# *Visualfocus*

## 2D/3D VISUALIZATION TOOL

***Visualfocus*** is a GMV's ***focusweb*** component able to display the flight of one or more satellites in real or simulated time. The different displayed elements, such as input orbits, attitudes and events, is obtained from the configuration files stored in the ***focusweb*** server data structure. Every scenario contains a database and one or more configuration panels. The user can use all the available elements (planets, satellites, ground stations and sensors) defined in its scenario database for every configuration contained in that scenario. The modified databases and configurations are automatically saved in the server so other users may re-use them. When the configuration is ready, the user may launch the graphical tool and the graphical display is started.

The time evolution can be scaled to make the simulation run faster than real time (a time factor scale 1 means real time speed), and even to move backwards (negative time factor). This time factor can be also changed from the graphical windows once they are launched. It is also possible that ***Visualfocus*** reads the simulation time directly from the host machine's clock. In this case the simulation will progress at real-time rate, and it will also be synchronized with current time reference.

Graphical representation of selected elements is performed in 2D and 3D, with capability to switch between them during the simulation:

- **3D visualization tool:** This view supports/includes:
  - A three-dimensional view of the Earth and celestial objects (e.g. planets, Sun, Moon).
  - Sensors field of view (conical/pyramidal/polygonal).
  - Ground stations, with visibility cone.
  - Station-satellite and satellite-satellite links.
  - The user can control the position of the camera.

Figure -1: ***Visualfocus*** 3D Display (Earth-centred)

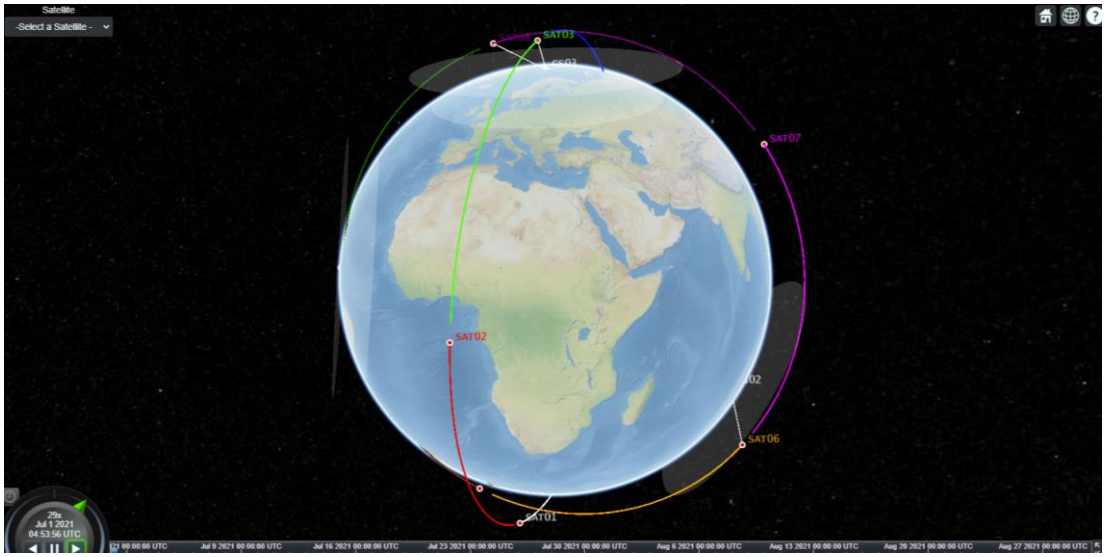


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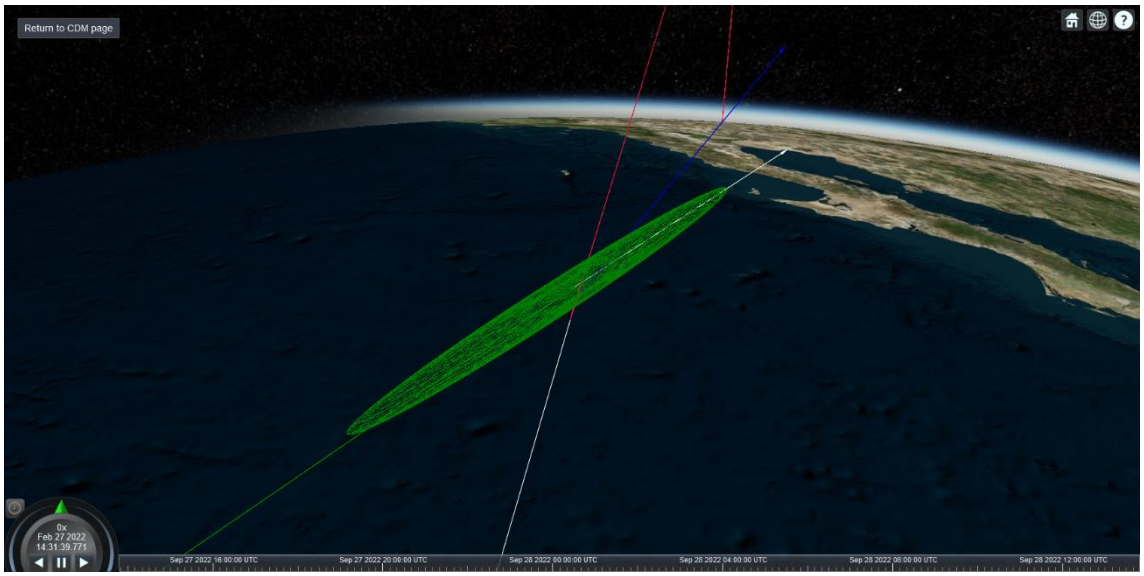
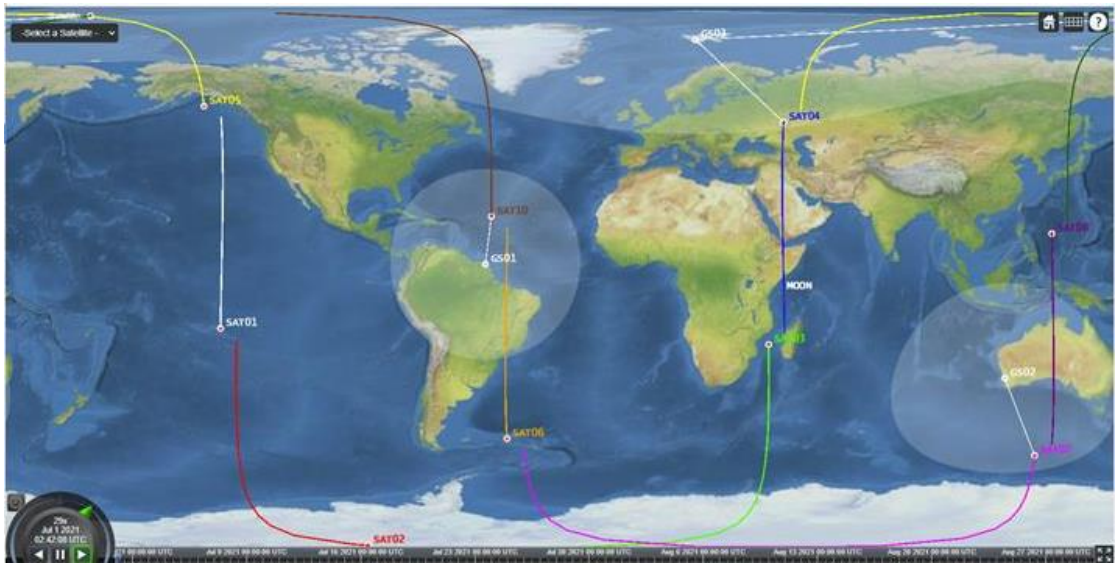
Figure – 2: CDM covariance ellipsoid




- **2D visualization tool:** This view supports/includes:
  - Ground-track of all active satellites and sub-satellite point.
  - Day/night terminator, eclipses, Moon shadow projection.
  - Ground stations, their visibility areas and links to visible satellites.
  - The swath of the sensors pointing towards the Earth.

Figure – 3: ***Visualfocus*** 2D Display




For both 2D and 3D, the **Cesium** open-source visualization library is used. **Cesium** is a JavaScript library that can be used for creating 3D globes and 2D maps in a web browser, without a plugin. It is a cross-platform, cross-browser library, capable to visualize dynamic-data. At the same time, it is open source under the Apache 2.0 license. This license allows the use of the software for any purpose, and it does not require that a derivative work is distributed using the same license.