HOW TO CONVERT A MOTION BASED TRAJECTORY INTO A WAYPOINT TRAJECTORY AND IMPORT IT INTO SKYDEL SYSTEMS ?

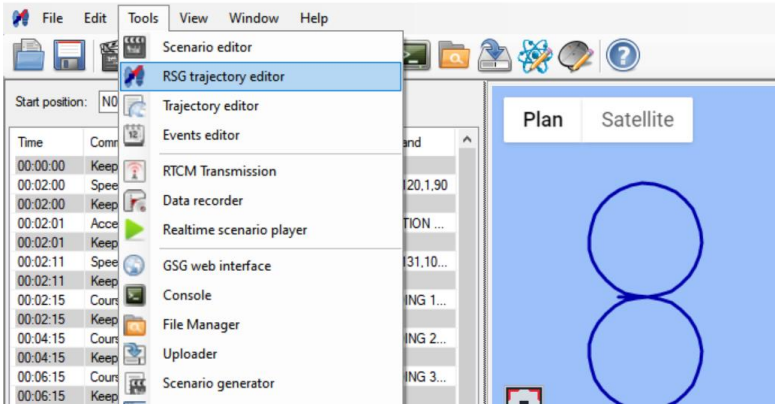
OROLIA SOLUTION

SKYDEL Software Engine has an integrated tool for building trajectories. The vehicle simulation trajectory type is a great way to quickly make a fairly realistic trajectory. You can import the data from "Use Street Map" (openstreetmap.org). User Manual Link.

For customized trajectories, like off-road or aircraft scenarios, OROLIA StudioView Software is a good complement. GSG StudioView software companion is historically designed and used for GSG 5 and GSG 6 simulator generations. It can help to setup scenarios and test GSG 5/6 simulator units.

For Skydel users, StudioView is a smart Toolbox for generating files to be deployed also for GSG-8 GSG-7 and SKYDEL architecture solutions. It can be used especially for building trajectories or antenna patterns and Rinex file modifications. This document will describe how to export a motion-based trajectory file (.traj) from StudioView to be used by SKYDEL.

To turn other formats (.nmea, .csv, .gpx, .kml, .kmz) from StudioView into a SKYDEL format, please refer to the application note Building trajectories for Skydel systems.



Tip: A Free StudioView License is available on line via OROLIA web site (Windows platform).

StudioView Link

PROCESS

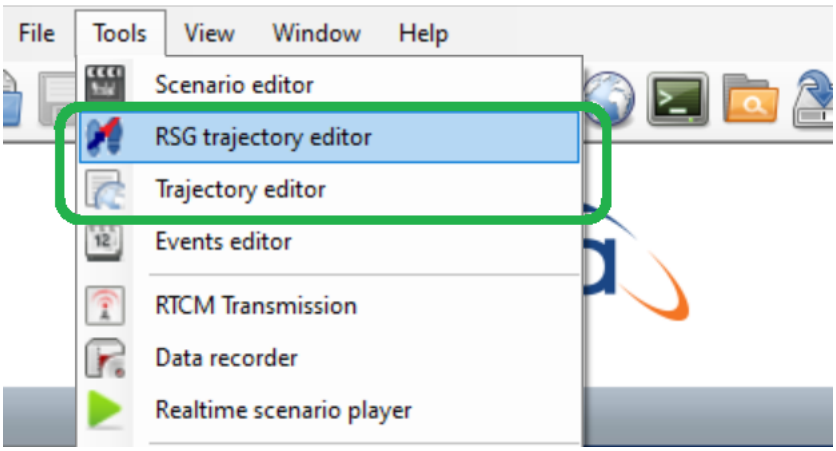
We will use StudioView to convert motion-based trajectory files (.traj) into waypoints trajectory files (.csv) to open them in SKYDEL / GSG 8 systems.

StudioView Software has 2 different tools to help user to build trajectory script:

-Trajectory Editor : used to manually create a trajectory as a sequence of waypoints through Google Maps plugin.

-RSG Trajectory Editor : can be used to describe a motion-based trajectory (proprietary format) – In this case, you don't create waypoint list but a sequence of commands to change position and/or attitude for the vehicle.

For this application note, we will explain the use of the RSG trajectory editor tool only.



User manual link for detail:
http://manuals.spectracom.com/GSG/Content/GSG/Topics/Tasks/SV_Trajectory.htm

Example – Trajectory conversion

An example of trajectory script made by StudioView Software is provided with the application note. This trajectory file is one of the samples provided by default when installing StudioView.

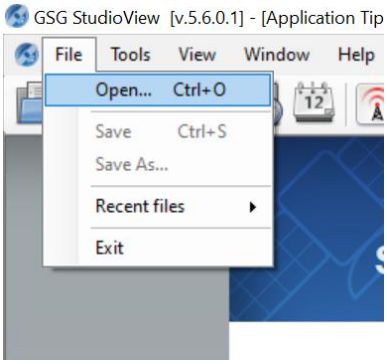
Preparing your StudioView trajectory file

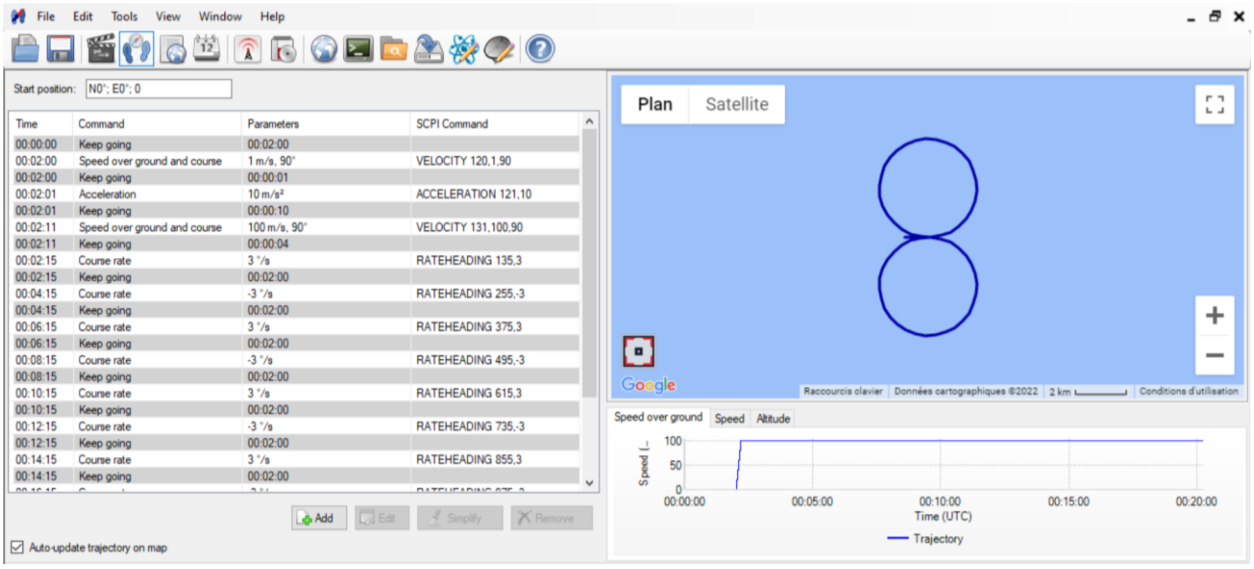
RSG Trajectory Editor allows user to create trajectory manually as sequence of motions. It contains Map window, Motions table and Velocity and Height charts. Tool provides common GoogleMap functions. Internet connection is needed for updating map, there is no OFF-Line process existing for StudioView to use GoogleMap plugin.

To build up your vehicle trajectory, you can add a direction or a speed command at a specific time.

Opening the file through StudioView will automatically display the trajectory on the map and list the motions on the left side. You can get also graphic view of speed and altitude.
Each motion can be modified by the user.

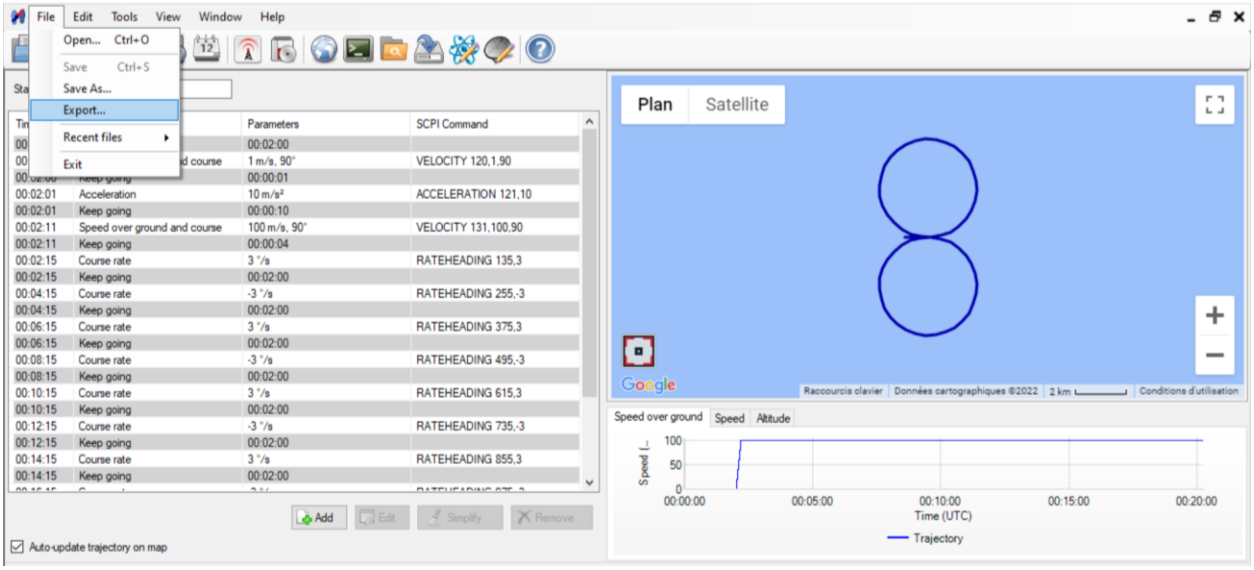
Open your TRAJ file on StudioView or create a new one (the StudioView template file used in this example is **FigureEight.traj**). The files GPPRSG.traj, SineWave.traj, and SquareAndLoops.traj are also available in the GSG StudioView repository.



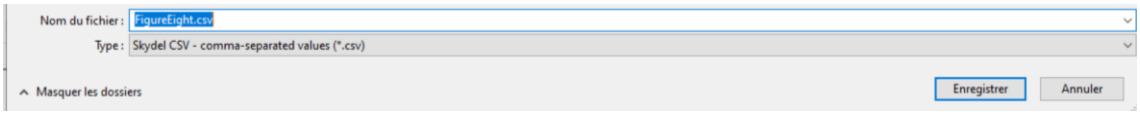


Your file is now loaded in StudioView. To convert your trajectory in a CSV format you have to export your file, click on the “File > Export button”.

You can select and name a new file in output trajectory field.



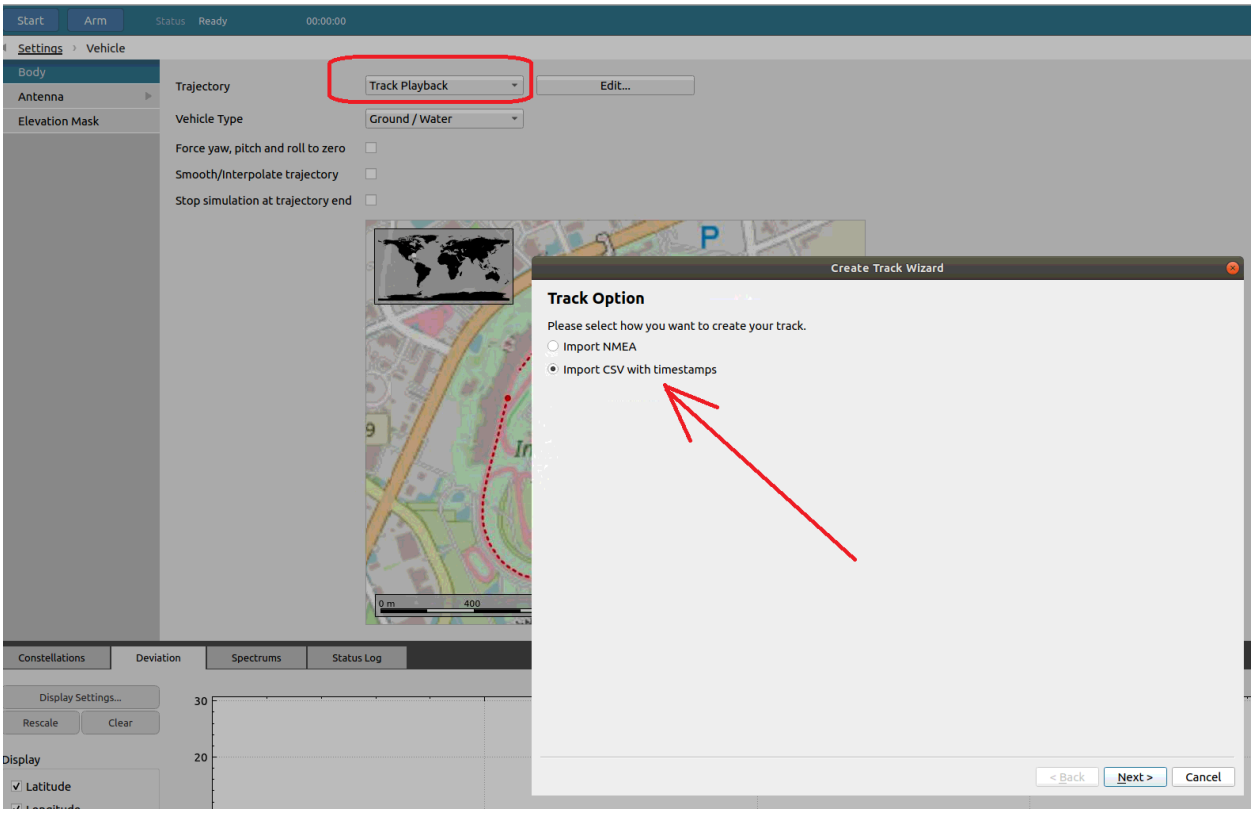
When saving file choose the Skydel CSV format.



Click “Save”.

Import your CSV file into SKYDEL

When preparing your SKYDEL scenario, go to vehicle body model and select Track playback mode. Select option to import and manage “CSV with timestamps”

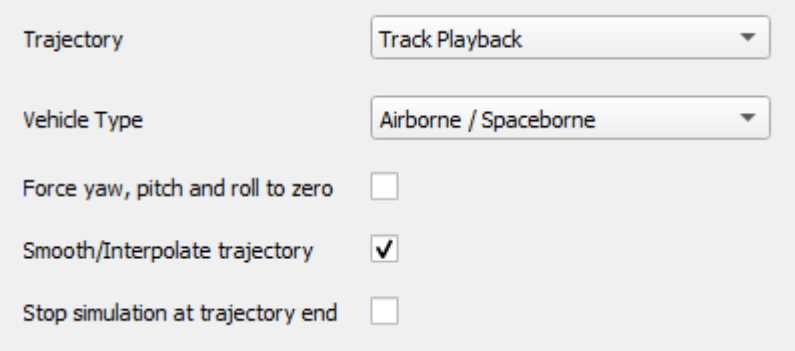


The detailed description for using vehicle motion tab is available through the Skydel user manual [link here](#).

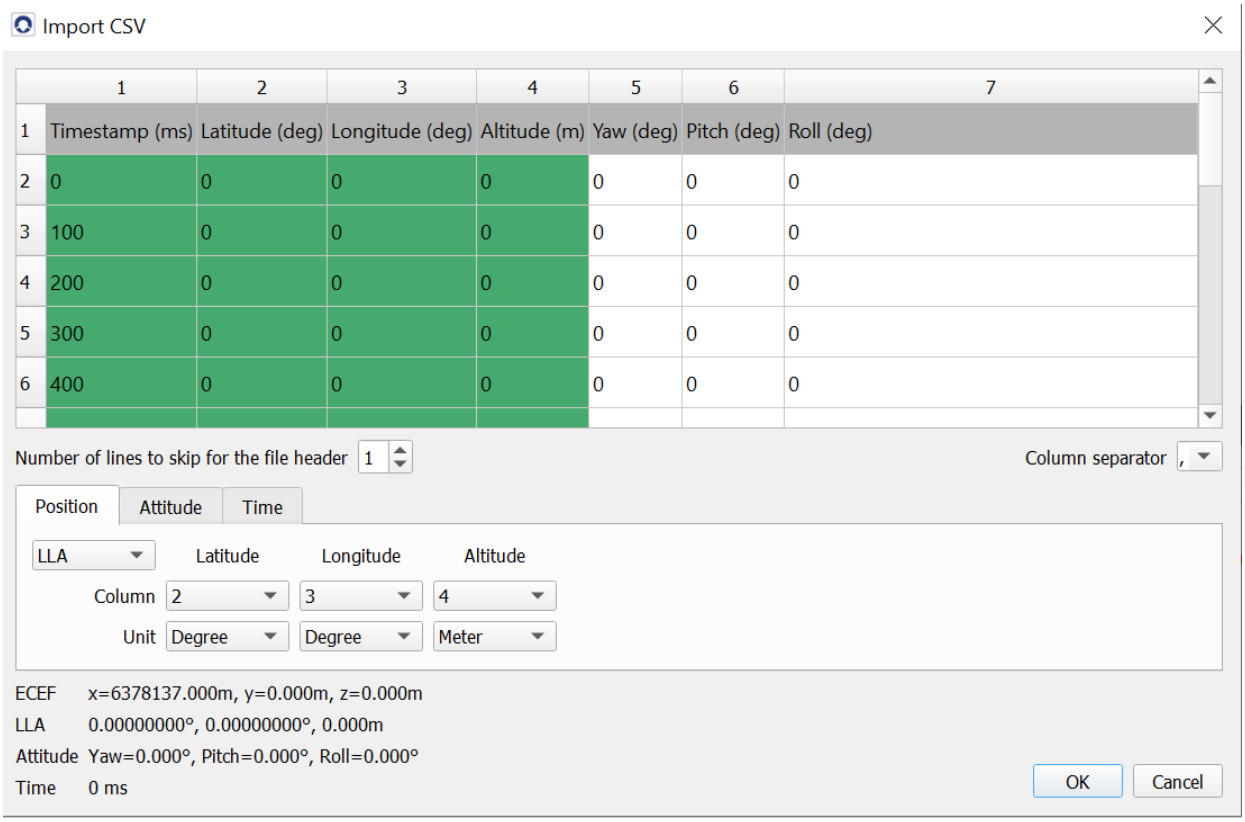
SKYDEL menu allows you to smooth/interpolate the file. Your file prepared with StudioView can be ready to use and if you are happy with it you don't need to add any processing on it. However, Skydel's engine runs at 1000 Hz so the imported trajectory must be interpolated. For low speed or low dynamic motion cases, a linear interpolation should be sufficient to keep a continuous tracking, but for aircraft trajectories we strongly recommend using Skydel's Smoothing tool.

Actually, when converting StudioView files to Skydel, Orolia recommends to always select the Smooth/Interpolate option and with airborne type. This can be done even if you have car or other type of trajectories. SKYDEL will apply a cubic spline interpolation function between plots with no modification of the original trajectory.

You can also decide if the scenario will stop or not at the end of the trajectory.

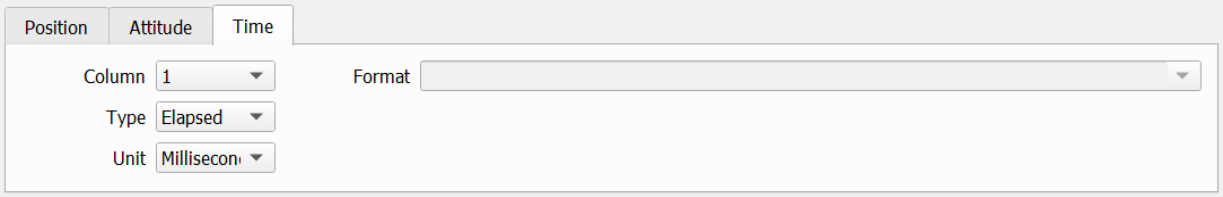


When processing the file for importation: select Column separator “,” and skip the first Header line generated by StudioView format. This will separate properly the values to process and exclude the useless lines.
Position format is LLA. Select appropriate columns and define the unit for each parameter. (see example below)

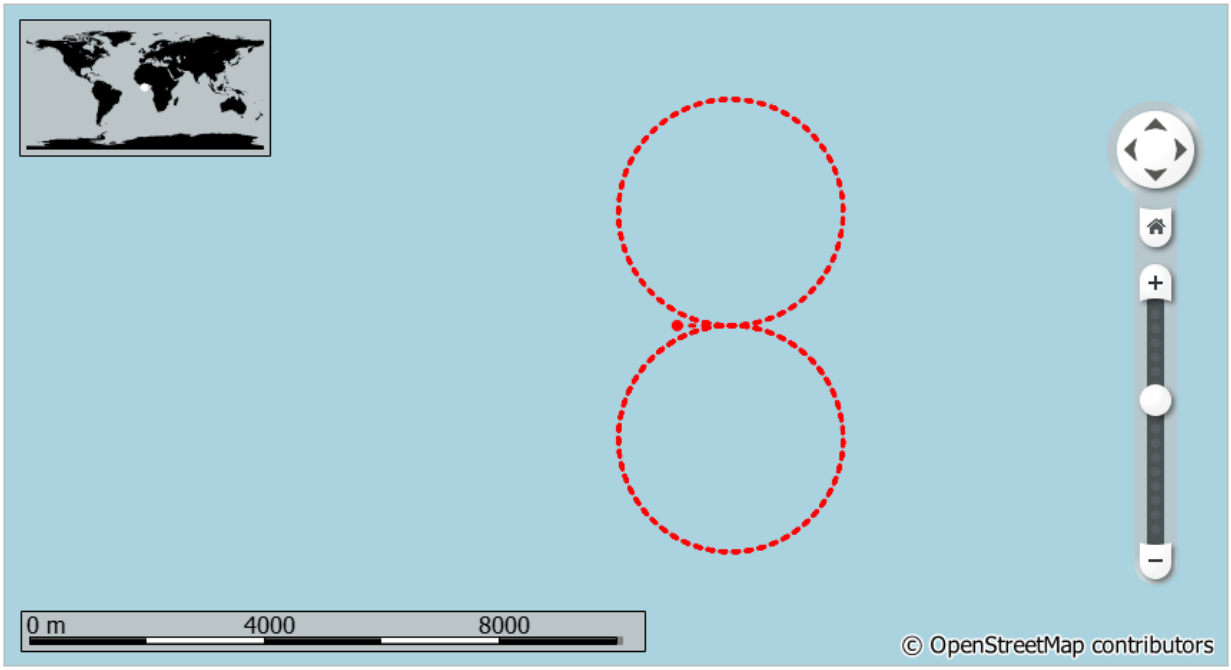


Attitude is not provided in the original StudioView file because this type of trajectory record has been done only with position change (through waypoint script) and with no change in pitch, roll, yaw parameters. Attitude setup can be skipped at this step. When importing RSG trajectory files, you will

have the possibility to import also attitude changes (see dedicated application note available separately).
Time is available on column “5”. Select it and set Type as “Elapsed” and Unit in “Second”
Speed column (#4) is ignored in our case as Skydel does not need it for this import process when position and time stamps are provided.



When all parameters are set, you can submit the import process by “OK” and get the final setting as below. Then you can include the trajectory into your scenario (skydel.sdx file) by clicking on “Finish”.



Launch your SKYDEL scenario

Once your trajectory file is loaded, you can set your SKYDEL configuration file (choosing your constellations, frequency bands, navigation parameters etc…) and launch the simulation with START button.

File Edit Window Tools Help
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Constellations
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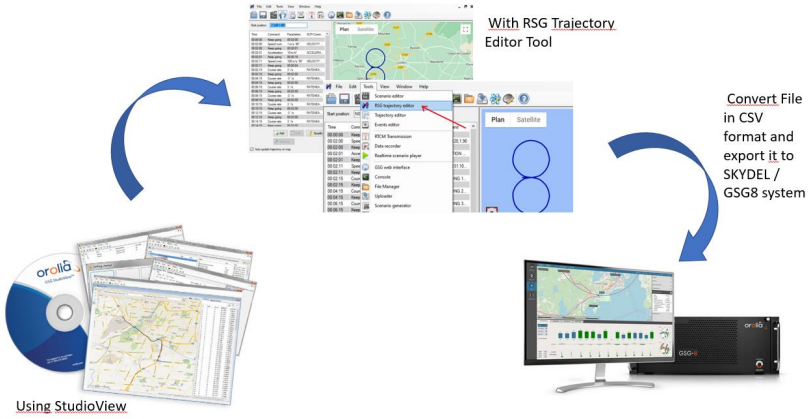
Conclusion

We expect this application provided help for using StudioView Tool and build new ranges of trajectories for your SKYDEL application.



For StudioView :

Video tutorial (Watch the first minute to see presentation of how to use the trajectory tool) : https://www.orolia.com/resources/videos/building-gps-simulation-scenarios-gsg-studioview-software

Tip: A Free StudioView License is available on line via OROLIA web site (Windows platform).

StudioView Link

For SKYDEL :

Orolia's GSG-8: Advanced GNSS Simulation Tutorial : https://www.orolia.com/orolias-gsg-8-advanced-gnss-simulation-tutorial/

Get information about vehicle setup following this link : http://manuals.spectracom.com/skydel/index.html#settings-vehicle-body