Calibration Trend Analysis of Digital Globe Imagers
Alexei Lyapustin, Goddard Space Flight Center

Purpose: Analyze the radiometric stability of commercial imagers for time series and trend analyses in support of Earth science research and applications

Study Objective: Using ancillary MAIAC MODIS atmospheric and surface BRDF data, characterize the radiometric calibration trends for DigitalGlobe images over Libya-4 quasi-stable desert CEOS calibration site

Imagery: MODIS, WorldView-2, WorldView-3

Findings: Both satellites show radiometric calibration trends, with WorldView-3 the more stable. Trends in WorldView-2 were approximately twice as large as the calibration trends in MODIS Collection 5 data. Use of MODIS calibration coefficients removes calibration trends, bringing the three sensors in close agreement, i.e., within ±3%.

Top: Data acquisition for WV-2 over Libya4 site. The left image shows the larger MODIS tile and location of the Libya4 site. The left image illustrates different WV-2 acquisitions over the years.

Middle: An example of trend characterization for the WV-2 Red and NIR bands.

Bottom: Summary Table of calibration trend analysis for the common bands of MODIS, WV-2, and WV-3. The derived trends per year per unit of reflectance are compared with MODIS Collection 5 calibration trends which were recognized significant for the science data analysis. The reflectance in RGB and NIR bands agree well among the WV-2 and WV-3 imagers over a reference point (column 5).