



# GNSS Testing & Simulation Solutions for Space Applications

The new generation of satellite enabled applications is relying on resilient and accurate GNSS signals as a key element for many critical projects to ensure highly accurate Positioning, Navigation, and Timing (PNT) data.

Orolia offers GNSS testing and simulation solutions designed to ensure the performance, resilience and accuracy of your system for complex GNSS space-based applications.



## The Space Ecosystem relies on GNSS

Today's space ecosystem is composed of a functioning web of vehicles, which, while serving various purposes, are highly dependent on GNSS signals during their launch, and while in orbit. Furthermore, the space economy is experiencing a period of rapid growth and innovation, due to high demand and shrinking costs.

As the number of interconnected applications grows, the number of threats aimed at GNSS signals follows. Hence the need for dedicated Testing and Simulation solutions to weed out vulnerabilities and ensure the resilience of your receiver or system in space operations.

In order to face these concerns, the industry must be prepared with flexible, future-proof solutions that can not only handle the dynamics of space, but expand the limits of possibility.

Powered by the industry-leading Skydel simulation engine, Orolia provides a full range of Testing and Simulation solutions dedicated to space related development or integration projects that require sophisticated simulation capabilities.

### Some applications include:

#### Earth Observation (EO)

- Ground Conditions, Payloads

#### Signal Studies/Remote Sensing

- Weather Forecasting, Sea States, Events

#### Communications

- Traditional Phone, Sat Phones, TV

#### GNSS

- Timing and Navigation, Augmentation - PPP, SBAS

#### In-Board Autonomous Navigation

- PVT Determination, Docking, Formation flying, etc.

#### Timing & Synchronization

- Synchronize payload to GNSS time

#### Attitude Determination

- Multiple antennas, Pointing accuracy of payloads

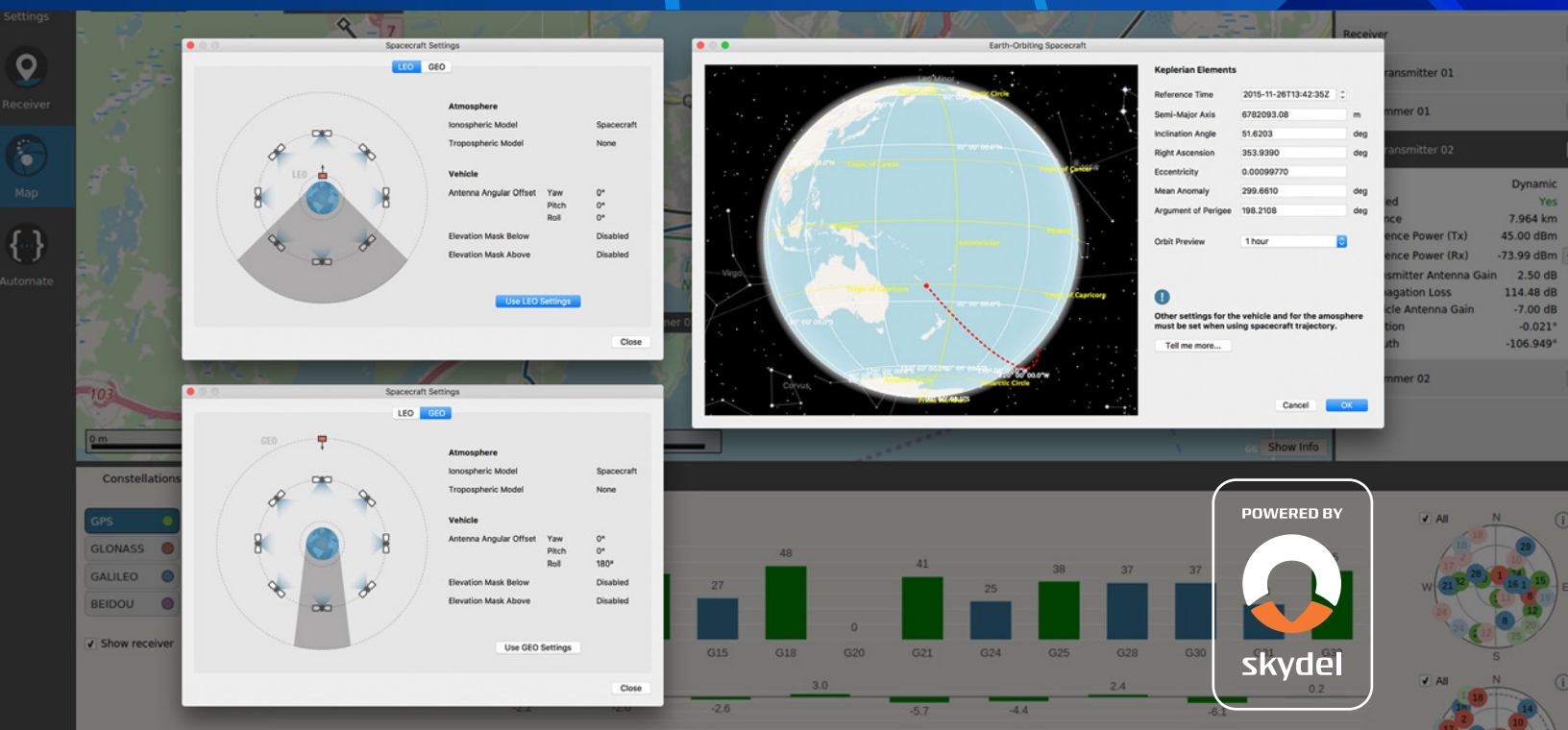
#### Satellite Deployment/Maintenance

- Delivery vehicles, Fuel jackets

#### Research/Experimentation

- New or custom signals from space, or ground-to-space (i.e. beacons tracked by satellite formation), GNSS beyond Earth's orbit (i.e. lunar missions)



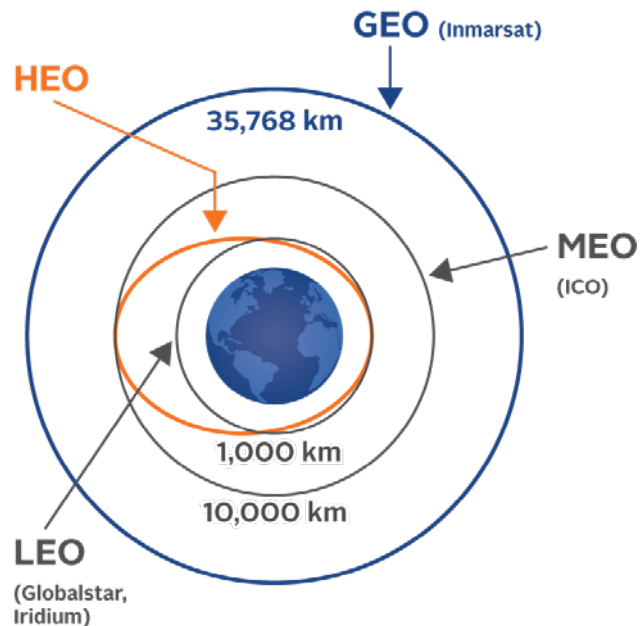


## Powerful, Proven GNSS Simulation

### The Skydel Simulation Engine

Flexible, future-proof simulation is available as a turn-key or software-only solution. Skydel powers Orolia's high-end GNSS simulators: **GSG-8**, **BroadSim**, **Anechoic** and **Wavefront** with shared software-defined benefits and interoperability.

- Intuitive user interface and automation
- Supports global constellations and frequencies
- Orbital trajectory generation (including ECI)
- Comprehensive API (Python, C#, C++, LabVIEW)
- User-defined signal customization and scenario creation
- Modify variables and parameters in real time
- Integrate interference with no additional hardware
- IQ file generation and playback
- 1000Hz simulation iteration rate
- Record and export user interactions as Python script
- Advanced jamming and spoofing scenario creation
- All-in-view simulation
- Reliable, long scenario run-times



Space orbits are an important consideration when testing space missions due to their unique characteristics. Of equal concern is the high number of satellites visible, and high signal power variations (signals from outside bore-sight).



## Orolia Brings Space Into Your Lab

Create the dynamic environment of space in your lab with a high-end simulator. Skydel is equipped with tools and features that allow you to customize unique and complex space scenarios seamlessly. Our experts will help you decide which configuration (Software-Only, GSG-8, BroadSim, Anechoic, or Wavefront) is best suited based on your specific needs.

Feature	Description	Option
Space Vehicle Orbital Trajectory Editor	<ul style="list-style-type: none"><li>• Enter Keplerian data for vehicle trajectory</li><li>• ECI/ECEF trajectory importation</li></ul>	SKY-EXLI (velocity >600 m/s)
Spacecraft Atmospheric Requirements	<ul style="list-style-type: none"><li>• Dedicated Spacecraft Ionospheric Model</li><li>• Additional Atmospheric effects</li></ul>	
GNSS Satellite Antenna Model	<ul style="list-style-type: none"><li>• Enables Realistic Side and back Radiation Powers</li><li>• Enables realistic effects when above the GNSS orbits (e.g. GEO)</li><li>• Independent trajectories and antenna patterns per each GNSS vehicle supports past, present and future generations of satellites.</li></ul>	
GNSS Constellations	<ul style="list-style-type: none"><li>• Simulate all satellites in view, including those seen from their back side</li><li>• Large range of power variations</li></ul>	
High Dynamic Trajectories	<ul style="list-style-type: none"><li>• 1 kHz refresh rate</li><li>• Perfect accuracy under any doppler conditions</li></ul>	
Hardware-In-The-Loop (HIL)	<ul style="list-style-type: none"><li>• Real-time steering control of receiver position and attitude for true hardware and software in-the-loop integration.</li></ul>	SKY-HIL