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IMAGE QUALITY TOOLS: POSTPROCESSING FOR [MAJOR EUROPEAN EARTH OBSERVATION SATELLITE; NAME DUE TO CONTRACTUAL OBLIGATIONS ONLY TO BE ANNOUNCED IN APRIL 2017] AND END-TO-END DATA MANAGEMENT

Abstract

The image quality of earth observation satellites, such as [major European Satellite], rely mainly on two factors: (1) the installed onboard hardware capabilities of sensors, optics, etc. and (2) the on-Ground image post processing capabilities. Image post processing relies on the exact knowledge of the spacecraft as-built-configuration, as well as in-orbit calibration and characterization. To improve the image quality after data reception on Ground, it is fed through highly complex models, which amongst others take as an input data which has been measured during AIT activities on Ground, data obtained in orbit during commissioning, as well as known changes over the lifetime. On-Ground characterizations can contain data such as measurements of as-build line of sights of optical heads, position and angles of AOCS sensors as well as actuators, unit-masses, etc. In orbit, mainly instrument calibration is performed during the commissioning phase, to adjust specific parameters of the image acquisition sensors as well as a characterization of the actuators of the spacecraft bus. Known changes to the spacecraft over time are mainly the change of mass and mass properties, due to propellant consumption, as well as ageing effects due to radiation. It becomes obvious that this data needs to be carefully managed and specially in the case of the deployment of multiple spacecraft or constellations, the data management must be handled using adequate processes and tools. Because there is a significant overlap of the data needed for image post-processing as well as for other spacecraft related activities, the [major European Satellite] program has chosen to implement a combined "Satellite Characterization and Calibration Database", since common Product Lifecycl Management (PLM) systems are not designed to configure and maintain well non-CAD as-built data. This database covers Image Quality Tool needs, as well as Flight Dynamics inputs, on-Ground and in-flight verification data and data needed for system- and AOCS performance analysis. This paper describes how engineering data is managed end-to-end in the [major European Satellite] program, how the interfaces to the different existing tools are handled, as well as the approach to maintain common and differing as-build data between multiple spacecraft. It analyzes furthermore how this data, if correctly managed can increase the productivity and reduce risk and inconsistencies in analysis throughout the lifecycle of a spacecraft, with a special focus on the increased data needs for image post-processing of earth observation satellites.