Initial On-orbit Spatial Resolution Characterization of OrbView-3
Panchromatic Images

- Characterization conducted under the Memorandum of Understanding among Orbital Sciences Corp., ORBIMAGE, Inc., and NASA Applied Sciences Directorate.
- Acquired five OrbView-3 panchromatic images of the permanent Stennis Space Center edge targets painted on a concrete surface.
- Each image available at two processing levels: Georaw and Basic.
  - Georaw is an intermediate image in which individual pixels are aligned by a nominal shift in the along-scan direction to adjust for the staggered layout of the panchromatic detectors along the focal plane array. Georaw images are engineering data and are not delivered to customers.
  - Basic product includes a cubic interpolation to align the pixels better along the focal plane and to correct for sensor artifacts, such as smile and attitude smoothing. This product retains satellite geometry - no rectification is performed.
- Processing of the characterized images did not include image sharpening, which is applied by default to OrbView-3 image products delivered by ORBIMAGE to customers.
- Edge responses were extracted from images of tilted edges in two directions: along-scan and cross-scan.
- Each edge response was approximated with a superposition of 3 sigmoidal functions through a nonlinear least-squares curve-fitting.
- Line Spread Functions (LSF) were derived by differentiation of the analytical approximation.
- Modulation Transfer Functions (MTF) were obtained after applying the discrete Fourier transform to the LSF.
- Average values of MTF at the Nyquist spatial frequency for five panchromatic acquisitions are as follows:
  - 0.12 ± 0.04 for the Georaw images, and
  - 0.09 ± 0.04 for the Basic image products.

OrbView-3 panchromatic images used for the spatial resolution characterization and the results of these evaluations shown as values of the Modulation Transfer Function at the Nyquist spatial frequency.