**Motivation**

1) To provide an open source software tool for users of GOLD-RTR-MINING data pool [1]: http://www.ice.csic.es/research/gold_rtr_mining/
2) To establish a valid framework for the GNSS-R community.

**Potential users:** ranging from new researchers in the field that want to easily get in touch with GNSS-R data and its analysis, to more expert users that may add their own functions.

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**Software Aspects**

1) C++/Fortran90 library.
2) Compiled in Linux with autotools. **Do not worry about makefiles!**
3) Interface to Python: high level language. An user-friendly environment rather easy to employ!
4) Adapted to numpy (package for scientific computing).
5) Distributed under a control version software (Git).

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**NOT JUST A WAVEFORM SIMULATOR! A SET OF GNSS-R CLASSES**

**Specular Geometry Class**

Defines a specular geometry from receiver and transmitter positions applying ellipsoid WGS84 plus an undulation value. Valid from ground-to-space-based scenarios.

**Reflecting Surface Class**

Defines the basic aspects of a reflecting surface: permittivity and roughness. Computes permittivity and reflectivity values (given incidence angle) from several media: sea water, sea ice, wet snow, dry snow and soil at L-band [2].

**Gnss Composite Signal Class**

Defines a basic signal autocorrelation model. Computes the autocorrelation function of several GNSS signals: GPS, Galileo, BeiDou and QZSS.

**Receiver Front-end Class**

Defines the main aspects of a receiver front-end.

**Waveform Model Class**

Once a GNSS-R scenario is defined by means of classes "Specular geometry", "Reflecting surface", "Receiver front-end" and "GNSS composite signal", it computes a power waveform model based on [4].

Both clean-replica and interferometric approaches can be simulated (including Delay-Doppler Maps).

**Power Waveform Class**

Defines a power waveform from a set of basic parameters.

Performs estimations of specular and scatterometric delays.

**Complex Waveform Cluster Class**

Defines a cluster of complex waveforms. Available methods include: different types of waveform integration, coherent time computation, navigation bit correction, phasor counter-rotation and Delay-Doppler Map determination.

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**References**


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**Next Step**

This library has been employed for the data processing of several ICE/IEEC experimental campaigns. External beta-testers with basic knowledge in GNSS-R are required!

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