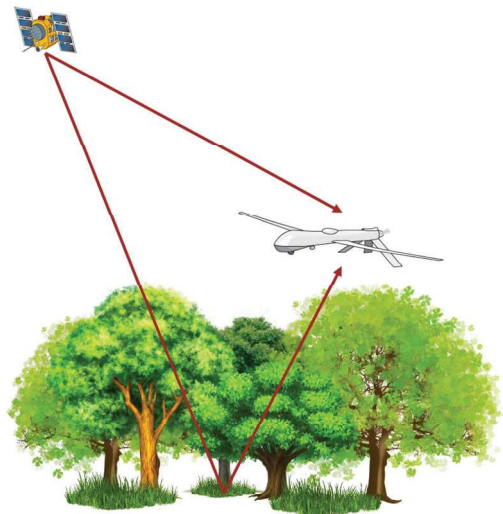


COREGAL Project Combined Positioning-Reflectometry Galileo Code Receiver for Forest Management.

COREGAL aims at developing a **low cost unmanned aerial platform** and **service** for **biomass mapping** that will allow **wide scale mapping** in the context of forest management.

COREGAL's main sensor is the **GNSS-P+R receiver**, developed as **Positioning Platform** and **Biomass Sensor**.

An **Unmanned Aerial Vehicle (UAV)** will be equipped with the GNSS-P+R receiver and optical cameras for **aerial mapping** and **biomass estimation**. Integrating positioning and reflectometry in a single device within a UAV offers a **unique value proposition** where Galileo and GPS are combined to increase the number of reflected signals and positioning quality.



GNSS-Reflectometry

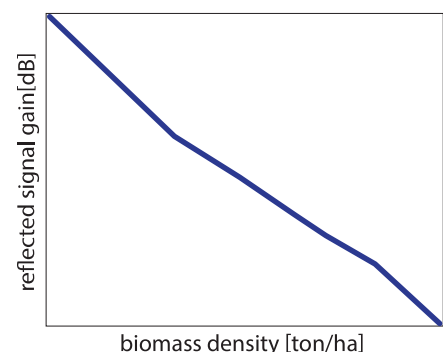
GNSS-Reflectometry applies **bi-static radar** concept to GNSS signals, replacing power consuming, heavy and expensive radars. The signal is transmitted by the GNSS satellite, reflected on the surface and then received by the GNSS-R sensor.

Worldwide availability and **good ranging capabilities** make GNSS signals an appealing opportunity for reflectometry applications. The incoming GNSS **reflected signal is loaded with information** about the reflective surface and any obstacle found along the propagation channel. This information is retrieved by the GNSS-R after the reception and demodulation of the received signal.

Biomass Estimation

The key point behind Biomass Estimation is that **GNSS reflected signals** are **sensitive to Biomass Density**.

The **GNSS signals** are **reflected** on the **forest ground** and are then received by the GNSS-R Sensor onboard the UAV. The received reflected signals are distorted and attenuated by the propagation through tree canopies, branches and leaves and can be used to retrieve the biomass data acquired during the propagation.





Applications

The COREGAL platform targets

Biomass Mapping applications:

- Carbon Stock Management;
- Forestry Management;
- Environment Management.

Remote Sensing applications:

- Aerial Mapping (with precise positioning determination);

GNSS applications:

- GNSS-R based remote sensing for altimetry determination

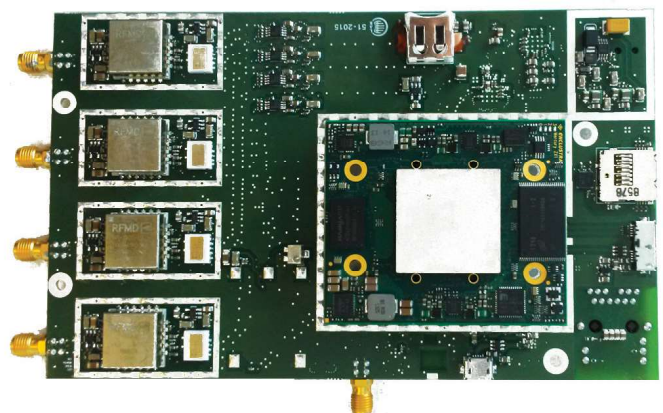


GNSS P+R Receiver

GNSS Positioning Plus Reflectometry Receiver supports real-time Galileo E1 CBOC, Galileo E5 AltBOC, GPS L1 C/A, GPS L1C and GPS L5 signals.

The GNSS P+R receiver consists of a state of the art **multi-frequency Radio Frequency Front-End** and a **Digital Signal Processing stage** running on Xilinx Zynq®-7000 All Programmable System-on-Chip, with the two sub-systems joined together in a **compact** and **power efficient** device.

- Powerful embedded dual ARM Processor
- Fully configurable Digital Signal Processor
- Multi-Frequency
- Multi-Antenna
- BPSK/BOC/CBOC/AltBOC signal processing
- Interfaces: Ethernet, UART, JTAG, GPIO, SMA



The COREGAL project is led by DEIMOS Engenharia in partnership with DEIMOS Space, Geonumerics, Tecnalia, University of Nottingham, Max-Planck Gesellschaft, Gamma Remote Sensing, University Tor Vergata, ENGEMAP, Universidade Estadual Paulista and Editora Mundo GEO.