

VerifLocal

This is a rapid translation of an article that has been published in issue #18 of the Actions Vitales magazine (FFVP Safety Commission)

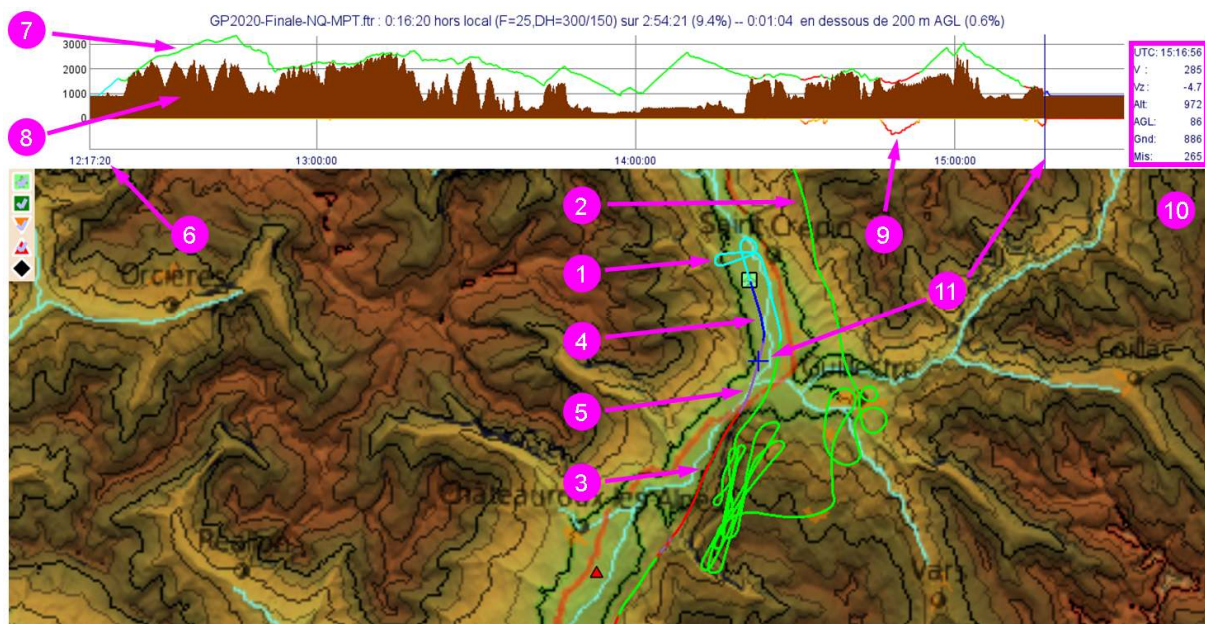
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The name VerifLocal comes from the French gliding expression : “rester en local”: “to remain within gliding range”

Glider simulators (especially Condor) have become very useful training aids, but the lack of sanctions in case of risk taking (getting out of gliding range of landable areas, low flying) means that in recent years some pilots have developed bad habits. Flying out of gliding range of safe areas, especially when flying in mountainous regions, is a practice that cannot be accepted in real flight and that should be banned even during a flight on a simulator... Hence Jean-François Gombault's suggestion to develop a "safety-oriented flight recorder".

After a career in computer programming, Marc Till - who practiced gliding before becoming interested in virtual flight - decided to take up the challenge. So, in spring 2020, a version 0 without a graphical interface was already created, using Condor topographic data (especially for the Alps) and SeeYou for the display (via a modified IGC file). The result was not very user-friendly but it paved the way. In June, version 1.0 got a graphical interface and a month later, version 2.0 added airspace (display only) and the use of LK8000 topographic data, which allows to analyze flights coming out of Condor scenes.

The intensive use during the eSport Series organized by the FFVP at the end of 2020 gave birth to version 3.0 with various improvements: detection of lowflying in flatland, detection of the non-respect of the airspace and optimizations of the application. Among these, we note the possibility of a "batch" mode allowing to process several files simultaneously without graphic display, the produced report being analysable on a spreadsheet program to preselect the files to be analysed then with more attention.



The representation on the screen, with the barogram at the top and the map at the bottom.

- 1: in cyan, the initial climb (towed, winch or motor)
- 2 : in green, the glider is within gliding range a landing area (LA).
- 3 : in red, the glider is no longer within gliding
- 4 : in blue, the landing circuit.
- 5 : in purple, low altitude flight.
- 6 : UTC time on the x-axis
- 7 : altitude of the glider with the same colors as the trajectory on the map
- 8 : ground elevation (brown)
- 9 : in yellow or red, the missing height to return within gliding range of a LA (in a straight line).
- 10 : the information 6, 7, 8 and 9 for the active point: UTC time, ground speed, climb rate, altitude, height above ground level, ground level, missing height.

Gliding range detection

With the topographic data, the application searches at any time, according to a modifiable time step (every 20 seconds by default) if the glider is within gliding range of an airfield or a recognized Landable Area (defined in standard .cup file). The height above the ground following escape routes is set to 150 m by default, the minimum height above the ground during flight to 200 m (by default). In order not to trigger an alarm in the case of a ridge flight, carried out in safety, the software does not take into account the trajectory close to the ground if it is possible to go back above the minimum height by deviating from the terrain.

The algorithm searches for escape routes to all "theoretically reachable" landable areas (altitude difference greater than or equal to the distance divided by the working glide ratio). It will work in the following order:

- in a straight line: straight line from the starting point to the target point, checking the height above ground every 90 m.
- in a broken line along the slopes: it follows a straight trajectory in the direction of the target point, until it reaches a relief. It then follows the contour lines in the direction of

the target point, periodically testing the possibility of going back in the same direction along a straight line, possibly to the next slope to repeat the same process.

- in a broken line following the slope and then the bottom of the valley: the software follows the line of the steepest slope, while periodically testing the possibility of a straight line trajectory towards the target point: "the glider's glide ratio is higher than the mountain's glide ratio, so if it doesn't go up anymore, you have to go down the stairs...". (Roger Biagi). Note that this function of the algorithm does not allow to "go up" a valley to pass a pass unlike the previous one.

On the screen, VerifLocal displays a possible escape route at any time, with priority to the airfields, possibly displaying an altimetric profile of the escape route (sectional view). It is also possible to manually search for escape routes.

The coloring of the trajectory informs instantly: green if the glider is within gliding range of a landing zone, red if it is not. In this case, the height missing to return within gliding range is displayed. At the beginning of the flight (towed, winch or motor), the trajectory is cyan, allowing to note the beginning of the autonomous flight. At the end of the flight, the trajectory becomes blue in the landing circuit (by default at 2 km from the landing point or in a cone of glide ratio 10).

With a nominal glide ratio of 20 (by default and modifiable) and a height of arrival of 300 m (by default), the proposed escape route does not take into account the wind and therefore gliding range detection must be analyzed "by hand" according to the aerological conditions of the day. VerifLocal cannot be exhaustive and "false positives" are possible. It is also necessary to make sure that the landing area is indeed landable (high crops, Notam, etc.).

On the screen, the level of difficulty of the fields is based on a colour code, taken from the classification of the fields in the Guide to safety areas in the Alps (FFVP): green for easy fields, orange for medium fields, red for difficult fields and black for very difficult fields. You can select the landing areas by level of difficulty, for example to check gliding range of airfields or easy fields.



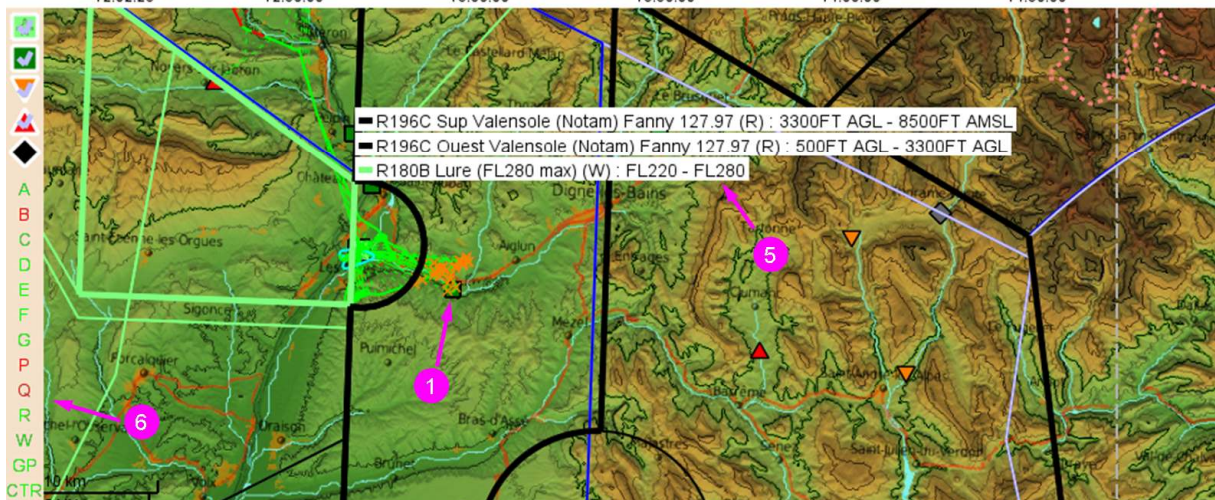
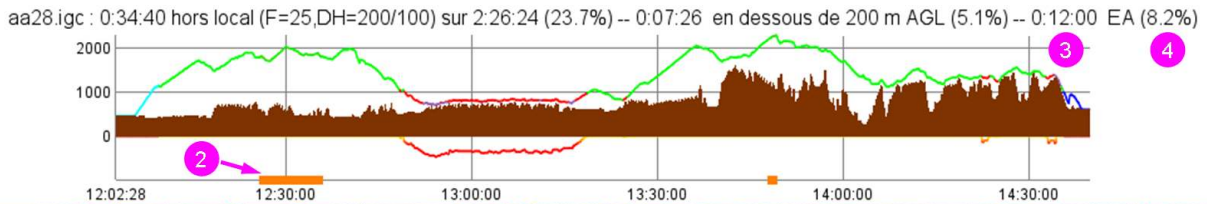
Escape routes displayed in the direction of

- 1: the closest LA that can be reached above the safety height (green dotted line)
- 2: the LA that can be reached with the highest arrival height below the safety height (orange)
- 3 : the theoretically reachable LA whose path will approach it as closely as possible (red)
- 4 : if the mouse hovers over a LA, its name and altitude are displayed.
- 5 : scale (automatically adjusted)
- 6 : selection of LAs by difficulty

Airspace detection

It is possible to display the airspace and to detect the penetration of the zones. The user must of course check the validity of the data used, the activity of the zones or not during the flight period, etc. VerifLocal allows the user to select certain classes of airspace, or to limit itself to displaying only the penetrated areas, with a count of the cumulative time spent in the areas. The detection is done with the same frequency as the determination of the gliding range.

It is also possible to create fictitious zones to detect low pass crossings, especially when the pass is relatively flat.



Detection of penetration in an airspace. Fictitious zones can be used.

The characteristics of the zones can be displayed by moving the mouse over the border

- 1 : orange cross on the trajectory if it is inside an activated zone
- 2 : orange mark on the horizontal axis of the barogram
- 3 : cumulative time spent in the zones
- 4 : same in %.
- 5 : airspace label (Name, Class, upper and lower limits)
- 6 : space selection bar

Possible uses

While VerifLocal was originally designed to detect "bad habits" in flights on Condor, during online competitions, the idea of using it for an analysis of real-life cross-country flights was born to improve security.

VérifLocal can thus be used as a debriefing tool during a pilot's first solo XC tasks, by verifying gliding range of airfield and by being able to analyse decision making and detect low flying (the trajectory turns purple). The software displays the trajectory, time, ground speed, climb rate, altitude, height above ground, altitude of the ground, the possible missing height.

It is therefore a first approach to debriefing that can take place, to analyze the decision making, by zooming in on this or that part of a flight. Thus, several escape routes can be indicated. The one displayed is not necessarily the best one according to the conditions of the day, but it is always possible to look for others "by hand".

Technical aspects

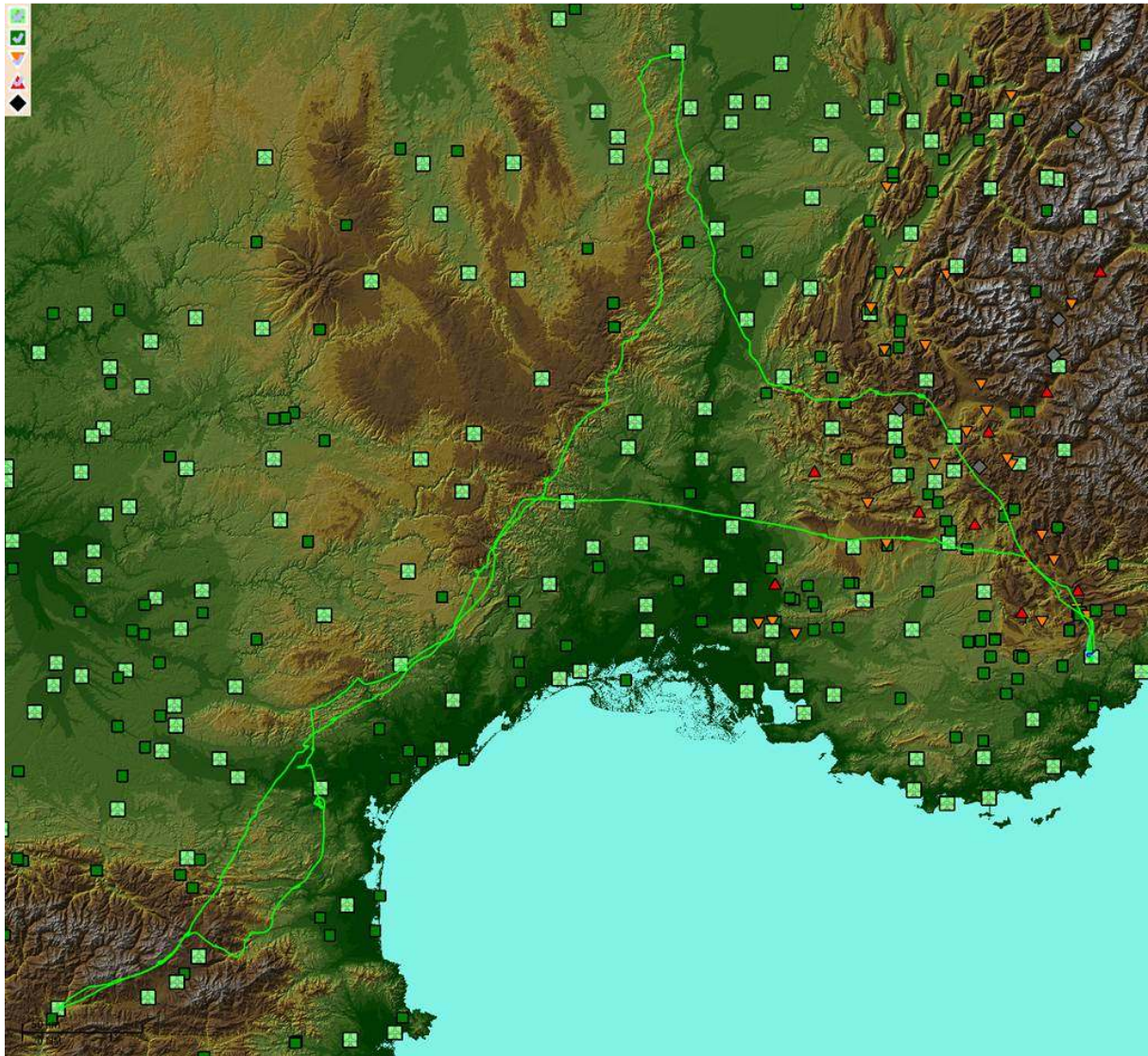
The VerifLocal software (French/English) only works under Windows. IGC or .ftr flight records (Condor 2 only) can be verified. The interface allows the user to set the parameters of the application according to his choices: glide ratio, trajectory calculation time step, safety height on arrival and above the terrain or ground, etc. These parameters can be saved in one or more configuration files.

The units used are meters and kilometers. Imperial units could be added very easily

Marc Till has decided to distribute this software freely (except for commercial applications). Version 3.0 is available on the CondorUTill website (link at the bottom of the page). A user guide (French and English) is available

<https://condorutill.fr/index.php>

Real-life flight example



Flight by Baptiste Innocent (August 2020 flying an ASH31).
At all times he has remained within gliding range of airfields or landable areas

As the flight straddled several Condor scenes, LK8000 topographic data have been used