

Focus on CSIR

Services in Optronic Sensor Systems Calibration and Validation of Satellite Sensors



Space technology increasingly provides essential information for socio-economic areas, such as sustainable water, food security, biodiversity, logistics and renewable energy. Applications of satellite data will make key contributions to innovative services and significantly improve the international market position of these sectors. When the provision of data from space is guaranteed, many more smart applications can be developed.

Calibration and validation (CalVal) processes for earth observation are the foundation of being able to deliver quality earth observation data products that are fit for purpose and can be trusted by the scientific user community.

Calibration is defined as the process of determining the quantitative response of a system or measuring instrument to known and controlled inputs. It is the fundamental process by which an instrument is given the capability to perform measurements that are traceable to international standards, therefore giving credibility to measurements performed with the calibrated instrument.

CalVal activities span the complete lifecycle of a satellite mission from conception through to de-orbiting or disposal.

The CSIR, in collaboration with the South African National Space Agency (SANSA) and other partners, has developed a first-of-its-kind capability in Southern Africa to effectively perform CalVal operations for earth observation systems. Established in 2011, the Paardefontein satellite radiometric calibration site has been developed with Department of Science and Technology funding. Located in northern Gauteng, far away from the

ocean and other immediate sources of atmospheric aerosols, the site is perfectly suited for CalVal operations.

The first South African satellite radiometric calibration field campaign using the Paardefontein site took place in July 2014 for a two-week period. A resounding success, the campaign proved that the South African space community is a world leader in this field and should pave the way for the eventual establishment of a complete space capability in the country.

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As a platform The South African National Radiometric Calibration site promotes:

- The establishment of a CalVal community in South Africa
- Human Capital Development through CalVal courses, workshops and campaigns
- International collaboration
- A safe and secure working area operated by the CSIR
- Good accessibility for the CSIR and the Department of Science and Technology research initiatives

The site allows for the post-launch radiometric calibration of satellite sensors and is suitable for medium- to high-resolution optical sensors.

CSIR owned instruments that are used for CalVal purposes include:

- Robotic Sunphotometer
- Solarlight MicroTOPS
- ASD Spectroradiometer
- Solys 2 Suntracker



Solarlight MicroTOPS II



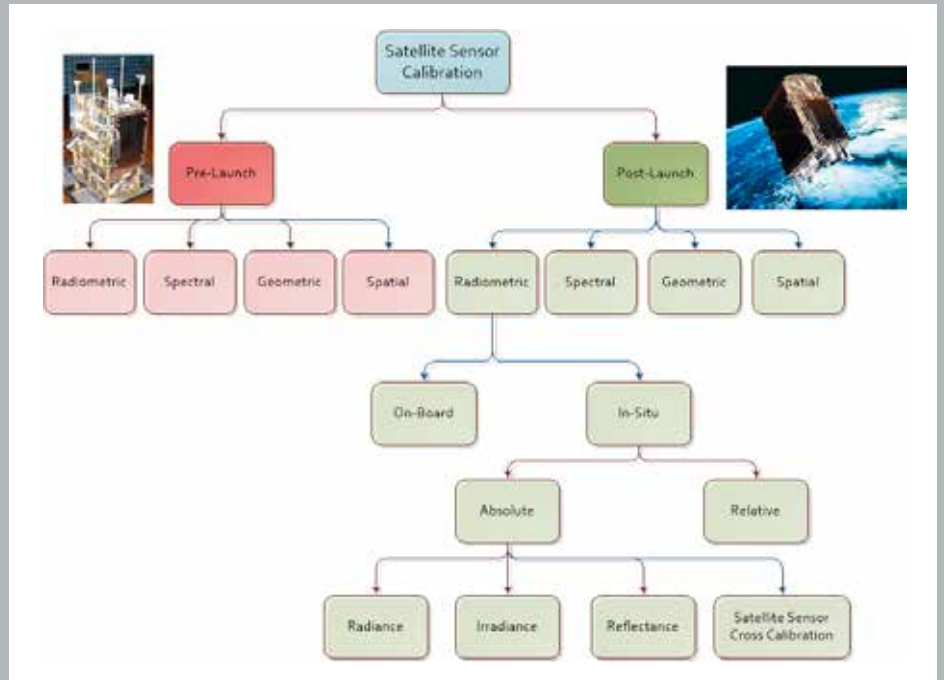
ASD Spectroradiometer



Solys 2 Suntracker



Robotic Sunphotometer



During CalVal campaigns, these instruments are integrated into a complete system in order to obtain the various measurement parameters that characterise a target of interest the day of a satellite overpass. The results gained from these measurements can then be used to:

- Quantitatively define the system response of a satellite earth observation system
- Independently assess the quality of the data products derived from the earth observation system outputs
- Evaluate the uncertainty associated with the earth observation system response

Data are then used to verify that the earth observation system meets the need for which it was originally conceived and implemented.

Calibration Site



Calibration Site - Google Earth



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