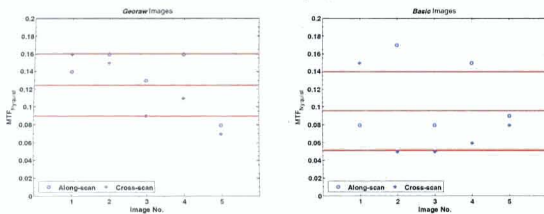




# Initial On-orbit Spatial Resolution Characterization of OrbView-3 Panchromatic Images

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- Characterization was 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 is 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.
  - The *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 three 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:
  - $0.12 \pm 0.04$  for the *Georaw* images, and
  - $0.09 \pm 0.04$  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.

Image Archive ID	Acquisition Date	Satellite Angle [°]		GSD [m]		MTF at Nyquist frequency				
		Zenith	Azimuth	Cross-scan	Along-scan	Cross-scan (Georaw)	Cross-scan (Basic)	Along-scan (Georaw)	Along-scan (Basic)	
14442	09/17/03	10.7	84.5	1.02	0.99	0.16	0.15	0.14	0.08	
24790	12/12/03	24.2	100.0	1.18	1.08	0.15	0.05	0.16	0.17	
22760	12/15/03	37.3	91.9	1.54	1.21	0.09	0.05	0.13	0.08	
23539	12/26/03	9.8	98.4	1.02	0.99	0.11	0.06	0.16	0.15	
24515	01/12/04	28.4	87.1	1.26	1.10	0.07	0.08	0.08	0.09	

