



FPM MOBILITY AND TRANSPORT
BELGIAN CIVIL AVIATION AUTHORITY

Aviation Safety Information Leaflet (ASIL) AIRSPACE INFRINGEMENTS

Analysis of the pilot questionnaires - Edition 2018-2019

Update of the Belgian Airspace
Infringement Reduction
Plan (B/AIRP)

ASIL nr. 01/2020



www.mobilit.belgium.be



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 (<http://www.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 2018 to December 2019 was used. For this period 135 pilot replies have been received and analyzed. About 48% of the pilots of identified aircraft completed the airspace infringement questionnaire during the period 2018/2019. 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.

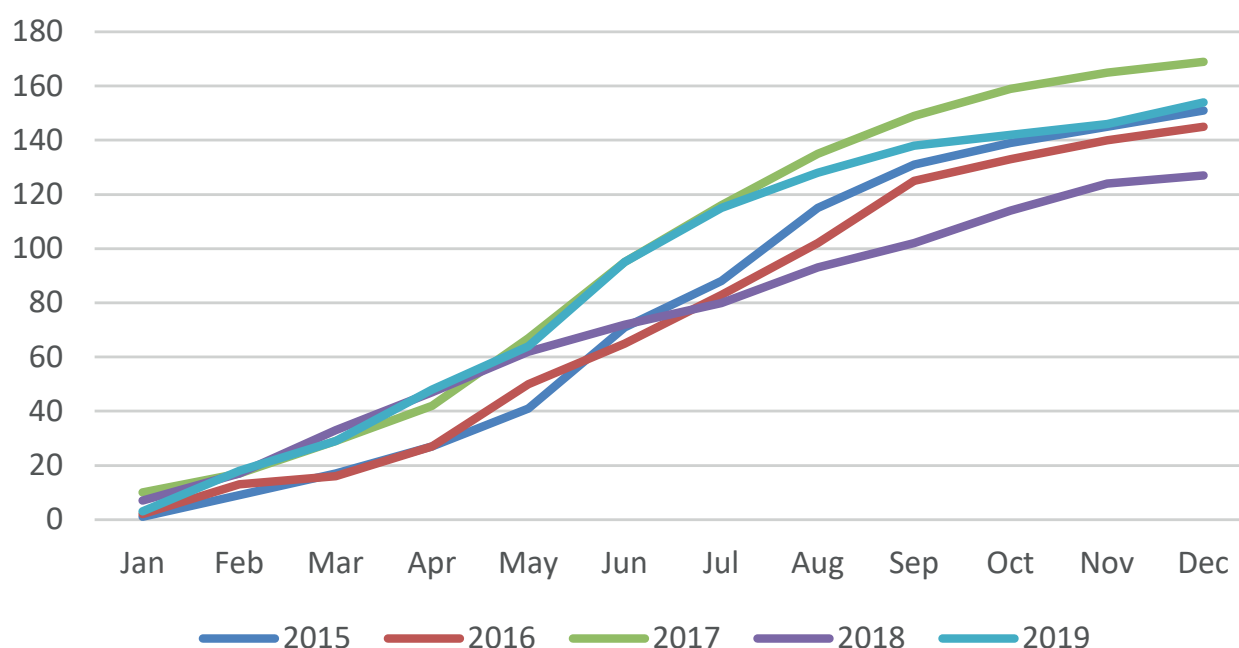
Following analysis results can be found in this document:

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Interpretation:

The chart here below displays the cumulative number of reported airspace infringements in the period 2015-2019 in which ATC was not directly involved. During the course of 2018, especially as of May 2018, there was a noticeable decrease in the number of airspace infringements. This decrease is most probably correlated with the broad BCAA and EASA safety promotion campaign on the prevention of airspace infringements that year. Unfortunately, in 2019, no momentum of that improvement was observed. On the contrary, 2019 ended up with the second highest number of airspace infringements in one year.

Cum. number of infringements - ECCAIRS



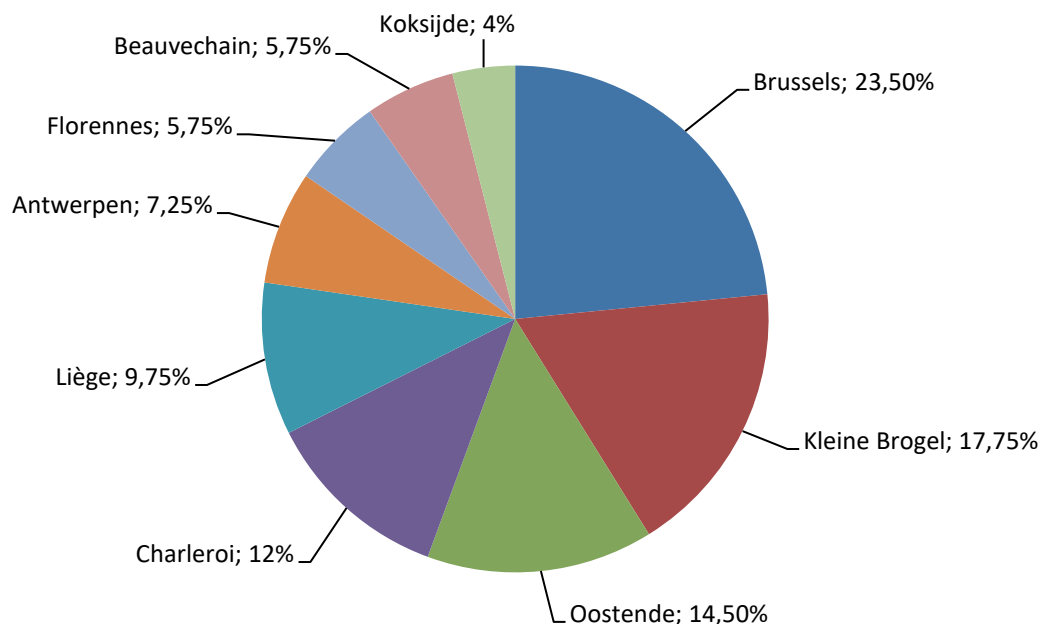
High level figures	2015	2016	2017	2018	2019
Total airspace infringements :	151	145	169	127	154
Comparison with previous year :	N/A	-4%	+17%	-25%	+21%
Completed questionnaires received :			80	63	72
Pilot's response rate :			47%	50%	47%

Interpretation:

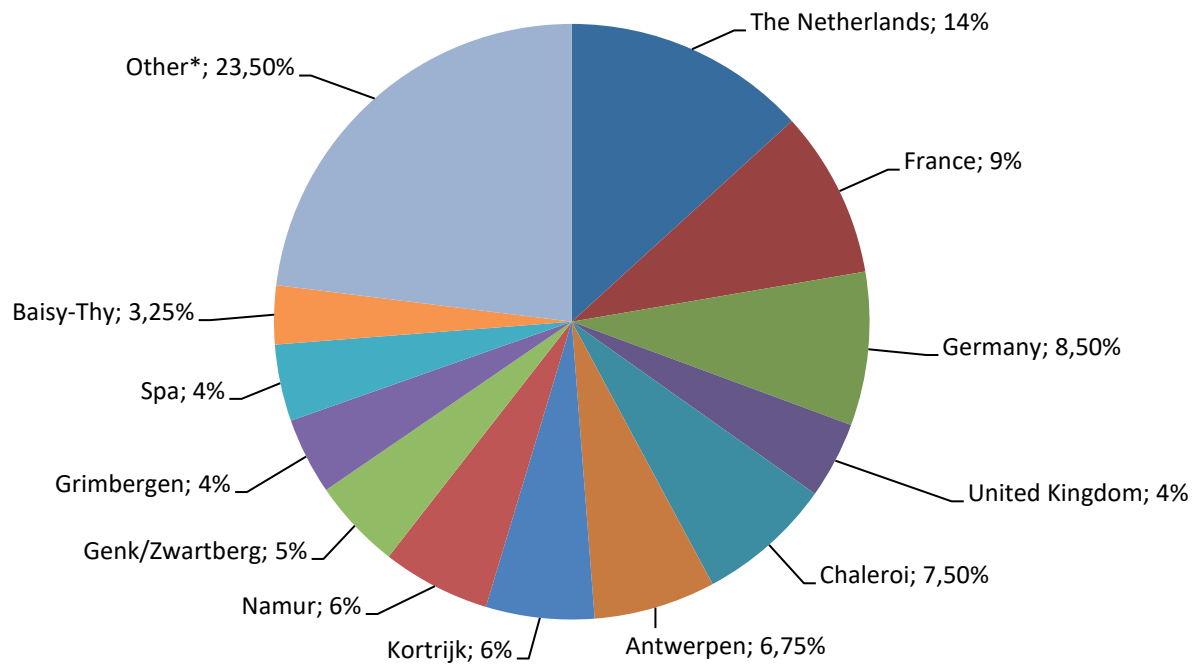
A large number of infringements are conducted in the airspace surrounding Brussels, Kleine Brogel and Ostend. The complex airspace around Brussels is definitely a hotspot that deserves extra attention from both pilots and authorities. The large amount of infringements in Kleine Brogel are most probably due to amount of recreational airfield and complexity of airspace in the vicinity of that military air base. Also a relatively large number of infringements are conducted in the airspace of Charleroi and Liège. There is also a relatively high number of airspace infringements (~16%) in the other military airspaces (Florennes, Beauvechain, Koksijde).

One out of three departure aerodromes is located in a neighbouring country. The same comment is valid for destination aerodromes. This important contribution to the number of infringements caused by aircraft departing from or arriving at foreign aerodromes was already observed in the past. Although the percentage of infringements caused by aircraft departing from or arriving at French aerodromes decreased significantly compared to the 2017 results.

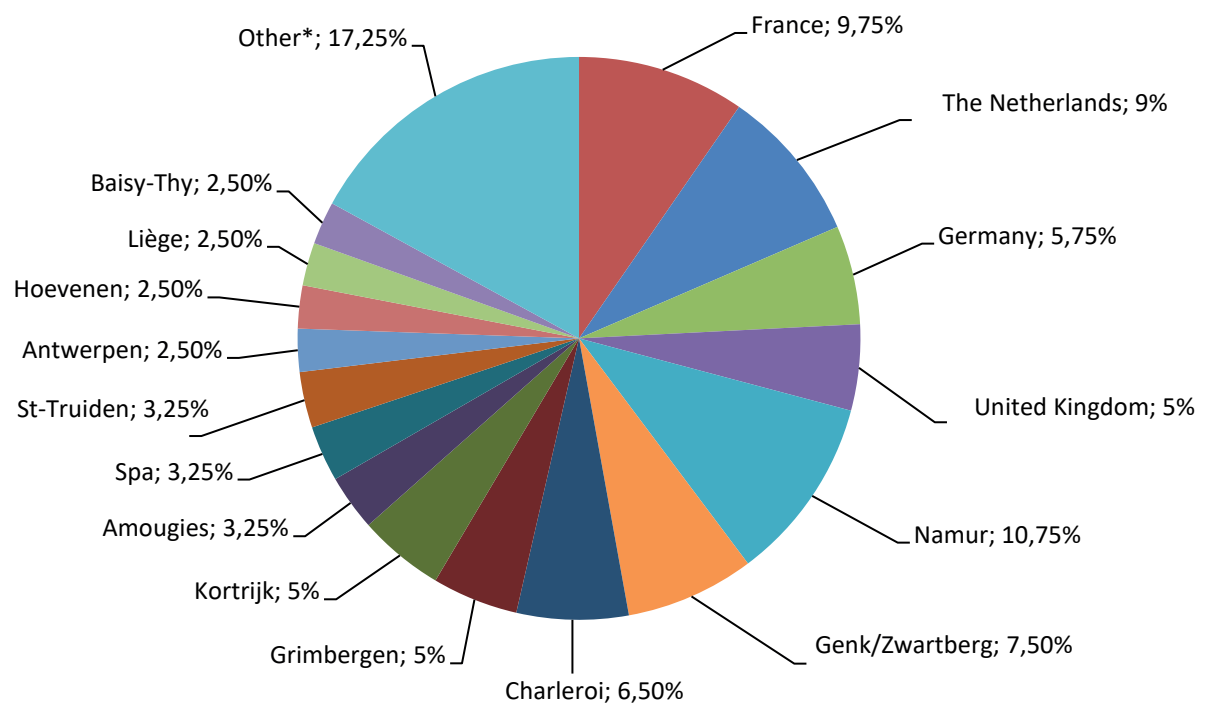
2018 & 2019 - Location of the infringement (airspace)



2018 & 2019 - Departure aerodrome



2018 & 2019 - Destination aerodrome



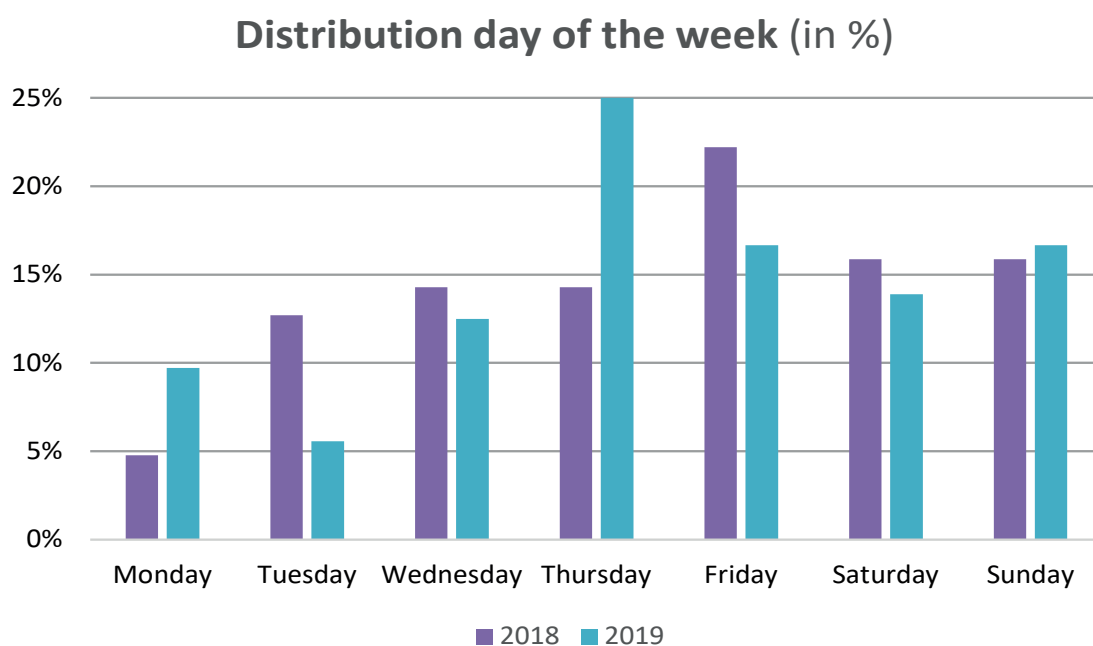
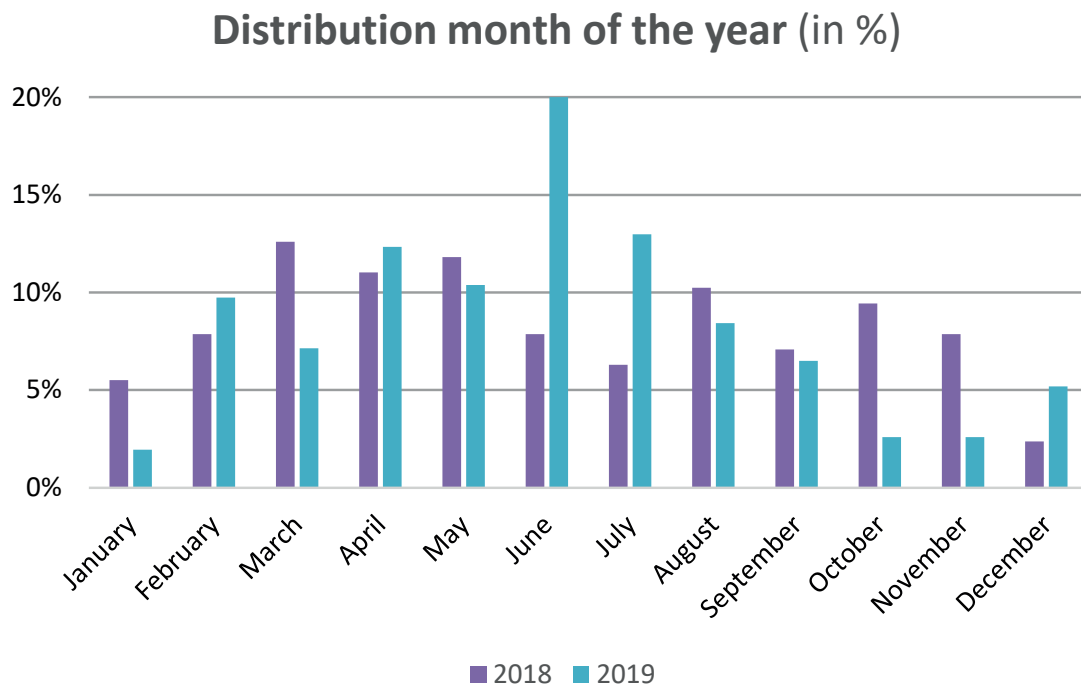
* "Other" combines aerodromes with less than 2,50% each.

3. DISTRIBUTION OVER TIME OF THE AIRSPACE INFRINGEMENTS

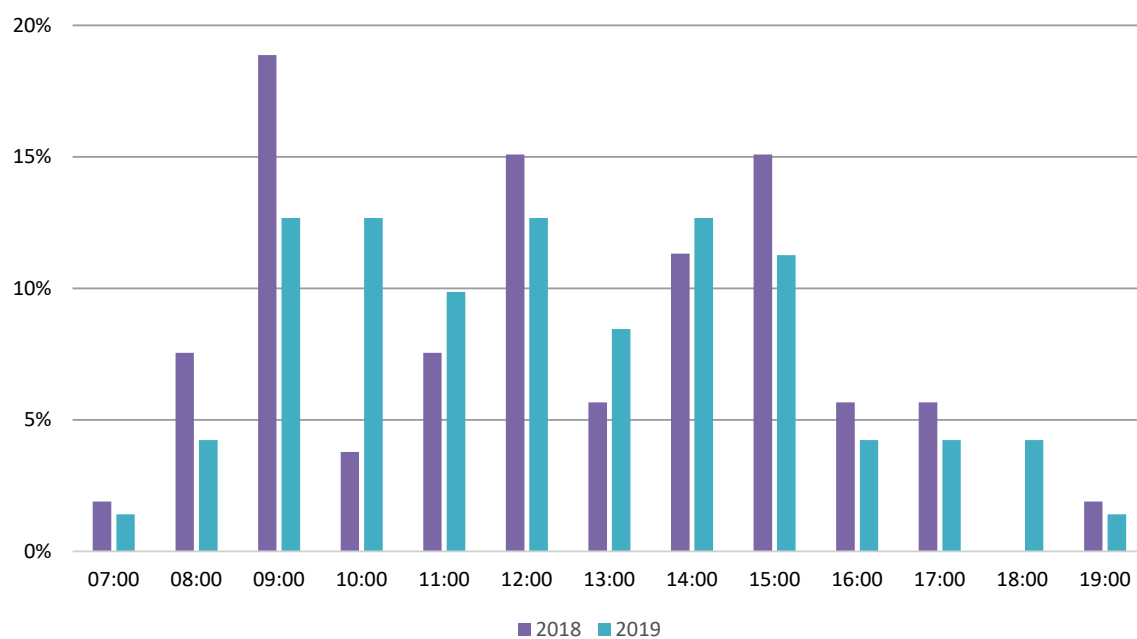
Interpretation:

The distribution of airspace infringements over the year reflects the higher rate 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.



Distribution time of the day (in %)



4. CAUSES AND RELATION BETWEEN CAUSES/CONTRIBUTING FACTORS

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 48.78% of the cases, also «distraction» was mentioned as one of the causes.
 But in 38.46% of the case with «distraction», this resulted in a «navigation error».

Numbers with a very low statistical significance are not displayed.

	Insufficient preparation of the flight	Technical failure of the navigation aids used	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	Other traffic	Meteorology (deteriorating weather, reduced visibility,	Unfamiliarity with the airspace/area/country	Unobserved changes in airspace	Use of wrong frequencies (COMM/NAV)	Loss, or reduction of skill, due to low annual flying hours	Other: due to ATCO
Total number of infringements with this cause	11	6	41	33	6	52	11	12	22	5	10	7	21
Percentage of infringements with this cause in respect to total number of infringements	8,15%	4,44%	30,37%	24,44%	4,44%	38,52%	8,15%	8,89%	16,30%	3,70%	7,41%	5,19%	15,56%
Percentage of infringements with combination of both causes / the cause in this column													
Insufficient preparation of the flight		16,67%	9,76%	15,15%	16,67%	7,69%		8,33%	13,64%		10,00%	14,29%	4,76%
Insufficiently equipped airplane / old - poorly maintained systems	9,09%		2,44%			1,92%							
Technical failure of the navigation aids used	9,09%		4,88%		16,67%	1,92%						14,29%	4,76%
Navigation error by pilot / navigator	36,36%	33,33%		24,24%		38,46%	45,45%	50,00%	18,18%		30,00%	57,14%	23,81%
Wrong interpretation of the airspace / map / environment	45,45%		19,51%		50,00%	19,23%		8,33%	50,00%	40,00%	40,00%	28,57%	19,05%
Wrong interpretation / use of navigation instruments			4,88%	6,06%		3,85%							
Wrong interpretation / use of GPS	9,09%	16,67%		9,09%		1,92%	9,09%		4,55%				9,52%
Database errors in the GPS		16,67%	2,44%		16,67%								
Distraction, work load in the cockpit, late observation of the airspace	36,36%	16,67%	48,78%	30,30%	16,67%		54,55%	41,67%	50,00%	40,00%	60,00%	28,57%	19,05%
Other traffic			12,20%		16,67%	11,54%		16,67%	4,55%			14,29%	14,29%
Meteorology (deteriorating weather, reduced visibility, etc.)	9,09%		14,63%	3,03%		9,62%	18,18%		9,09%				
Unfamiliarity with the airspace/area/country	27,27%		9,76%	33,33%	16,67%	21,15%	9,09%	16,67%		80,00%	30,00%	28,57%	19,05%
Unobserved changes in airspace				6,06%		3,85%			18,18%		10,00%		
Not updated navigation tools (chart/navigation software,...)		16,67%	2,44%	3,03%		1,92%							
Use of wrong frequencies (COMM/NAV)	9,09%		7,32%	12,12%		11,54%			13,64%	20,00%		14,29%	4,76%
Loss, or reduction of skill, due to low annual flying hours	9,09%	16,67%	9,76%	6,06%		3,85%	9,09%		9,09%		10,00%		
Loss, or reduction of skill, due to long period between this flight and the previous						1,92%	9,09%		4,55%				
Other: due to ATCO	9,09%	16,67%	12,20%	12,12%	33,33%	7,69%	27,27%		18,18%		10,00%		

*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.

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 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 information to warn them of the airspace ahead, or think 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.

5. EXPERIENCE OF THE PILOTS INVOLVED

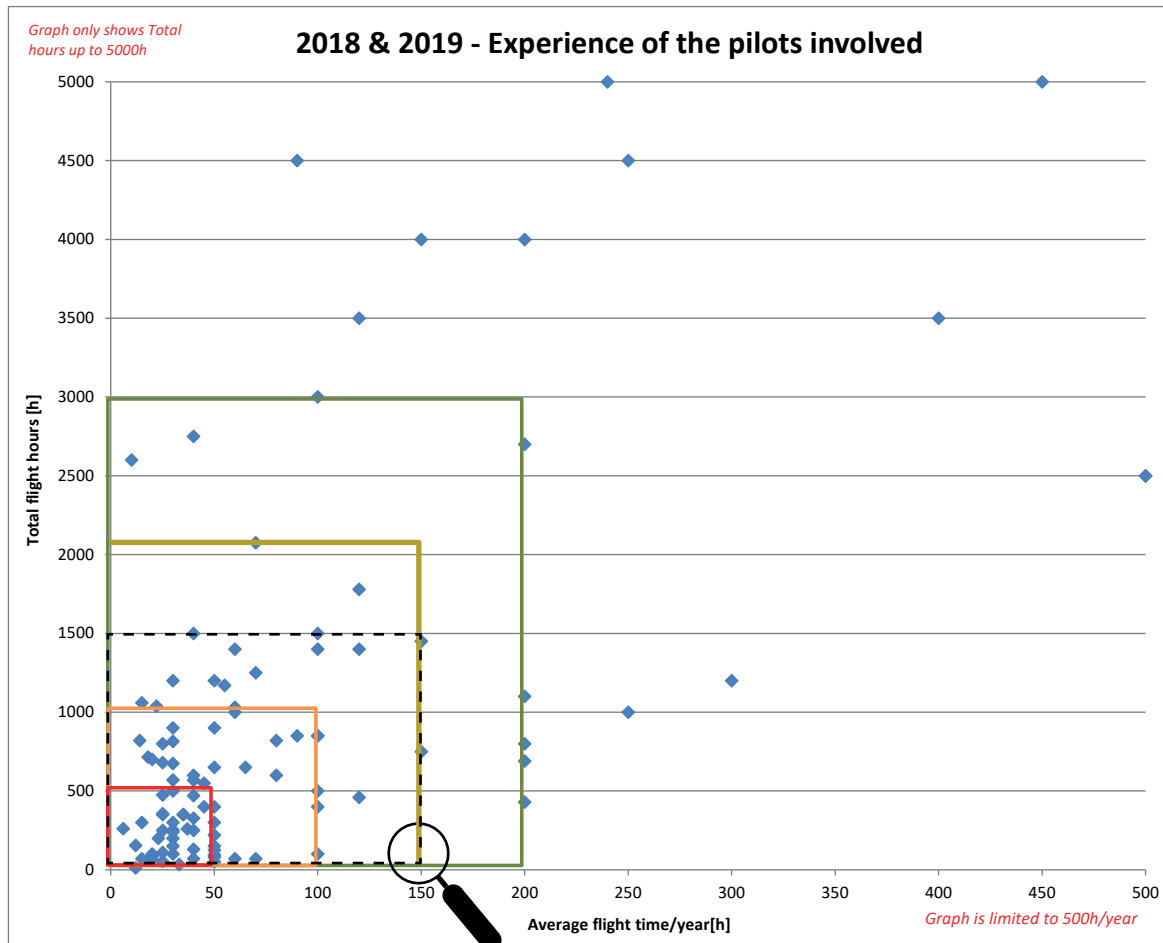
Interpretation:

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 500 flight hours per year. 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.

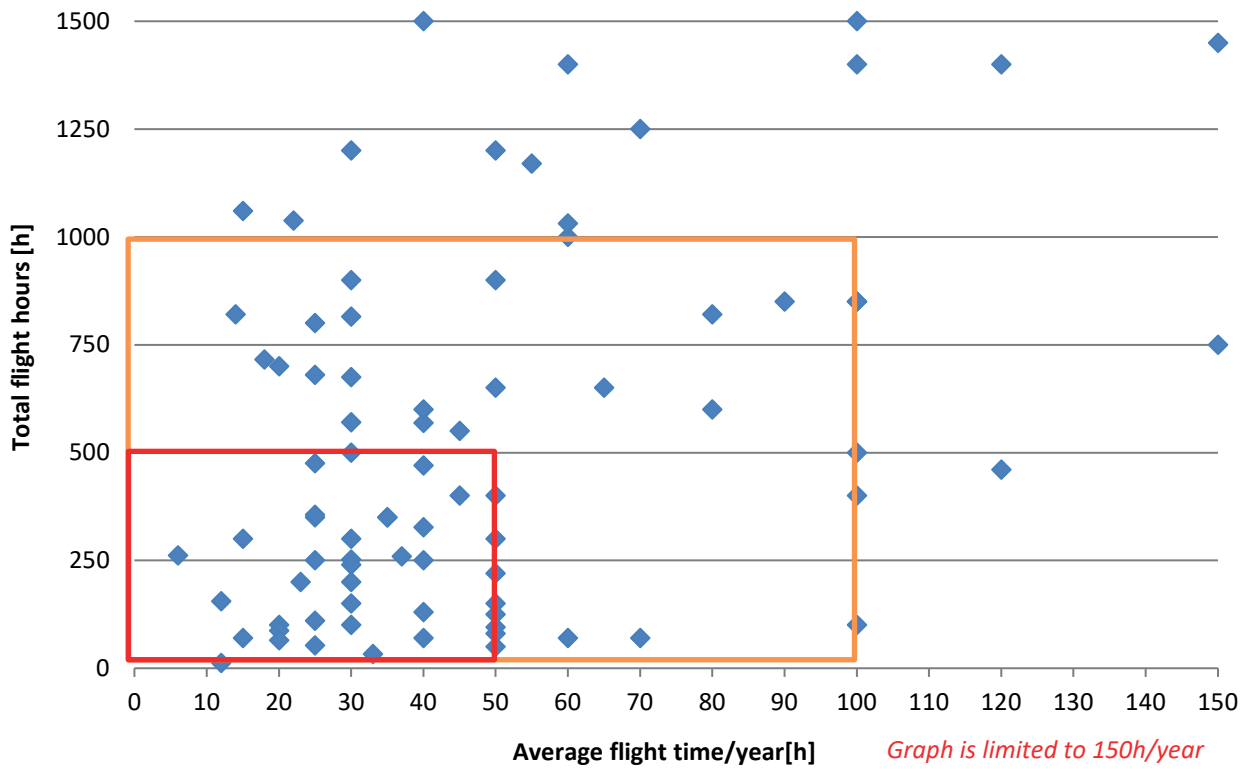
Note: «Total cumulative percentage» is the percentage of outcomes inside a rectangle formed by total flight hours and average flight time (see corresponding colour) in comparison with the total number of outcomes.

Total flight hours		Avg. Flight time/year		TOTAL CUM. PERCENTAGE
Hours	Cum. Percentage	Hours	Cum. Percentage	
<3000	71,85%	<200	67,41%	62,96%
<2000	67,41%	<150	63,70%	59,26%
<1000	54,07%	<100	54,81%	44,44%
<500	35,56%	<50	37,04%	22,96%



Graph only
shows Total
hours up to
1500h

Zoom on: Experience of the pilots involved



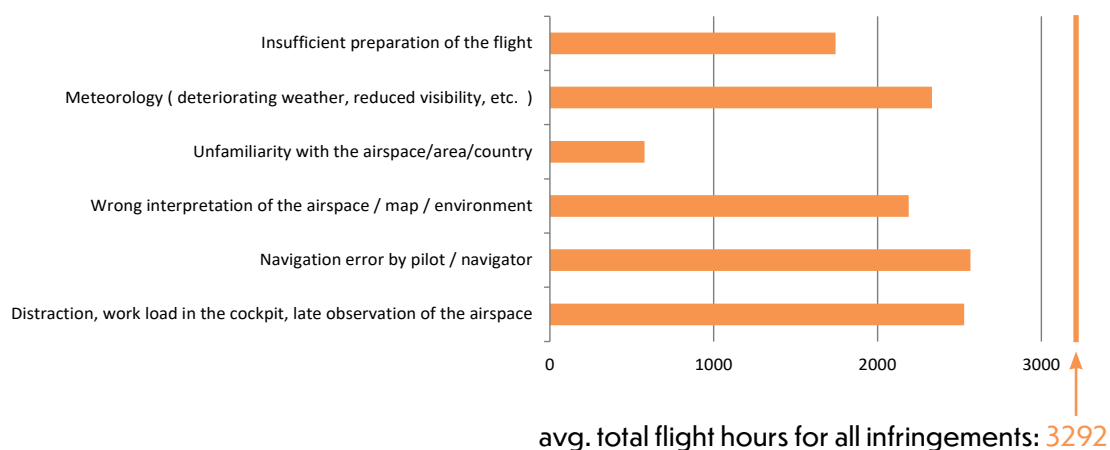
Graph is limited to 150h/year

6. RELATION BETWEEN PILOT EXPERIENCE AND CAUSE/CONTRIBUTING FACTOR

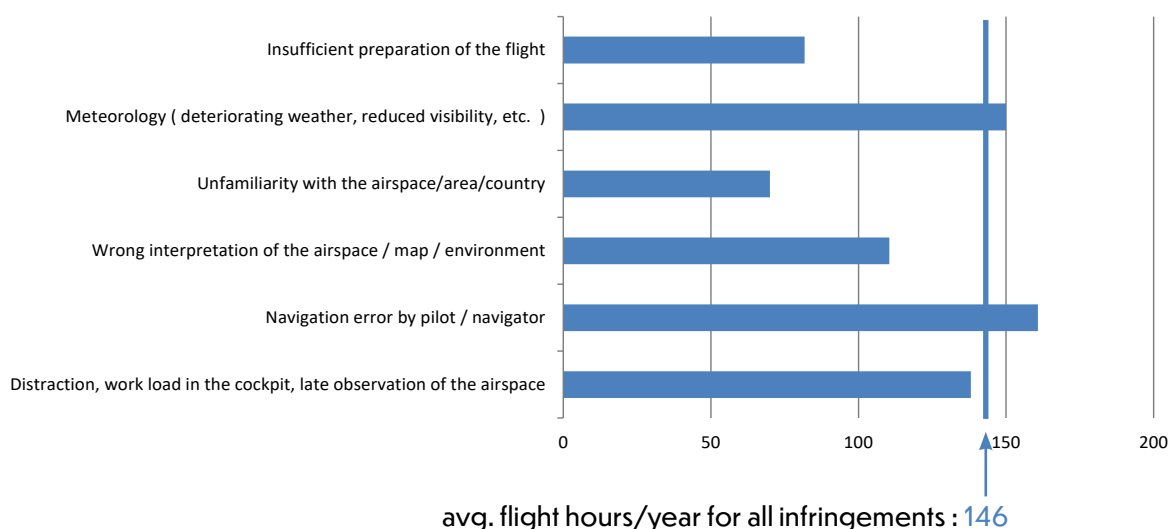
Interpretation:

These graphs show the pilot 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 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 navigation errors and distractions, usually due to heavy workload in the cockpit. Meteorology (deteriorating weather, reduced visibility, etc.) is a contributing factor for all pilots.

2018 & 2019 - Avg. total flight hours of pilot involved vs Infringement cause



2018 & 2019 - Avg. flight hours / year of pilot involved vs Infringement cause



7. RELATION BETWEEN PILOT LICENSE AND CAUSE/CONTRIBUTING FACTOR

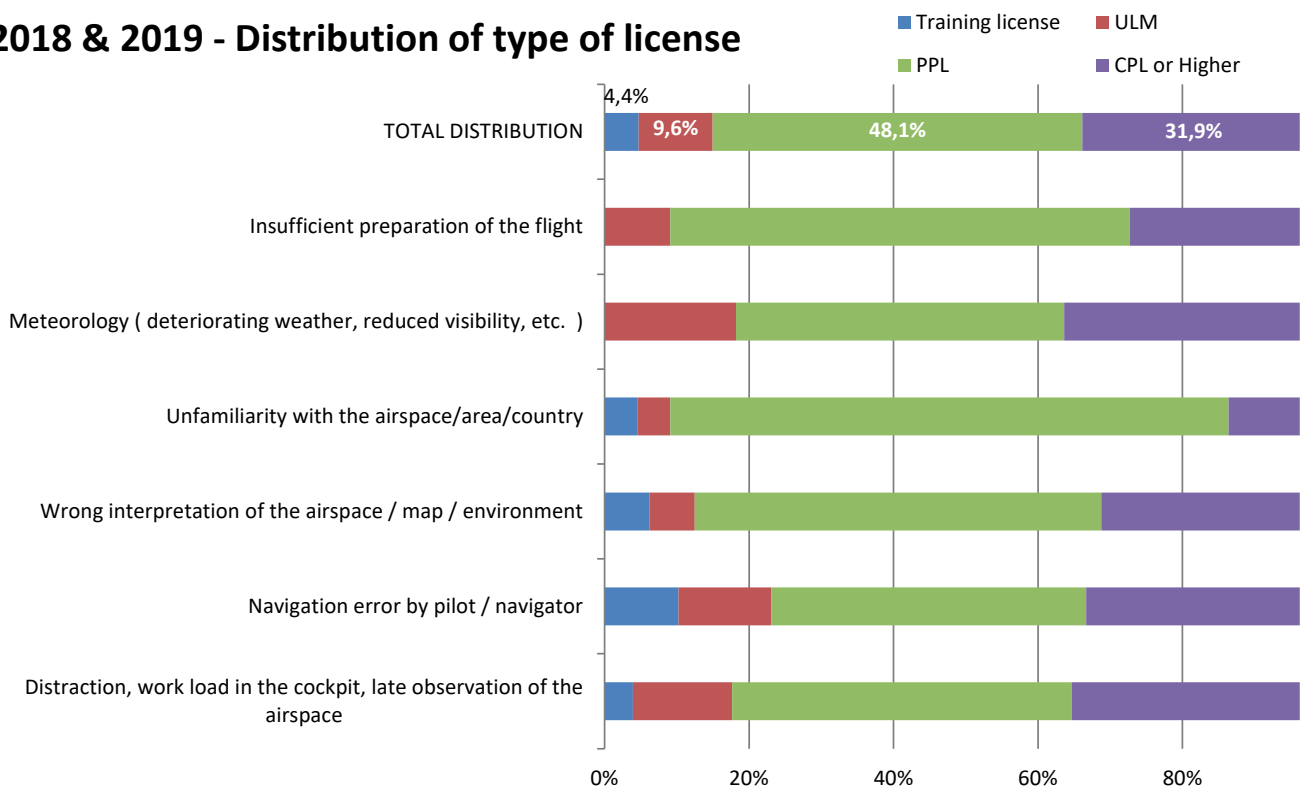
Interpretation:

The top row shows the distribution of the (highest) license of the pilot involved in the infringement. Around 48% of the pilots involved have a PPL license. 32% have a commercial pilot or ATPL license. Around 10% of the infringements can be attributed to pilots having an ULM license. Lastly, 4% of the infringements are committed by trainees.

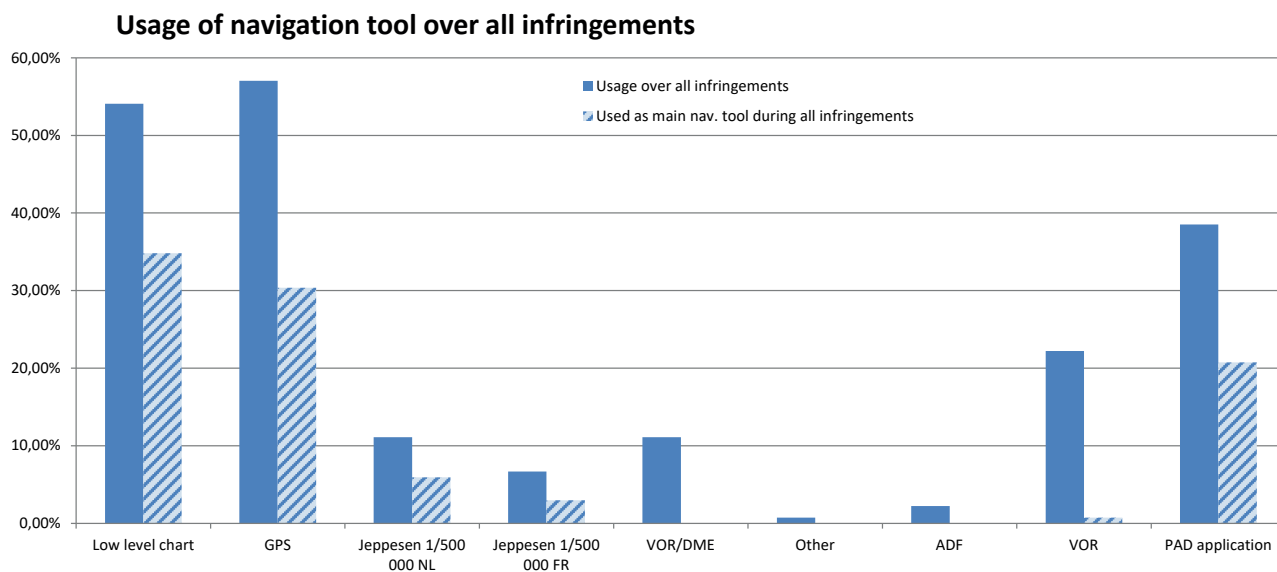
The other rows show the distribution for all infringements where the pilot indicated that specific cause. It can be seen that PPL pilots are relatively more represented when it comes to unfamiliarity with the airspace, an insufficient flight preparation, and a wrong interpretation of the airspace. On the other hand, when it comes to distraction and navigation errors, we notice that these occurrences are relatively more reported by CPL pilots or higher.

Note: Total distribution equals 94%. For the remaining 6%, the type of license is unknown and therefore not displayed on the chart.

2018 & 2019 - Distribution of type of license



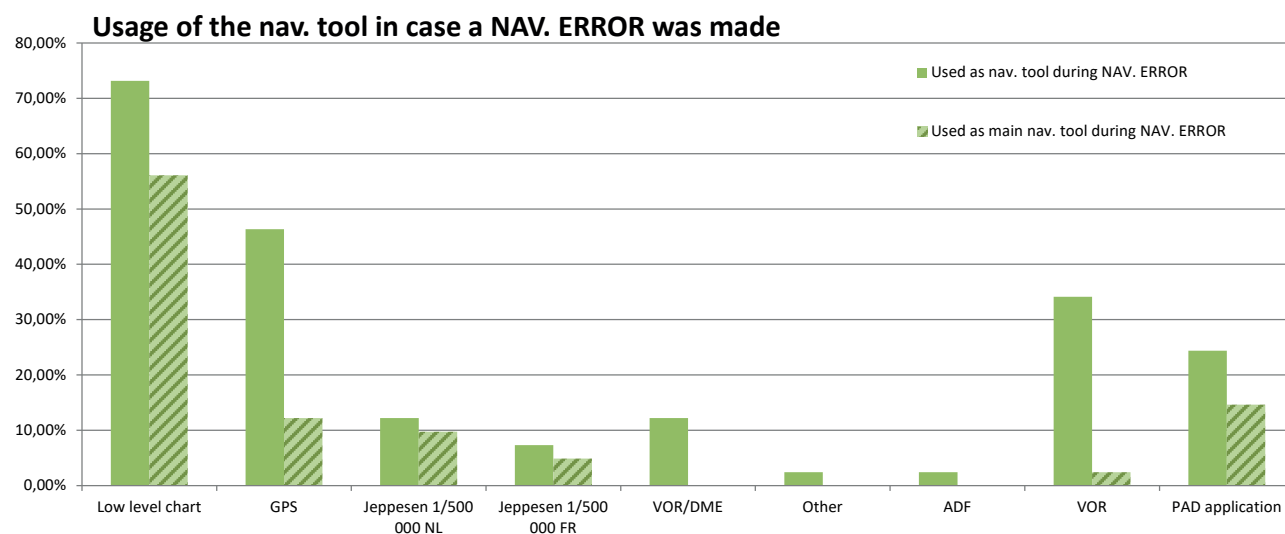
8. USAGE OF NAVIGATION TOOLS



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, 34% used a map for this purpose. Tablet/smartphone applications, also known as Electronical Flight Bag (EFB), were also used in 21% of the infringements.

The second image illustrates the portion of pilots that were using these tools, but still made navigation errors. 56% were using a low level map as primary means of navigation. Notice that more than 46% of the pilots were using GPS but still made navigation errors. Pilots should 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!



- A large number of infringements are conducted in the airspace surrounding Brussels, Ostend and Charleroi. 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 third) can be seen by aircraft departing from or arriving at 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 and meteorology.
- Almost 50% of the pilots were using a GPS but still made navigation errors. Pilots should be aware that if they want to use these navigation tools, they should know how to use them and that a good flight preparation remains aviation safety key !

BCAA website:

https://mobilit.belgium.be/fr/transport_aerien/programme_belge_de_securite/violations_de_lespace_aerien

https://mobilit.belgium.be/nl/luchtvaart/belgisch_veiligheidsprogramma/schendingen_van_het_luchtruim

https://mobilit.belgium.be/en/aviation/airspace_infringements

EASA website:

<https://www.easa.europa.eu/airspace-infringement>

These 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 or cross. BCAAs website also contains all other materials on avoiding infringements (leaflet, infographic, banner...) developed by EASA as a 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.

EUROCONTROL Top ten tips for GA pilots:

<https://www.skybrary.aero/bookshelf/books/133.pdf>



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