VerifLocal V4.1

User's Guide

Contents

VerifLocal

VerifLocal is a program that analyzes IGC flight recordings or files coming from the Condor simulator (**.ftr**).
It allows to check whether a glider has remained within gliding range of Landable Areas (in the broad sense) during the flight (according to a given Glide Ratio) and can determine some escape routes and the area reachable from a given point on the path.
Low level flight may also be detected.
It is possible to use topographic data from Condor or LK8000 or from OpenTopography.org.
Airspace can be displayed on the map and it is possible to detect the entry into the zones.
A batch mode enables to process multiple files without graphical display, see **ADVANCED USE**

The name comes from the French gliding expression: “rester en **local de ...**“**:** “to remain within gliding range of ...”

RECOMMANDATIONS

This software is provided "as is" without any express or implied warranty. In no event shall its authors be liable for any damages whatsoever resulting from its use. The results provided are only indicative and cannot be used as proof. It is up to the user to check that the data used (list of LAs and airspace among others) are up to date.

Wind effect on the glide ratio may be computed, but its effect should be only used as an indication as aerology is not taken into account. It is therefore recommended to keep heights and safety coefficients that correspond to the values commonly used. If in doubt, set wind to zero.

The use of this software should in no case exempt the user from using his common sense.

Note about this document

A number of illustrations were made with version 3 of the software and have not been updated.
Besides that, most pictures have been taken from the French/metric version of the software.
This should not compromise comprehension

Glide Ratio :

For IGC files, the default Glide Ratio used for computations is 20. If the glider type is clearly identified (the type indications in the IGC files are not always reliable) one can use half of the maximum Glide Ratio, otherwise it is recommended to keep the default value of 20 (or even less for "wood-and-fabric" ones), possibly 25 for 15m or 18m classes and above;
For flights coming from Condor, if the option **Condor: automatic glide ratio** is activated, the calculation glide ratio will be equal the maximum glide ratio of the glider in question (defined in the Glider_data.txt file) multiplied by a safety factor (50% by default); otherwise, the default glide ratio will be used.

Escape routes

Tracks towards LAs are shown only as a means of verifying their existence. If there are several, the selection of the one shown is made on arbitrary criteria (see below), so there is no guarantee that the track displayed is the best one. They can therefore only be recommended for actual flights after a thorough check.

Airspace

Detection of entry into the zones is binary. In case of detection, it is up to the software user to check the activity of the zone in question and, if necessary, whether clearance has been obtained by the pilot.

Language and Units

The software detects if the computer uses French; otherwise English will be used.
It is possible to force French or English if needed (see below ADVANCED USE)

The software uses metric units (m, km, km/h, m/s) for calculations and display by default.
Support for imperial units (ft, Nm, kt, kt) or Australian units (ft, km, kt, kt) is available from version 4.0. (data entry and display only)

USAGE

Most options and parameters can be modified via the menu bar, a dialog box and certain keyboard shortcuts.
All these are defined in a configuration file: **VerifLocal.ini**, which can be found in the program installation folder.
In the following, for each menu entry, dialog box field or keyboard shortcut, the name (and possibly the value) of the parameter in the **VerifLocal.ini** file will be indicated in square brackets: **"[]"**, for example: **[Check Airspace].**

It is possible to read Condor **(.ftr)** or IGC **(.igc)** files, whether they come from **real or simulated** flights. During the same session it is possible to read both types of files.
Only Condor Versions 2 & 3 are supported

For IGC files, the program will **automatically** search to see if a usable topography file exists.
The map displayed can also be modified, see below: Menu/Map (IGC) and View/Current Map

For more details, see **TOPOGRAPHIC DATA AND MAPS** below.

For Condor files, the landscape on which they were recorded is selected automatically if it is installed on the computer, otherwise the same .**trn** or .**DEM** file is used as for IGC files.

For each flight recording, the program will check the location of Condor aerodromes (.ftr only), as well as the Landable Areas (LA) defined in one or more .cup (SeeYou) files. See the **.CUP FILES** paragraph below

The program will try to detect the release at the end of the towing or winching operation as well as the entry into the landing circuit (2 km ~1.1NM from the landing point or cone of GR=10).

Engine operation is also detected. The **ENL** and **MOP** fields (if available) are read from the IGC files.
The default value of the detection threshold (500) is generally adequate [**ENL_Threshold]**

For the duration of the flight, the program will check (by default every 20 seconds) whether it is possible to reach a LA, in a straight line or in a broken line depending on the glide ratio used for the calculation (see below), staying above the terrain (150m AGL by default) and respecting a safe height on arrival (300m by default).

Escape routes

Please refer to the **§ ESCAPE ROUTE SEARCHING ALGORITHM** for a description of the algorithm.

This algorithm is neither optimal nor exhaustive and **does not necessarily find all possible routes**.
However, we consider that this is not essential as a careful observation of the map allows us to detect the few "false positives" that might remain.
To do this, it is also possible to manually construct an escape route.

“False negatives” are excessively unlikely because the height above ground of the escape routes is very finely determined (every 90m ~100yds = horizontal resolution of the topographic data).

It is possible to display escape routes periodically (see below): only 1 escape routes at each point of the path, in the direction of the LA:

1. the nearest one that can be reached above safety height (**green** on the map) ;
2. otherwise, the LA that can still be reached with the highest arrival height below safety height (**orange**) ;
3. alternatively, the trajectory towards a theoretically reachable LA: among all the escape routes that would allow to reach a LA in the absence of relief and which are blocked by the relief, the one that will come closest to the targeted LA (**red**).

In the first two categories, if more than one track towards LAs is found, the trajectory will be displayed first:
- towards an aerodrome, in a straight line, then in a broken line;
- otherwise to another LA, in a straight line, then in a broken line.

It is also possible to manually determine an escape route, see the corresponding section below in the section Interaction with the programme.

When the reachable zone is displayed, it is also possible to automatically calculate a clearance path to any point within the zone, see the corresponding § below in the **INTERACTING WITH THE SOFTWARE** chapter.

Reachable zone

VerifLocal can also extensively determine the reachable zone from the current point on the trajectory, taking into account the glide ratio and the wind.
Any updrafts or downdrafts due to the terrain are not taken into account.
The calculation is performed on a mesh whose pitch can be adjusted. The finer the mesh, the more accurate the calculation, but the longer the calculation time may be, depending on the height above ground level and the complexity of the area that can be reached.
The long calculation time means that this algorithm cannot be used systematically for the entire trajectory. It is best used to analyse complex cases where the algorithms used to find a way out may fail (crossing several passes, going up a valley, etc.).

For more details, see the corresponding section below in the **INTERACTING WITH THE SOFTWARE** chapter.

The algorithm is described in the appendix

Low-level flight

Low-level flight can be detected: the minimum height is defined by [**Parameters /Minimal height AGL (flight)]** (no detection will be performed if the value is zero).
The trajectory will be coloured purple and the cumulative time will be displayed in the barogram text (see below).

In order not to set off an alarm in case of safely carried out ridge flying, such trajectory points will not be taken into account if it is possible to go back above the minimum height by deviating from terrain along the line of greatest slope for 1km or less

Airspace

It is possible to display the airspace and to detect penetration into the zones.

Zones must be defined in a file in OpenAir format (.txt or .air), which is not supplied with the distribution but can be downloaded automatically if it is available on the Internet (see below).

For Condor 3 files, the OpenAir file supplied with the landscape will be automatically used

This feature can also be used to detect, for example, low-level flight in mountain passes during competition events in mountainous areas. Simply create a file containing fictitious zones. To do this, it is possible to convert Condor penalty zones (quadrilaterals only) to OpenAir format using the Condor flight plan converter: CoTaCo

Interacting with the software

Start

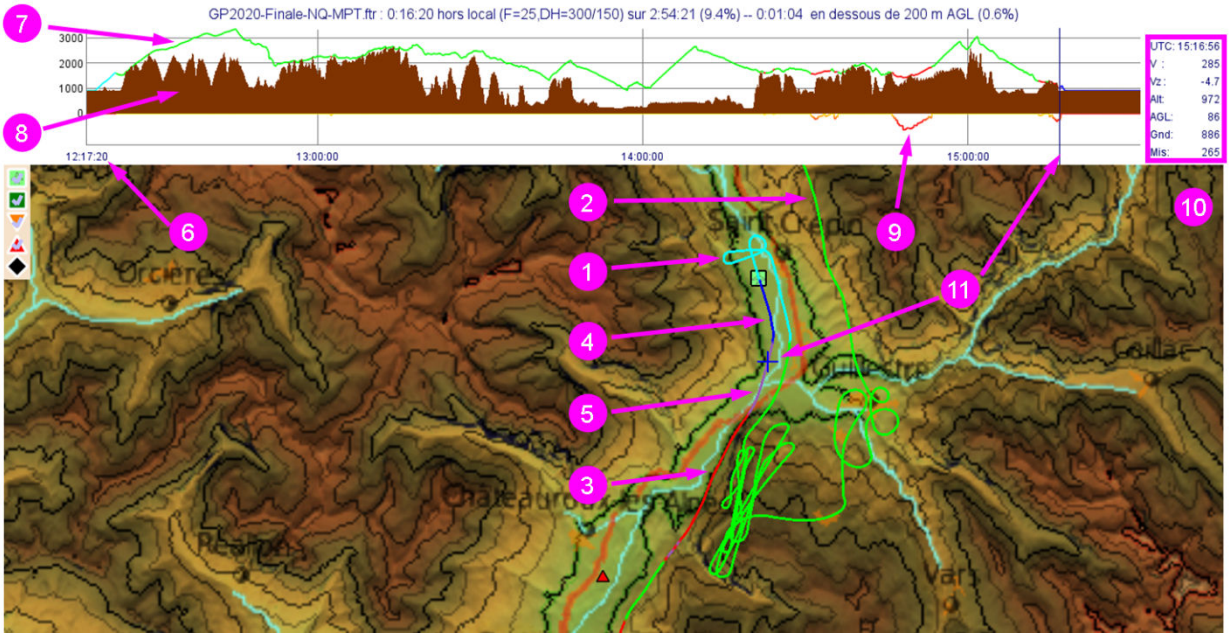
To open a file, select **File/Open...** from the menu.
If you want to use drag and drop mode to start the program, it is recommended that you create a shortcut on your desktop. You can then drag a file (**.igc** or **.ftr**) onto the shortcut to scan it.

Display

Map :

At start-up the map is displayed on the whole window.
The colour of the trajectory represents:

1. **Cyan:** initial climb (tow, winch or motor start)
2. **Green:** the glider is within gliding range of a LA (**Yellow**: less than 100m/~300ft above min altitude).
3. **Red:** the glider is not within gliding range of a LA
4. **Blue:** landing circuit.
5. **Purple:** low-level flight (if detection is activated)



Barogram :

It is located above the map or on the full page (see Display menu).
You can see:

6. Time (local time for Condor, UTC otherwise , abscissa) ;
7. the altitude of the glider (top curve, same colors as the trajectory on the map);
8. ground elevation (**brown**) ;
9. downwards (from **yellow** to **red**) the height missing to be within gliding range of a LA (straight line only) ;
10. information (5, 6, 7 and 8) condensed for the active point;
    - **UTC :** time
    - **V :** velocity
    - **Vz :** climb/sink rate
    - **Alt :** altitude
    - **AGL**: height above ground
    - **Gnd** : ground elevation
    - **Mis :** missing height
11. The active point is represented by a vertical blue line on the barogram and by a glider icon on the map.

Airspace information is described in the relevant paragraph.

The text above the barogram indicates:

1. file name ;
2. time spent outside gliding range of LAs (="hors local") (duration) ;
3. Glide Ration used for the calculation (F=**GR**, below : 25); **[Working_L/D]** (or auto) ;
4. safety height on arrival (DH=**HHH**/ggg, below : 300); **[Safety_height**];
5. minimum height above ground level (DH=hhh/**GGG**, below : 150) **[Ground_clearance**] ;
6. if applicable, if the calculation was made with altitude corrected for kinetic energy (TE) ;
7. total flight time;
8. time spent outside gliding range (percentage) ;
9. time spent below the minimum flying height (if detection is activated) ;
10. minimum flight height **[Min_AGL_height]** ;
11. percentage

When the map and the barogram are displayed simultaneously, if the mouse is moved over the barogram, a glider icon indicates the position of the glider on the map (active point) and details are displayed to the right of the barogram.
It is also possible to adjust the current time by using the left and right arrows (use the SHIFT key to move faster)

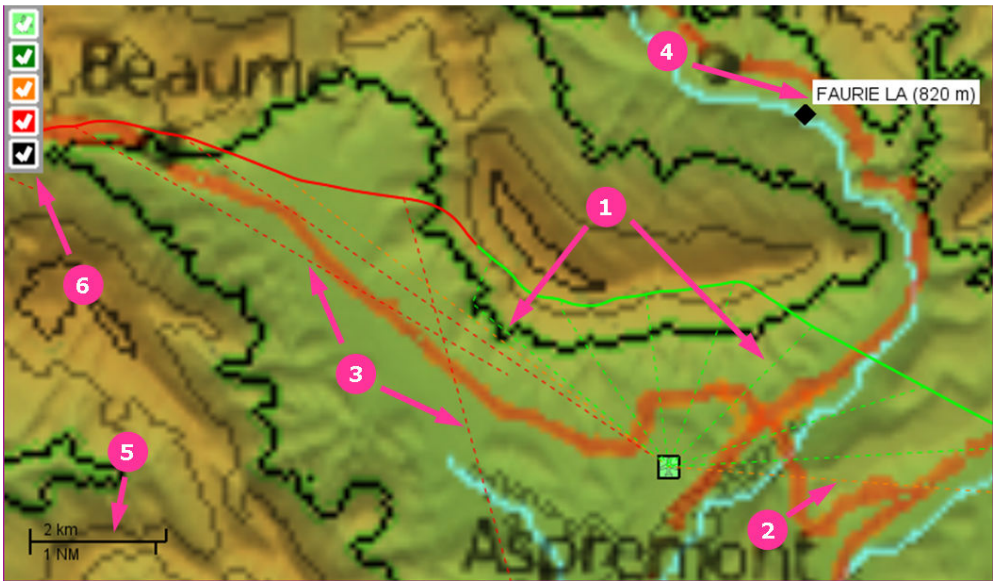
If you click on the barogram with the left mouse button, the map is centred on the corresponding position.

If the mouse cursor is placed on the track, the index of the barogram is positioned at the corresponding moment.
It is also possible to activate the automatic centring of the map (in the Display menu).

Escape routes

The track displayed (dotted lines) is in the direction of the LA:

1. nearest one that can be reached above safety height (**green**) ;
2. otherwise, the one that can be reached with the highest arrival height below safety height (**orange**) ;
3. or, alternatively, the trajectory towards a theoretically reachable LA that will come closest to it (**red**).
   If no LA is theoretically reachable, no track will be displayed.



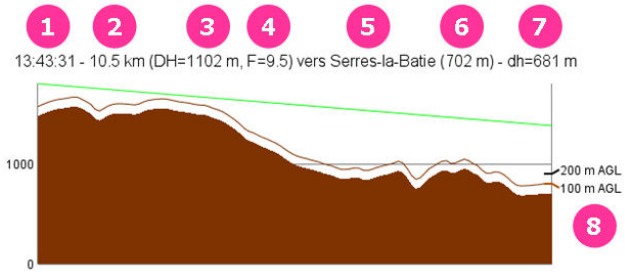
Miscellaneous information

4. If the mouse passes over a LA the corresponding name and elevation are displayed.
5. The scale in the lower left corner is automatically adjusted (value or line length)
6. Selecting LAs by difficulty (see below)

Escape routes altimeter profiles

When escape routes are displayed, right-clicking on a track brings up the corresponding altimeter profile in the lower left corner of the map; the active track is highlighted (**magenta**). The colour of the track in the profile window is the same as on the map (**green**, **orange** or **red**).
The profile disappears when you right click again.
It reads:

1. time corresponding to the starting point on the trajectory;
2. distance flown (in a straight or broken line) ;
3. height difference between the start of the route and the LA
4. (theoretical) glide ratio needed to achieve it (without any margin)
5. name of the LA reached (or targeted);
6. elevation of the LA reached (or targeted);
7. if the LA is reached, the height above the ground at arrival;
8. a graphical indication of the safety heights on the vertical axis to the right.



Note: In the case of **orange** routes, the difference between the arrival height (7) and the minimum height may not correspond to the missing height displayed on the barogram (MIS). This occurs if the selected route is towards an aerodrome, but there is another route arriving higher on an LA not classified as an aerodrome and which will not be retained therefore

Manually determined escape route

It is possible to manually determine a broken line escape route.

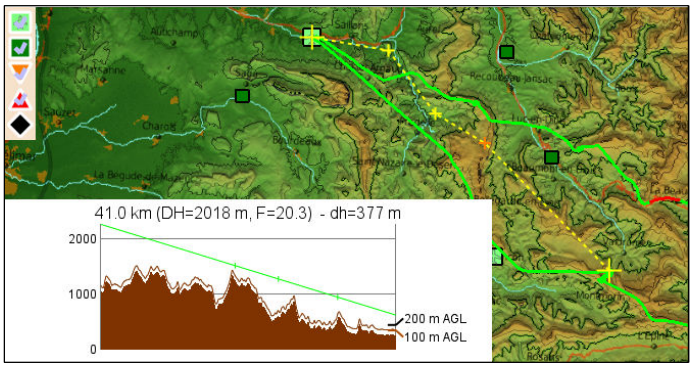
Position the cursor on a point of the path so that a glider icon appears, then press the "M" key.
The cross will turn orange and it will be possible to move the new point with the mouse (without clicking). The ground track will be visible on the map as yellow dotted lines. The elevation profile will be displayed.
To add another point, press the "M" key again.

To finish entering points, left-click.
To select a point, click on it with the left button, the cross will become orange.
It is then possible to:

- move the active point (as above);
- delete the active point, press the **DELETE** key;
- insert a new point before the active point, press the **INSERT** key.

To deselect the active point, left click.
The starting point of the escape route cannot be changed.

The profile display is similar to the one shown above, but the path does not stop when it meets the relief.

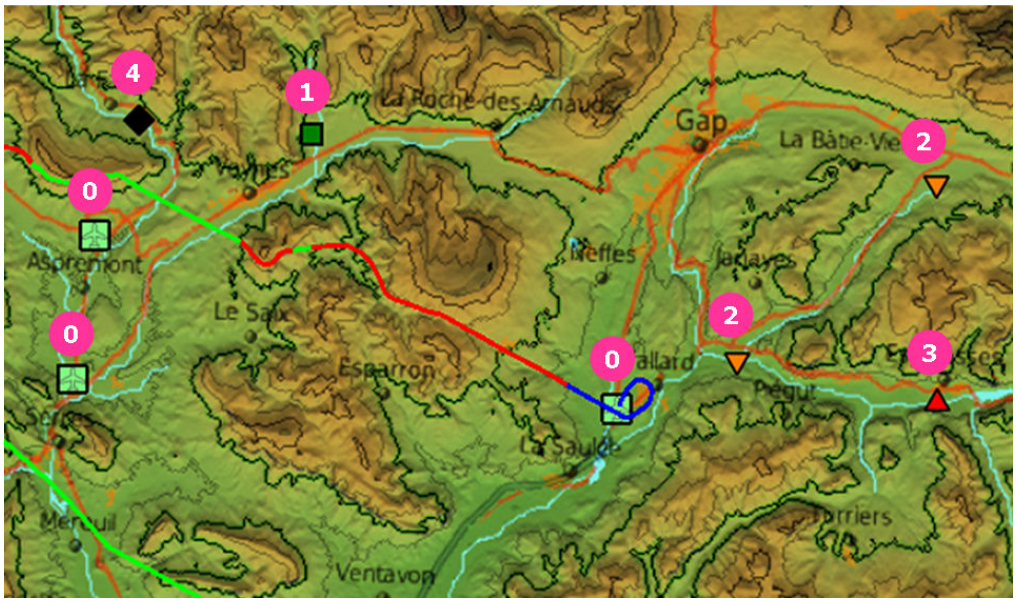


The ground track and elevation profile are erased by right-clicking.

Selection of LAs used

It is possible to select which LAs will be used for the calculation. The selection is made by level of difficulty according to the information found in the .cup file(s) (see below):

0. airfields ("aircraft" logo on light green background)
1. easy fields or set of fields (dark green square)
2. medium or no information found (orange point-down triangle)
3. difficult (red triangle)
4. very difficult (black diamond)



To select/unselect a level of difficulty, click in the corresponding box in the top left corner of the map (see above); all LAs at that level will be selected/unselected.
It is also possible to select/deselect individual LAs by clicking twice on them with the left mouse button.

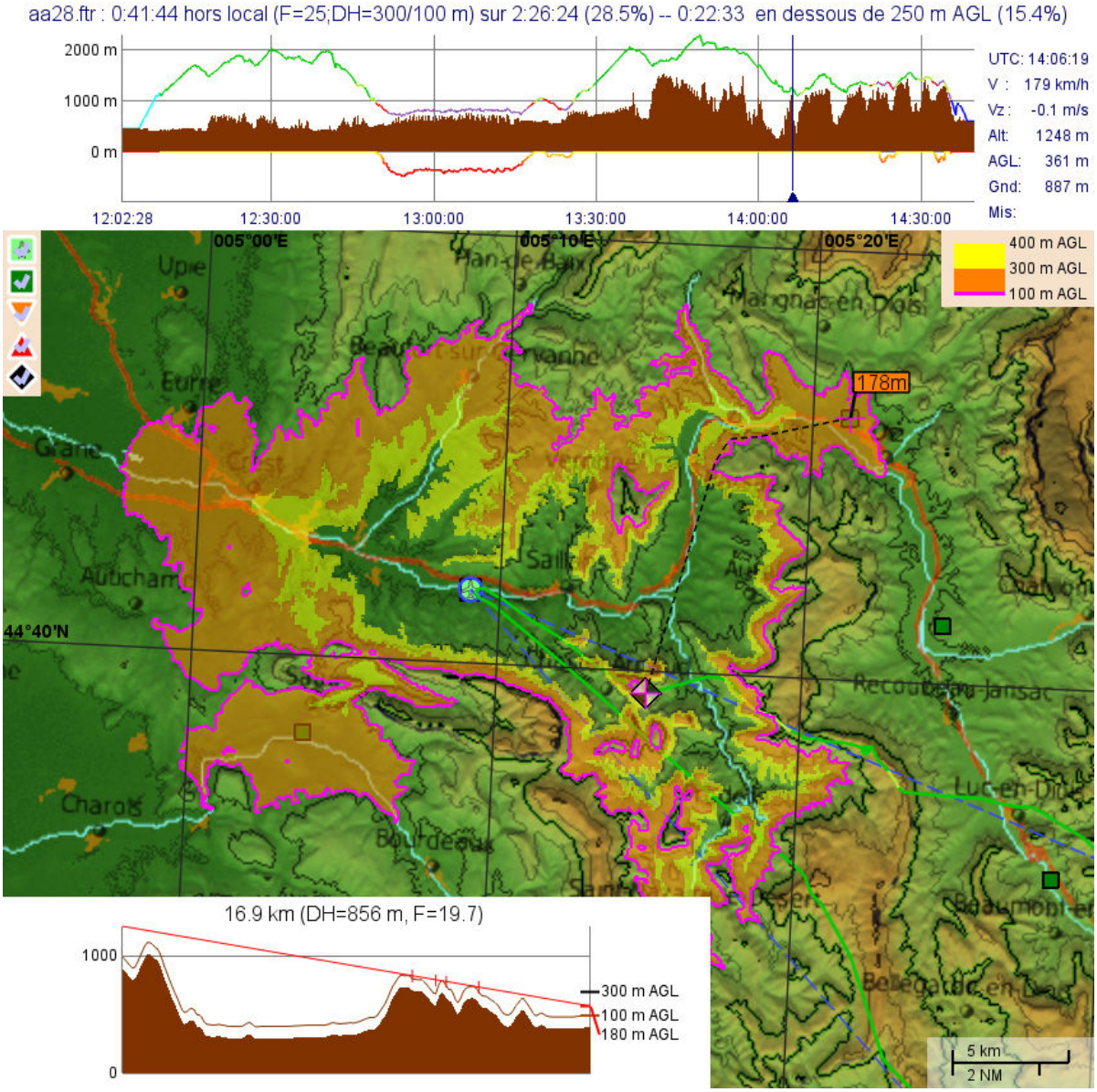
It is possible to save the current LA selection into a text file (Menu/Save LA list) which can be read (Menu/Read LA list). If a list has been read or written, the corresponding filename will be saved into the setup file when saving that file, otherwise the selection level list will be saved.

The re-calculation is not automatic, the flight track will turn grey as soon as a check-box or an individual LA has been modified.

The display will turn back to normal once a re-computation is performed (Menu/Recompute or [F5] key)

Only the theoretically reachable LAs will be displayed. If the **Show unreachable LA & AS** option is set in the dialog box [**Show_unreachable=1]**, all the LAs located in the working rectangle (grey dotted line on the map) will be displayed.

Reachable zone



The R key activates/deactivates the calculation and display of the reachable zone. The current point is indicated by a black and white marker. It is not possible to change the current point while the reachable zone is displayed.
If a colour display mode is selected (setup dialog box), the colour will indicate the height above ground level on arrival at the point in question. The colour scale will be displayed in the top right-hand corner of the map.

Aerodromes and landable areas will have a label (orange) indicating the arrival altitude if it is below a predefined value (250m in the case above).

If you click (left mouse button) on a point inside the attainable zone, the track to this point will be displayed in black dotted lines and the altimeter profile will be displayed (detailed description above).
Right-clicking removes this display.

NOTE: The elevation profile is calculated towards the mesh point closest to the target point.
If the mesh is coarse and the ground is not flat, this may result in differences in arrival height (e.g. 178/180m, above, with a fine mesh).

Airspace

If a file has been defined and the display has been selected (**"A"** key to toggle, or **Display / Airspace** in the menu [**Show Airspace=1** or **2]**), the airspace will be displayed in a simplified way using colours defined in the file (red will be lighter), or default values.
Only zones with at least one point close to the trajectory will be displayed. If the **Show unreachable LA & AS** option is set in the dialog box [**Show_unreachable=1]**, all zones with at least one point in the working rectangle (grey dotted line on the map) will be displayed.

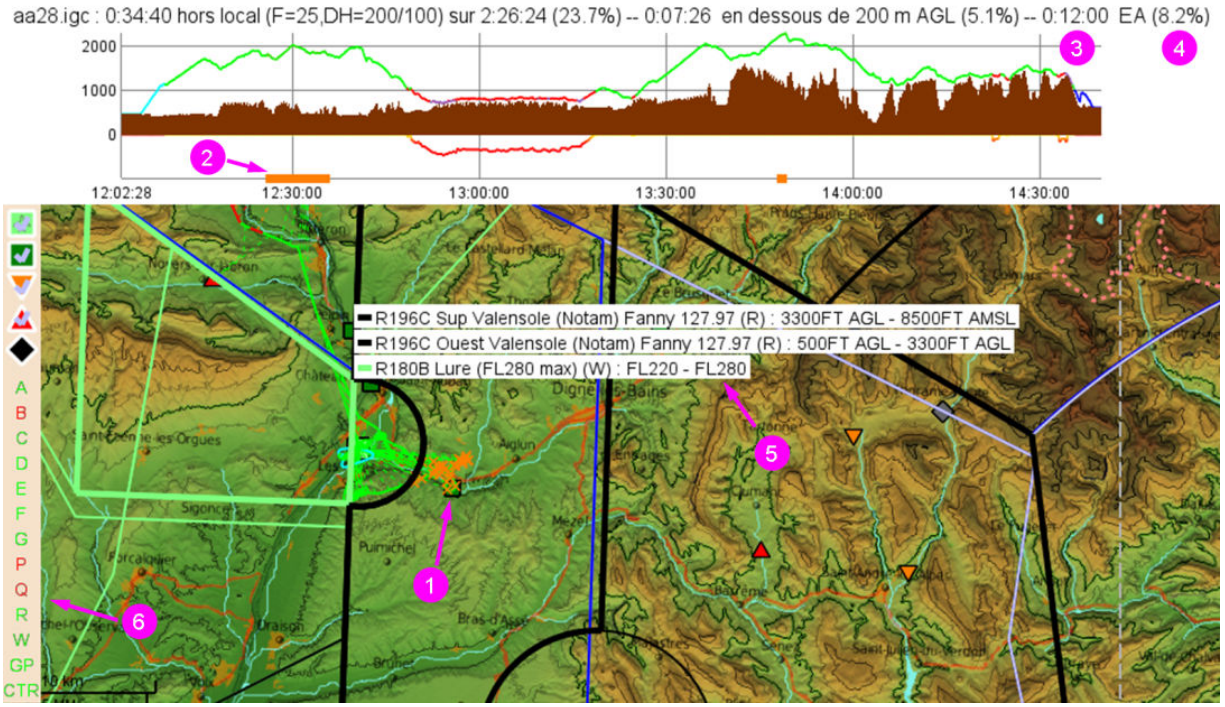
It is possible to detect the penetration of the glider into airspace zones:
you have to check the **Check Airspace** tick box in the setup dialog box [**Check Airspace=1]**

The detection is done with the same frequency as the gliding range determination. If a point of the trajectory is inside an activated zone, an orange cross (x) will be added on the trajectory **(1)** and an orange mark will be made on the lower horizontal axis of the barogram **(2)**. The time spent in each zone will be displayed in the summary file **(**see section **FILES CREATED** below**).**and the total time will be added at the end of the barogram text **(3),(4).**

Move the mouse over an orange cross to display the zone concerned (if there are several, the number will be indicated).

You can toggle the display of the zones between all active zones and only those for which penetration has been detected by selecting **Display/Only zones Penetrated** in the menu or by using the **"P"** key [**Show Airspace=2].**

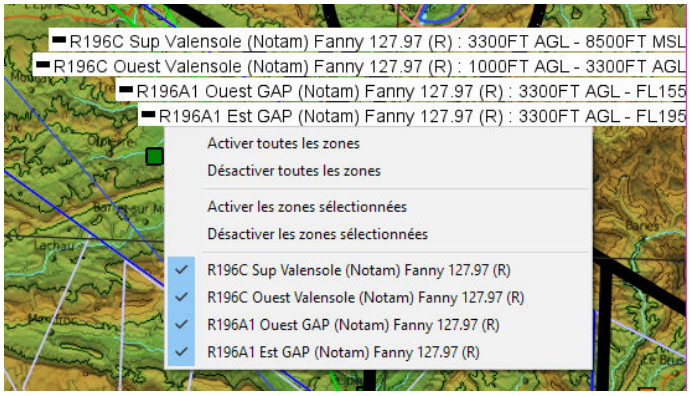
To display information about an airspace segment, move the mouse over a corner or along a boundary (detection points are about 2km ~1NM apart). Selected airspaces will be bolded and labelled with information from the AN (name), AC (class), AL (lower limit) and AS (upper limit) fields **(5)**



Selecting zones :

Zones can be activated/deactivated individually:
Move the mouse over a corner or along a boundary (see above), then right-click. A pop-up menu will appear, allowing you to activate/deactivate all zones, or only those selected, or to do so individually.

For a zone to be taken into account in airspace detection, the corresponding class must also be active.



The re-calculation is not automatic; the flight track turns grey as soon as a zone has been modified.
The display returns to normal when a recalculation is performed (**File/Re-compute** or **[F5]** key).

Selecting classes:

When airspace is displayed, a class (AC) selection bar is displayed vertically on the left side of the screen below the selection of the LAs **(6).** Active zones are green, otherwise red. Click on a label to toggle the status of the corresponding class.

The re-calculation is not automatic; see above.

Downloading an airspace file available online

You can automatically download an airspace file available online.
To do this, enter the URL of the file in the AirspaceFile field in the **VerifLocal.ini** file
e.g. for France (default) : https://www.planeur.net/_download/airspaces/france.txt

The programme will check whether the file is available in the **Airspace** folder and whether it is up to date.
If not, the program will offer to download it and install it in this folder.
If an older version exists, it will be renamed with the **.bak** extension.

Exemption zones

If there are exemption zones that allow you to cross or partially enter a prohibited zone (e.g. a national park), this can be taken into account: if the glider is both in the exemption zone and in the main zone, only the presence in the exemption zone will be detected.

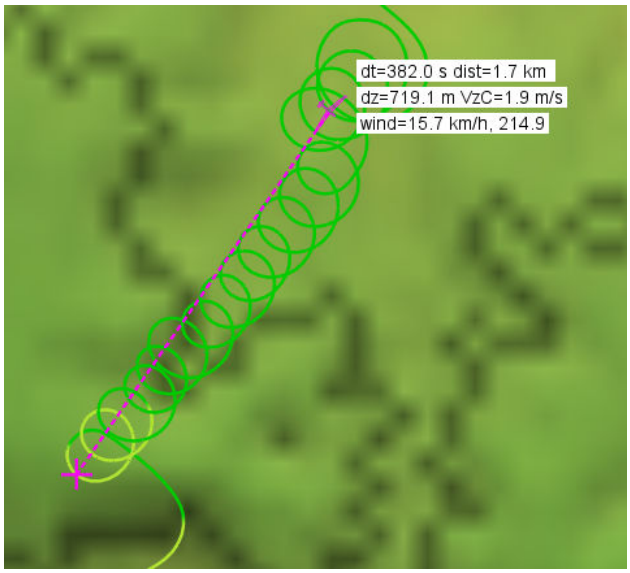
Note: for this to work, the classes of all the zones concerned must be activated.

The zones must be described in a text file whose name must be the same as the airspace file with the suffix **_DEROG**, e.g. **france_DEROG.txt** for the **france.txt** file.
An example for the Ecrins and Vanoise French national parks is given in the distribution (**france_DEROG.txt)**.

For each main zone, the name of the main zone must be given on a single line, followed by the names of the exemption zones, separated by commas.
The names must be **strictly identical** to those in the airspace file (**AN** fields)
For example, for the Vanoise Park (FR) :
Vanoise 1000m/sol,Vanoise P1 Grand Roc noir autorise du 15/05 au 30/10,Vanoise P2 Aussois autorise du 15/05 au 30/10

Measurement mode and wind determination

It is possible to measure a number of elements between two points on the trajectory.
Position the cursor on the first point and press the Z key, then move the cursor to the second point.



This will read:
dt: time
dist: distance travelled
dz: difference in height
VzC: compensated vertical speed
wind: wind speed, direction

The wind determined in this way can be used for calculations: press the W key.
In order to obtain a relevant determination of the wind, it is recommended to take the measurement on a thermal climb, on an area with a regular track, without recentering manoeuvres, between two points where the glider is flying in the same direction (the glider icon turns **magenta** in this case).
To exit "measurement" mode, press the Z button again

Zoom and Pan

The map can be moved by clicking and dragging it with the left mouse button.
It is possible to zoom in and out:

- by clicking on the middle mouse button and moving it vertically ;
- by using the mouse wheel;
- by using the keyboard shortcuts [CTRL][+] and [CTRL][-] (numeric keypad).

Keyboard shortcuts

F2 opens the setup dialogue box
F5 launches a recalculation using the key
F8 screenshot in JPG (default) or PNG format
A toggles the airspace display mode (see below)
P toggles the display mode for penetrated areas (see below)
C toggles the task (French: circuit) display, use the key (see below)
L toggles the latitude-longitude grid display
M adds a point for manually determined escape routes
G toggles the display of the finesse required to reach the ZAs (see below)
R activates/deactivates the calculation and display of the reachable zone (see below)
Z activates/deactivates measurement mode
W saves the wind determined in "measure" mode

CTRL+ and **CTRL-** (numeric keypad) Zoom +/-
CTRL* (numeric keypad) return to initial zoom
CTRL HOME Restore original view

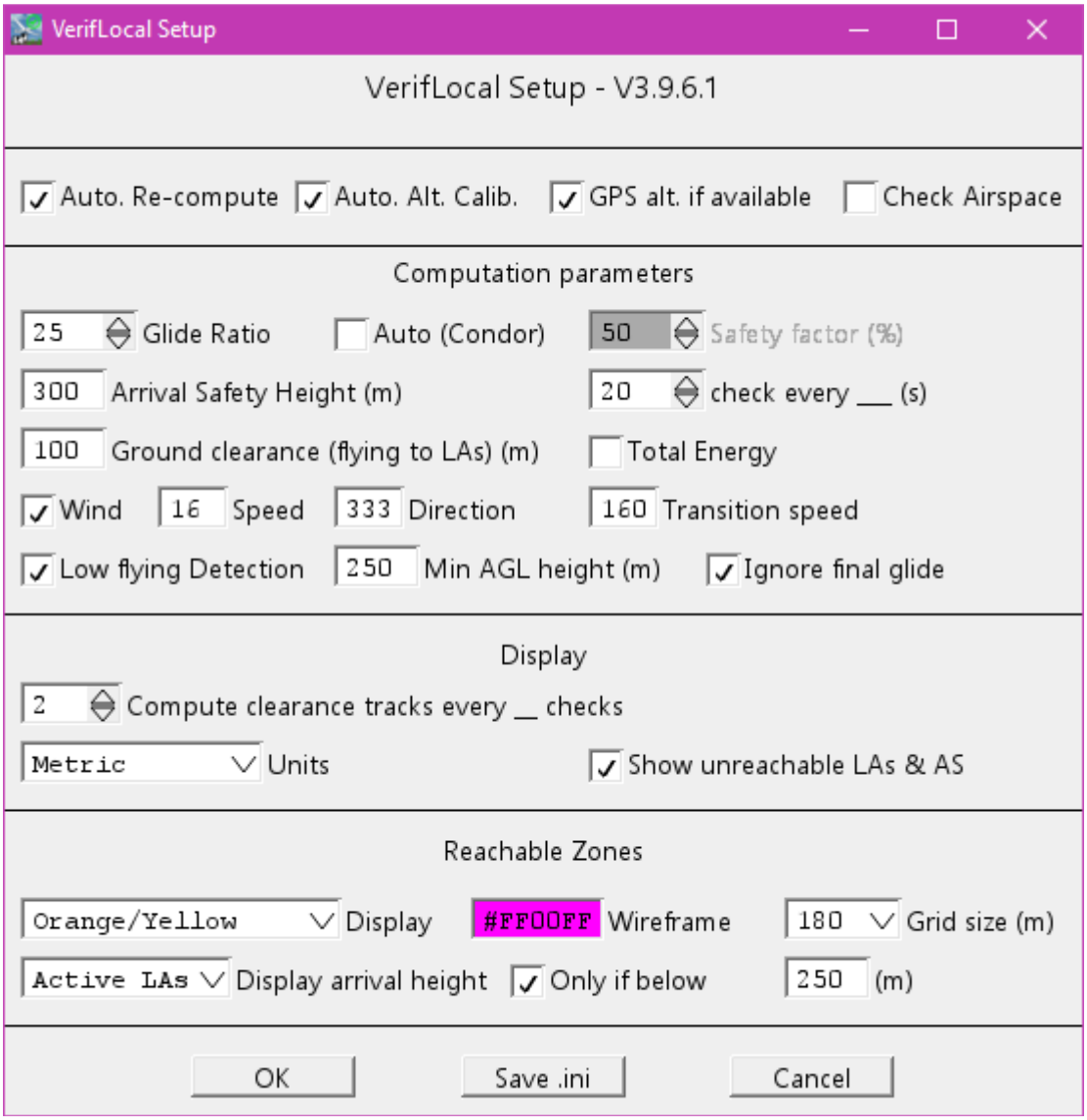
CRTL-O open a new file
CRTL-Q quit
DELETE removes a point for manually determined escape routes
INSERT inserts a point for manually determined escape routes

Setup dialog box

If you click the [OK] button **,** the settings are not automatically saved in the VerifLocal.ini file. To save them, you will need to do so explicitly by clicking on the [Save .ini] button or via the menu: **Setup/Save Setup**

If an input box turns red when you click [OK] or [Save .ini], this means that the value is invalid; right-click on the input box to obtain an error message.

Clicking in a "colour" box opens a colour picker



Automatic recalculation

Enables or disables automatic recalculation. In the VerifLocal.ini file: **[Auto_Recompute].**

Auto. Alt. Calib.

Activates or deactivates the automatic calibration of altitudes (IGC files only**) [Calibrate_Alt]**

GPS alt if available **[Use_GPS_Alt]**

Use GPS altitude when both (GPS and barometric) are available in the IGC file

Check Airspace

Toggles detection of penetration into activated airspace zones **[Check Airspace].**
Click on File/Recalculate if necessary or press [F5] to refresh the display

Glide ratio

Allows you to change the calculation glide ratio (see definition in §Recommendations). **[Working_L/D]**
Warning: this value does not correspond to the glider's maximum glide ratio.
Allowed values: [5-99]
The glide ratio value will be displayed in the barogram information bar (GR=xx).
If necessary, click on File/Recalculate or press [F5] to refresh the display.

Auto (Condor): automatic GR

Toggles automatic glide ratio determination for Condor flight recordings **[Auto L/D].**
If the option is not enabled, the glide ratio will be the default or user-defined glide ratio
Changing this option will only take effect when the next file is opened.

Safety factor (%)

Safety factor for automatic GR determination (Condor) **[L/D_Sfty_Fact]**
Allowed values: [0-100] - default: 50

Arrival safety height

Used to change the minimum arrival height **[Safety_height]**
Minimum value: 0
The value will be displayed in the barogram information bar (DH=HHH/ggg)
If necessary, click on File/Recalculate or press [F5] to refresh the display.

Check every _ s

Allows you to change the calculation frequency (in seconds) **[Time_step].**
Minimum value: 10s
Click on File/Recalculate if necessary or press [F5] to refresh the display

Ground clearance (flying to LA)

Used to change the minimum height when flying towards LAs**[Ground_clearance]**
Minimum value: 50m/164ft
The value will be displayed in the barogram information bar (DH=hhh/GGG)
If necessary, click on File/Recalculate or press [F5] to refresh the display.

Total energy

Toggles the use of an altitude corrected by kinetic energy to determine escape routes and the reachable zone (altitude display remains unchanged) **[Total_Energy].**
If this option is activated, it will be displayed in the barogram information bar (TE)
Click on File/Recalculate if necessary or press [F5] to refresh the display

Wind

Selects/deselects whether wind is taken into account when calculating escape routes and the reachable zone
The wind can be specified in the dialog box or determined from the drift in the updrafts (see description of "Measurement" mode)

Speed

Wind speed (current units) **[Wind_Speed]**

Direction

Wind direction (degrees) **[Wind_Dir]**

Transition speed

Glider speed used to calculate clearances and reachable area (current units) **[Transition_Speed]**

Low Flying Detection
Selects/deselects low flying detection

Minimum AGL height (flight)
Used to change the minimum height during flight (in metres) **[Min_AGL_height].**
Minimum value: 0m (disables control)
The value will be displayed in the barogram information bar (below HHH m AGL)
If necessary, click on File/Recalculate or press [F5] to refresh the display.

Ignore final glide
Toggle to ignore or take into account the final glide when calculating the time below the minimum AGL height. **[Ignore_Final_Glide].**

Compute clearance tracks every _ checks
Allows you to change the frequency of the clearance display (every N calculations) **[Paths_frequency].**
Minimum value: 1
If necessary, click on File/Recalculate or press [F5] to refresh the display.

Units
Drop-down list for selecting units (metric, imperial or Australian) **[Units].**
We strongly advise against modifying parameters without saving them before changing units

Show unreachable LA and AS
Selects/deselects the display of theoretically unreachable ZAs and Airspace **[Show_unreachable].**

Reachable Zones
Display
Used to change the display of the reachable zone **[Display_Reachable].**
Wired, Grey, Green, Grey/Orange/Yellow, Orange/Yellow, Orange/Yellow/Green

Wireframe
Used to change the colour of the wireframe boundary of the reachable zone **[Border_color].**

Mesh size (m)
Changes the size of the mesh used to calculate the reachable area **[Grid_size].**
Possible values 90,180,360,720m (m are always used, whatever the units selected)

Display arrival height
Selects whether the arrival height is displayed on Landable Areas **[Show_Arrival_Height].**
Possible values None, Active LAs, All

Only if below
Selects the value above which arrival heights are no longer displayed **[Max_Arrival_Height_Shown].**

Other parameters
A number of parameters can only be accessed via the **VerifLocal.ini file**, please refer to their description in the file. These include a number of display parameters:
- glider icon scale
- wind arrow scale
- task line colour and width

Menus

Shortcut keys are indicated between square brackets after the name of the menu item ***[KEY]***

If a menu item corresponds to a parameter defined in the **VerifLocal.ini** file, the name and possibly the value are indicated between square brackets. **[name=value]**

File/Open IGC or Condor file... [CTRL-O]

Opens an IGC or **.ftr** file (Condor flight track) and determines whether the glider remained within gliding range and the escape routes according to the options selected.

File/Re-compute[F5]

Determines whether the glider remained within gliding range and the escape routes according to the options selected. The [F5] key can be used to start the re-calculation.

Fichier/ Screenshot [F8]...

Takes a screenshot and saves it to a JPG (default) or PNG image file

File/Save modified IGC file...

Opens a selection window for the modified IGC file (see above)

File/Quit [CTRL-Q]

Ends program execution

Setup/Parameters[F2]

Opens the setup dialog box

Setup/ Terrain (IGC)

Allows you to change the topographic data file **(.trn** or **.DEM)** used for IGC files. **[TrnFile]**
For **.trn** files: if it exists, the default map (**name.bmp**) will be selected; otherwise the user will be prompted to select one that must match the defined topography **(.trn**) file.
The file change will only be taken into account when the next file is opened.

Setup/Map (IGC)

Changes the map (**.bmp**) used for IGC files (only when a **.trn** file is selected) **[MapFile]**
The selected map must match the topography **(.trn**) file defined.
The map change will only be taken into account when the next file is opened.

Setup/Add CUP file

Allows you to add a **.cup** file to the list (10 max) **[CupFile]**
It is not possible to remove a file from the list; it must be done directly in the setup file if it has been saved.

Setup/Airspace

Allows you to change the airspace file that will be displayed [AirspaceFile]
The map change will only be taken into account when the next file is opened or if the airspace display is deactivated/activated in the Display menu.

Setup/Save sel. LA list.

Saves the list of selected LAs into a text file **[LA_select]**

Setup/ Load sel. LA list

Reads the list of selected LAs from a text file **[LA_select]**

Setup/Save setup

Saves the current setup in the VerifLocal.ini file.
The previous version is renamed to VerifLocal.ini.bak.

Setup/Save setup as....

Saves the current setup to another file.
If the file does not yet exist, you have to enter the file name: **my_file**
The **.ini** extension will be automatically added to the filename if not specified.
If it exists, the previous version is renamed to **my_file.ini.bak**

Setup/ Load setup ...

Loads the setup from a file.
The parameters will be taken into account when the next file is opened or if a re-computation is launched (except for terrain and map)

Display/Tracks towards Landable Areas [D]

Toggles the display of escape routes on the map. **[Show_paths]**
Click on File/Re-compute to refresh the display if the "Automatic re-compute" option is not enabled.

Display/Change Condor map

Allows you to select an alternative map
This map will not be saved in the setup.
The selected map must match the selected Condor landscape or the topography file (**.trn**) defined for IGC files.

Display/Condor map

Selects the default Condor map or the map selected via the option above

Display/Relief Shading

Selects a map with relief shading
This map will not be saved in the setup.
In order to limit the calculation time, it is restricted to the theoretically reachable area.

Display /Lat-lon Grid[L]

Activates/deactivates latitude-longitude grid display **[Lat_Lon_Grid]**

Display/Map

Selects the display of the map only [**Display_map=1]**

Display/Barogram

Selects the display of the barogram only [**Display_map=2]**

Display/Both

Selects the display of both map and barogram [**Display_map=3]**

Display/ Task [C]

Toggles the display of the task on the map

Display/ Glide ratio required [G]

Toggles the display of the glide ratio required to reach the LAs on the map
Relief is no taken into account, no safety margins

Display/ Airspace [A]

Toggles the display of airspace on the map **[Show Airspace=0/1]**

Display/ Zones penetrated [P]

Toggles the display of airspace zones penetrated **[Show Airspace=2]**

Display/ Auto. center

Toggles the auto centring mode: the map is automatically centred on the position of the glider when the simultaneous display of the map and the barogram is active.

Help/ Manual

Opens the manual with the default software for PDF files

Help/ About…

Displays version number

Parameters : setup file (VerifLocal.ini)

Most parameters can be changed interactively using the dialog box or the menus.

It is possible to save the setup if it has been changed.
It is possible to save the setup in another file, which allows, for example, to work on different areas.
It is possible at any time to reread a setup file (the parameters will be taken into account when the next file is opened).

All parameters that can be modified are defined in the **VerifLocal.ini** file and can also be changed by editing this file with a text editor (Notepad or other). Comments (#) in the file should be self-explanatory.

If a file name is preceded by **%INST%\,** this file will be searched in the VeriflLocal installation folder.
Otherwise, if only the file name is specified, the file will be searched first in the folder where the program is running, and then, if not found, in the installation folder.

If you have used previous versions:
Copy your old VerifLocal.ini file into the installation folder, then start **VerifLocal**, the file will be updated automatically

Note: do not modify the VerifLocal_default.ini as it is needed as a template for saving the VerifLocal.ini file

TOPOGRAPHICAL DATA AND MAPS :

In the case of Condor files, the Condor landscape data and maps (based on SRTM data with a 90m grid) will of course be used.

For IGC files, you can use :

- these same data and maps without the need for Condor to be installed on the computer;
- data from **OpenTopography:** https://opentopography.org/ (**.asc** files)
- LK8000 topographic data (**.DEM** files)

If the flight to be analysed goes beyond (with a margin of about 50km) the map defined in the **VerifLocal.ini** file or in the Setup menu (see below), VerifLocal will search for all potentially usable files (**.trn**, **.asc**, **.DEM,** in that order) in the following folders

- .trn file of Condor landscapes, usually **C:\Condor2\Landscapes**
- **VerifLocal** installation folder
- **Maps** sub-folder of the **VerifLocal** installation folder
- If applicable, sub-folder **_Maps** of the **LK8000** installation folder (only .**DEM** files, you will have to fill in the **LK8000_Map_Path** field in the **VerifLocal.ini** file**)**

The first file found will be selected

If no file is found, VerifLocal will propose to download the corresponding data from **OpenTopography** (see below)

Condor

For the Alps, the **AA2.trn** file and the **AA2.bmp** map can be obtained on the CondorUTill page:
Download the file https://condorutill.fr/VerifLocal/VerifLocalData.zip and unzip it in the **Maps** subfolder of **VerifLocal** installation folder

This data is of course provided without any guarantee of accuracy of any kind, but given the number of Condor flights that have already taken place across this landscape, the accuracy can be considered more than adequate.

If Condor is installed on your PC, start **VerifLocal** and click on **[Setup/Terrain(IGC)]** in the menu bar and select the **AA2.trn** file which is located in **C:\Condor2\Landscapes\AA2\ (**if Condor is installed in **C:\Condor2**). The default map will automatically be selected.
Then click on **[Setup/Save setup]** if you want to save this setup

For other areas, obtain the **.trn** and **.bmp** files of the Condor landscape corresponding to the area of the flight and proceed in the same way.

The easiest way is to download the "basic" package of the corresponding Condor landscape from Condor Club: https://www.condor-club.eu/sceneries/197/.
For a given landscape, it is always the first in the list of files to be downloaded.
Unzip the file to the desired location. It is then possible to delete all files except:
LANDSCAPE_NAME.trn and **LANDSCAPE_NAME.bmp**

NB: be careful to use only landscapes intended for Condor version 2 or 3 ("C2" or "C3" must appear before the landscape name in the list)

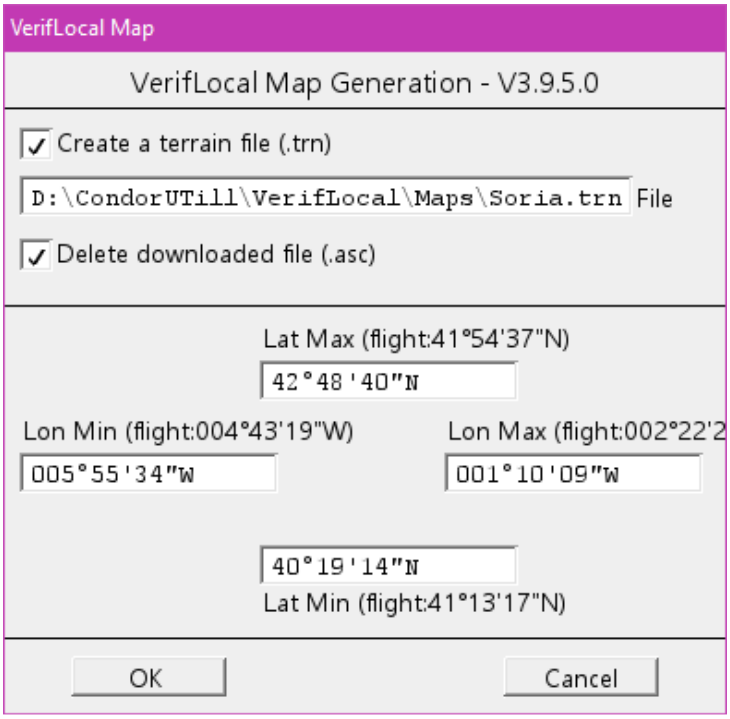
OpenTopography

You will have to enter the minimum and maximum coordinates of the map (the default values are obtained by adding a margin of about 100km around the flight to be analyzed)
Recognised formats are :

- decimal degrees (negative values for S & W): 46.4205513 14.8083334
- sexagesimal degrees: 46°25'13.98["]N 14°48'30.0["]E
  it is not necessary to indicate the seconds and minutes if they are zero
- sexagesimal degrees (separated by spaces): 46 25 13.98[ ]N 14 48 30.0[ ]E
- SeeYou (.cup) format (leading zeros are required): 4625.233N 01448.500E
- Condor "F2" format (idem): 46.25.233N 014.48.500E
- IGC file format (idem): 4625233N 01448500E

The data will be written to a file named, **OpenTopography-LatMin-LatMax-LonMin-LonMax.asc** (coordinates in decimal degrees rounded to the nearest 1/10), e.g.: **OpenTopography-25S-22.3S-15.7E-19.5E.asc**

If you think you will need to reuse this data, it is possible to convert it to Condor (.trn) format, which avoids converting SRTM data to UTM coordinates each time, which may take some time. To do this, check the box "Create a terrain file (.trn)" and indicate the name of the file in the "File" field



The data downloaded is obtained with a resolution of 3 arc seconds (about 90m) in ASCII format which results in very large files, so it is advisable to activate the "Delete downloaded file (.asc)" option.

Only maps with relief shading are available at the moment.

LK8000

It is possible to use terrain files (.DEM) either existing ones or files generated by the **LKMAPS_Desktop.exe** application which can be downloaded at the following address:
https://github.com/LK8000/LKMap_Desktop/releases/tag/v2.0.0

Terrain files for LK8000 are available on their website: https://www.lk8000.it/download/maps.html

All resolutions are supported, but display quality will be the best when the DEM file resolution is 3 arcseconds (SRTM3, or 90m ~100yds).

Only maps with relief shading can be displayed at the moment.

Converting .asc or .DEM files

It is possible to convert .asc or .DEM files into .trn files using VerifLocal with the -trn option on the command line or by using the shortcut Dem2Trn.exe.
The program will ask for the name of the file to be converted, then the name of the .trn file to be created, as well as the name of the map (.bmp, relief shading). The conversion will be carried out directly, without displaying any graphics.

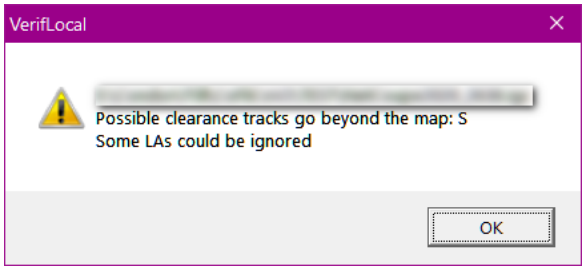
Relief shading maps

These maps are calculated each time.
The sun is at NW (315°), 30° above horizon
Colours can be modified by editing the AltCol.txt file (see below).
It is possible to modify shading calculation parameters (only in the VerifLocal.ini file).
See: http://www.reliefshading.com/analytical/shading-methods/
Below Slope_1: 100% diffuse shading
Above Slope_2: 100% aspect shading
Relief_Shading_Slope_1=10
Relief_Shading_Slope_2=60
Relief_Shading_Contrast=4

Restrictions

Flights must be contained entirely within the area corresponding to the topography file.
If they straddle two landscapes, they cannot be processed.

If a flight takes place close to the limits of the landscape, the software will not take into account LAs that are off the map but which could theoretically be reached (given the maximum altitude of the flight).
This message will be displayed:



CUP FILES

You can specify the .cup file(s) via the menu: **Setup/Add .cup file.**
The list of files can be found in the VerifLocal.ini setup file (see **PARAMETERS VerifLocal.ini file**).

These files are specific to each zone and must be provided by the user.
They are in SeeYou format: http://download.naviter.com/docs/CUP-file-format-description.pdf

It is not recommended to use the Condor landscape .cup files because they do not generally contain Landing Areas and the quality of the data is very variable.

Only the LAs (airfields or fields) are taken into account (styles=2, 3, 4, 5). Duplicates are eliminated. Latitude and longitude are used; the elevation read in the file will be ignored, and the ground elevation at the point in question will be taken into account (to ensure calculation consistency).

For the French Alps, we recommend using the file from the FFVP's guide to safety areas of the Alps: **guide_aires_securite.cup**, which is included in the distribution.

The degree of difficulty in using these Landing Areas is specified by a "Tag" in the **description** fields
See the "Comments" section near the bottom of these GitHub pages:

- English: https://github.com/planeur-net/outlanding/blob/main/README.en.md
- French: https://github.com/planeur-net/outlanding/blob/main/README.md

It is also possible to automatically download CUP files available online
To do this, enter the URL of the file in the CupFile field(s) in the VerifLocal.ini file.
For example, for the French Alps (default): https://planeur-net.github.io/outlanding/guide_aires_securite.cup

The program will check whether the file is available in the installation folder and whether it is up to date.
If not, the program will offer to download it and install it in this folder.
If an older version exists, it will be renamed with the .**bak** extension.

For other files, it is the user's responsibility to check that the information used is up to date.

For the Alps in general, and a little beyond, the AAPCA (Fayence) has put a very exhaustive file online: https://www.aapca.net/venir-voler-a-fayence/carte-vac/

Note : Version 3 of VerifLocal classified LAs with no indication of difficulty as "easy" (green); they are now classified as "normal"/"medium" (orange).

CUP format extension

It is possible to add indications of difficulty in the **description** fields, using the tags mentioned above.
Version 3 of **VerifLocal** used abbreviated tags, which are still recognized:
This indication must appear at the end, between braces {}. Values recognized are:

{A}	Aerodrome	level 0
{F} or {E}	Easy field	level 1 (dark green square)
{ZA} or {LA}	Outlanding area	level 1 (dark green square)
{M}	Medium	level 2 (orange point down triangle)
{D}	Difficult	level 3 (red triangle)
{TD} or {VD}	Very Difficult	level 4 (black diamond)

For example:

```
"FAURIE LA",FAURIZ,FR, […] ,"FAURIE LA 1 Bleu 310 (Page134){TD}",,
```

Eliminating duplicates

When reading a file, aerodromes or LAs close to a point already read will be ignored.
The minimum distance (default: 1500m in both directions) is defined in theVerifLocal.ini file [**TP_separation]**

Consequently, if you are using several .cup files, it is recommended that you put those that do not contain difficulty information last, in order to retain this information in case a ZA appears in several files.

Checking elevations

For "real life" use, it is possible to use the program to systematically check the elevation of the Landing Areas defined in the files (see **ADVANCED USE** below).

FILES CREATED

At each run, a summary of the results will be added at the end of the **VerifLocal.log file** that will be created if it does not yet exist. As that file may grow big, it can be deleted from time to time

For each flight recording processed, a summary is written in the same folder and named **name_SUMMARY.txt** where **name** is the name of the file being analysed
It contains a reminder of the main parameters (glide ratio and safety heights), as well as the times and positions of the entries and exits of "within gliding range":

```
Local OK              12:08:52          44°02'32"N     005°58'33"E 1115m
Sortie local          12:47:55          44°12'05"N     005°54'09"E 1118m
```

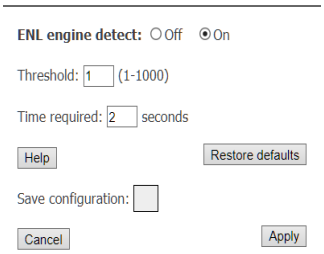
Modified IGC files

The software does not allow 3D visualization.

If desired, or for archiving purposes, it is possible to save modified IGC files in which a fictitious indication of engine operation is inserted, equal to the height missing to be within gliding range, clipped to 900m ~2900ft (if it is null, the glider within gliding range)

The trajectory alone will be recorded in a file named **name_LOCAL.igc.**
If the escape routes are displayed, they will be added to the trajectory and the file name will be **name_PATHS.igc.**
To be fully usable, these files must be viewed with software or on a website that takes into account engine operation.
This is possible, among others, with SeeYou (select "Engine noise level" to colour the trajectory).

On line, it is also possible on the https://igcviewer.bgaladder.net website
The engine operation detection must be activated with the following parameters:



AVANCED USE

Batch mode

If a large number of files are to be processed (for example for competitions), it is possible to make a pre-selection by running **VerifLocal** in batch mode. No display will be made and a summary will be written to a CSV file, which can be used in a spreadsheet (Excel or other). To do this, simply run the executable **VerifLocalBatch.exe** (in interactive mode or from a command window) or **VerifLocal.exe** with the **-B** option from a command window (see below).

The data available in the .csv file are :

File	filename
,% out of gl. range	percentage of time spent out of gliding range
time out	time spent out of gliding range
flight time	total flight time
dH ave	average value of altitude needed to remain within gliding range (Mis. on the barogram)
dH max	maximum value of the altitude needed to remain within gliding range (Mis. on the barogram)
Glider	glider name, if available
L/D	working L/D
dH Arr.	safety height on arrival at the LA
dH Gnd	minimum height above ground
time < HHH m AGL	time below HHH m above ground level
% in AS	percentage of cumulative time spent within Airspace zones
time in AS.	cumulated time spent inside the Airspace zones

Command line

It is possible to launch the program from a command window or from a script.
The syntax (same for **VerifLocalBatch**) is:

```
>   VerifLocal  [-help][-B][-d|-D][-EN|-FR][-f:GR][-chk][-geojson] [file]
    -help          displays the list of options
    -B             activate batch mode (same as running VerifLocalBatch) see below
    -d             debugging
    -D             very verbose debugging
    -EN            forces the use of English
    -FR            forces the use of French
    -AS            activates airspace verification
    -f:GR          defines the Gliding Ratio used for calculations
    -chk           checks the elevations in the .cup file(s)
    -geojson       generates a .geojson file with the tracks
    file           name of the file to be processed (.igc or .ftr)

>   VerifLocalBatch  [-help][-d|-D][-EN|-FR][-f:GR] [report] [file(s)]
    report          summary file name (.csv), will be requested if missing
    file(s)         name(s) of the files to be processed (.igc or .ftr, it is
possible to use the usual characters * and ?, e.g.: PATH\FILE_*.igc), will be
requested if missing (max 25 if interactive input)
```

Checking CUP file elevations

If the -chk option is activated, no flight recording will be processed and the software will compare the elevations of the LAs contained in the **.cup** file(s) with the ground elevation defined in the **.trn** file.

If the difference is more than +/- 50m (~160ft), the name of the LA and the corresponding elevations will be written in a file named **NAME.csv** (if the file is named **NAME.cup**).

ESCAPE ROUTE SEARCHING ALGORITHM

If the starting point of the escape route is below the safety height above the terrain, the glider will first try to deviate from the terrain along the line of greatest slope to pass over this height again.

Then the escape routes will be sought towards all the theoretically reachable LAs (difference in altitude greater than or equal to the distance divided by the glide ratio).

These escape routes will be searched for in the following order:

In a straight line

The trajectory is followed in a straight line from the starting point (shifted if necessary, see above) to the target point, checking the height above ground every 90m (usual horizontal resolution of altimetry data). If one remains permanently above the safety height above ground (for escape routes) and arrives above the minimum height at the finish, the search is over, the trajectory is stored and one moves on to the next LA.

Otherwise:

In a broken line along the slopes
The trajectory is followed in a straight line from the starting point (shifted if necessary, see above) in the direction of the target point, until it passes below the safety height above the ground. Then we will deviate from the relief along the line of greatest slope to pass above this height again.
Then one follows the contour lines in the direction of the target point (do not go backwards). One periodically tests the possibility of reaching the target point in a straight line, as above. If it is possible (by respecting the above criteria), the search is over, one stores the trajectory (after simplification: elimination of points that cause unnecessary detours) and moves on to the next LA.
Otherwise, if the target point is still theoretically reachable and one can start again in a straight line in its direction, one simplifies the recorded trajectory and advances to the next slope and starts again.

Otherwise, if the algorithm gets stuck:

In a broken line following the slope then the valley floor (talweg)
This algorithm is based on heuristic methods for determining watersheds[1] and on an aphorism by the late Roger Biagi: "*The glide ratio of the glider is greater than the glide ratio of the mountain, so if you can no longer climb, you go down the stairs, rubbing your bottom on all the steps*" (heard during a "mountain safety" briefing in Aspres-sur-Büech in the early 1980s and quoted from memory).

One looks for the lowest grid point in the immediate vicinity of the starting point and then move to the lowest neighbouring grid point (first, then second or even third neighbour in the case of a local minimum). The possibility of reaching the target point in a straight line, as above, is periodically tested. If it is possible (respecting the above criteria), the search is over, one stores the trajectory (after simplification) and moves on to the next LA;
Otherwise, one continues to descend, periodically simplifying the trajectory. One will stop if the target point is no longer theoretically reachable or if one gets stuck in a basin, in which case one gives up and move on to the next DZ.

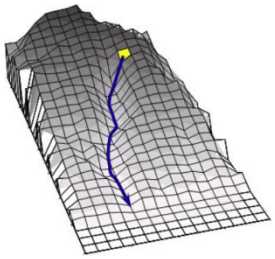


Image taken from the ATHYS documentation

Note that this algorithm does not allow to fly uphill do cross a pass, unlike the previous one.

Selection of the escape routes found

The choice of the escape route displayed will be made according to the criteria shown on page 3.

[1] http://www.athys-soft.org/documentation

Optimization

In the case of long flights at high altitudes, a large number of LAs may be theoretically accessible, which can significantly increase the calculation time.
To avoid this, an optimisation algorithm is activated automatically (only for these cases): the list of LAs is periodically sorted by increasing distance.
This can modify the selection of escape routes but does not call into question whether or not the glider remains within gliding range.

In the event of a problem, this optimisation can be deactivated by setting **Optimise=0** in the **VerifLocal.ini** file.

ALGORITHM FOR DETERMINING THE REACHABLE ZONE

A square zone is determined, centred on the current point, possibly offset from the mean direction of flight.
This area is then divided into small squares (mesh). The size of the grid can be set from 90 to 720m.
For each point at the centre of the mesh, we start by determining whether it can theoretically be reached from the current point (we don't take the terrain into account). If so, we determine whether the point can be reached in a straight line, taking into account the terrain, and we record the arrival altitude (this calculation can be performed on several cores).
For points that are theoretically reachable but not reachable in a straight line, we then try to find points in their vicinity that are already reachable, working in this way from close to close.
The result is a map describing the entire reachable zone, which also makes it possible to determine a trajectory to each point in the zone.

SUPPORT

Please report any problems to: cotaco@marc-till.com

If you experience unexpected program crashes, execute the VerifLocal-Debug.bat script and send the VerifLocal-Debug.log file to the above mail address

ACKNOWLEDGEMENTS

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- Jean-Marc Savoie for the tests and the classification by difficulty of the LAs
- not forgetting all the other beta-testers

The graphical interface uses components of "tiny file dialogs" under a zlib license.
https://sourceforge.net/projects/tinyfiledialogs/

The Cpw library is Open Source software, under the Lua license
https://mathies.com/cpw/about.html.

The NaviCon.dll library is provided courtesy of UBSoft, publisher of Condor, which retains copyright.

The conversion of image files is done with NConvert from XnSoft: https://www.xnview.com/en/nconvert/
Please refer to the license.txt file in the NConvert folder.

The topographic data and the map of the Alpine Arc are provided courtesy of Dgtfer, creator of the Arc Alpin 2 (AA2) Condor landscape.

DISCLAIMER

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APPENDIX 1: AltCol.txt file templates

The first line indicates the color reference frame used: [HVC] or [RGB]

Colors can be defined by triplets:
- RGB: [0-255.0-255.0-255]
- HVC (Hue, Value, Chroma ~ Saturation) [0-360,0-100,0-100]

On each line, the maximum altitude of the slice (in m) and the corresponding color triplet.
Values are read in free format and can be separated by spaces, tabs or commas.

We recommend that you make a backup copy of this file before making any changes.

RGB :

```
[RGB]
   0 128 242 230
   2   9  90  14
  50   0 102   3
 110  22 118  11
 185  66 141  38
 360 115 173  63
 550 165 203  94
 700 187 200  84
 820 230 210  97
 950 222 194  69
1160 170 131  64
1450 150 114  66
1650 135 102  69
2000 139 105  70
2200 158 128  78
2450 165 149 133
2700 184 168 153
2900 197 192 188
3150 212 211 207
3400 221 221 221
3700 233 233 233
4000 242 242 242
4500 226 241 238
5000 219 241 238
5500 221 237 237
6000 192 211 243
6500 180 183 224
10000 180 183 224
```

HVC :

```
[HVC]
0       280     81      27
2       243     22      18
50      242     24      23
110     236     30      23
185     226     42      19
360     212     56      18
550     197     70      17
700     176     72      19
820     156     80      22
950     154     74      26
1160    139     53      18
1450    135     47      15
1650    130     42      12
2000    130     44      12
2200    139     52      14
2450    130     60      6
2700    129     67      6
2900    126     76      2
3150    152     83      1
3400    0       87      0
3700    0       91      0
4000    0       95      0
4500    276     93      3
5000    278     92      5
5500    284     91      4
6000    319     82      9
6500    343     73      8
10000   343     73      8
```