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Poster

The future EUMETSAT Polar System Second Generation (EPS-SG) programme is scheduled to provide observations in the 2020 to 2040 timeframe. EPS-SG represents Europe's contribution to the future Joint Polar System, which is planned to be established together with the National Oceanic and Atmospheric Administration (NOAA) of the United States, following on from the Initial Joint Polar System.

In preparation for the processor development and testing, EUMETSAT has generated dedicated test data sets for all instruments on the EPS-SG satellites. This includes auxiliary data needed in the processing. The test scenario is based on 3 orbits of Metop-A (EPS-SG will provide coverage in the same orbit), covering two summer and one winter orbit in 2007 and 2008. For the radio occultation instrument on-board of EPS-SG, this test data set covers more than 500 simulated occultations, using GPS, Galileo, GLONASS and BeiDou GNSS. The orbits of the EPS-SG satellite and the GPS constellation are based on the actual Metop-A and GPS positions. For the other constellations, expected orbits were used.
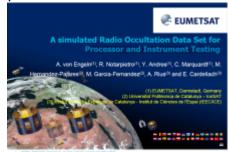
An occultation prediction tool was run with the EPS-SG and GNSS orbits as input, to determine occultation positions. At these positions, ECMWF profiles were extracted (from the latest available analysis, with 137 vertical levels, every 6 hours, on a 0.5 Degree latitude and longitude grid). A modified version of the ROM SAF software ROPP was first used to forward propagate the ECMWF profiles to neutral bending angles and refractivity profiles (up to about 80km altitude). The ECMWF profiles cover different refraction conditions (even ducting), identified as categories in the data set; these are determined on the refractivity gradient found in the lower troposphere. The bending angle and refractivity profiles are in addition extended to cover the ionosphere; ionospheric data and required modifications to the ROPP software were generated through a dedicated EUMETSAT study with the Universitat Politecnica de Catalunia, Spain.

For each occultation within the dataset, a Multiple Phase Screen based Wave Optic

Propagation tool will be used to simulate the propagation of L1 and L5 unmodulated signals through the corresponding refractive field. Amplitudes and carrier phases for different frequencies within the L1 and L5 Galileo and GPS bandwidths simulated to the EPS-SG orbit will be made available as well.

This full test data set, which provides input for End-to-End testing of processors, is planned to be made available to the public later in 2017; it includes the GNSS and EPS-SG orbit/clock files, occultation tables with positions and times of the expected occultations for all GNSS, bending angle, refractivity and ionospheric information, wave optics propagation output, as well as information on the ionosphere above the EPS-SG satellite, plus other required auxiliary data.

In order to use the data for full End-to-End testing of processors and instruments, the wave optics propagated simulated signals should be modulated with proper GNSS codes. A Coded Signal Module tool will also be used for generating realistic GPS (L1C/A, L1C and L5 data and pilot components) and Galileo (E1 and E5a data and pilot components). An extension of this data set including also these data is planned to be made available in 2018.

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Abstract file

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