



FPS MOBILITY AND TRANSPORT  
BELGIAN CIVIL AVIATION AUTHORITY

# Aviation Safety Information Leaflet (ASIL) AIRSPACE INFRINGEMENTS

Analysis of the pilot questionnaires Edition 2020-2021

UPDATE OF THE BELGIAN AIRSPACE  
INFRINGEMENT REDUCTION  
PLAN (B/AIRP)



ASIL 2022-03



[www.mobilit.belgium.be](http://www.mobilit.belgium.be)



## INTRODUCTION

The Belgian Civil Aviation Authority (BCAA), skeyes and the Belgian Air Force, have joined forces, in order to reduce the number of airspace infringements in Belgian airspace. The approach to this problem is one of documenting the occurrences, drawing conclusions, implementing improvements and stimulating awareness and training on the matter rather than blaming and punishing.

In the frame of this approach, pilots are reminded that they should report these kind of occurrences to the BCAA in accordance with Regulation (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation. The reporting of these occurrences can be done via the European reporting portal (<https://aviationreporting.eu/>).

To get more details on the infringements occurring in the Belgian FIR, the BCAA sends a questionnaire to each aircraft owner or pilot involved in an infringement. The answers are grouped and analyzed to get a better understanding of the causes and contributing factors of airspace infringements in Belgium. To raise the awareness and to demonstrate the usefulness of good reporting, this summary of the results is made public and shared with all stakeholders.

In the following pages you can find the graphs resulting from the analysis of the occurrence reports and the answers provided by pilots, instructors, examiners,... via the questionnaires. For this analysis, available data from January 2020 to December 2021 was used. For this period 144 pilot replies have been received and analyzed. About 52% of the pilots of identified aircraft completed the airspace infringement questionnaire during the period 2020/2021. The BCAA would like to emphasize that the sole aim of this analysis is the prevention of future accidents and incidents, and not the determination of violations or responsibilities. This information shall not be used for purposes other than maintaining or improving aviation safety.

### Following analysis results can be found in this document:

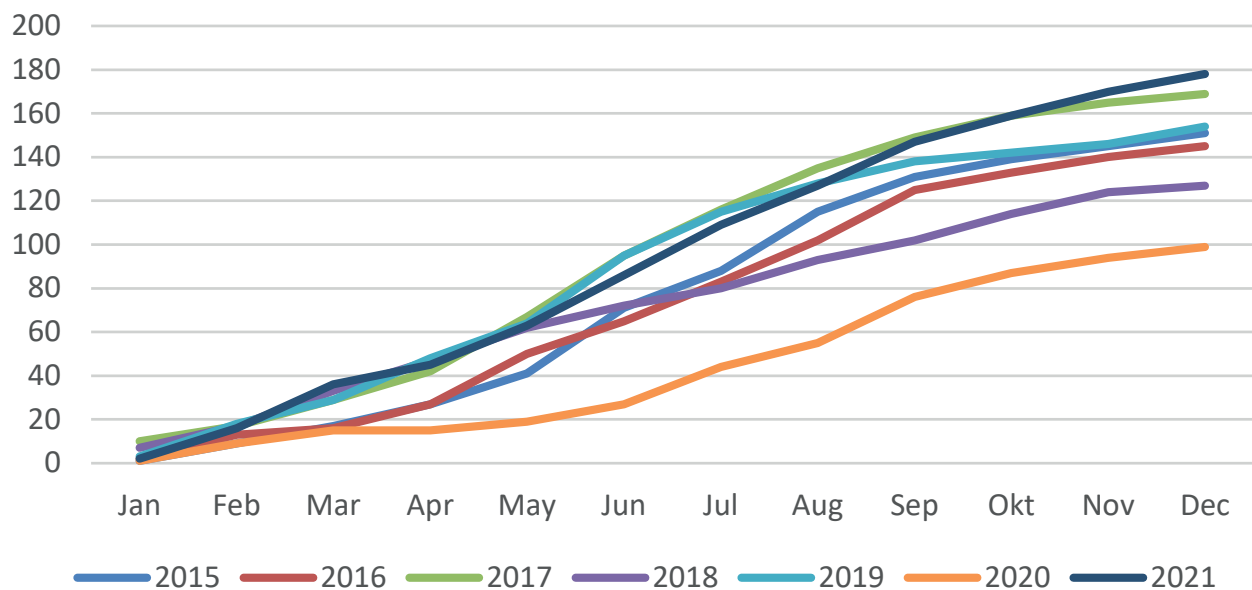
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# 1. EVOLUTION OF AIRSPACE INFRINGEMENTS

## Interpretation:

The chart here under displays the cumulative number of reported airspace infringements in the period 2015-2021 in which ATC was not directly involved. During the course of 2021, especially as of May 2021, there was a noticeable increase in the number of airspace infringements. The figures of the first quarter of 2022, not displayed on this chart, confirm this concerning tendency. The figures of 2020 were low, obviously due to the reduced number of flights during the pandemic. Other decreases have already been observed in the past, most probably correlated with the broad BCAA and EASA safety promotion campaign on the prevention of airspace infringements that year. Unfortunately, in 2019 and 2021, no momentum of that improvement was observed. On the contrary, 2021 ended up with the worst number of airspace infringements in one year. Almost 15 each month in average, meaning **one every other day!**

Cum. number of infringements - ECCAIRS



High level figures	2015	2016	2017	2018	2019	2020	2021
Total airspace infringements :	151	145	169	127	154	99	178
Comparison with previous year :	N/A	-4%	+17%	-25%	+21%	-36%	+80%
Completed questionnaires received :		80	63	72	49	95	
Pilot's response rate :		47%	50%	47%	50%	53%	

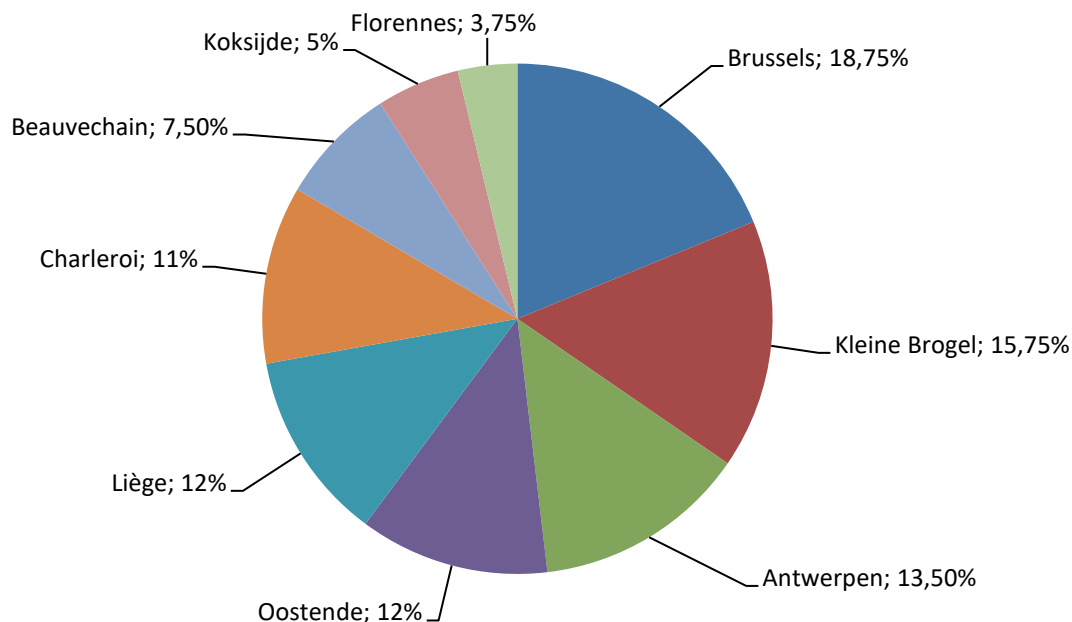
## 2. LOCATION (CTR, TMA) OF THE AIRSPACE INFRINGEMENT

### Interpretation:

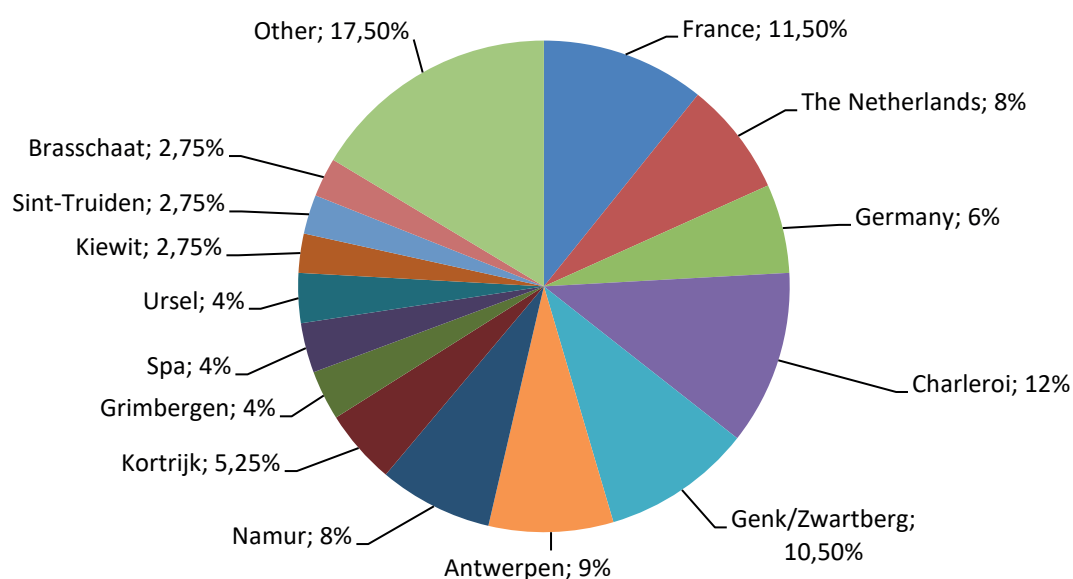
A large number of infringements are conducted in the airspace surrounding Brussels and Kleine Brogel. This "top 2" has not changed compared to the previous period (2018-2019). The complex airspace around Brussels is definitely a hotspot that deserves extra attention from both pilots and authorities. The large amount of infringements in Kleine Brogel are most probably due to the amount of recreational airfields and complexity of airspace in the vicinity of that military air base. Also a relatively large number of infringements have occurred in the airspace of Liège, Antwerp and Charleroi. There is also a relatively high number of airspace infringements (~16%) in the other military airspaces (Florennes, Beauvechain, Koksijde). This percentage of 16% remains comparable to the 2018-2019 figures.

One out of four departure aerodromes is located in a neighbouring country. This important contribution to the number of infringements caused by aircraft departing from or arriving at foreign aerodromes was already observed in the past. Compared with 2018-2019, the United Kingdom has disappeared from the list of the departure aerodromes.

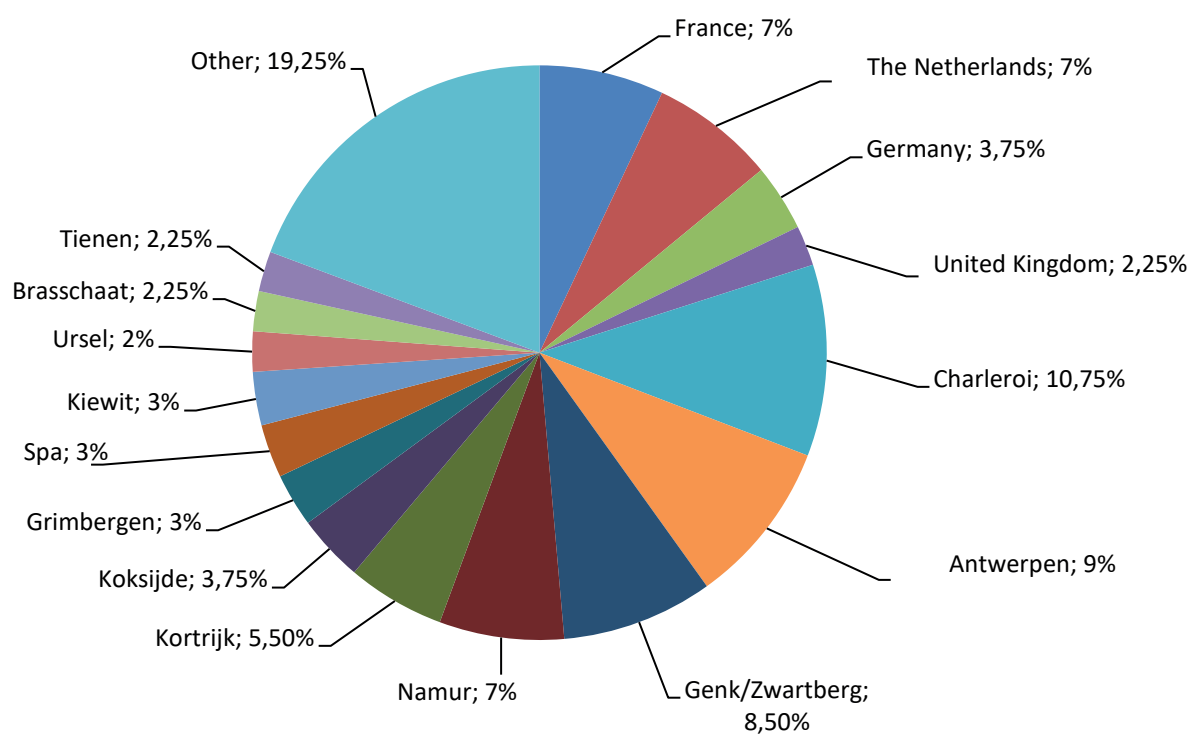
### 2020 & 2021 - Location of the infringement (airspace)



## 2020 & 2021 - Departure aerodrome



## 2020 & 2021 - Destination aerodrome





### 3. DISTRIBUTION OVER TIME OF THE AIRSPACE INFRINGEMENTS

#### Interpretation:

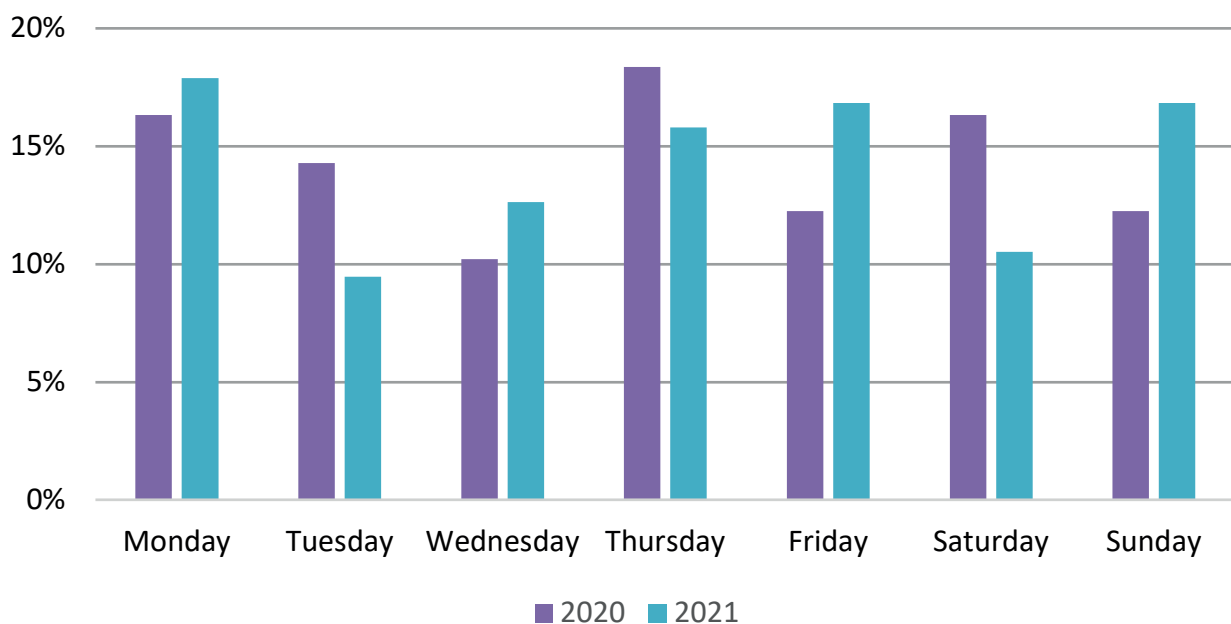
The distribution of airspace infringements over the year reflects a peak in September 2020, probably due to a return to operations after lockdown. In 2021, the higher rate can be seen during the beginning of the summer. Periods with nice weather can clearly be distinguished.

These graphs show the importance of a good flight preparation at the beginning of the 'summer' season, as well as after a long period of interruption that impacted pilot's flying skills.

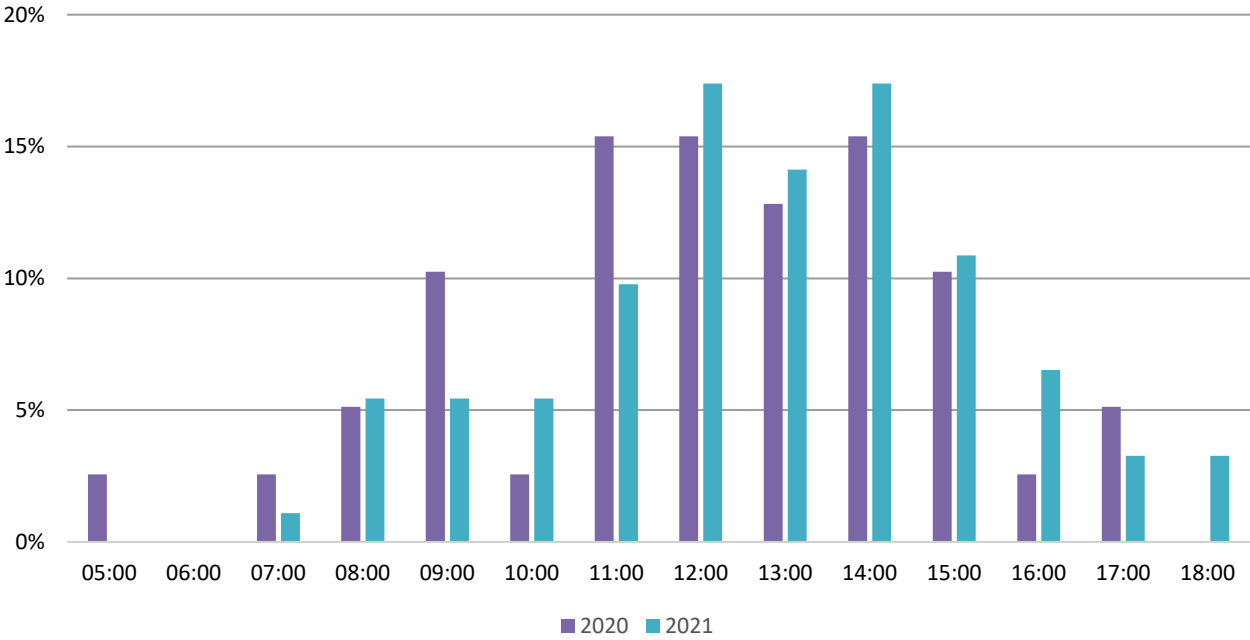
#### Distribution month of the year (in %)



#### Distribution day of the week (in %)



Distribution time of the day (in %)



## 4. CAUSES AND RELATION BETWEEN CAUSES/CONTRIBUTING FACTORS, AS INDICATED BY THE PILOT

### Interpretation:

This matrix shows the correlation between the causes as indicated by the pilots. In the questionnaire, the pilot is free to indicate as many factors as wanted.

For example: a pilot could indicate 'distraction' & 'navigation error'. But he/she can also indicate a combination of 'distraction' and 'use of wrong frequencies'.

The top row of the matrix shows the prevalence for every cause over all replies. The rows below indicate how many times the combination of causes was chosen.

Distraction, navigation errors and the wrong interpretation of the airspace are key factors in making airspace infringements. Followed by the unfamiliarity with the airspace and the insufficient preparation of the flight.

The wrong interpretation of the airspace also encompasses the services that are linked with that airspace. In other words, the wrong interpretation of ATC clearance or instructions or information is also a key factor. For example: an aircraft receiving a joining clearance from EBBR APP to join the TMA at a certain altitude and forgetting that, to join the EBBR TMA, this aircraft will have to cross first another airspace (e.g. mil TMA) and not asking clearance for that.

Interesting correlations are: insufficient preparation resulting in navigation errors and high work load; wrong interpretation of the airspace and unfamiliar airspace resulting in a high work load; deteriorating weather leading to navigation errors...

Remark: several pilots trust on Brussels/Belga Flight Information Center to warn them of the airspace ahead, or presume Brussels/Belga will coordinate with ATC. Pilots must be aware that the ATS-service they may expect depends on the combination of the classification of the airspace they are operating in, the VFR/IFR status of the flight and thus the type of service (ToS) provided by ATS. Pilots must be aware of the ToS they are provided with and what the associated responsibilities are.



This cross-table shows the relation between the different causes for one infringement.

- The top row, shows the total number of times each cause was mentioned in the infringements.
- The matrix below shows the prevalence of every cause in respect to the cause on top.

EXAMPLE: in case of a "navigation error", in 42.86% of the cases, also "distraction" was mentioned as one of the causes. But in 37.50% of the case with "distraction", this resulted in a "navigation error."

	Insufficient preparation of the flight	Navigation error by pilot / navigator	Wrong interpretation of the airspace / map / environment	Wrong interpretation/ use of GPS	Distraction, work load in the cockpit, late observation of the airspace	Meteorology ( deteriorating weather, reduced visibility, etc. )	Unfamiliarity with the airspace/area/country	Unobserved changes in airspace	Use of wrong frequencies ( COMM/NAV )	Other: due to ATCO	
<b>Total number of infringements with this cause</b>	11	42	30	6	48	15	27	7	14	25	Numbers with a very low statistical significance are not displayed.
<b>Percentage of infringements with this cause in respect to total number of infringements</b>	18,06%	29,17%	20,83%	4,17%	33,33%	10,42%	18,75%	4,86%	9,72%	17,36%	
	Percentage of infringements with combination of both causes / the cause in this column										
Insufficient preparation of the flight		14,29%	26,67%	33,33%	14,58%	6,67%	29,63%	57,14%	28,57%	8,00%	
Insufficiently equipped airplane / old - poorly maintained systems			3,33%				3,70%			4,00%	
Technical failure of the navigation aids used		4,76%									
Navigation error by pilot / navigator	54,55%		23,33%	33,33%	37,50%	46,67%	22,22%	14,29%	7,14%	8,00%	
Wrong interpretation of the airspace / map / environment	72,73%	16,67%		16,67%	18,75%	20,00%	37,04%	14,29%	21,43%	8,00%	
Wrong interpretation/ use of navigation instruments					2,08%		3,70%		7,14%		
Wrong interpretation/ use of GPS	18,18%	4,76%	3,33%		4,17%	6,67%	7,41%				
Database errors in the GPS	9,09%			16,67%			3,70%				
Distraction, work load in the cockpit, late observation of the airspace	63,64%	42,86%	30,00%	33,33%		60,00%	40,74%	42,86%	21,43%	4,00%	
Other traffic		4,76%	6,67%		6,25%						
Meteorology ( deteriorating weather, reduced visibility, etc. )	9,09%	16,67%	10,00%	16,67%	18,75%		3,70%				
Unfamiliarity with the airspace/area/country	72,73%	14,29%	33,33%	33,33%	22,92%	6,67%		28,57%	7,14%	16,00%	
Unobserved changes in airspace	36,36%	2,38%	3,33%		6,25%		7,41%			4,00%	
Not updated navigation tools ( chart/navigation software,... )	9,09%		3,33%				3,70%				
Use of wrong frequencies ( COMM/NAV )	36,36%	2,38%	10,00%		6,25%		3,70%			8,00%	
Loss, or reduction of skill, due to low annual flying hours	9,09%				2,08%	6,67%					
Loss, or reduction of skill, due to long period between this flight and the previous	9,09%	2,38%	3,33%								
Other: due to ATCO	18,18%	4,76%	6,67%		2,08%		14,81%	14,29%	14,29%		

\*Note: The "due to ATCO" statement is the pilot's own assessment in the questionnaire. This does not mean that the ATS-provider is actually responsible or partially responsible for the airspace infringement.

## 5. EXPERIENCE OF THE PILOTS INVOLVED: TOTAL FLYING HOURS AND AVERAGE FLYING HOURS PER YEAR

### Interpretation:

The plots on this page show the distribution of experience of the pilots involved in airspace infringements. The total flying experience is shown against the average flying hours per year, as reported by the pilot.

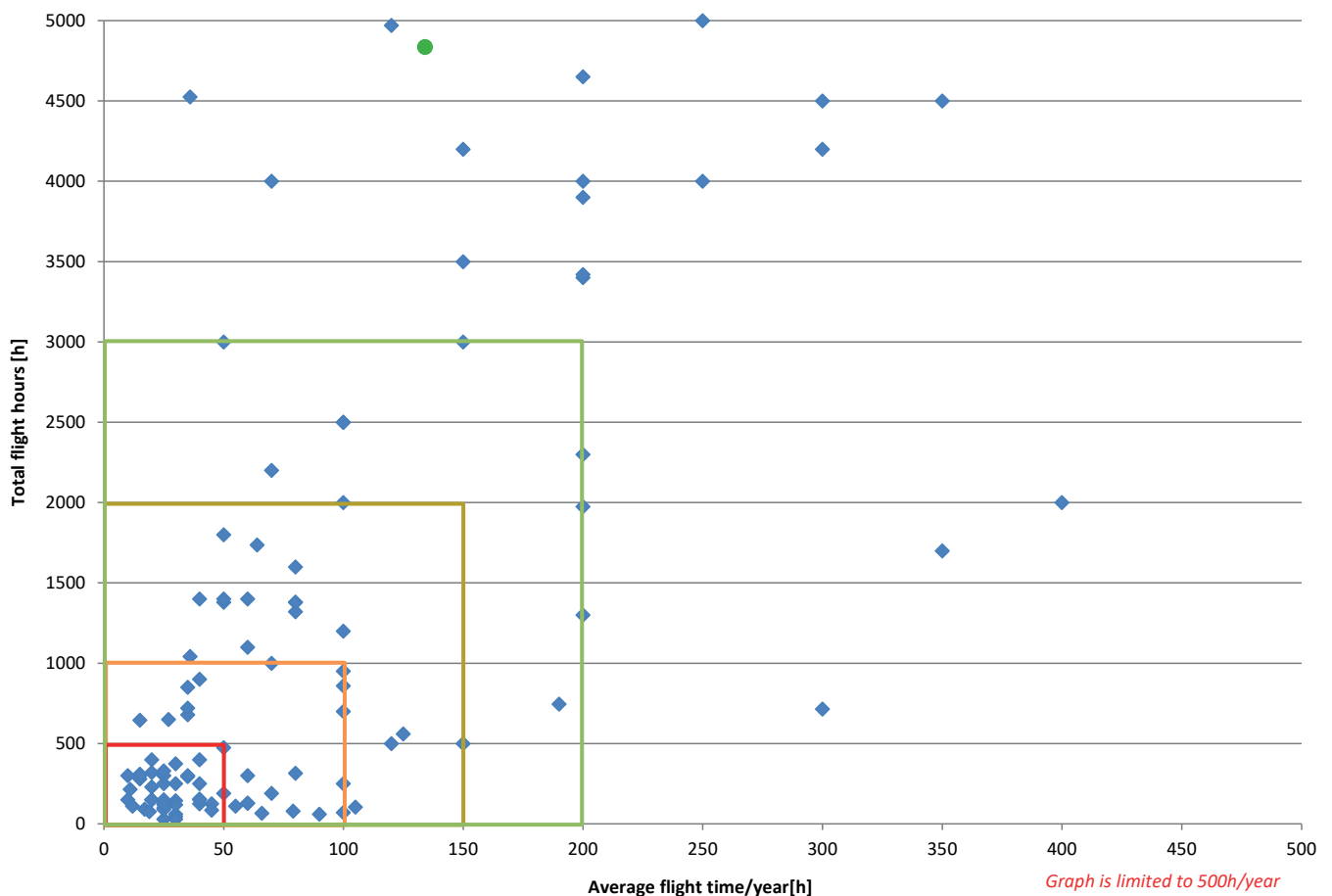
For practical reasons the graphs don't show the pilots with experience above 5000h nor more than 800 flight hours per year. As during the 2018-2019 period, most airspace infringements are caused by pilots with a low number of total flight hours and with a limited average of annual flight time, although infringements are committed by pilots over the complete range of experience.

Note: «Total cumulative percentage» is the percentage of outcomes inside a rectangle formed by total flight hours and average flight time (see corresponding colour) in comparison with the total number of outcomes.

TOTAL FLIGHT HOURS		AVG. FLIGHT TIME/YEAR		TOTAL CUM. PERCENTAGE
HOURS	CUM. PERCENTAGE	HOURS	CUM. PERCENTAGE	
<3000	62,50%	<200	65,97%	58,33%
<2000	58,33%	<150	61,81%	54,17%
<1000	46,53%	<100	52,08%	38,89%
<500	36,81%	<50	34,03%	27,08%

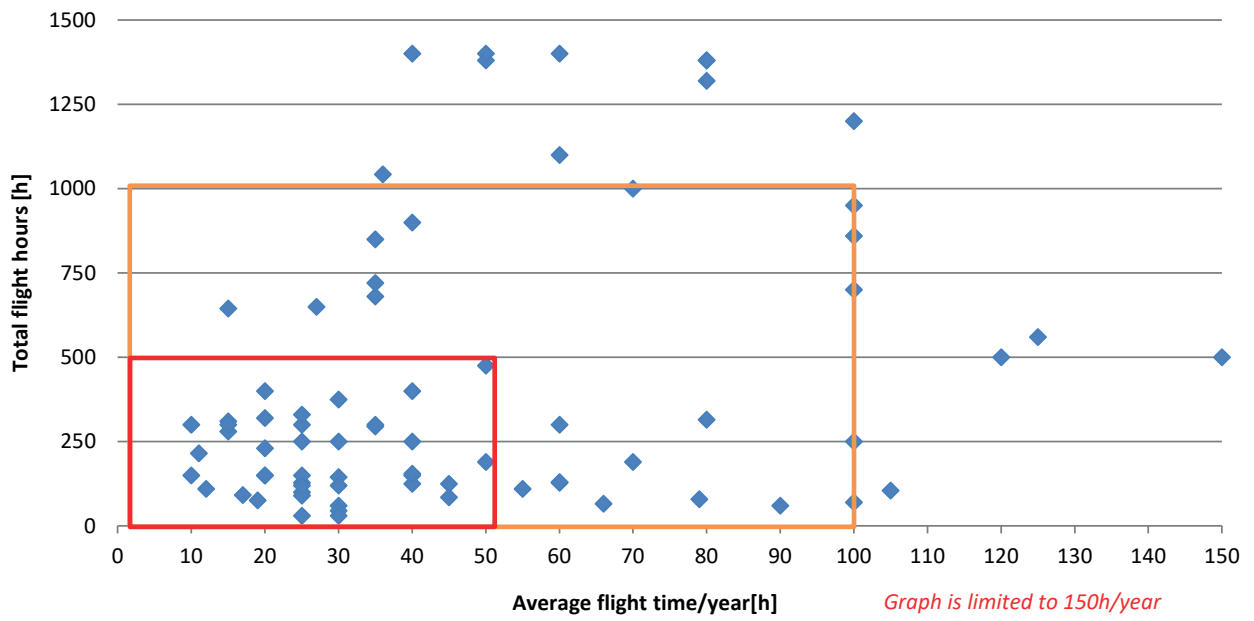
Graph only shows Total hours up to 5000h

### 2020 & 2021 - Experience of the pilots involved



Graph only shows  
Total hours up to  
1500h

## Zoom in: Experience of the pilots involved

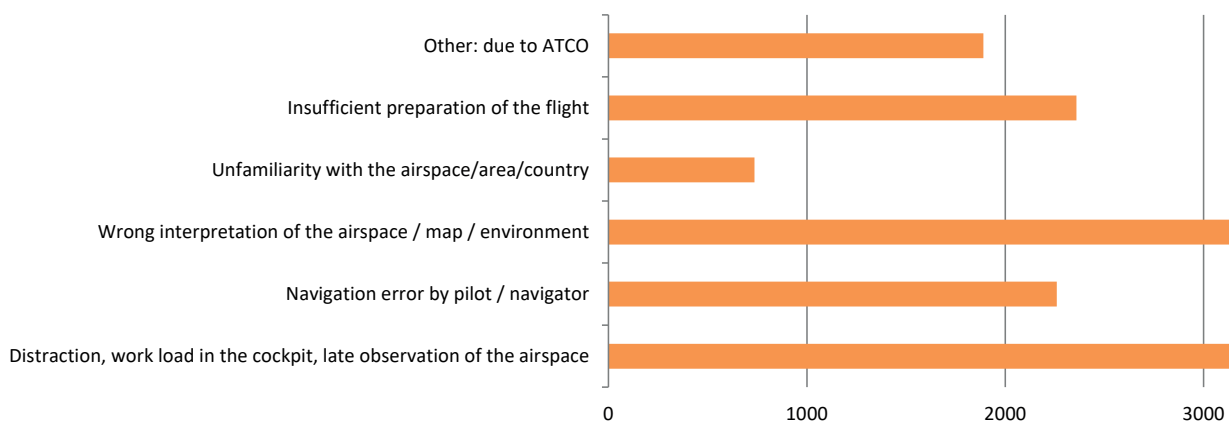


## 6. RELATION BETWEEN PILOT EXPERIENCE AND CAUSE/CONTRIBUTING FACTOR

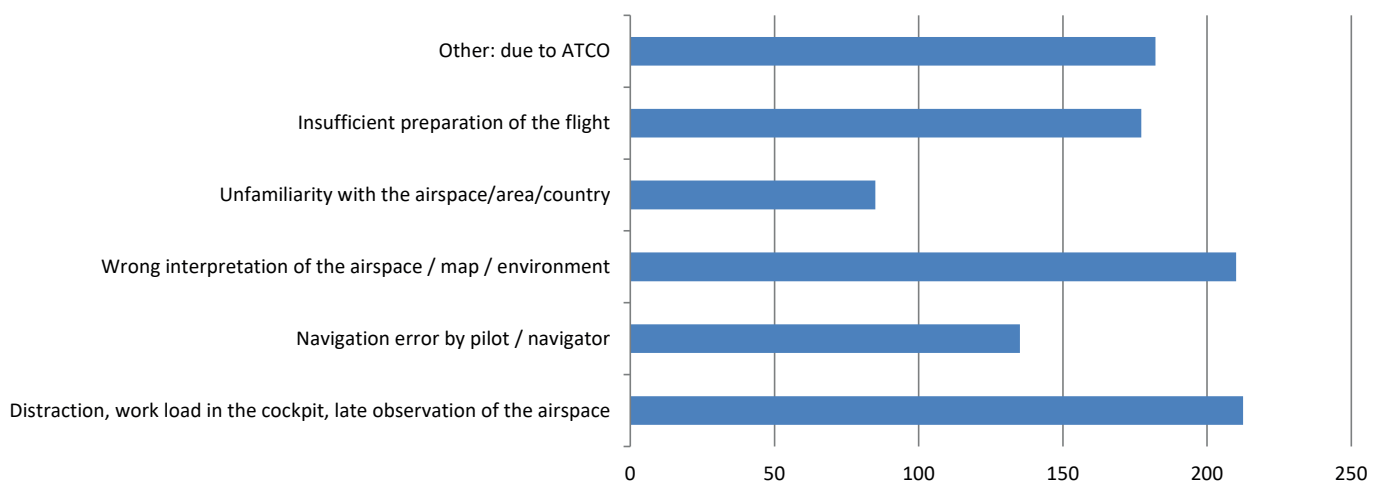
### Interpretation:

These graphs show the pilot's experience in relation to the causes of the infringement. Only the most frequent causes are displayed. The vertical line indicates the average experience of all the pilots that were involved in an infringement regardless of the cause, while the rows show the average for all pilots that indicated that specific cause. Less experienced pilots commit infringements due to navigation errors, their unfamiliarity of the airspace, and the insufficient preparation of the flight. This latter raises concerns as one may expect a thorough flight preparation given their relatively low level of experience. More experienced pilots encounter wrong interpretation of the airspace and distractions, usually due to heavy workload in the cockpit.

**2020 & 2021 - Avg. total flight hours of pilot involved  
vs Infringement cause**



**2020 & 2021 - Avg. flight hours / year of pilot involved  
vs Infringement cause**



## 7. RELATION BETWEEN PILOT LICENSE AND CAUSE/CONTRIBUTING FACTOR

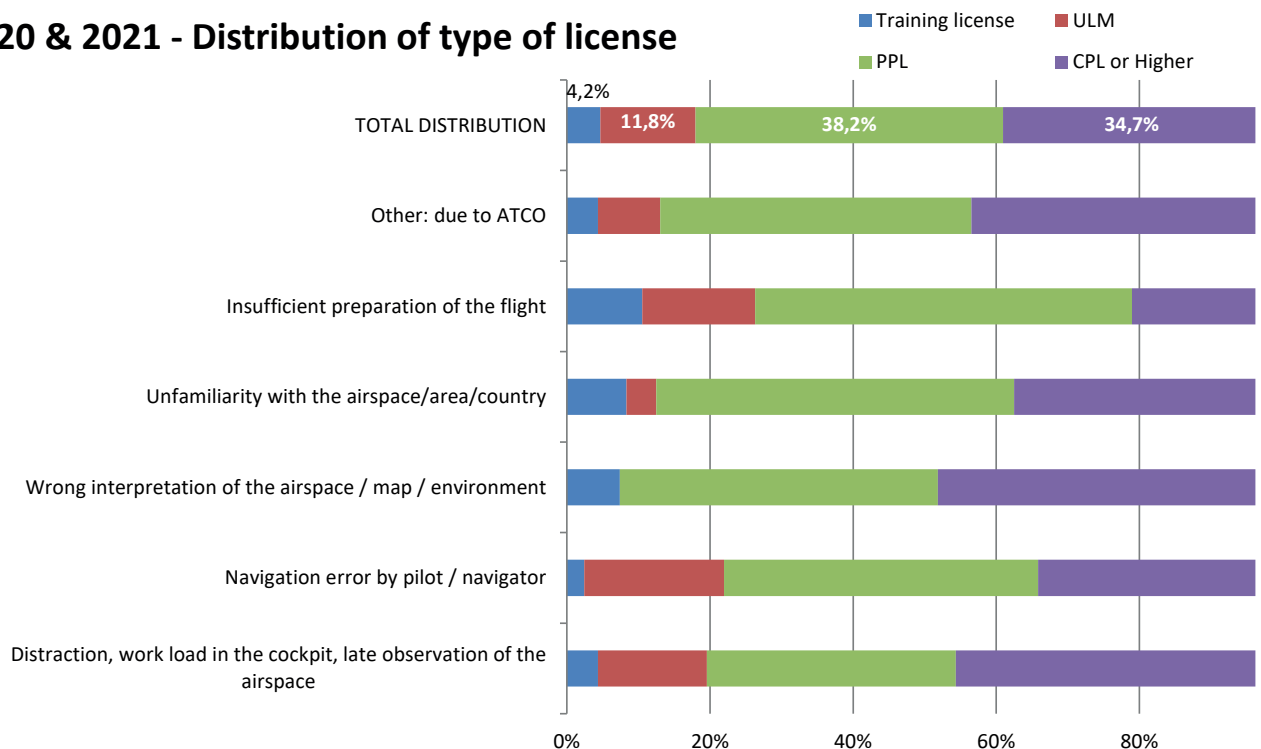
### Interpretation:

The top row shows the distribution of the (highest) license of the pilot involved in the infringement. 38% of the pilots involved have a PPL license. Around 35% have a commercial pilot or ATPL license. Around 12% of the infringements can be attributed to pilots having an ULM license. Lastly, 4% of the infringements are committed by trainees.

The other rows show the distribution for all infringements where the pilot indicated that specific cause. It can be seen that PPL pilots are relatively more represented when it comes to an insufficient flight preparation, unfamiliarity with the airspace and navigation error. This raises another concern as one may expect an even more thorough flight preparation knowing that the flight is in an airspace the pilot is unfamiliar with. On the other hand, when it comes to distraction and wrong interpretation of the airspace, we notice that these occurrences are relatively more reported by CPL pilots or higher.

Note: Total distribution equals 89%. For the remaining 11%, the type of license is unknown and therefore not displayed on the chart.

### 2020 & 2021 - Distribution of type of license



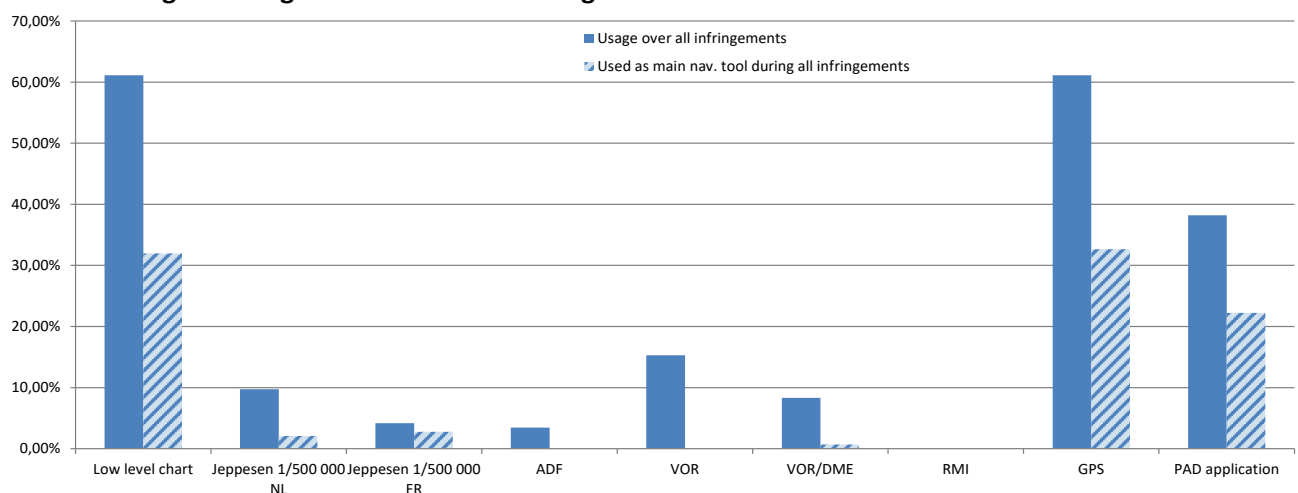
## 8. USAGE OF NAVIGATION TOOLS DURING AIRSPACE INFRINGEMENTS AND DURING AIRSPACE INFRINGEMENTS INVOLVING A NAVIGATION ERROR.

### Interpretation:

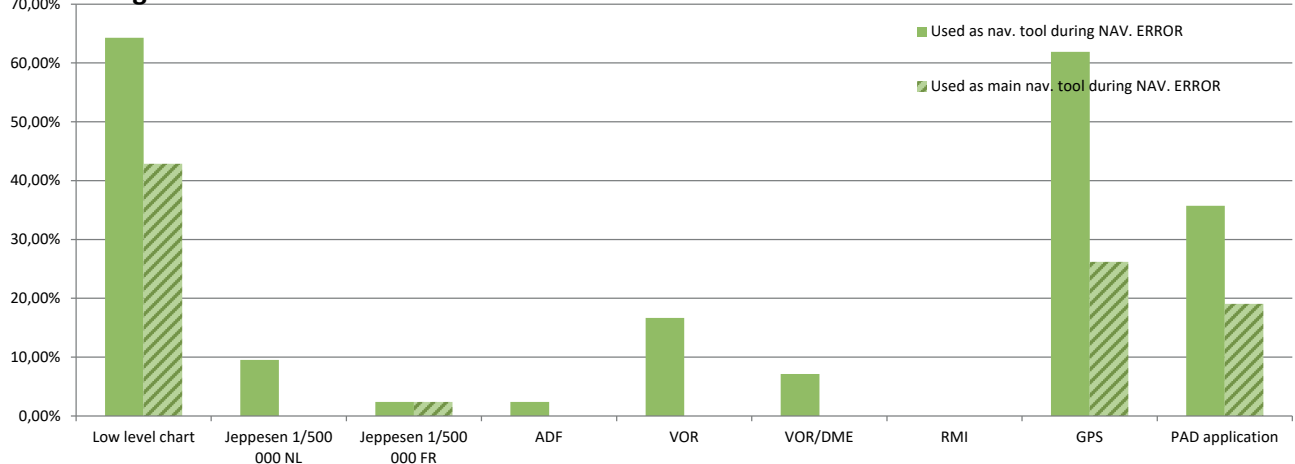
This page shows the usage of different navigational equipment at the time of an infringement. As can be seen in the first graph, over 30% of the pilots state they were using GPS as their main navigation tool, 32% used a map for this purpose. Tablet/smartphone applications, also known as Electronical Flight Bag (EFB), were also used in 22% of the infringements. These figures remain comparable to the previous period (2018-2019).

The second image illustrates the portion of pilots that were using these tools, but still made navigation errors. 64% were using a low level map as primary means of navigation. Notice that more than 26% of the pilots were using GPS but still made navigation errors. This is an encouraging reduction of 20% compared to the previous period (2018-2019). However, pilots should still be aware that if they use these tools, they should know how to use them and make sure to use the latest updates of charts and maps! Also, especially when using static charts: do not rely on the maps only. A good flight preparation remains key and includes i.a. the study of NOTAMS and the knowledge of activation times of certain airspace volumes!

**Usage of navigation tool over all infringements**



**Usage of the nav. tool in case a NAV. ERROR was made**



## 9. CONCLUSION

- Airspace Infringements remain a **very important issue** in the Belgian airspace with a historical record in 2021!
- A large number of infringements are conducted in the airspace surrounding Brussels, Antwerp, Ostend and Liège. There are also a large number of infringements in military airspace mainly in the airspace of Kleine Brogel.
- An important contribution to the number of airspace infringements (one fourth) can be seen by aircraft departing from foreign airports (mainly French and Dutch airports).
- Unfamiliarity with the airspace, insufficient preparation of the flight and distraction are key factors in making airspace infringements. Followed by the wrong interpretation of the airspace. Knowing the complexity of the Belgian airspace, **a thorough flight preparation is key!**
- 25% of the pilots were using a GPS but still made navigation errors. This is an encouraging reduction of 20% compared to the previous period (2018-2019). Pilots should be aware that if they want to use these navigation tools, they should use up-to-date maps and know how to use them and remember that a good flight preparation remains aviation safety key !

## More information on how to avoid airspace infringements

The following websites provide links to the videos of EASA, Belgium and other European countries. These videos suggest useful tips that will help to reduce the risk of airspace infringement and mid-air collisions. It is recommended to start with those videos corresponding to the countries where the pilot wants to fly to or cross.

BCAAs website also contains all other materials on avoiding infringements (leaflet, infographic, banner...) developed by EASA as part of a Europe-wide safety promotion campaign on the prevention of airspace infringement.

EASA and BCAA encourage to use these videos and documents in the briefing rooms of the flight clubs, flying schools, etc... to help others.

[EASA website on how to avoid airspace infringement and reduce the risk of mid-air collision.](#)

[BCAA Aviation Safety Information Leaflet 2021-02 on Airspace infringements.](#)

[BCAA website, “Violation de l’espace aérien” section.](#)

[BCAA website, “Schendingen van het luchtruim” section.](#)

[BCAA website, “Airspace infringements” section.](#)

[EUROCONTROL Top ten tips poster for General Aviation pilots.](#)





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