

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
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## TRUTHS OPSI: OBSERVING PERFORMANCE SIMULATOR FOR THE TRUTHS MISSION

### Abstract

Traceable Radiometry Underpinning Terrestrial - and Helio – Studies (TRUTHS) is a climate mission led by the UK Space Agency (UKSA), which will be delivered by the European Space Agency (ESA) to enable in-flight calibration of Earth Observation (EO) satellites. TRUTHS will contribute to increased trust in both the projections based on Earth Observation data obtained from space. The primary mission objective for the operational TRUTHS mission is to provide highly accurate and trusted climate records and to help constrain the uncertainties in predictions of climate forecast models, while its secondary mission objective is to enhance performance and ensure consistency and coherence of data from the global EO system, including European infrastructure, such as the instruments on-board the Copernicus Sentinels to create a foundation for a unified international “operational climate observing system”.

Planetek Hellas has been carrying out the Phase A/B1 activities related to the TRUTHS Mission Observing Performance Simulator (OPSI): defining the high-level functional requirements of the software linking space and ground segments, and the interfaces towards the ground segment, during phase A, while creating the prototype software architecture for the End-To-End Metrological simulator (E2EMS) and the OPSI during phase B. The E2EMS is responsible for the execution of a metrologically rigorous uncertainty-error propagation through the simulation model, to provide the necessary proof about the performance that is required by the TRUTHS mission via Monte-Carlo analysis, considering all the relevant physics of the actual instrument. The OPSI SW simulator is part of the E2MS and aims to assist in the assessment of different system implementation options, the development of retrieval algorithms at different data levels, and the detailed design as well as the scientific preparation/monitoring of the mission. The high-level objectives of the simulator are identified as following:

- Enable the generation of simulated Level-1 output data;
- Support the assessment of the end-to-end performance of the mission based on Level-1 products simulated for selected test scenarios;

- Support the assessment of the impact of individual error sources on the output of an ideal system, both separately and simultaneously;
- Support the assessment of the performance of the retrieval algorithms and their associated assumptions.