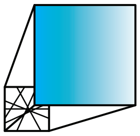
SMALL SENSOR CALIBRATION & TVAC TESTING

All sensors, no matter their size, require calibration to make meaningful measurements. Complete sensor calibration provides a thorough understanding of sensor operation and performance, preparing payloads for successful flight.

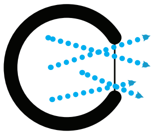
With the recent proliferation of small satellite technology, from nano to ESPA size, the Space Dynamics Laboratory (SDL) has tailored its calibration services to accommodate small systems. SDL's calibration includes verification of these primary indicators of sensor performance:

- **Radiometric:** The sensor converts raw electronic signals to usable data effectively, ensuring that measurements are uniform and consistent.
- **Spatial:** The sensor's position, pointing direction, and orientation are accurate, and its imaging is in focus.
- **Spectral:** The sensor is fine-tuned to optimize measurements in the targeted wavelengths, without interference.

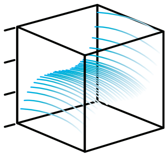
SDL has been calibrating electro-optical sensors for over 50 years and has developed specialized equipment ideal for simulating the space environment. SDL recognizes the cost, schedule, and risk challenges in small satellite production and makes calibration recommendations tailored to fit the customer's budget and mission needs.



Non-Uniformity Correction Testing

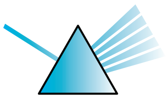


Radiometric Flood Source Testing

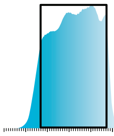


Spatial Testing

Focus & Image Quality Testing



Spectral Wavelength Characterization



In-Band Spectral Response

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KEY CALIBRATION TESTS

RADIOMETRIC CALIBRATION

Radiance & Irradiance Responsivity

- Translate the payload response from raw counts to usable data for an extended source or a point source

Radiometric Corrections

- Correct for non-uniformity, linearity, and integration modes
- Determine the response correlation between multiple focal plane arrays (FPAs)

Dynamic Range Characterization

- Characterize the payload response at the top of the dynamic range (saturation)
- Characterize the payload response at the bottom of the dynamic range (noise and change detection)

SPATIAL CALIBRATION

Focus

- Determine the payload system focus

PRF, MTF, FOV

- Characterize the payload spatial response to a point source: determine point response function (PRF), modulation transfer function (MTF), and effective field of view (FOV)

Coalignment & Scanning

- Determine the geospatial position and view angle
- Characterize the alignment function of the scan angle

Jitter & Scatter

- Determine the payload response to scene vibration and scatter over the FOV and the field of regard

Irradiance Uniformity & Distortion Map

- Determine the uniformity of the payload response to a point source across the field of regard
- Characterize the effects of distortion over the FOV

SPECTRAL CALIBRATION

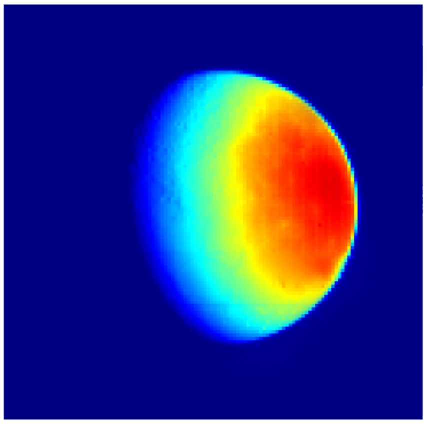
Relative Spectral Responsivity

- Determine the payload spectral response as a function of wavelength within and outside of the expected passband

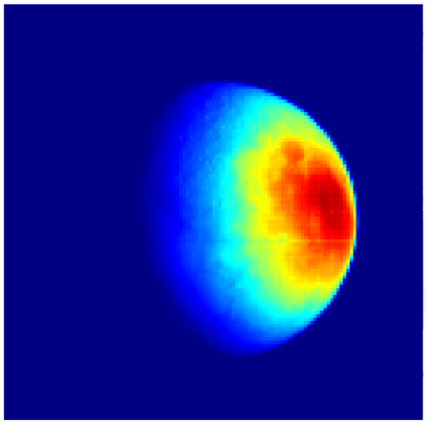
Response Repeatability

- Characterize the short- and medium-term repeatability of measurements
- Develop the baseline for long-term validation of measurements
- Monitor the contamination buildup

Visible, 725–889 nm



Mid-wave IR, 4.90–4.93 μm



Long-wave IR, 11.05–11.17 μm

Lunar surface images are shown in the visible, mid-wave IR, and long-wave IR passbands. Radiometric calibration displays the response for each passband; spatial calibration reveals the lunar response variations across the lunar surface; and spectral calibration shows variations of the image across the electromagnetic spectrum (visible to long-wave IR).