IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

Author: Mr. Josua Blom
Simera Sense, South Africa

TOOLS FOR SUCCESSFUL EO PAYLOAD INTEGRATION AND OPERATION IN THE COMMERCIAL SMALL SATELLITE INDUSTRY

Abstract

Simera Sense is a supplier of Earth Observation Imaging Payloads (EO Payloads) for the commercial small satellite industry. We have delivered EO Payloads to various customers, such as universities, emerging government organisations, and satellite integrators. We have also gained valuable insight from over 16 missions that have launched our products.

In this paper, we present two innovative tools we have developed over the past five years to help customers achieve successful Earth Observation Satellite missions effortlessly. These tools address the challenges of time, budget, and knowledge constraints often affecting these missions. They also enable our customers to operate our EO Payloads effortlessly on orbit and meet their mission objectives.

The first tool is the "Workbook", a comprehensive camera model that simulates the performance of our EO Payloads under different settings and scenarios. It allows users to select product models and settings, specify host platform characteristics, and obtain real-time feedback on imaging quality. The Workbook is based on product specifications, test data, and engineering expertise. In this paper we discuss several use cases, including modelling of performance metrics, derivation of input parameters, and effortless camera setup according to simulated imaging scenarios. Derivation of input parameters, for example, guides the user through the process of estimating illumination conditions and target albedo for a real imaging session at given time, date and geographic location. The second tool is the EO Payload Emulator, which is a digital twin of our Simera Sense EO Payload Imager Control Electronics. The Emulator is a functional replica of the real hardware that responds in the same way. The Emulator allows customers to start software development at an early stage of their satellite projects, before receiving any product hardware. The Payload imaging parameters as determined by the Workbook can be configured on the Emulator and an image captured through the customer's own satellite bus software, providing a first-order end-to-end experience of the EO payload operation pipeline. The Emulator is built in Python but can be accessed through any programming language via TCP/IP sockets. In this paper we discuss how the Emulator can benefit customers by providing a representative digital instrument and how various operational conditions, limitations and error states can be induced and simulated.

Together, these tools lower the barriers of entry for aspiring students or commercial small satellite companies while enhancing their understanding and utilisation of Simera's satellite camera systems.