italy and Croatia.
- High traffic continues when ACCs need to collapse sectors for the night shift.

18:00-21:00

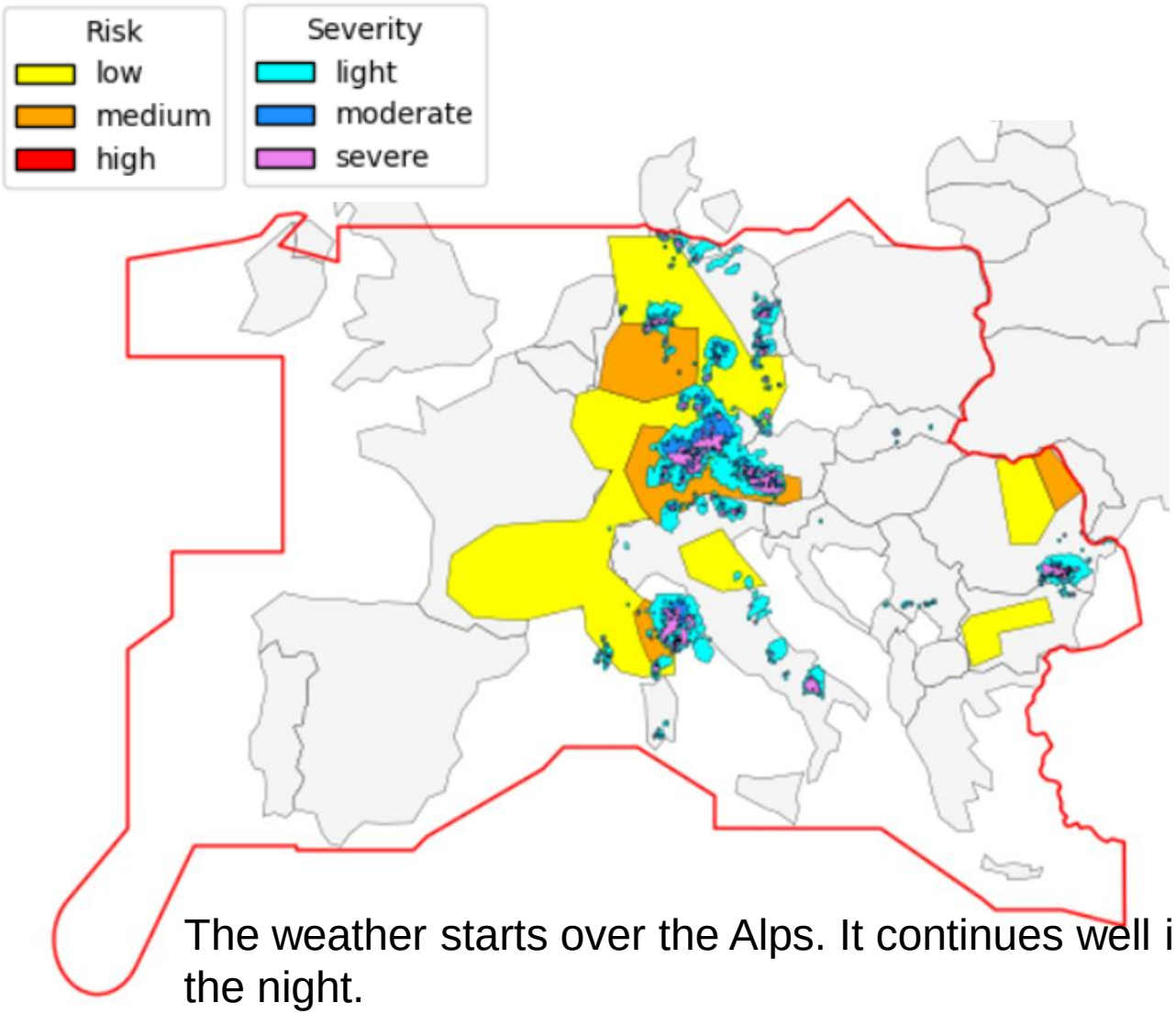


Hourly Delay Per Flight

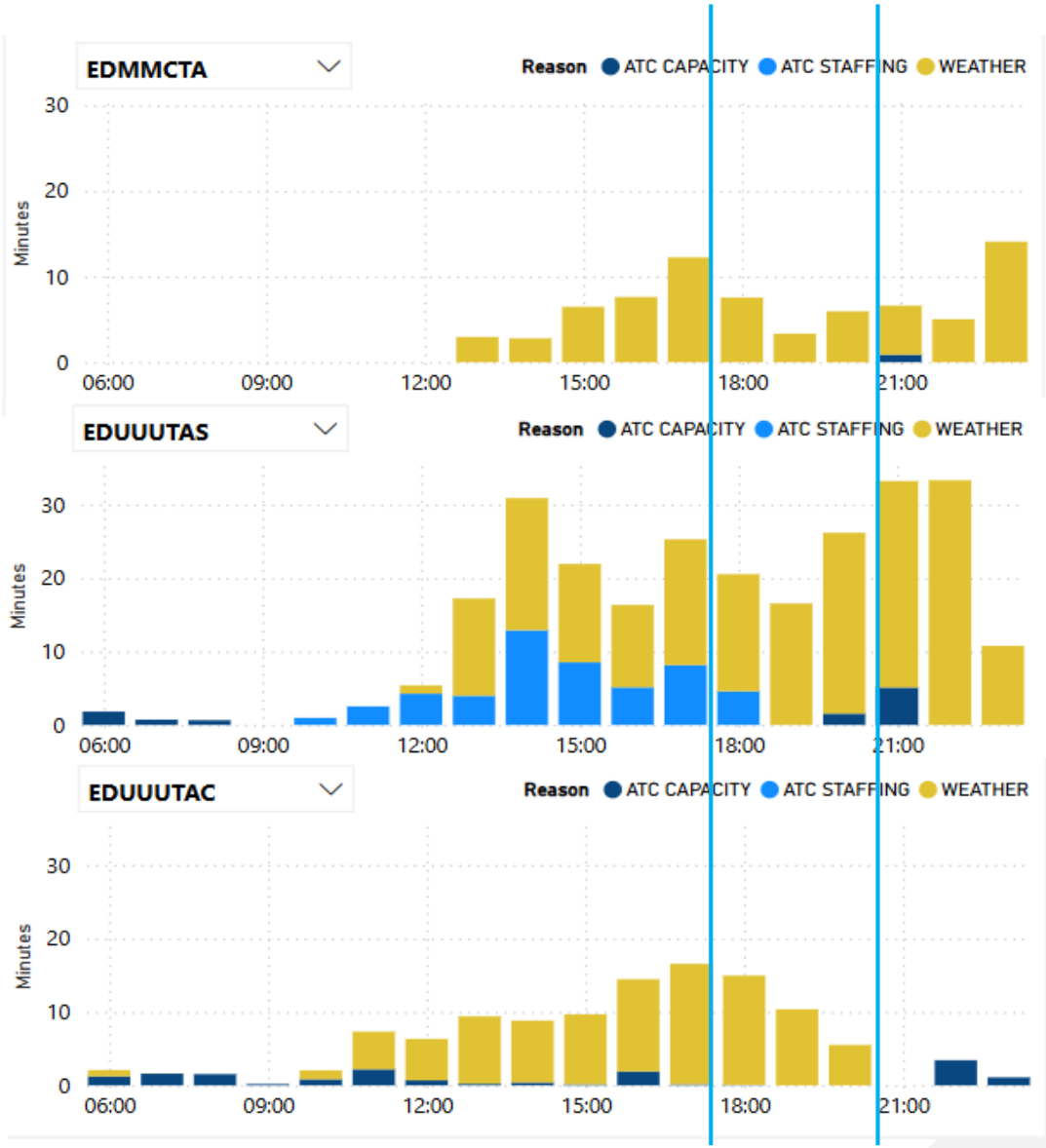


No more weather in the Balkans. Budapest applies end of day regulations to collapse sectors from 21:00.

18:00-21:00



Hourly Delay Per Flight



The weather starts over the Alps. It continues well into the night.

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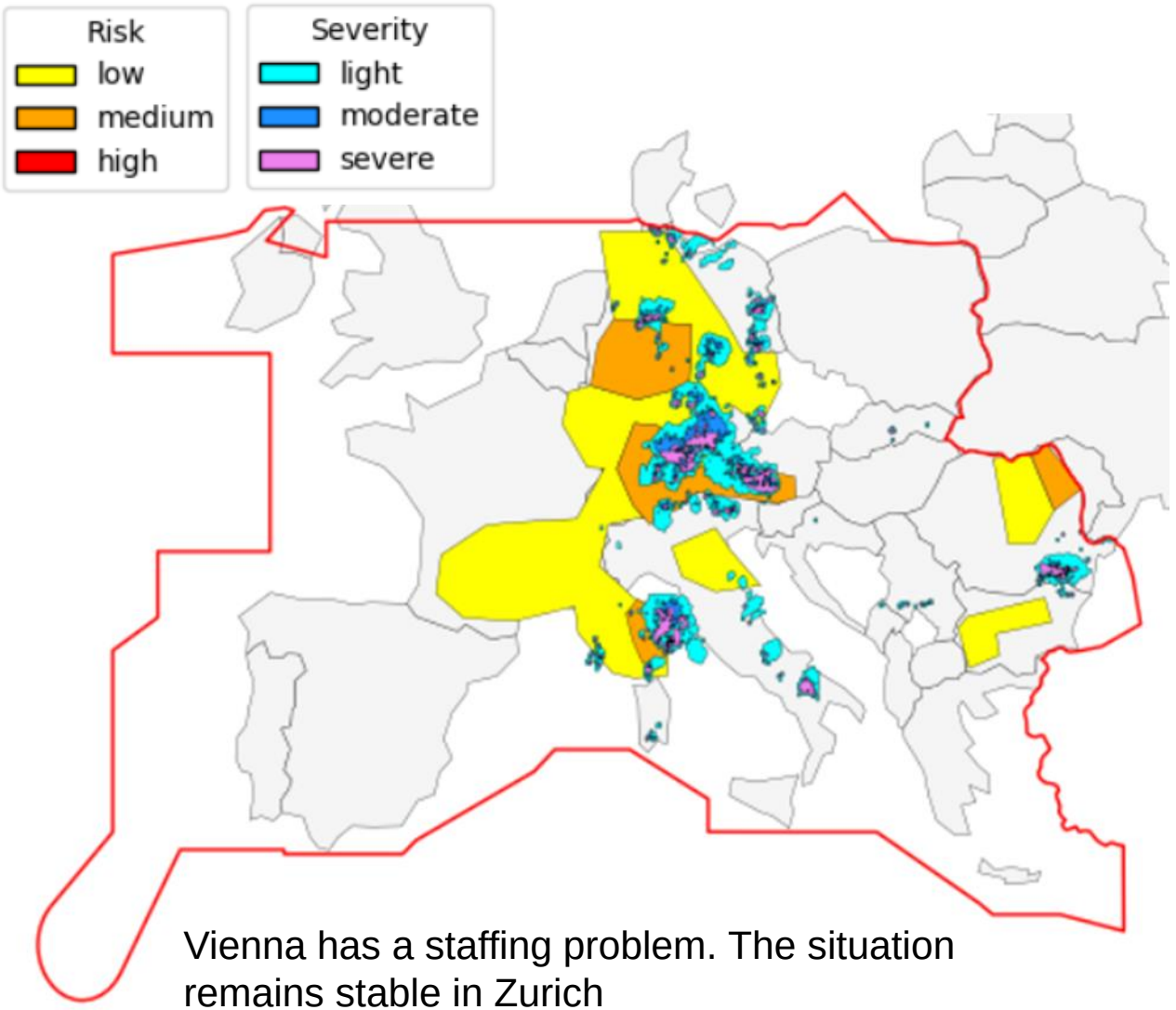
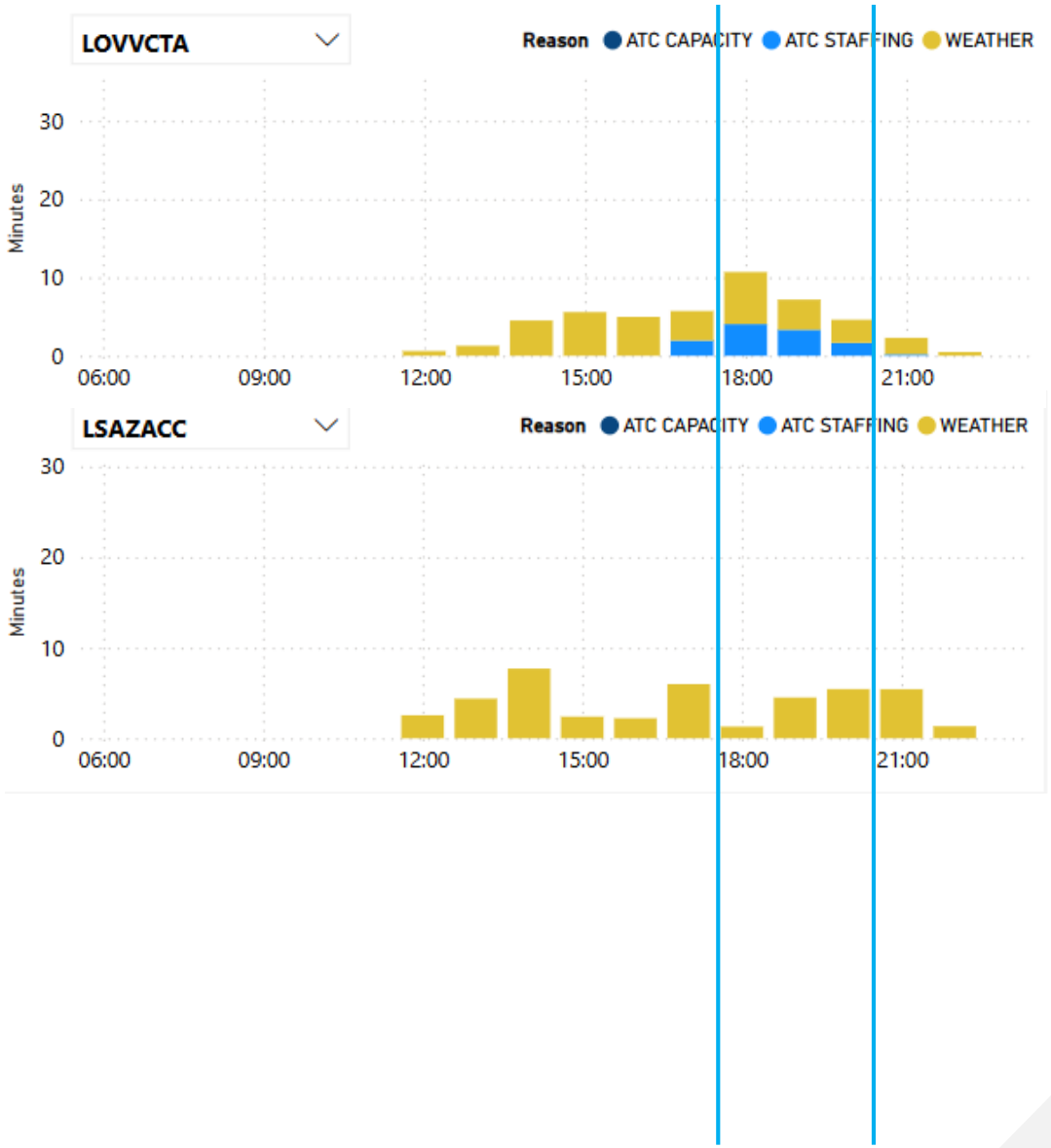
18:00-21:00

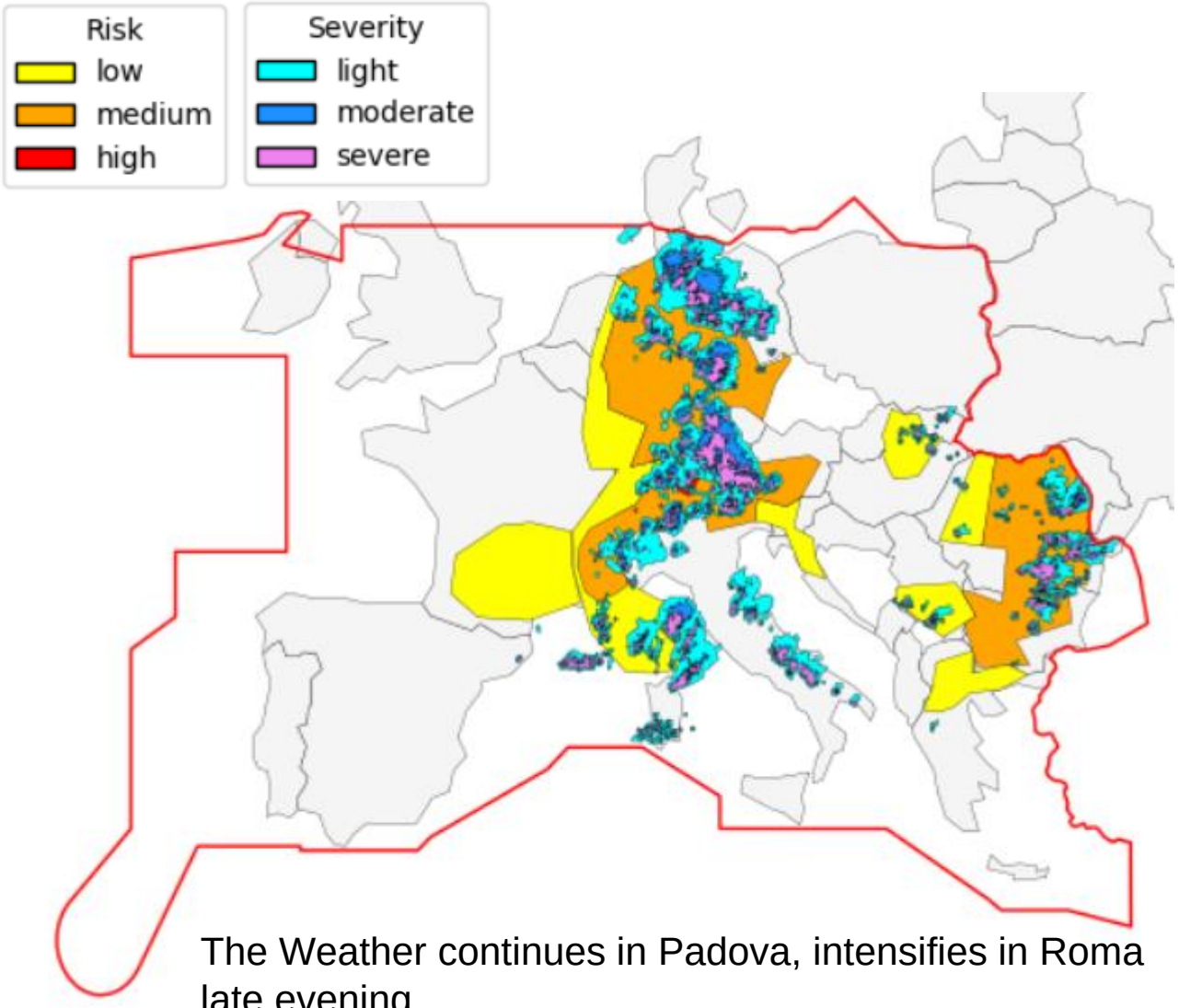


Hourly Delay Per Flight



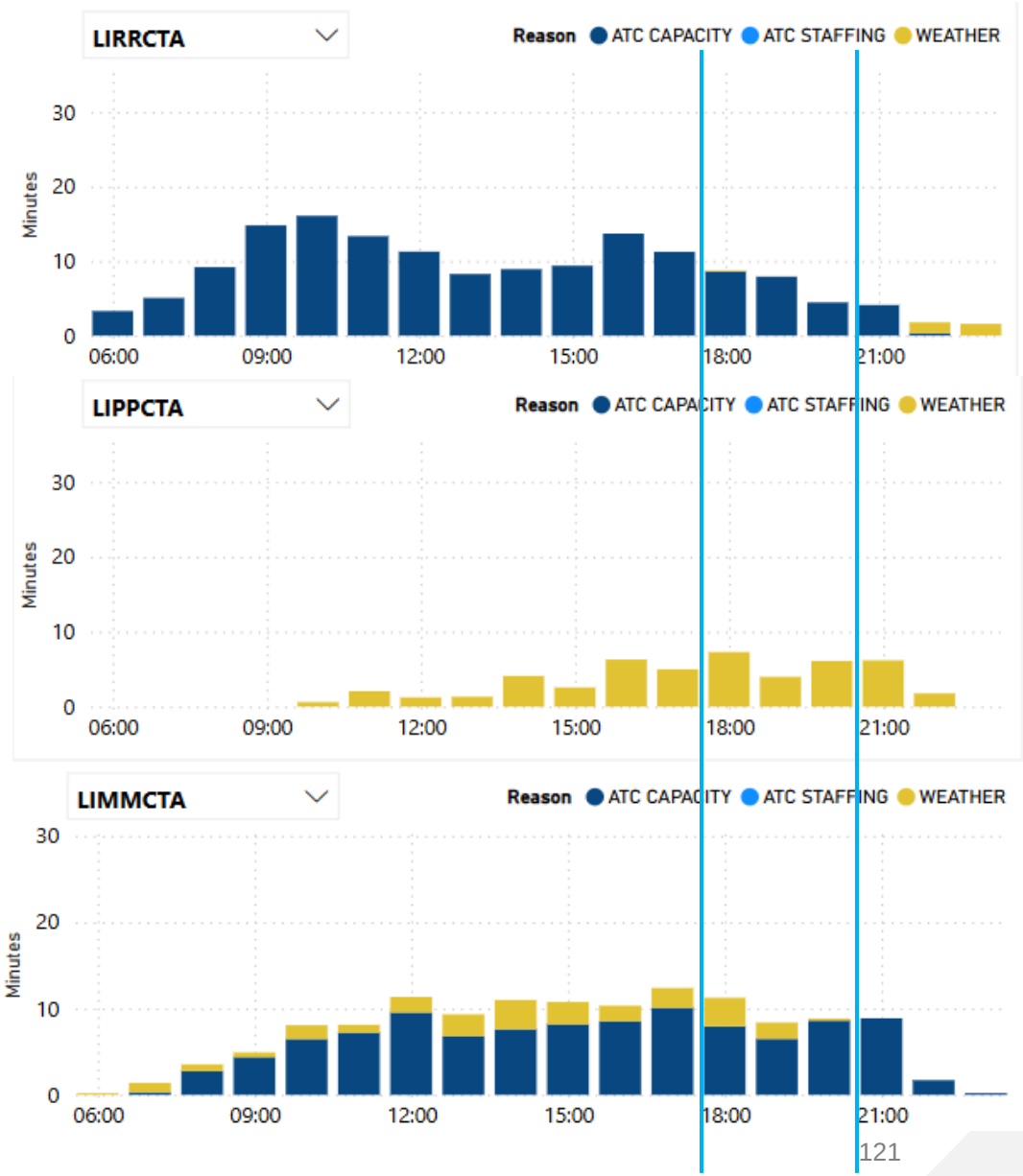
Vienna has a staffing problem. The situation remains stable in Zurich

18:00-21:00

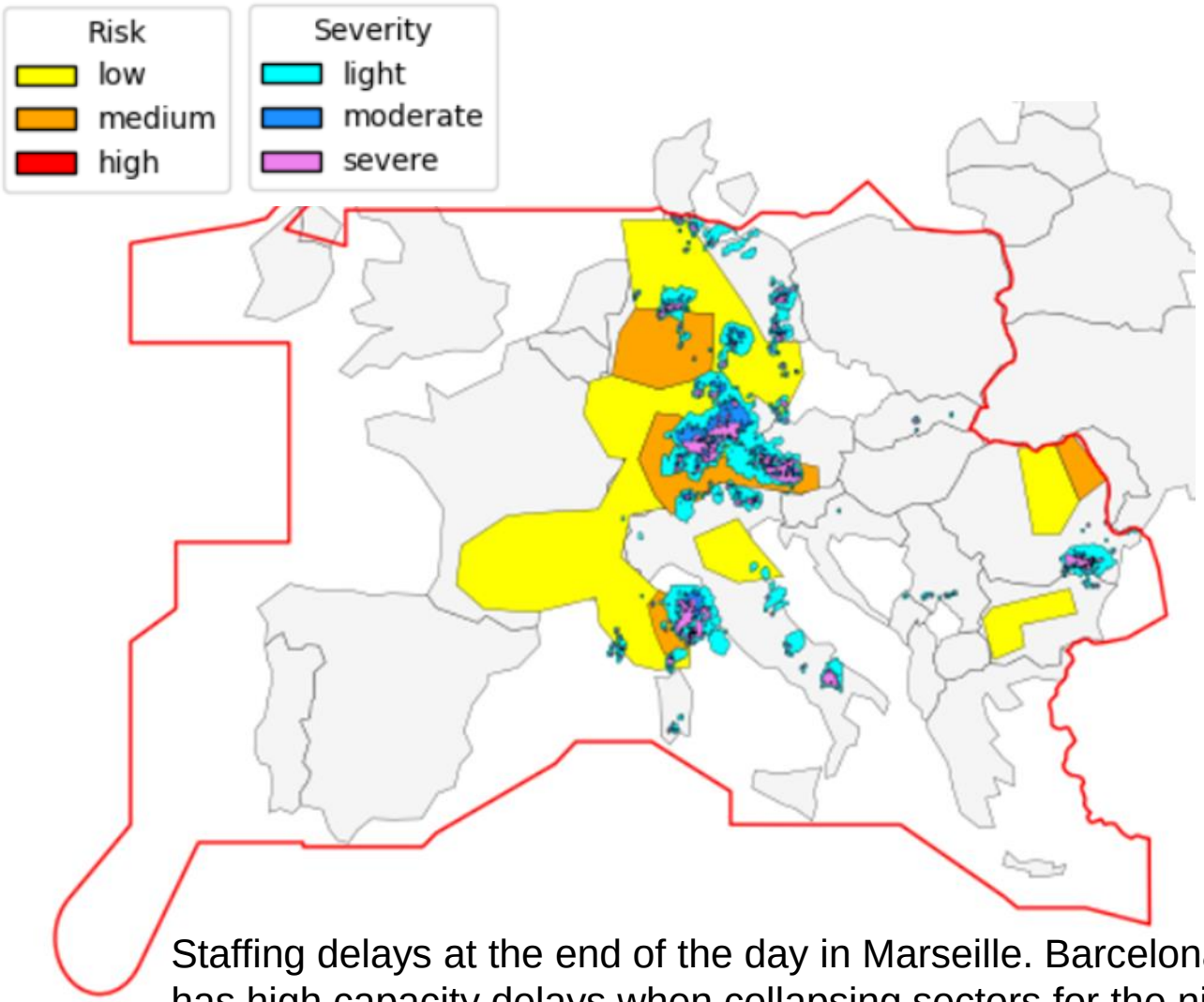


The Weather continues in Padova, intensifies in Roma late evening.

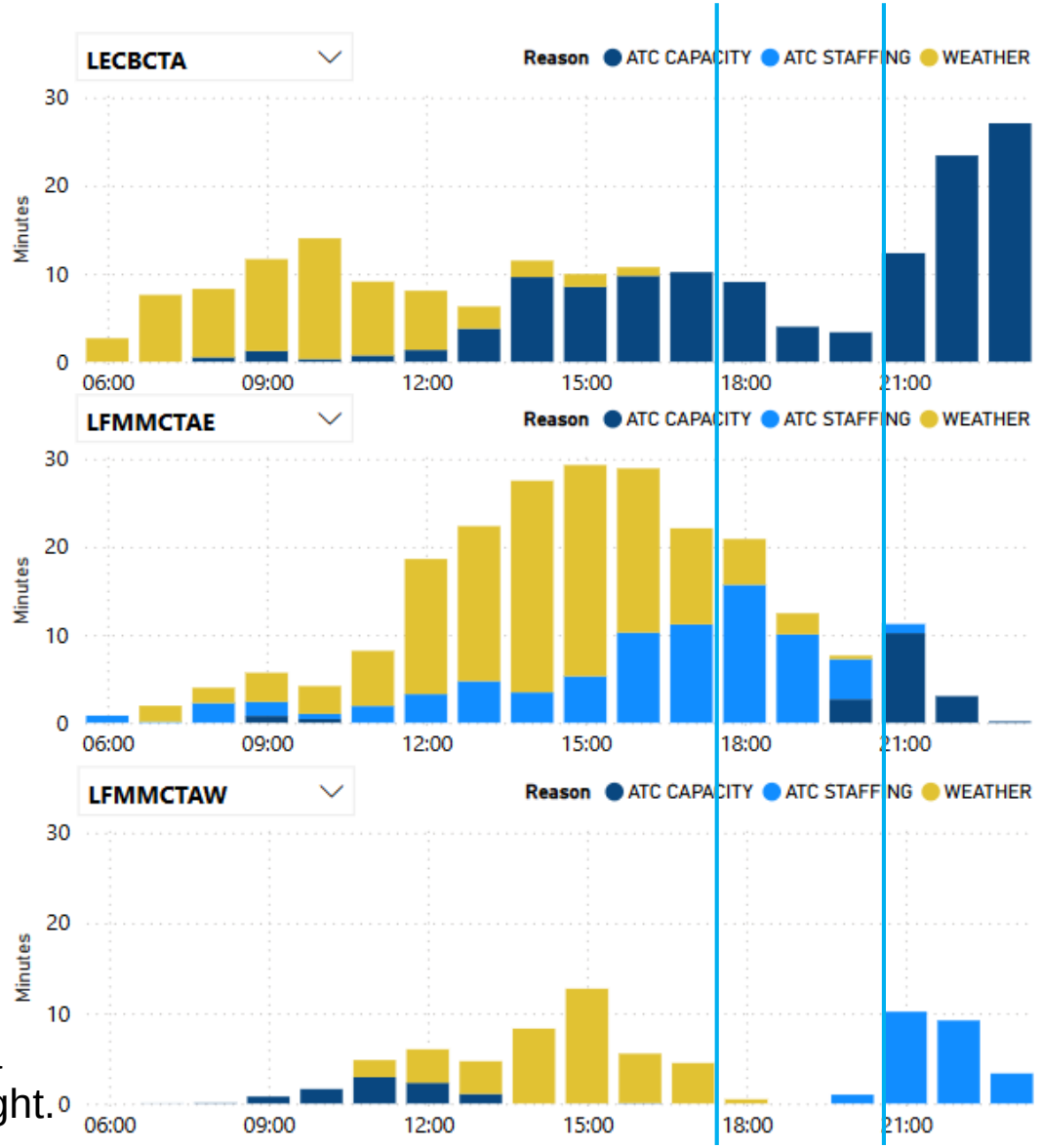
Hourly Delay Per Flight



18:00-21:00



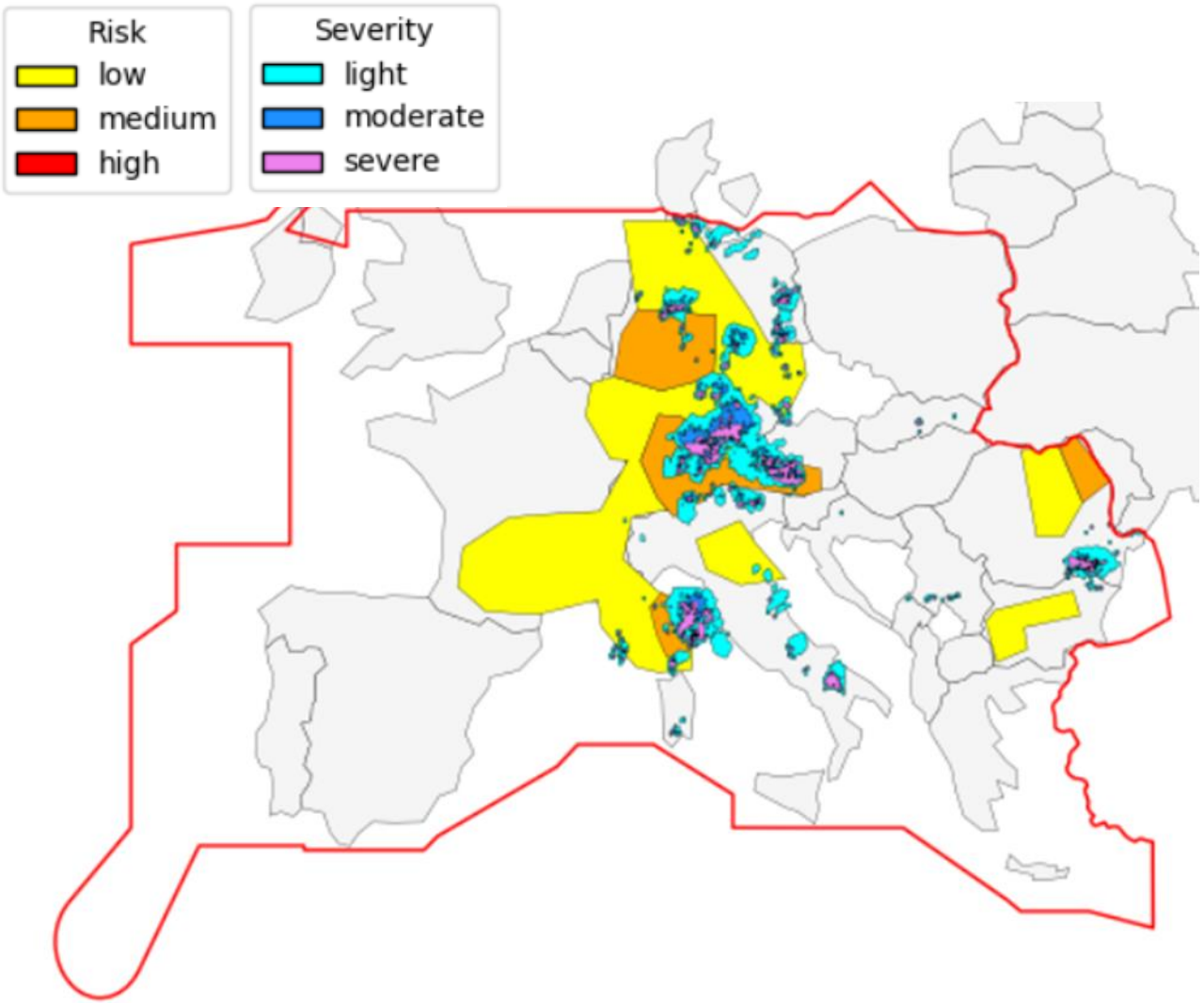
Hourly Delay Per Flight



Staffing delays at the end of the day in Marseille. Barcelona has high capacity delays when collapsing sectors for the night.

EUROCONTROL

18:00-21:00



Hourly Delay Per Flight

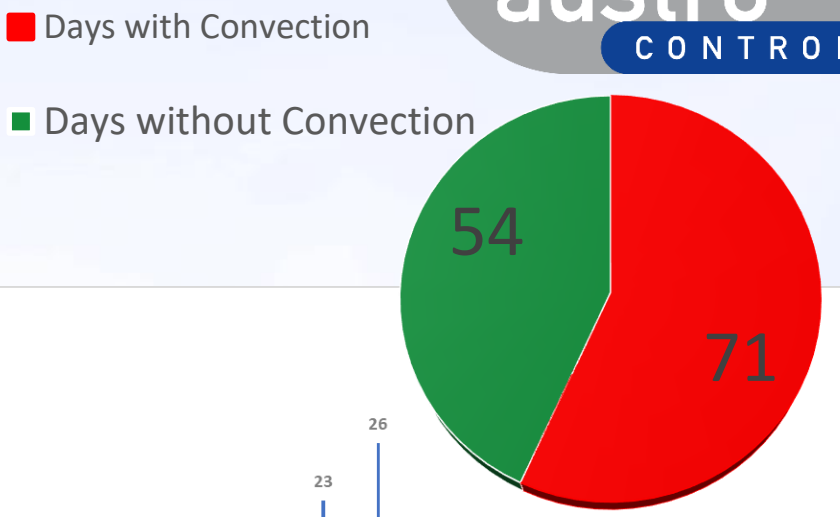
ACG ATFCM Weather Procedure

Convection in ACC Vienna 2024

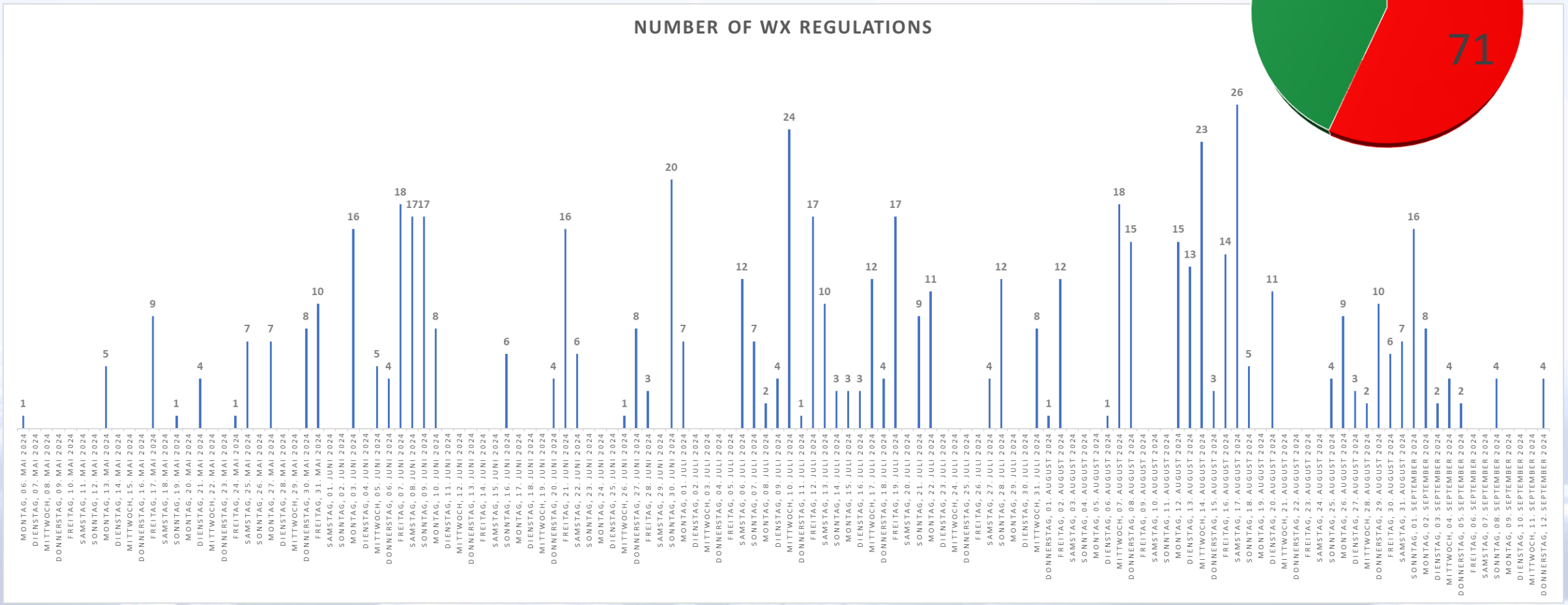
www.austrocontrol.at

Anita Eder
FMP Manager

Summer 2024 in ACC Vienna



Dealing with CBs/TCUs/SQLs in Summer is daily business in ACC Vienna.



How do we deal with Convection in our airspace?

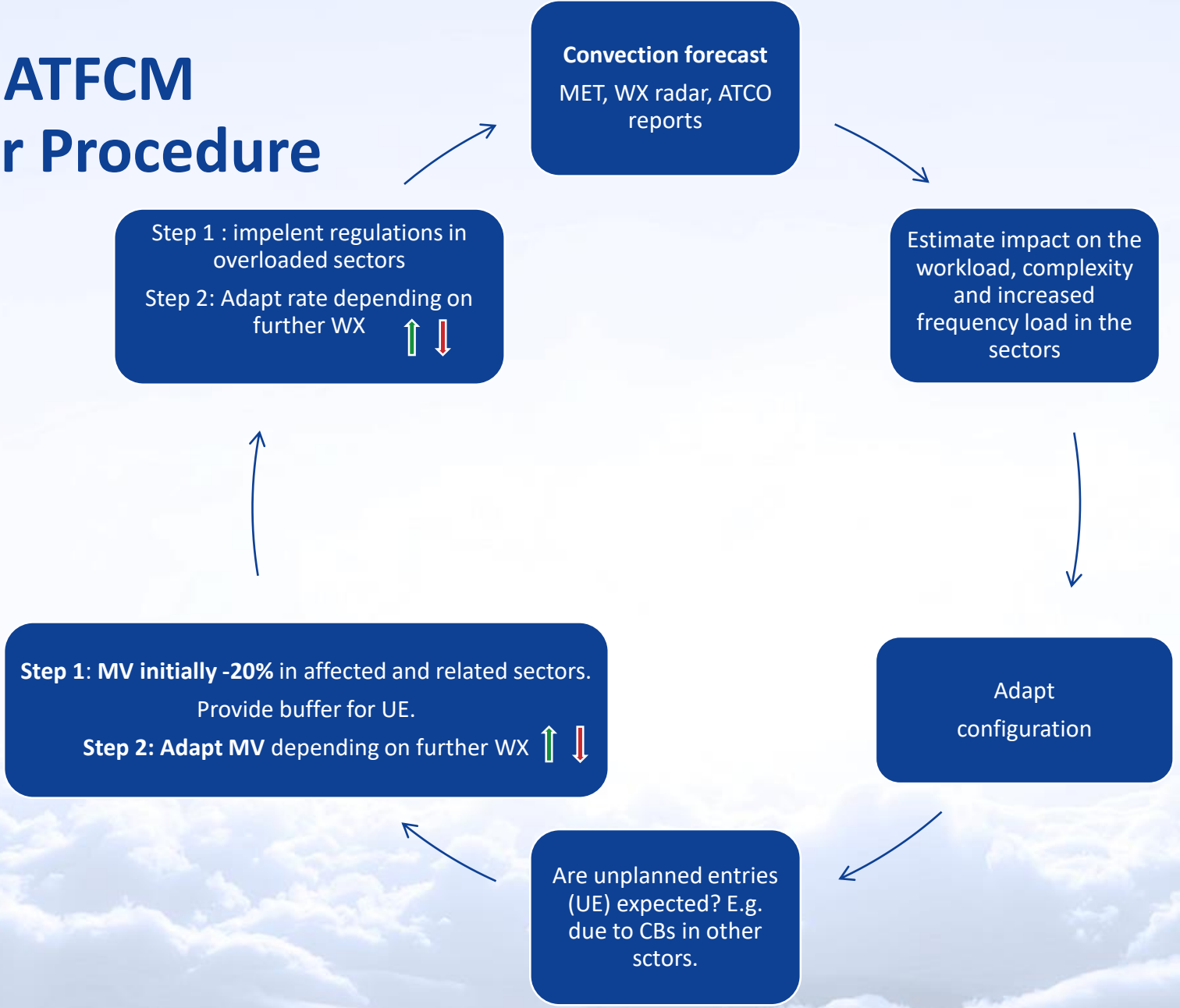
ATFCM Weather Procedure ACC Vienna

Key Elements	
Staffing	▪ Call in additional staff D-1 (based on Cross Border WX)
Configuration	▪ Increase configuration if additional staff is available. ▪ Adapt configuration. Give vertical split priority to horizontal sectors affected by convection, but not to be expected to be partially blocked by Convection.
Capacity	▪ **Reduce capacity (MV)** by an average percentage as early as the weather forecast prognoses CB/TCU/SQL in ACC sectors. ➢ Reduce MV of affected sectors ➢ Reduce MV of sectors, where a related impact (e.g. unexpected traffic) is expected.
Regulation	▪ Regulate sectors, where capacity has been reduced, as soon as possible, if traffic load is too high. (-20% ~4 hours in advance). ▪ Adapt the rate, as soon as it is more obvious, if actual convection deteriorates or improves, compared to the forecast. 

To achive

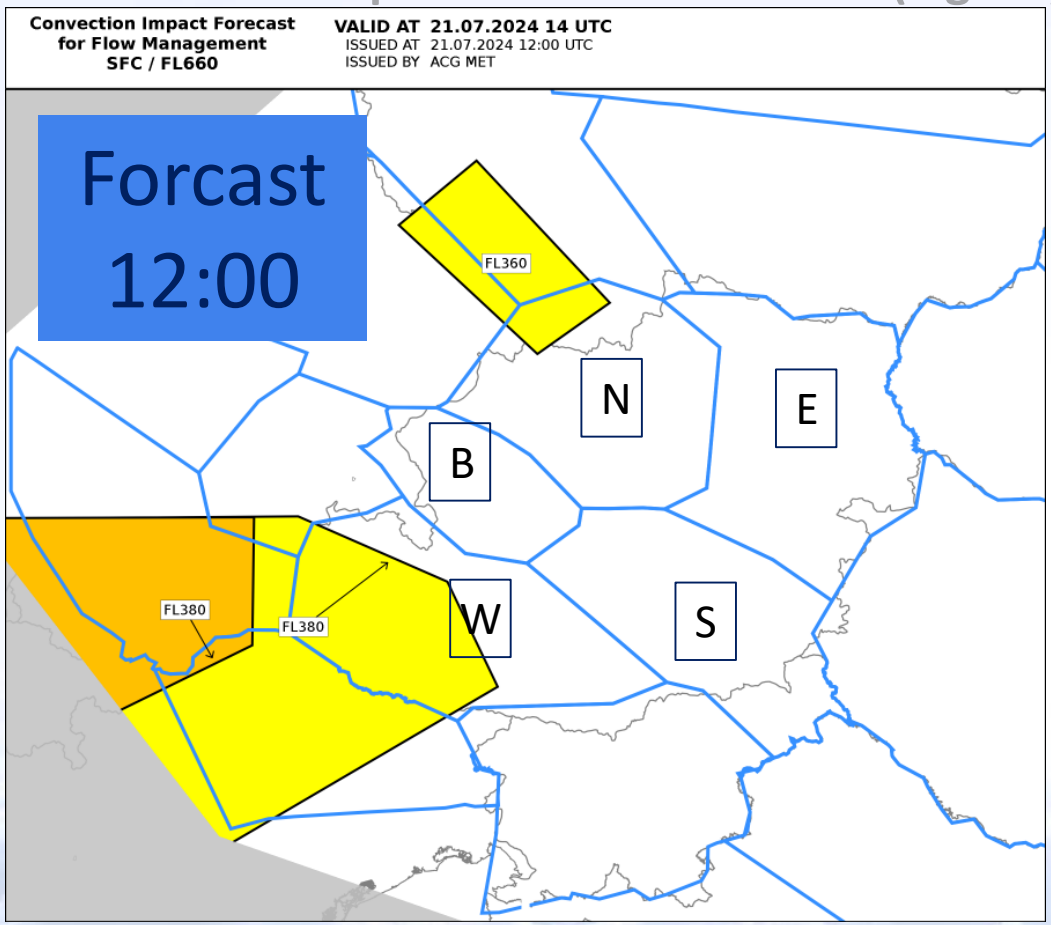
- Provision of as much capacity as possible, despite the capacity reduction in terms of regulations
- Protect sectors dealing with convection
- **Reduction of traffic load**
- **Safety**

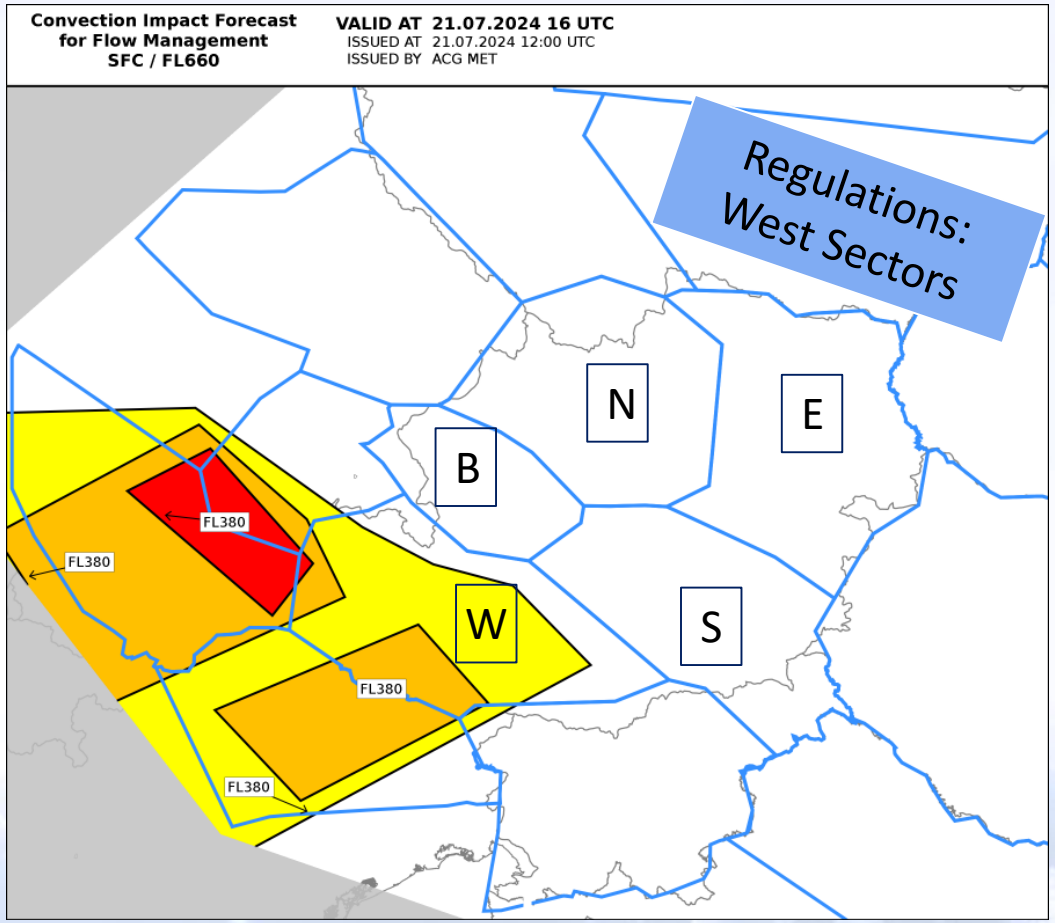
Tactical ATFCM Weather Procedure



Example: 21.07.2024

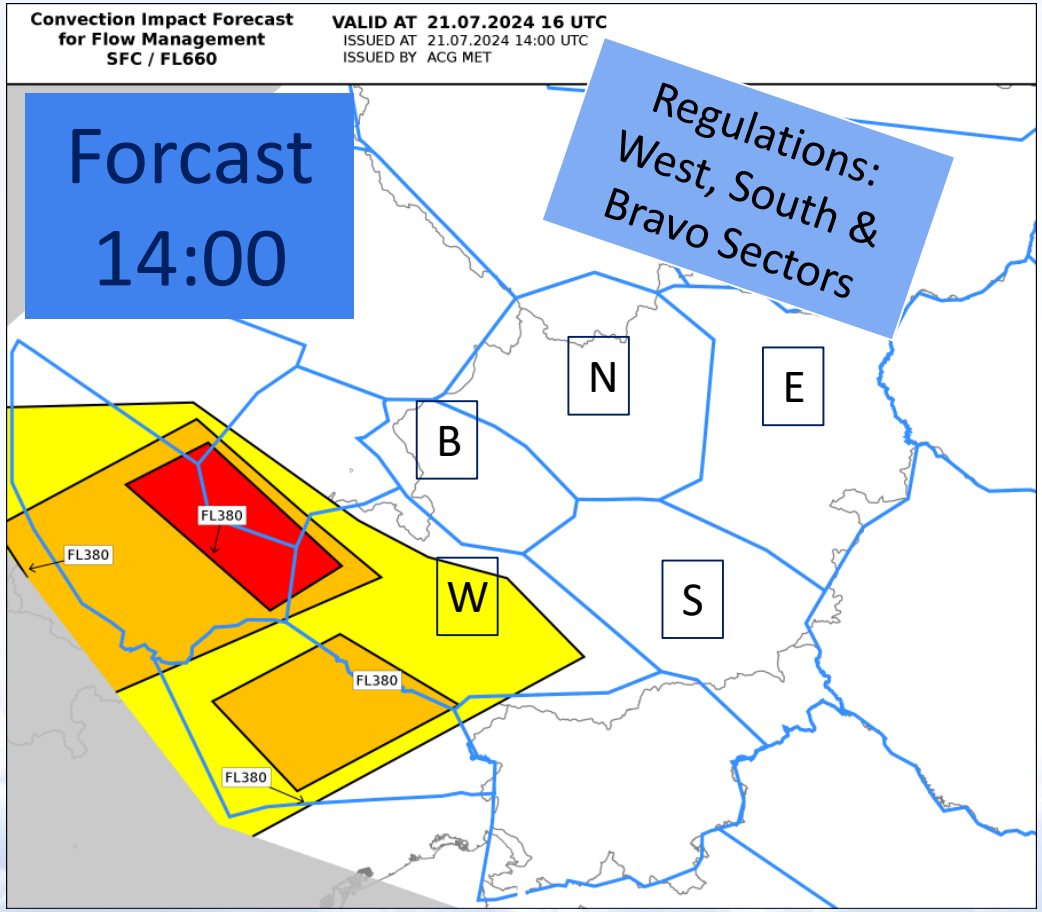
Convection Impact Forecast ACG MET (SigWX)

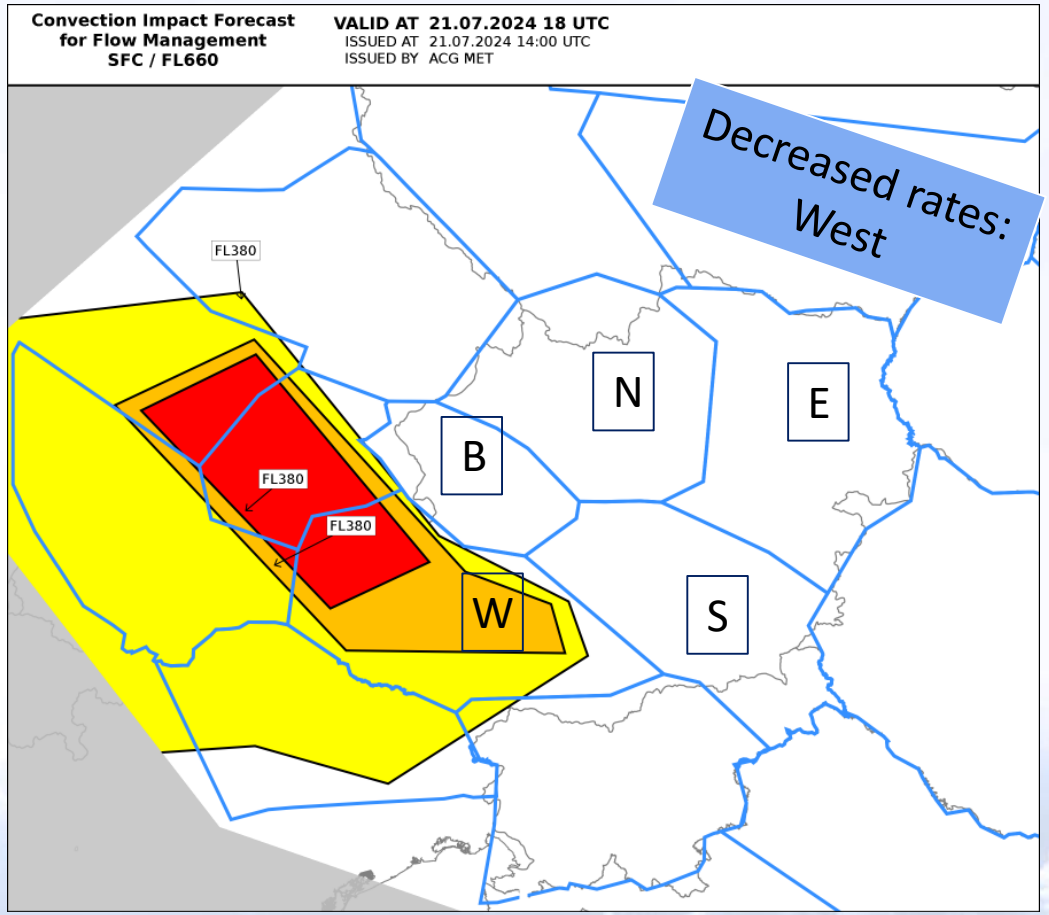




Example: 21.07.2024

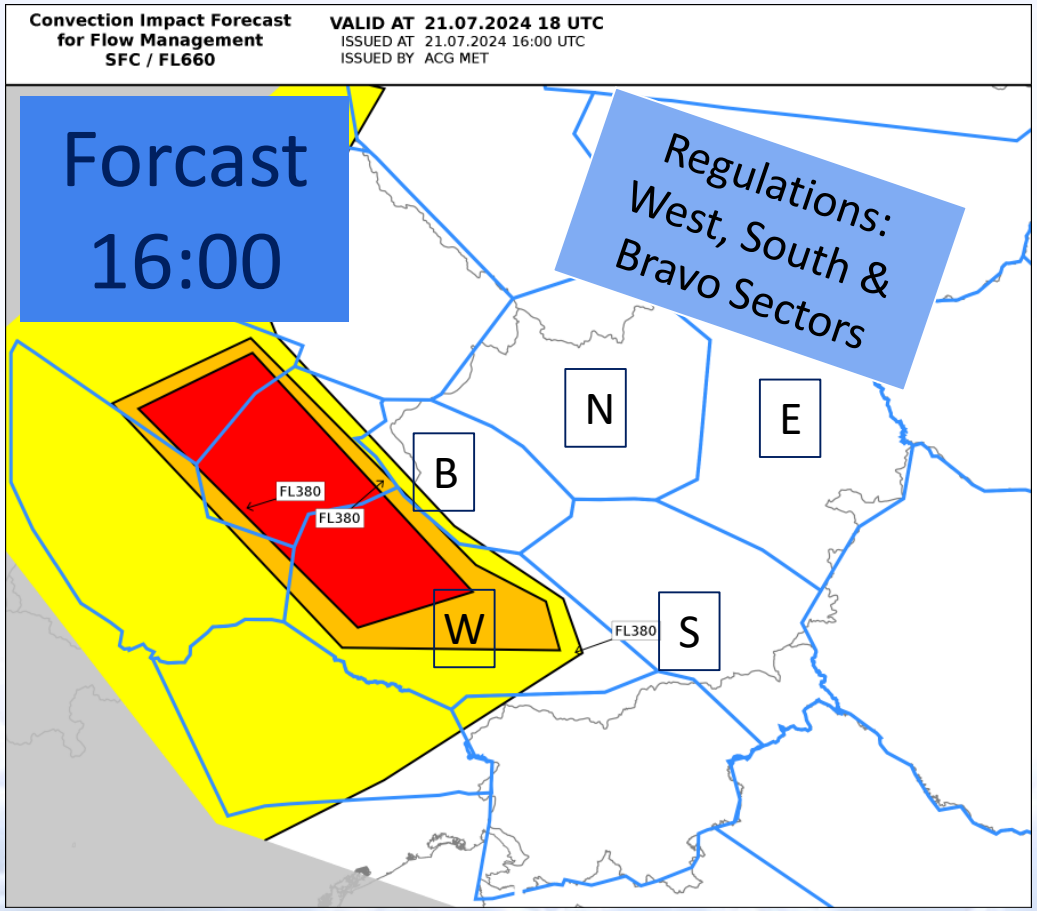
Convection Impact Forecast ACG MET (SigWX)

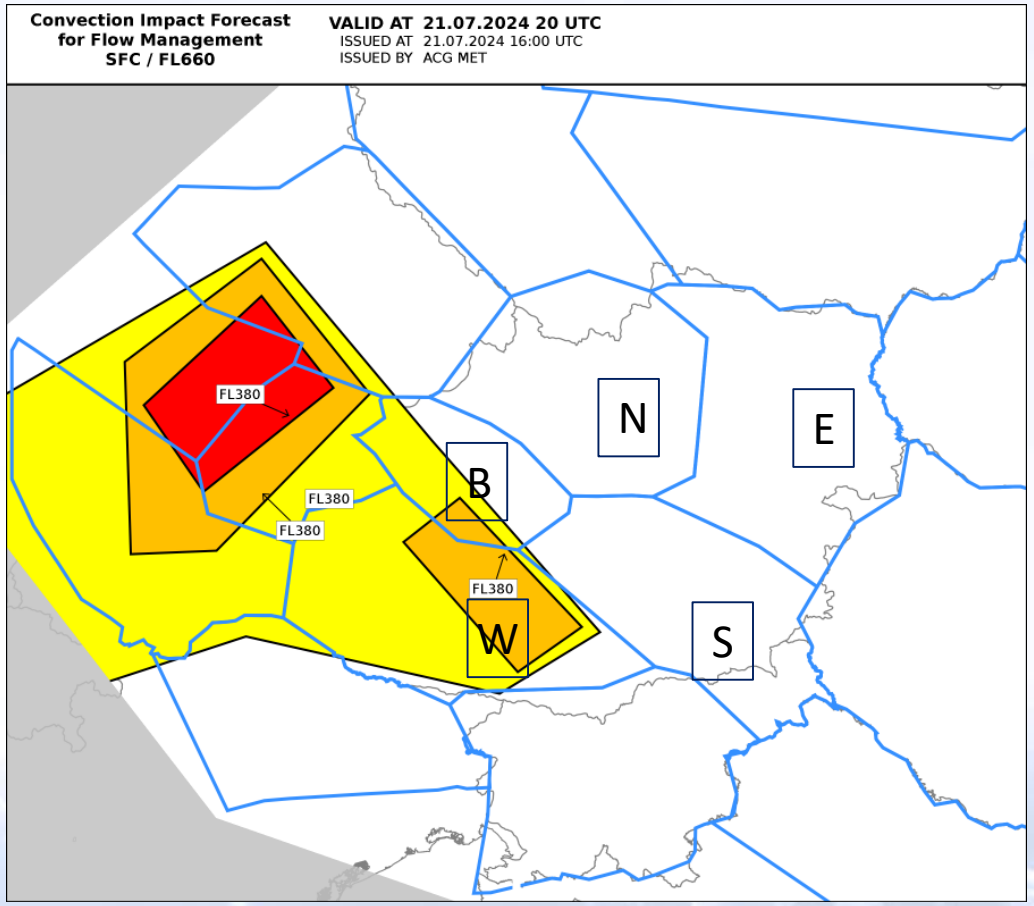




Example: 21.07.2024

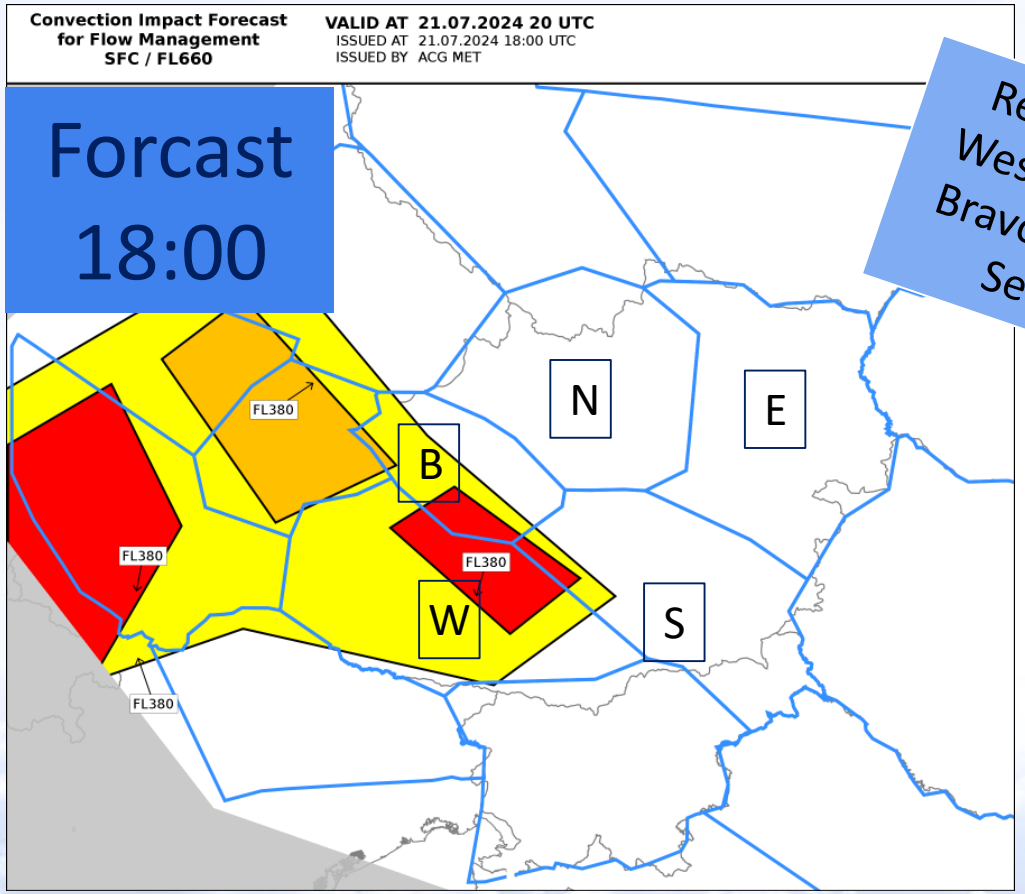
Convection Impact Forecast ACG MET (SigWX)



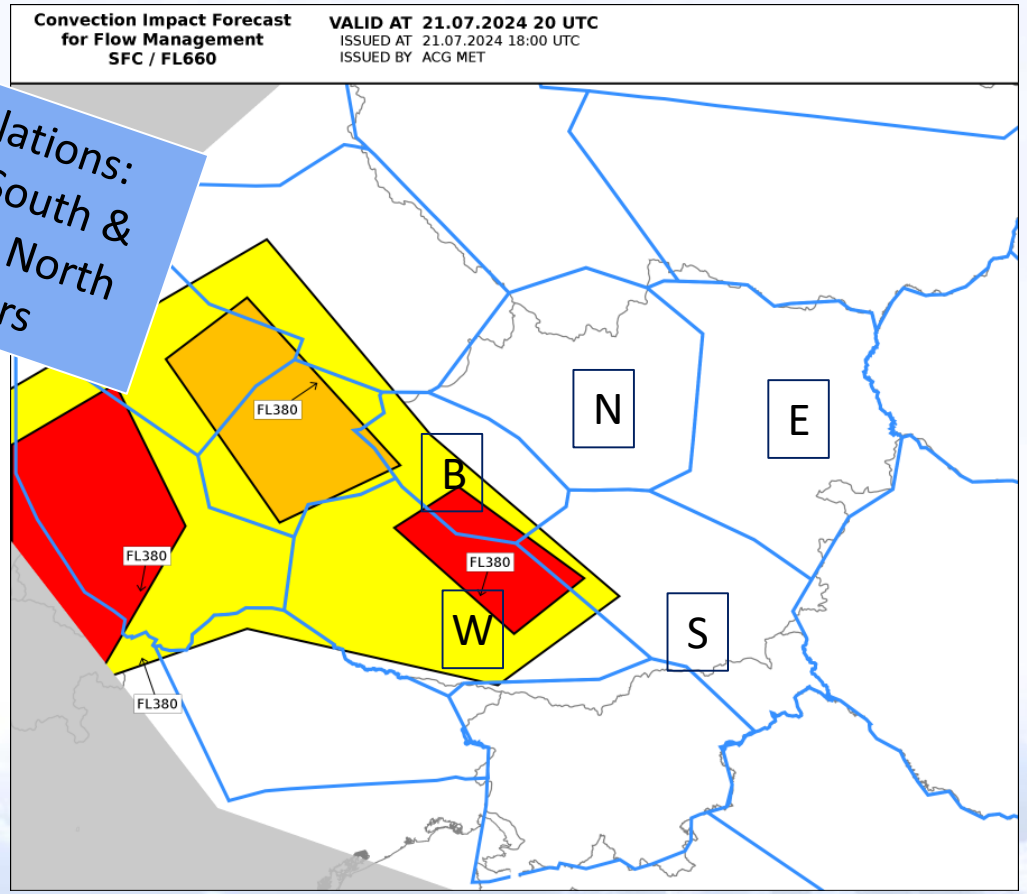


Example: 21.07.2024

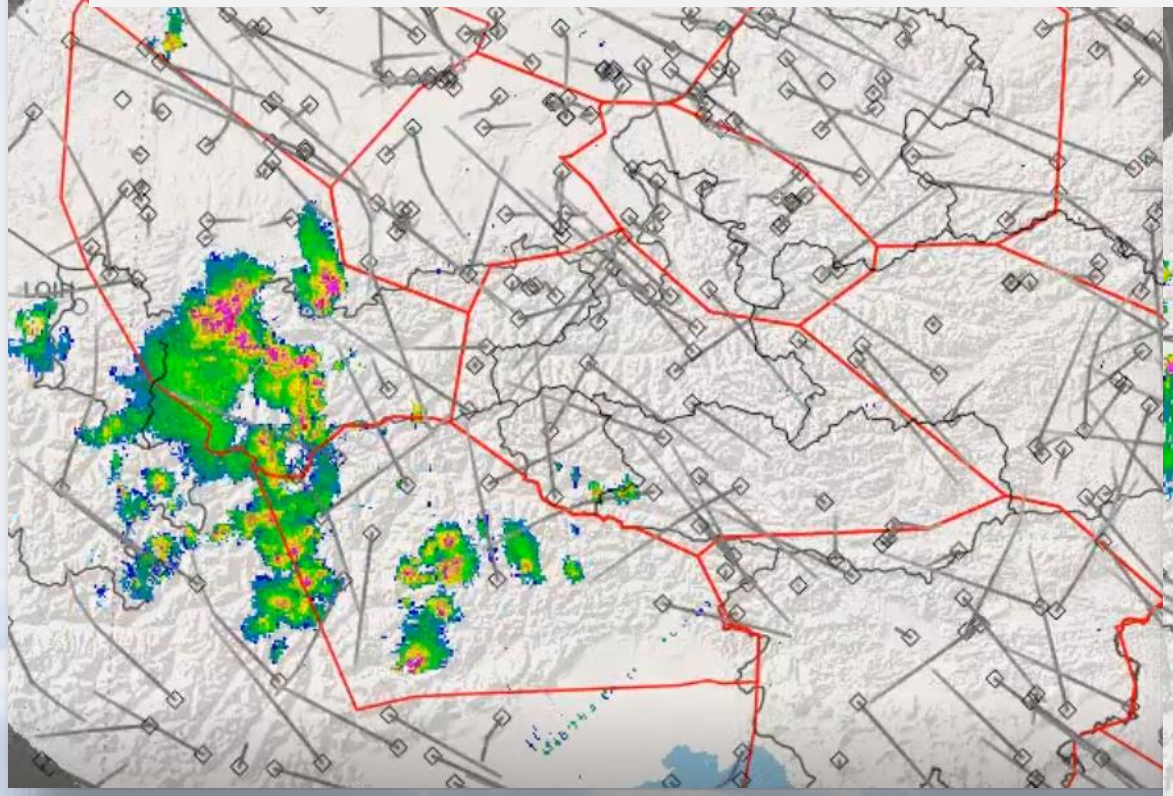
Convection Impact Forecast ACG MET (SigWX)

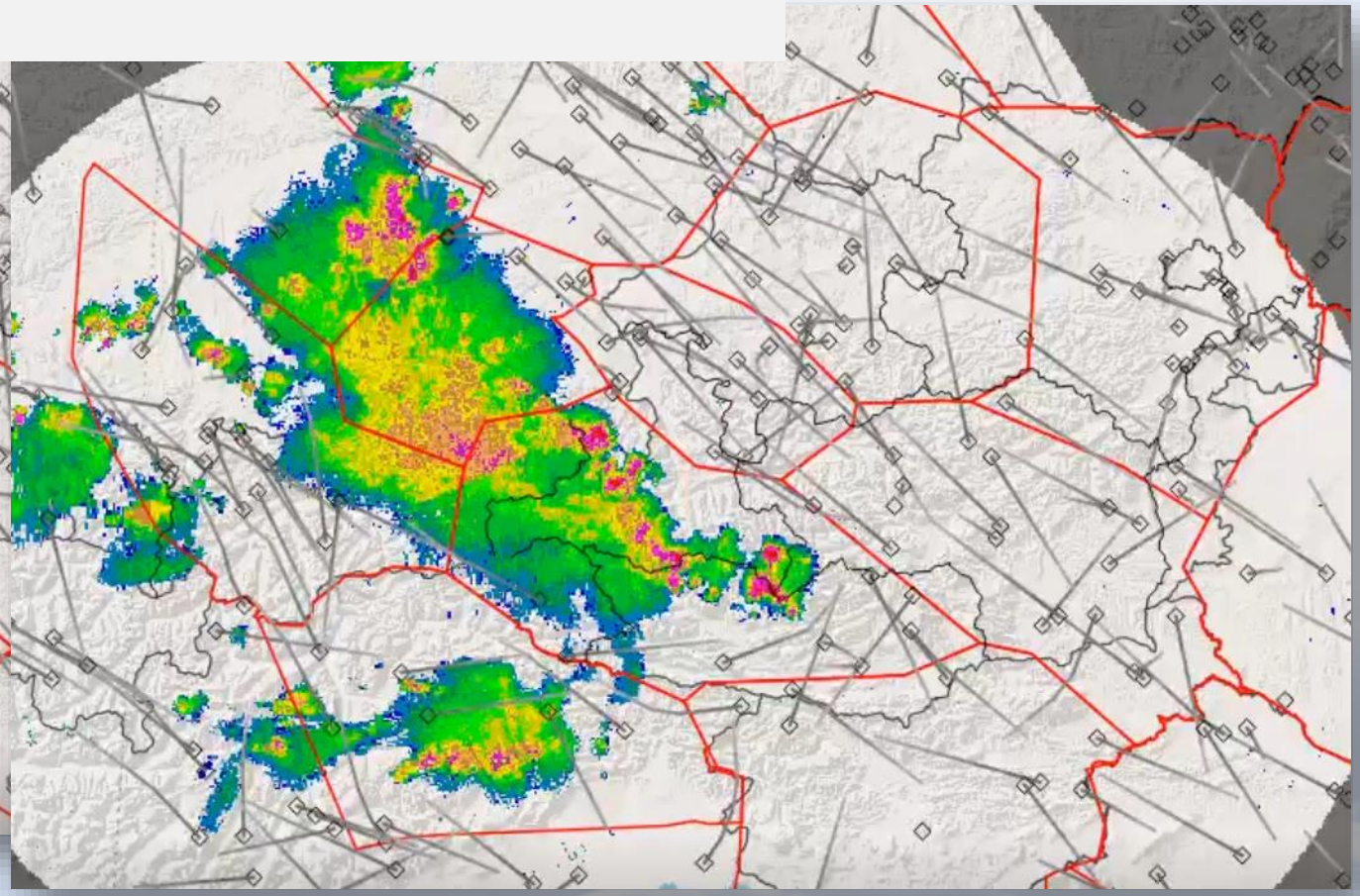


Regulations:
West, South &
Bravo & North
Sectors



Deviations due to Convection results in increased workload and complexity and affect safety…





Use the **QR code** or
go to **ectrlvote.eu** and
log in with **eurocontrol521**

21:00-00:00

- The weather stayed over the Alps for an extended period

- Several ACCs had continued high traffic and delays due to the knock-on effect of the day’s events.

EUROCONTROL Network Manager Weather Workshop 2025

Review of Weather and Forecasts on 21.07.2024

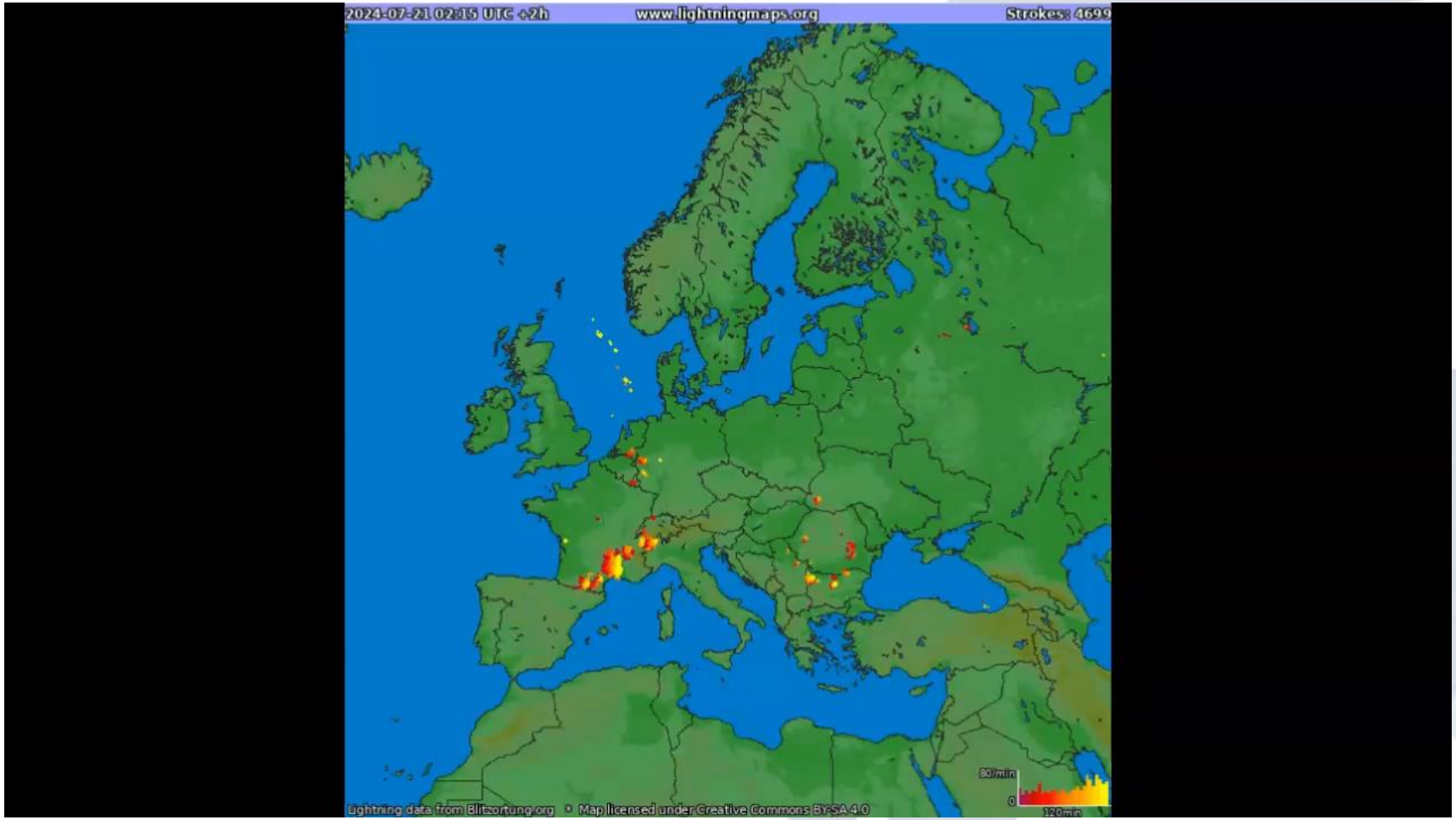
Brussels

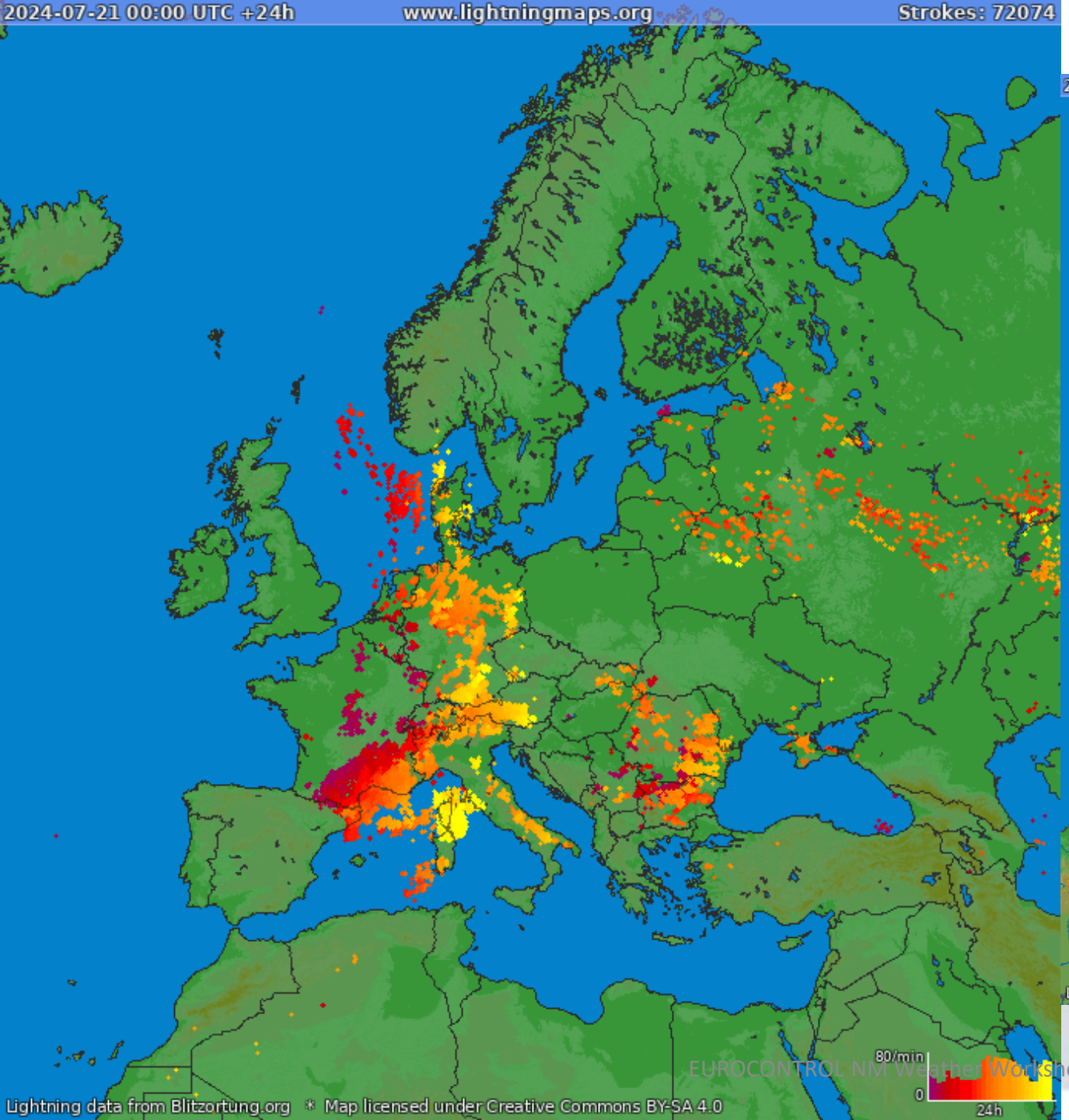
12 March 2025

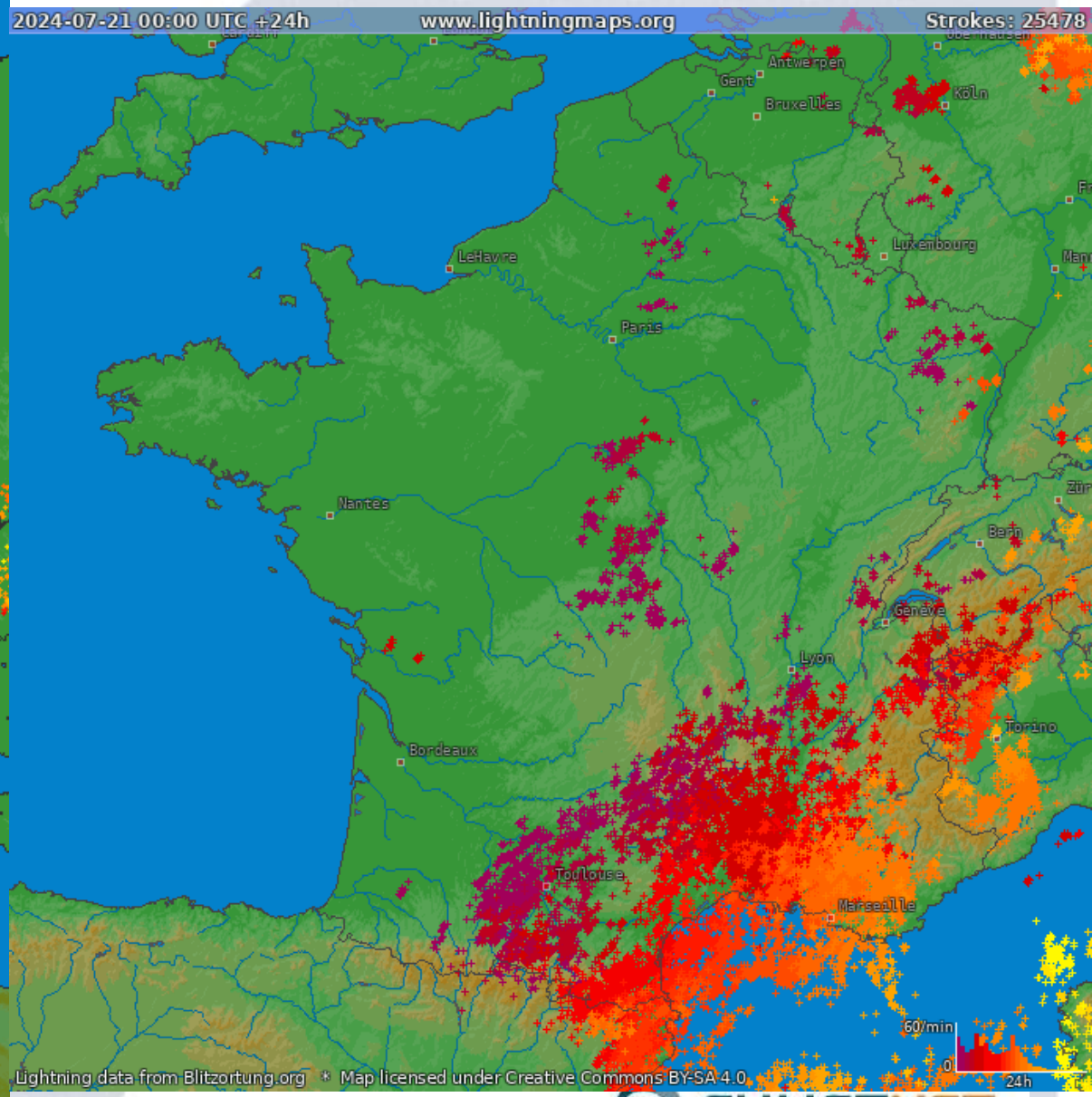
By Clemens Weidemann on behalf of EUMETNET

EUMETNET

Actual Weather development

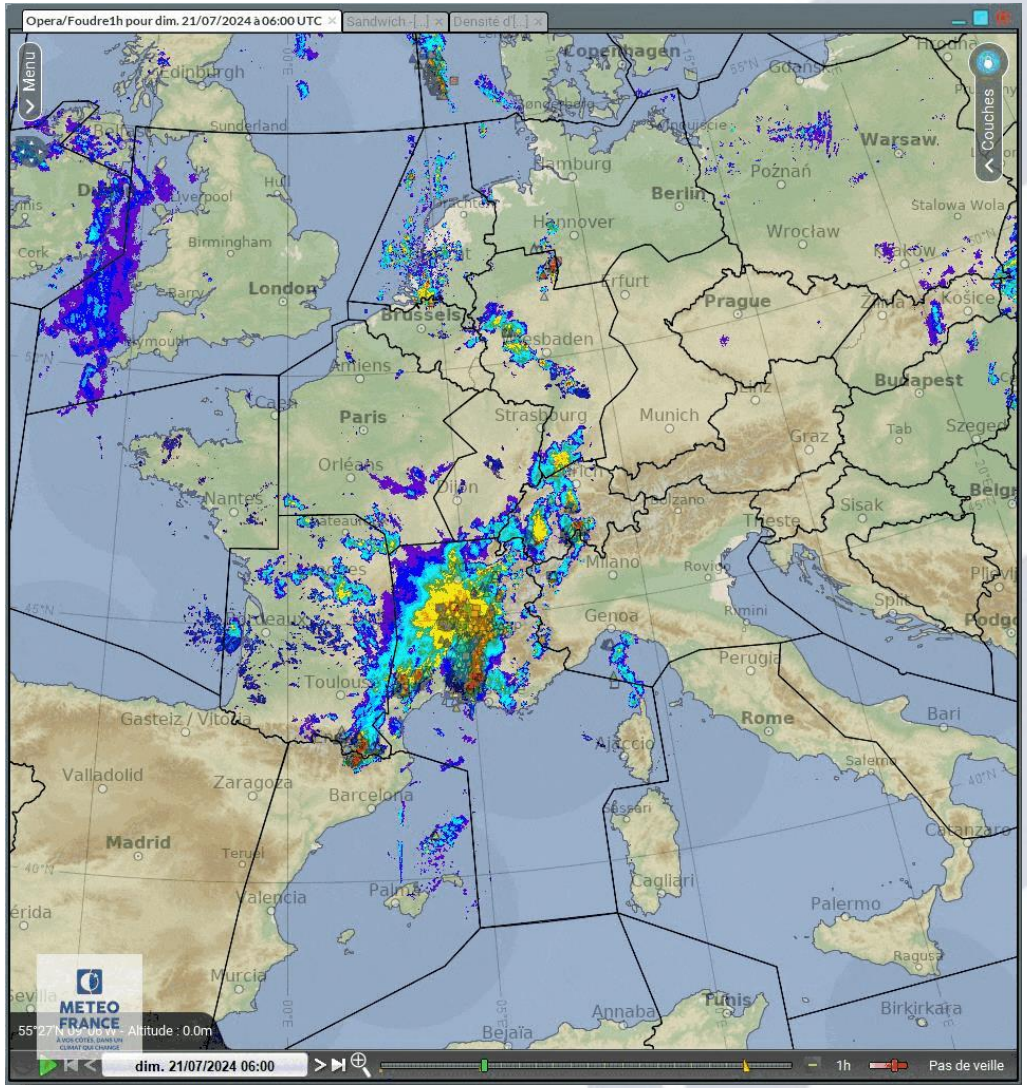



2024-07-21 00:00 UTC +24h
www.lightningmaps.org
Strokes: 72074
80/min
0
24h
Lightning data from Blitzortung.org * Map licensed under Creative Commons BY-SA 4.0

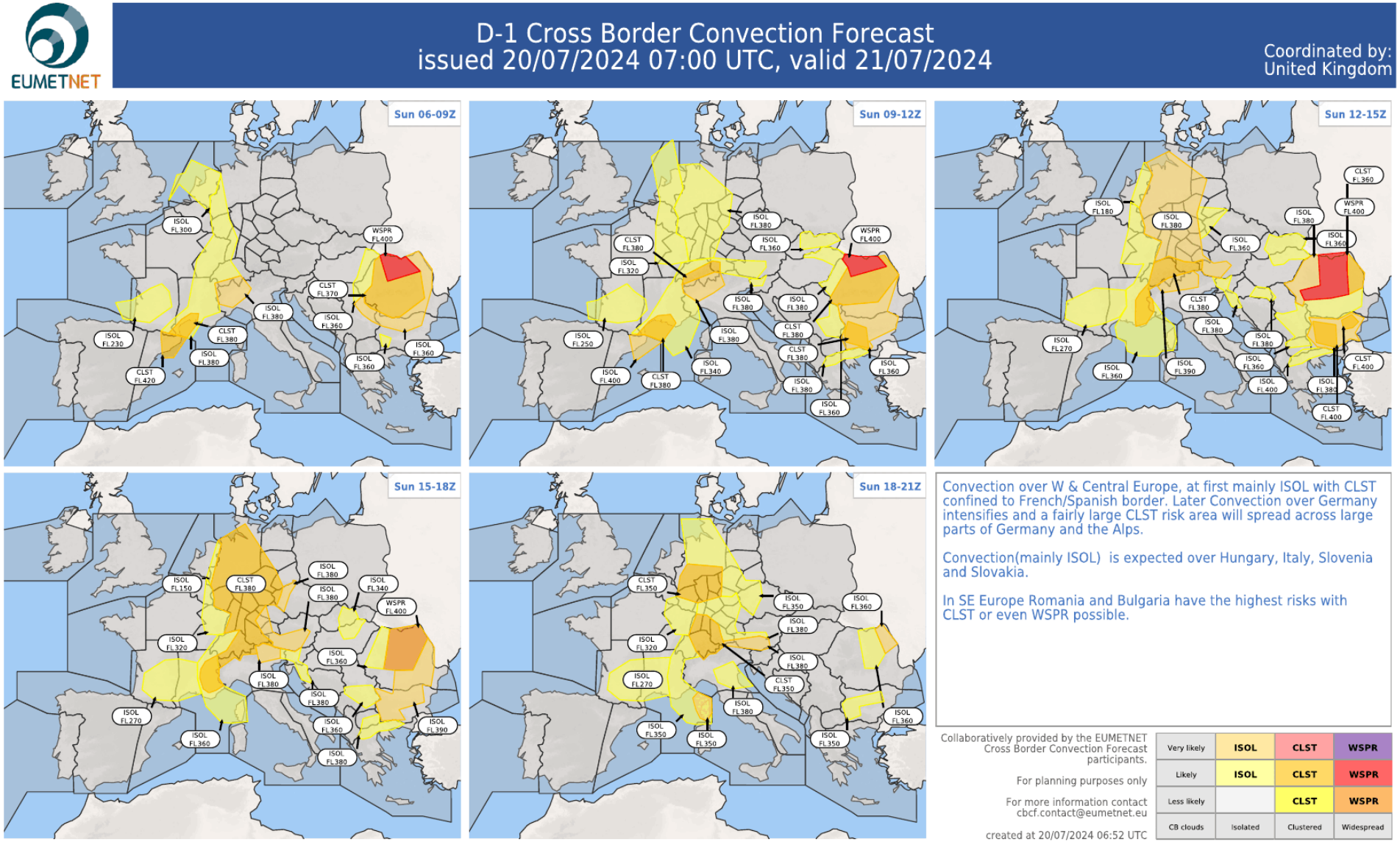

2024-07-21 00:00 UTC +24h
www.lightningmaps.org
Strokes: 25478
Antwerpen
Gent
Bruxelles
Köln
Luxembourg
LeHavre
Paris
Nantes
Bern
Genève
Lyon
Torino
Bordeaux
Toulouse
Marseille
60/min
0
24h
Lightning data from Blitzortung.org * Map licensed under Creative Commons BY-SA 4.0

EUMETNET

Focused with Wx Radar and lightnings

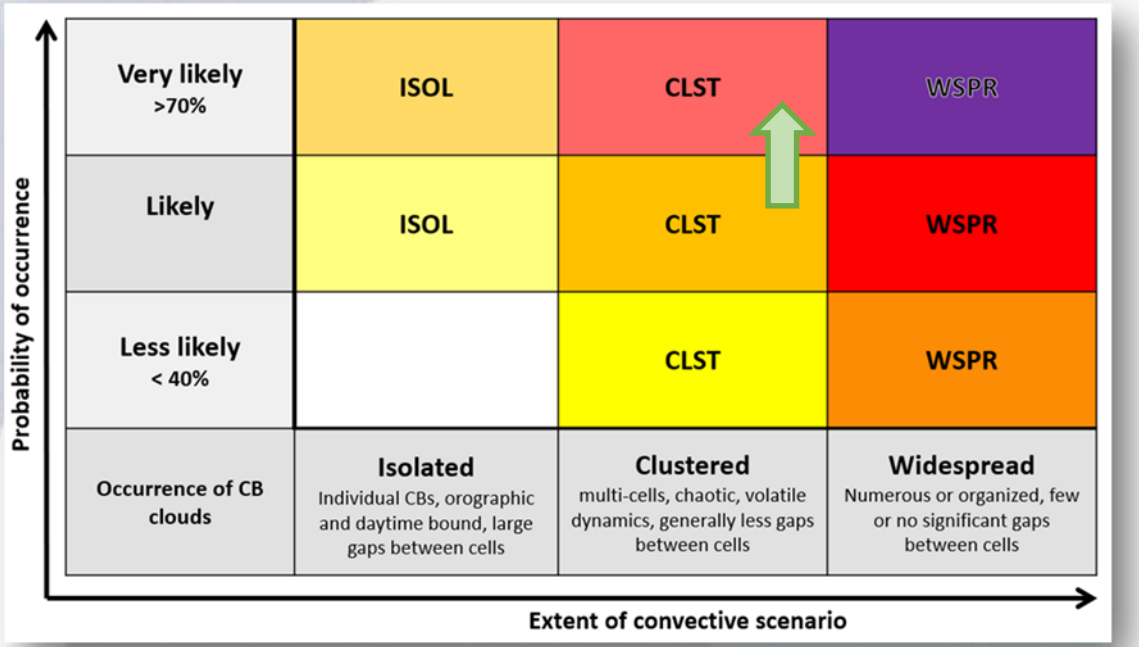


Animated GIF, use presenter mode

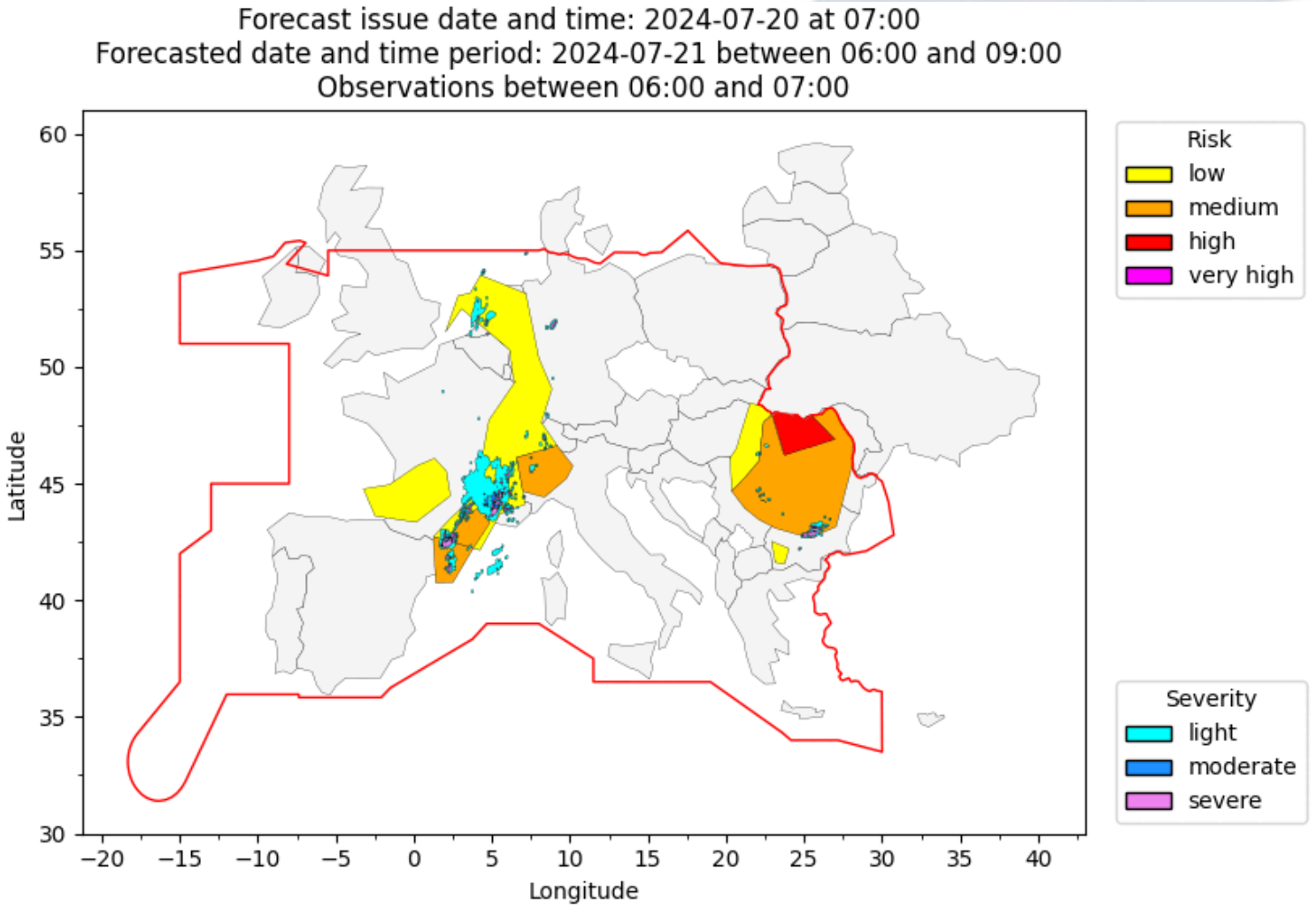


Why weren't all the red polygons already there at D-1?

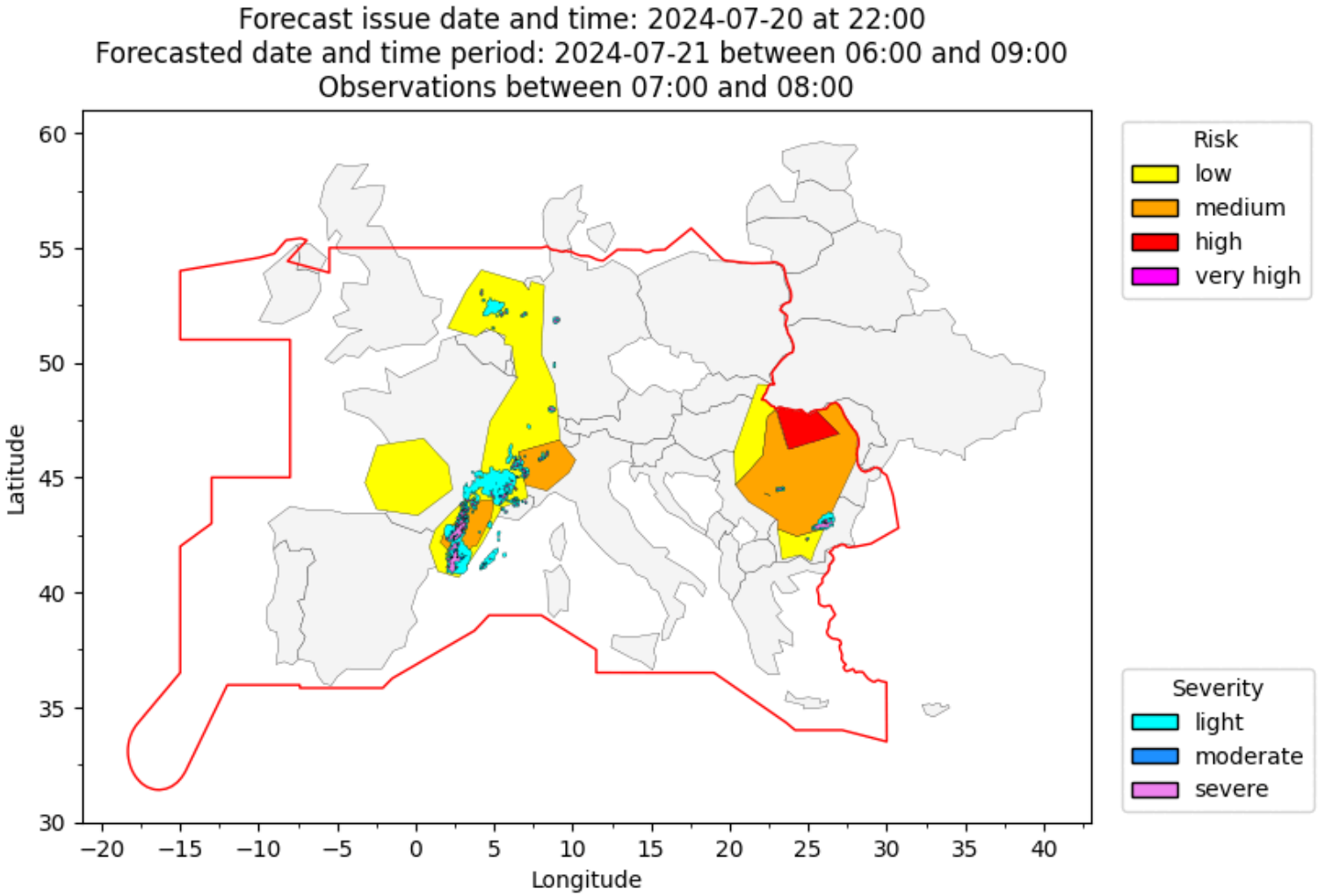
- Probability is dependent on lead time
  - The closer we get to the event, the more accurate all forecasts will be
- In this case, extent of convection was not updated
  - New red polygons to highlight hot spot areas



Actual Development + D-1 CBCF Polygons



Actual Development + D-0 CBCF Polygons



Use the **QR code** or
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log in with **eurocontrol521**

SUPPORTING
EUROCONTROL
AVIATION

NMOC Summer 2025 Preparation

Enhancing Pretactical and Tactical Demand Capacity Balancing in the European Network

Yolanda Portillo
Head of the NMOC

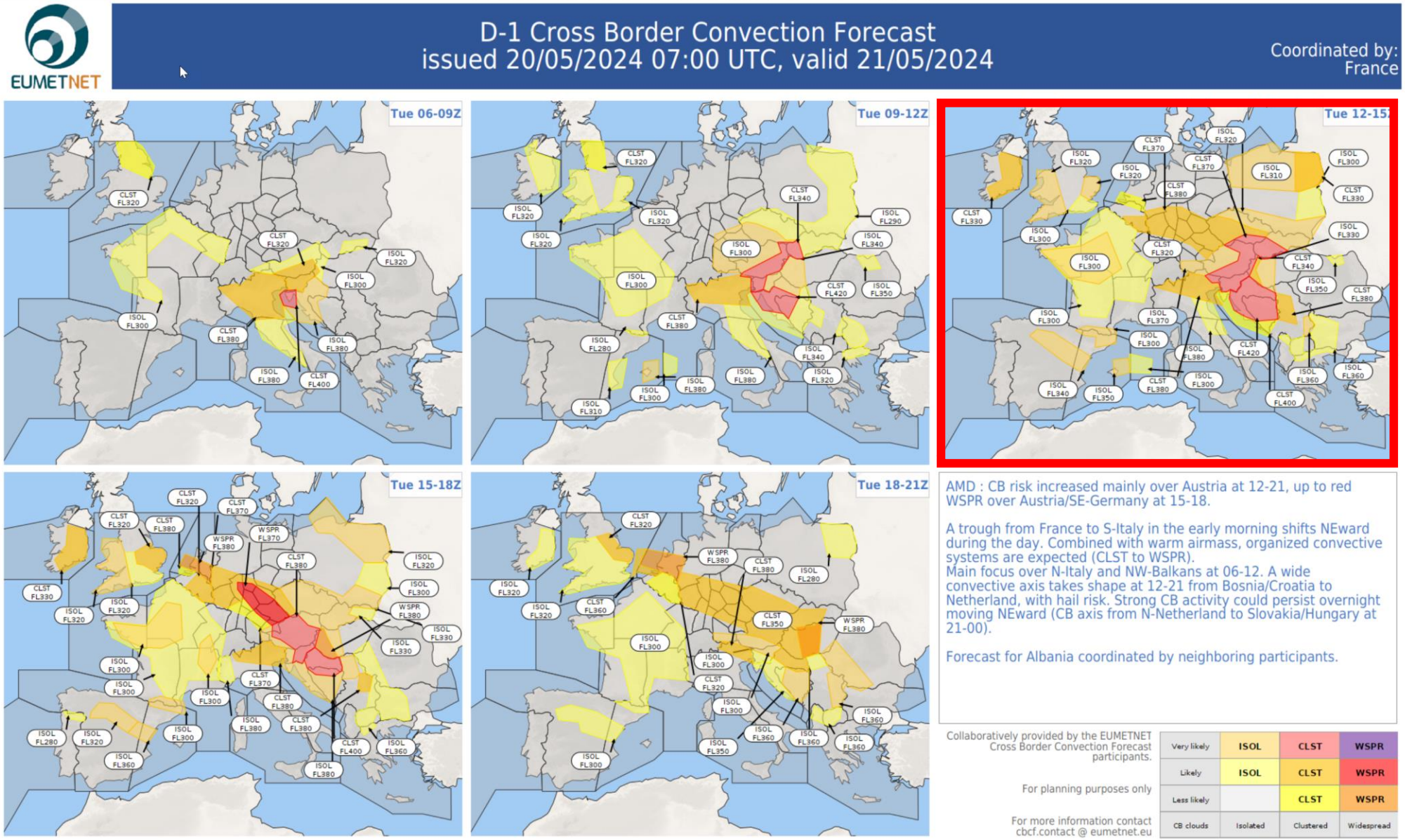
CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER
FOUNDING MEMBER sesar JOINT UNDERTAKING
NETWORK MANAGER

Example 1

Red Polygon on SE axis

21/05/2024

WX D-1



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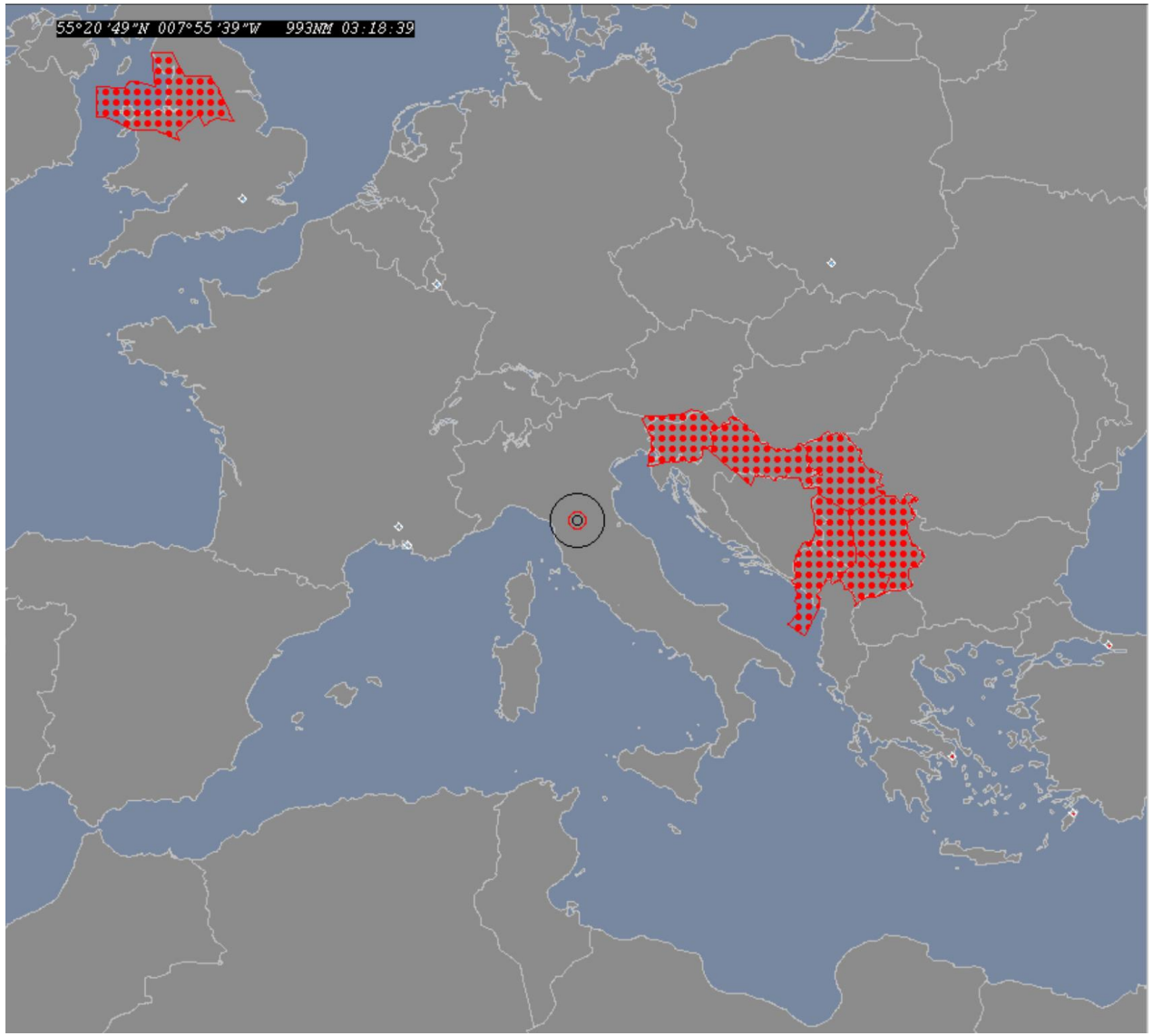
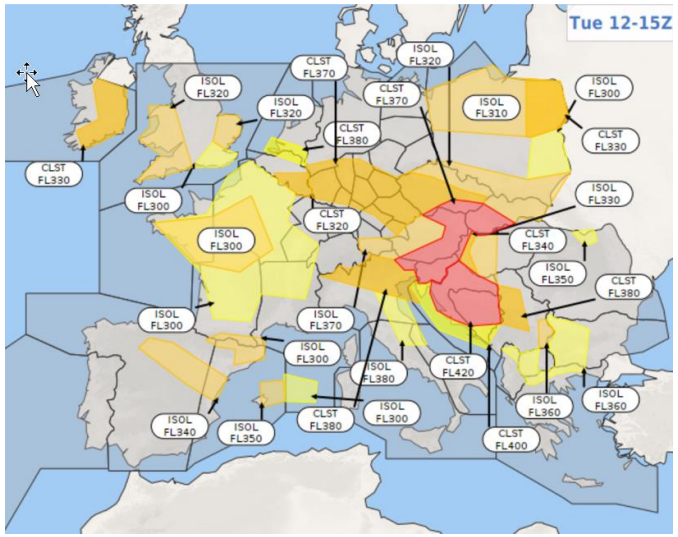
Pre-tact situation - initial





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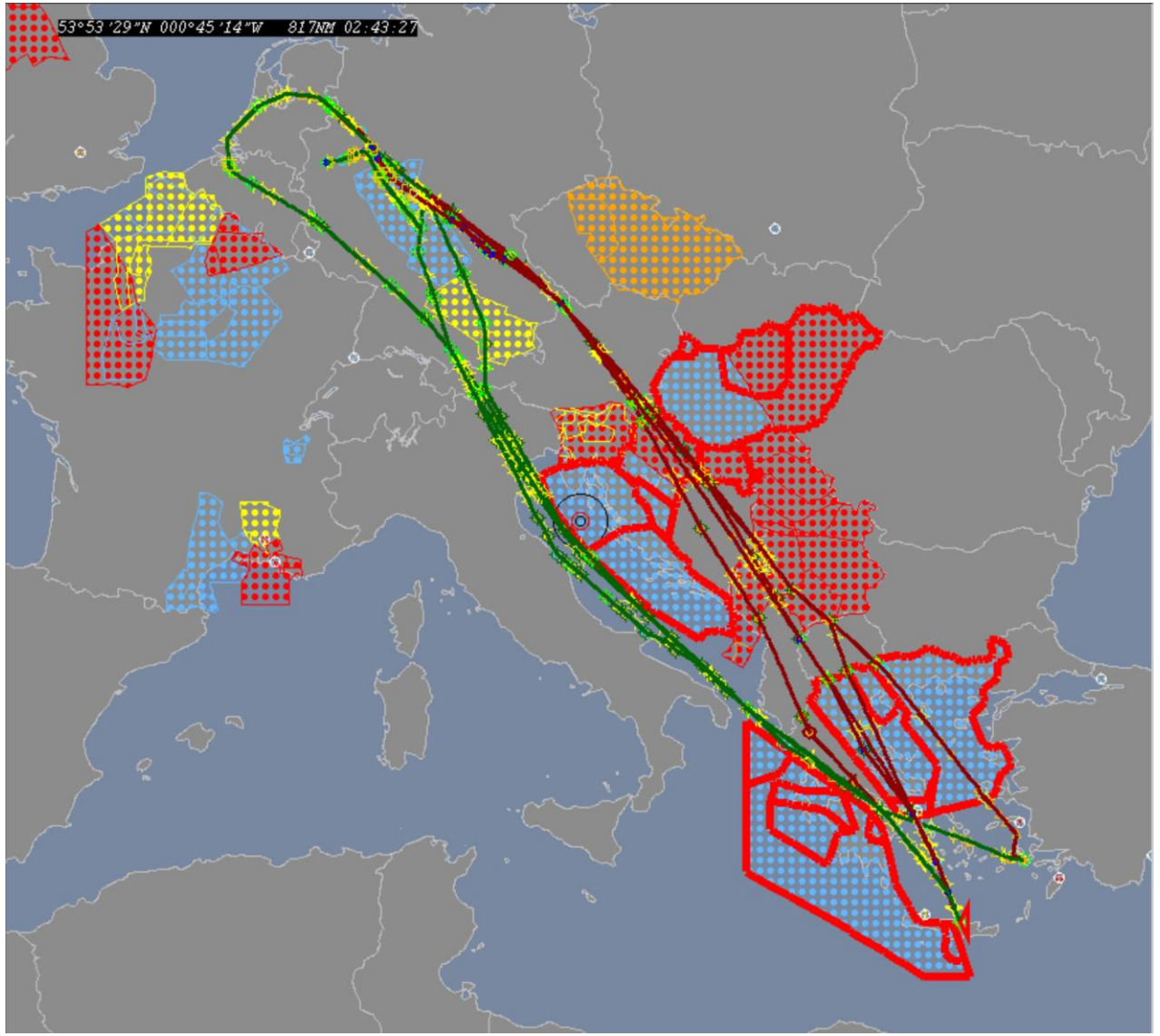
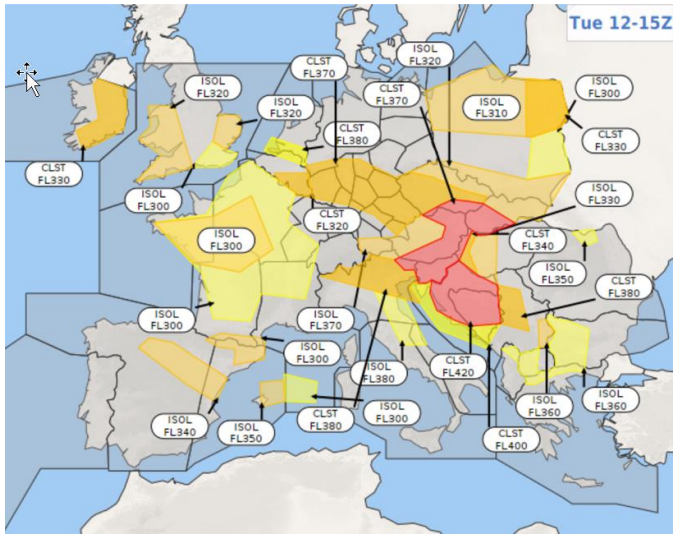
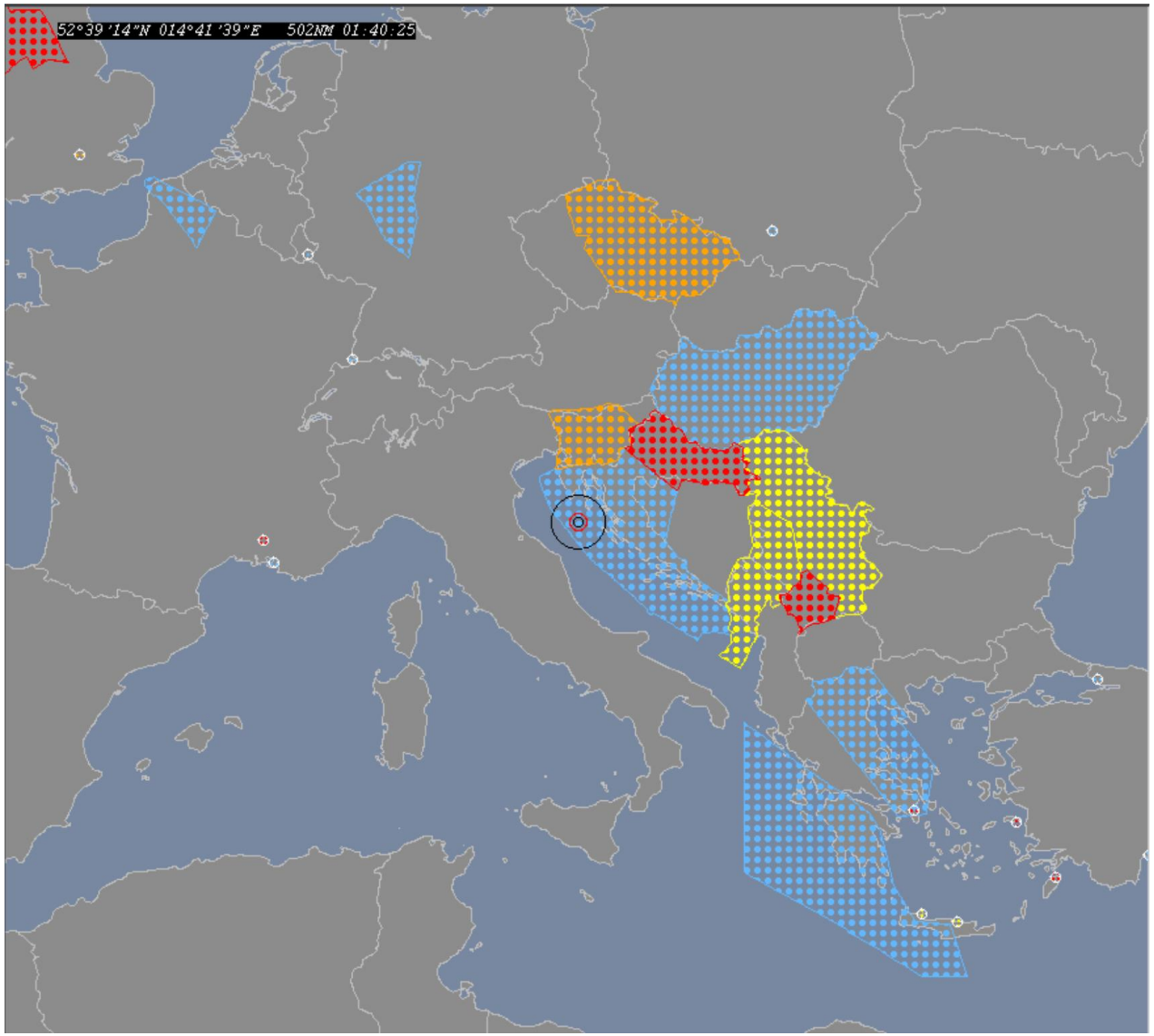
NM scenario

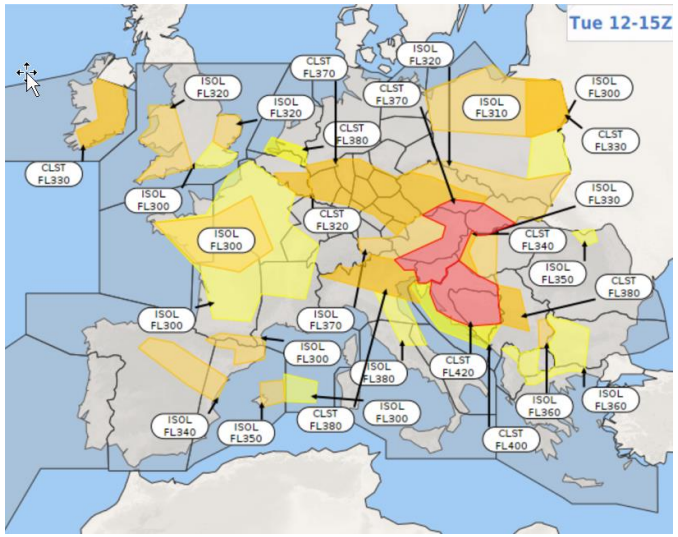




EUROCONTROL

Pre-tact situation after scenario





EUROCONTROL

Centralised Network Weather Assessment

1

Aggregate National Forecasts

Combine forecasts from multiple sources

2

Analyze Network Impact

Assess weather effects on European airspace

3

Integrate into ATFCM

Use assessment for central service provision

Benefits

Enhanced Safety

Improved coordination during adverse weather

Reduced Delays

Better use of available airspace capacity

Network Stability

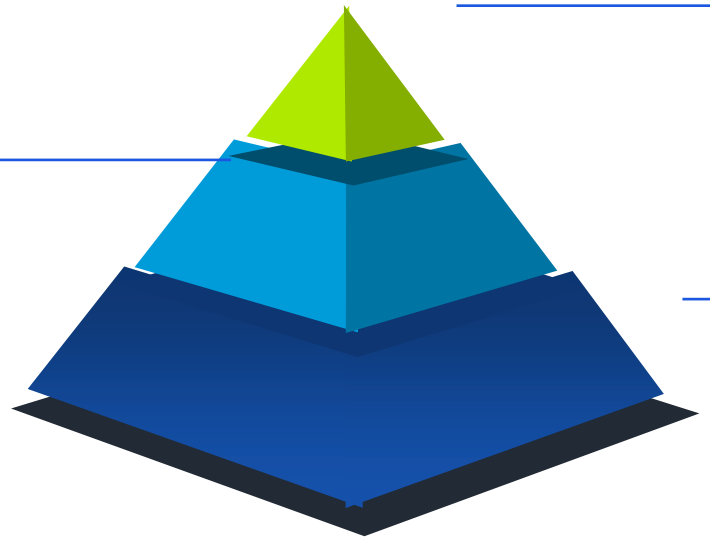
Increased predictability and certainty

EUROCONTROL

Challenges in XBW Implementation

Forecast Confidence

Insufficient continuity and granularity in forecasts



ANSP Approval

Lack of approval from impacted ANSPs

Decision Timing

Delayed decisions due to performance concerns

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Key Elements

1

NMOC Endorsement

Direct implementation of NM scenarios approved during CDM processes

2

Met Specialist Integration

Incorporating meteorological expertise into decision-making

3

Pretactical Application

Using Network Scenarios to improve stability and predictability

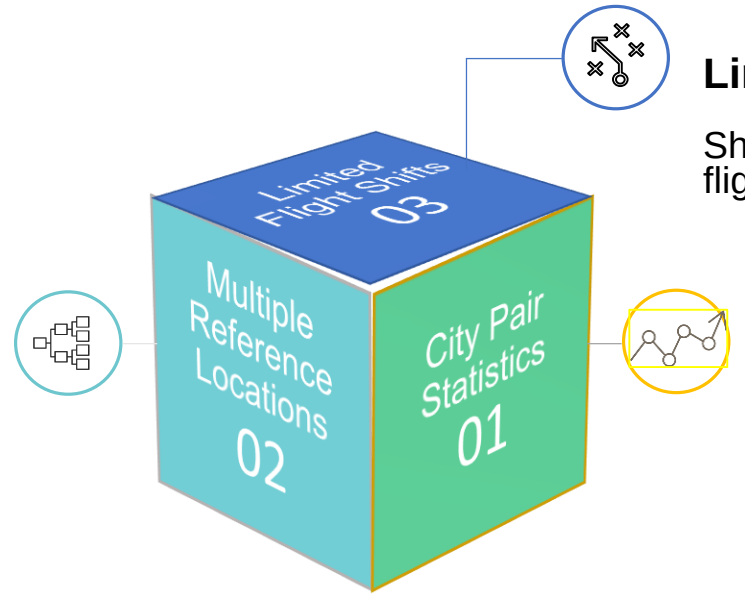
EUROCONTROL

NM Scenarios

Characteristics

Multiple Reference Locations

Off-loading based on bad weather patterns from summer 2024



Limited Flight Shifts

Shifting specific number of flights to avoid overloads

City Pair Statistics

Based on historical flight data between city pairs

Approval Process

01. NMOC Definition

02. Stakeholder Sharing

03. CDM Approval

04. Publication

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Network Weather/Capacity Based Operations

TRIGGERS

NMOC will analyse the need based on previously defined triggers

TIMELINE

Pretactical/tactical timeframe based on current process as per ATFM Operations Manual

PUBLICATION

Using INP and NOP Portal

DELAY REATTRIBUTION

Weekly basis (share with POCs) , August at the end of the month

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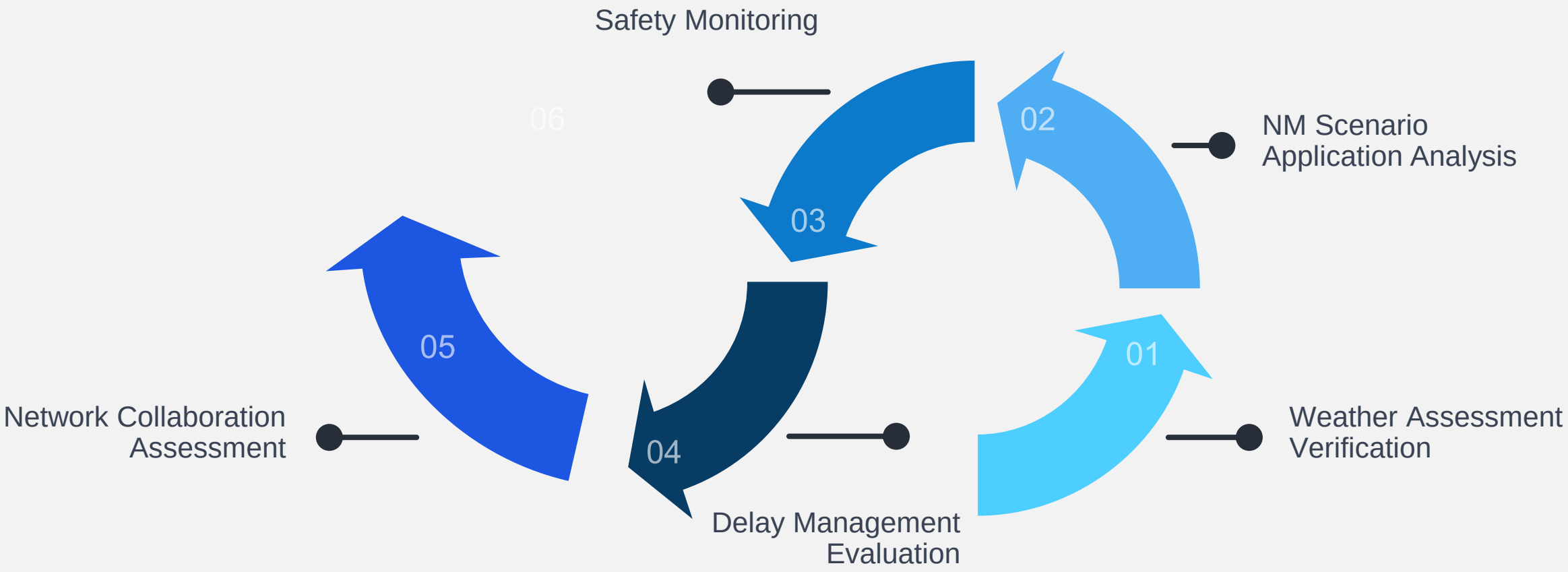
Follow-up Process



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EUROCONTROL

SESAR MET

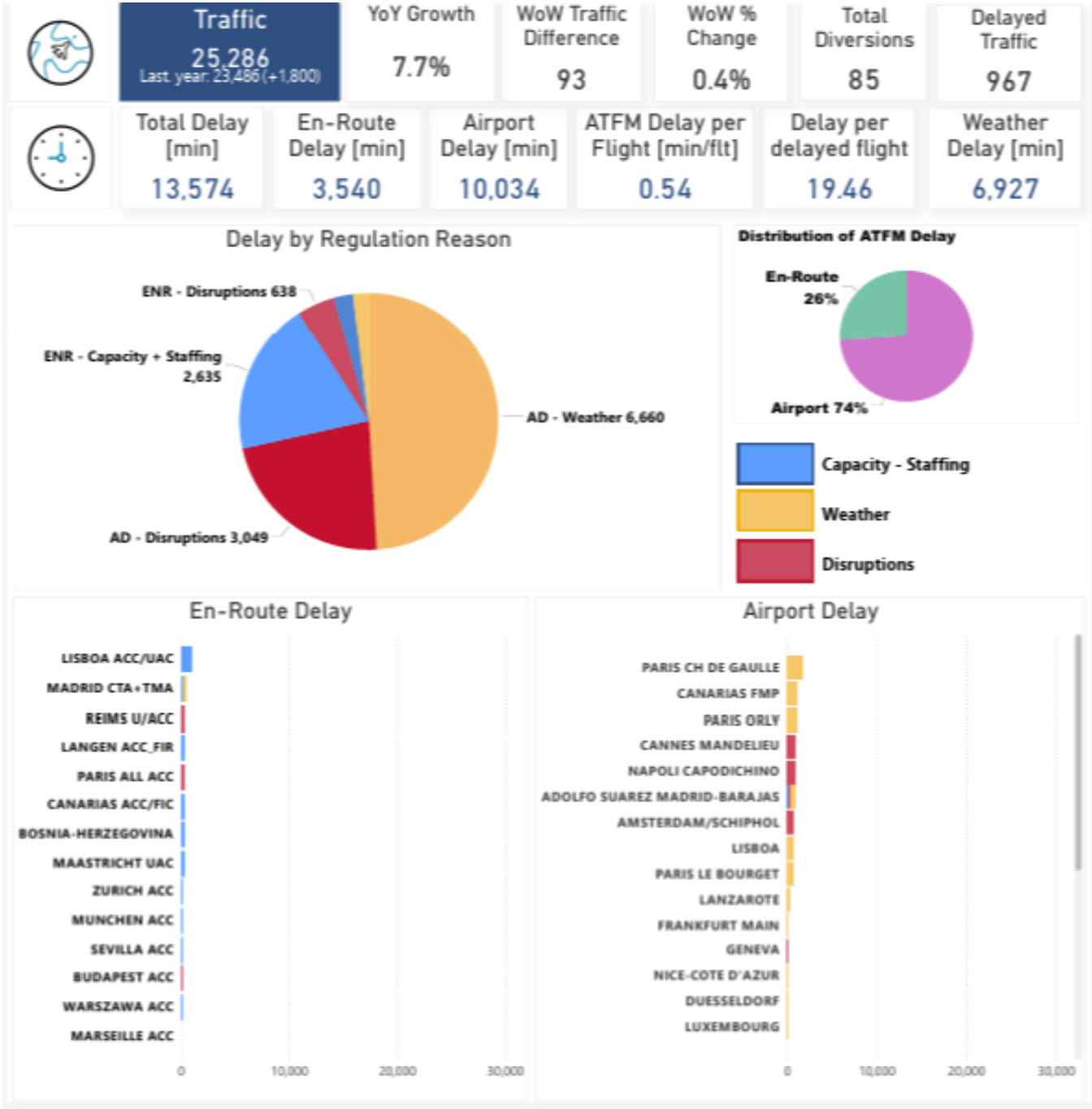
OZNUR UYGUR - SJU Programme Manager

12/03/2025

EUROPEAN PARTNERSHIP

Co-funded by the European Union

Why I believe that the MET solutions are important?



SESAR MET

Deployed / Demonstrated

Baseline SESAR 2020

SESAR 3 - ONGOING

CP1 + Deployed solutions

- Meteorological Information Exchange (SWIM) including Digital MET Services (Sol #35)

Under deployment in several member states

- Aerodrome Meteorological Information Service
- En-Route and Approach Meteorological information Service
- Network Meteorological Information Service

- SWIM Services; TOPMET , TOPLINK Demo
- Enhanced Ground Controller Situation Awareness in all Weather Conditions #70
- Enhanced Ground Weather Management System (GWMS) as local 4DWxCube (Pj18-4b-01) – (The ground weather management system (GWMS) and associated glide path wind profile capability; and METForTAM information service) including uplink and downlink services.
- Cumulonimbus (Cb) Global capability and service PJ.18-04b-02

- TRL 6 SOLUTIONS:
- Initial DAC /DCB (W2 PJ09)
- Network Collaborative Management (PJ24)
- Weather-dependent reductions of wake turbulence separations for final approach PJ.02-01-05

TBO

- MET and AIM information services in the aircraft information domain PJ.18-04c - TRL 4

CNS

- Aircraft as an AIM/MET sensor and consumer (PJ.14-W2-110) TRL 4

AIRPORT

- MET data and services for wake turbulence separation (PJ.02-W2-14.14) TRL 4
- Enhanced optimal spacing delivery for departures (eOSD) (wind) PJ.02-W2-14.8) – TRL 2
- Improved capacity and safety of runway operations at secondary airports in low-visibility conditions PJ.02-W2-17.1 TRL 2
- Dynamic Pairwise Wake Separations for departures based on wake risk monitoring PJ.02-W2-14.9a TRL2

NETWORK

- MET & uncertainty management (ISOBAR - START, FMP MET, ALARM) TRL 2

ENGAGE Workshop

SESAR 3 Projects

- AI based weather phenomena mng (convection, SO2, ice crystals, turbulence, low visibility, wind) KAIROS
- Contrails
- HERON ORD AWALON with accurate WIND data
- Link to SDO 8 - Digital aeronautical information management and MET services

From Vision to Reality: SESAR MET So Far

How to get the data?

How will we use the data?

SESAR 3 Projects

- AI based weather phenomena mng (convection, SO2, ice crystals, turbulence, low visibility, wind) KAIROS
- Contrails
- And previous SESAR projects as listed in the previous slide

Optimizing ATM with AI-Enhanced Meteo Data

Airspace Management & DCB for NM & ANSPs & AU & Airport

- Digital Capacity (Collaborative Decision-Making, Advanced Algorithms & Real-Time Data, Comprehensive approach to balancing demand and capacity, maximizing airspace capacity and adapting to changing conditions, AI-powered Digital INAP and Network Digital Assistants
- Advanced DAC (Dynamic Capacity Assessment, Advanced Tools for Optimization, Enhanced Coordination and Information Sharing)
- Enhanced demand Management (Spot Management, Automated Aid-Tool, Automated Regional Constraint Reconciliation, Automated Network Constraint Reconciliation, Shared Complexity Load Methodology)
- Dynamic Airspace Configuration through data uncertainty/confidence parameters, which are no longer bound to time parameters
- Flow Centric Approach in future
- Collaborative management at regional airports - AOP-NOP + AOP-AOP
- TBO
- Airport operation support for ex; ORD with wind service
- Moving hazard zones – DMA Type 3

SESAR MET Evolution: What's Next?

SESAR 3 – IR 2

IR 3

New Service Delivery Model refers to the Operational meteorological information (OPMET)"; local weather, convection, winds, clear air turbulence, icing, space weather.

- **IR-3-01: Addresses next generation ATC platform fully leveraging aircraft capabilities. This includes Meteo (MET) as a service**
- **(including the DMA 3 moving hazard zones + adaptive DCB)**
- **IR-4-01: Addresses the next generation airport platform fully leveraging aircraft capabilities. This includes Meteo (MET) as a service**
- **IR-5: Autonomy and digital assistants for the flight deck – not obvious but I expect that on board MET element could be included in a proposal**

IN FUTURE ENGAGE THE WEATHER MORE IN ADAPTIVE AIRSPACE MANAGEMENT: SMARTER DCB THROUGH AI !

KAIROS

Unlocking the potential of AI-based weather forecasts for operational benefits

AI METHODS · CRIDA · AEMet · dgac DSNA · ENAIRE · EUROCONTROL · iGA · FLUGHAFENZÜRICH · ILMATIETEEN LAITOS · meteomatics · METSAFE · Rolls-Royce · SWISS · uc3m Universidad Carlos III de Madrid · UNISPHERE

sesar JOINT UNDERTAKING

- Network Manager
- ANSPs
- Airlines
- Airports
- Aircraft OEMs
- UAM/UAS
- MET Providers

MET is very important for all stakeholders and SESAR aims to bring them together. We pay attention to the consortium structure to ensure having wide range of expertise

KAIROS

High altitude ice crystals

Windshear

Low visibility

Heavy snow

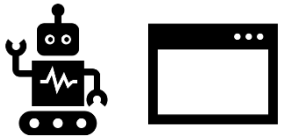
Clouds - Turbulence

Heavy lightening

Heavy dust – SO2
Volcanic ash

Analysing weather phenomena

SOL 1: AI Convection Prediction
SOL 2: AI-based MET Applications



Applying artificial intelligence algorithms

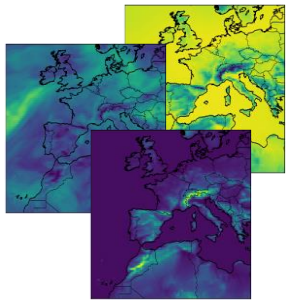
on available forecast and observation weather data to improve the prediction of weather phenomena impacting aviation.

Integrating the AI-based forecast

with decision support tools and platforms currently used by aviation stakeholders across the airspace system.

AI-Powered Meteo Forecasting in ATM

Business as Usual



Numerical Weather Products

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Meteorologists

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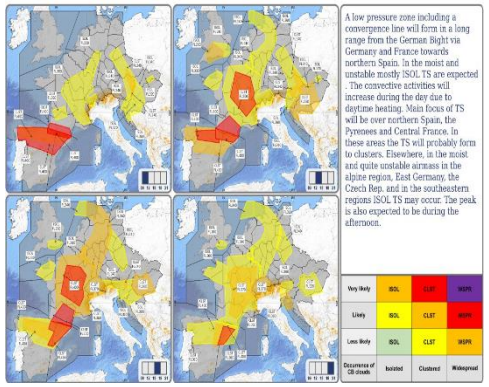
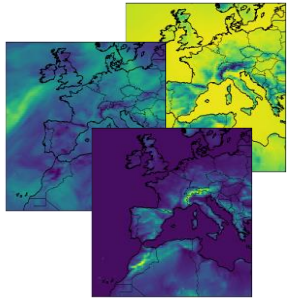


Aviation MET Forecast

KAIROS approach



Numerical Weather Products

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Meteorologists

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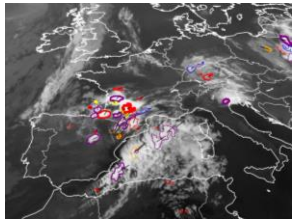

Weather Observations

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AI Model

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Dynamic Digital Forecast

EUROCONTROL

SUPPORTING
EUROPEAN
AVIATION

Thank you!

CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER

FOUNDING MEMBER sesar JOINT UNDERTAKING

NETWORK MANAGER