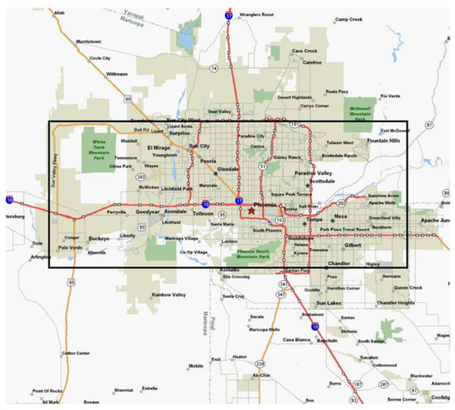
GeoEye-1 On-Orbit Performance

Image Quality & Geolocation

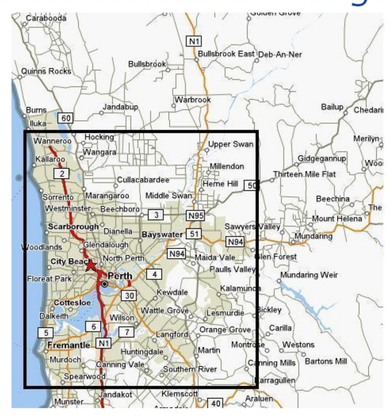
Sensor Characteristics

Imaging Feature	Panchromatic Sensor	Multispectral Sensor
Ground Sample Distance (nadir)	0.41m	1.65m
Array Type	Linear 64 stage TDI	Linear 24 stage TDI
Directionality	Bi-directional	Uni-directional
Spectral Range	450 – 800 nm	Blue: 450 – 510 nm
		Green: 510 – 580 nm
		Red: 655 – 690 nm
		Near IR: 780 – 920 nm
Pixel Size	8 µm	32 µm
Stages of TDI	8, 16, 32, 48, 64	3, 6, 10, 14, 18, 21, 24
Pixel Aggregation	1x1, 2x2	1x1, 2x2
Imaging Pixels	37,544	9386
Line Rates	20,000 and 10,000 lines / sec	2,500 lines / sec
Quantization Level	11 bits per pixel	11 bits per pixel per channel
On-board Compression	Visually lossless at 2.5 bpp	Visually lossless at 2.5 bpp per channel

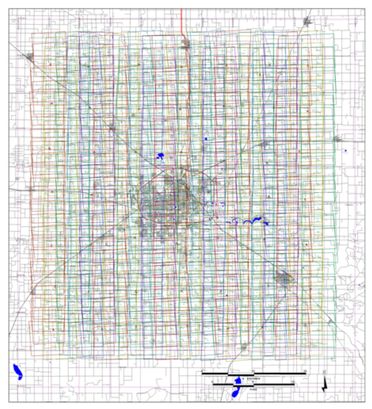
Geometric Calibration Ranges



Phoenix, AZ
Primary Calibration Range
Primary Characterization Range



Perth, Australia
Primary Calibration Range

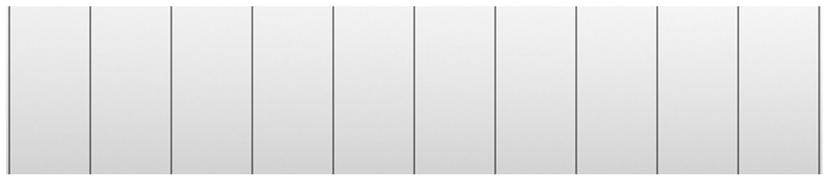


Lubbock, TX
Primary Verification Site
Secondary Calibration Range

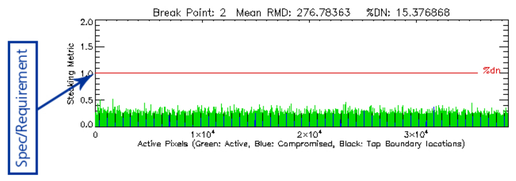
Relative Radiometric Calibration

Example of Calibration Data - Door Closing

GeoEye-1 Flat-Field Imagery Pre-Correction

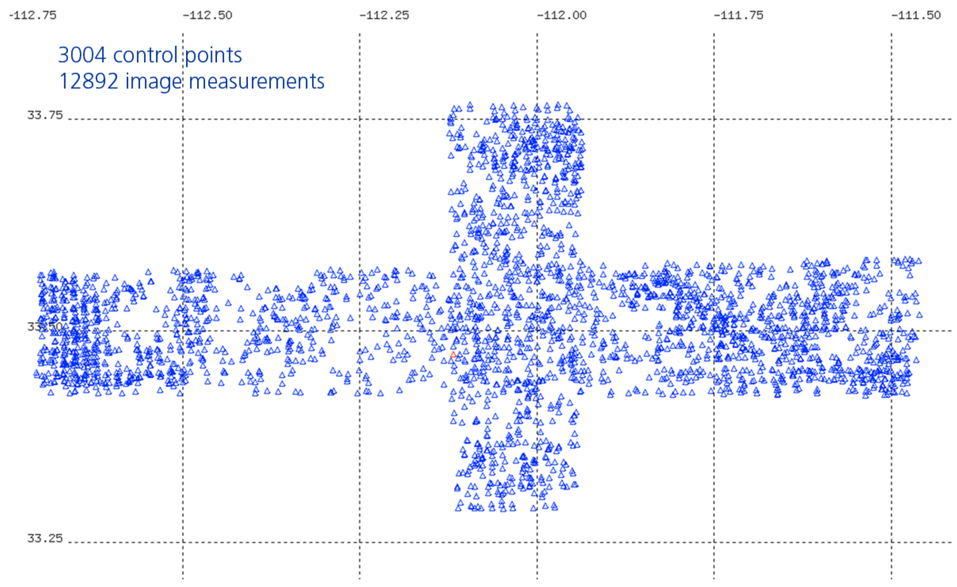


GeoEye-1 Flat-Field Imagery Post-Correction

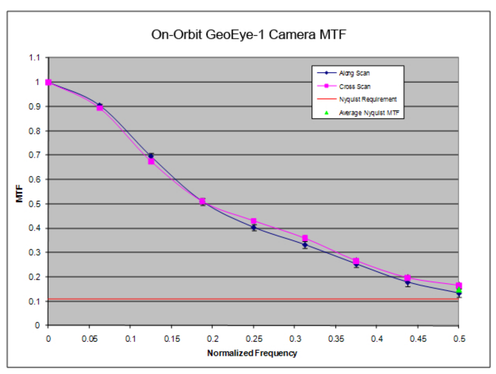


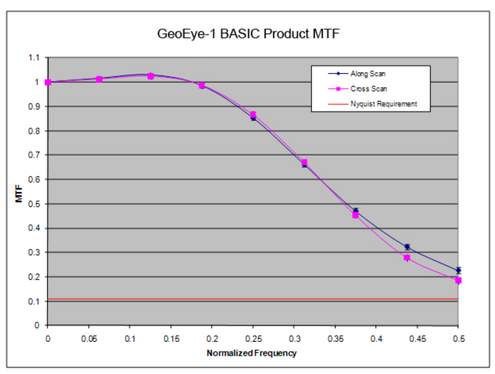
Panchromatic 20,000 lps
1x1 Aggregation
32 TDI
Forward Scan

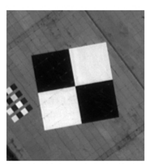
Control Point Generation for FAM 2009 Jan



Modulation Transfer Function (MTF)



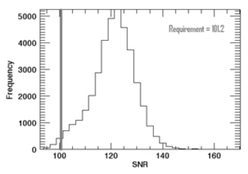




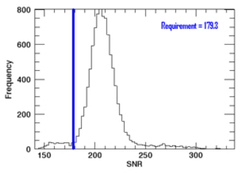
GeoEye-1 Image of Big Spring MTF Target

Parameter		Measurement
Camera Level 1x1 aggregation	Along Scan	0.13 +/- 0.01
	Cross Scan	0.16 +/- 0.01
Product Level 1x1 aggregation	Along Scan	0.23 +/- 0.01
	Cross Scan	0.19 +/- 0.01

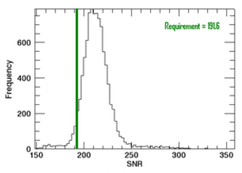
On-Orbit SNR Measurement



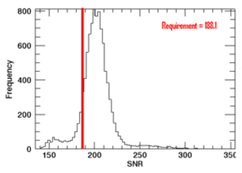
Pan Band: 1x1 agg, 8 TDI, Reverse Array



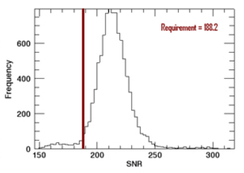
Blue Band: 1x1 agg, 3 TDI, Reverse Array



Green Band: 1x1 agg, 3 TDI, Reverse Array



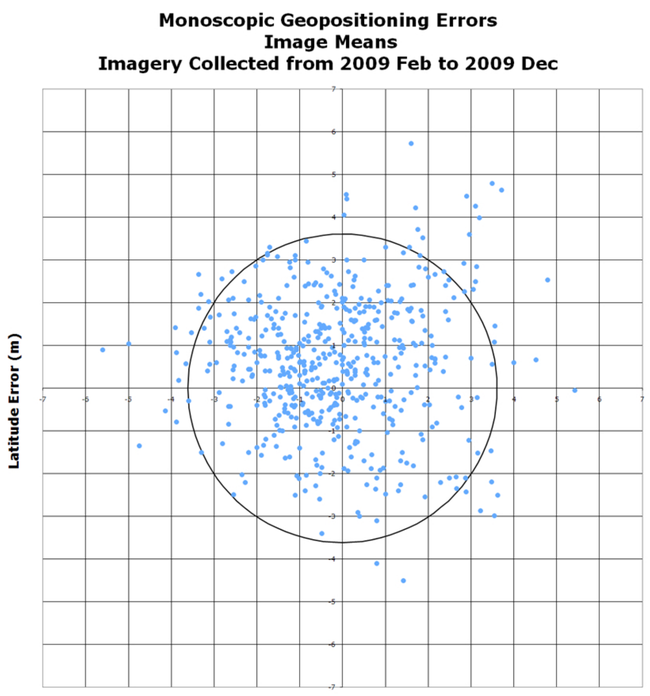
Red Band: 1x1 agg, 3 TDI, Reverse Array



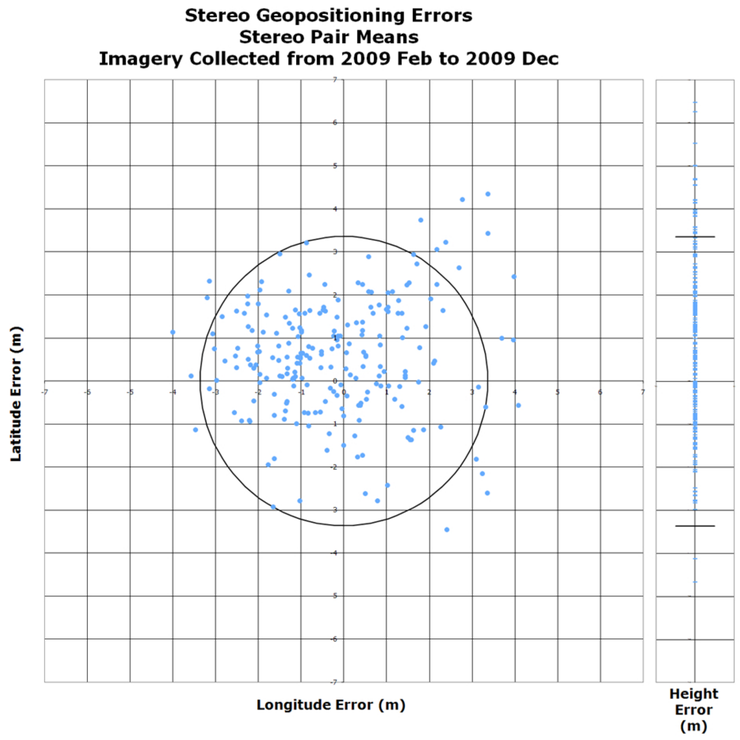
Near IR Band: 2x2 agg, 3 TDI, Reverse Array

Band	Mean Well Fill (%)	SNR Requirement (Scaled to well fill)	SNR Mean
Pan	15.02	101.2	122.5
Blue	14.88	179.3	204.8
Green	15.39	191.6	206.4
Red	14.44	188.1	195.4
NIR	15.31	188.2	210.2

Absolute Geolocation Accuracy



- World wide distribution of T&E sites
- Based on rigorous (physical) model
- Sample of 530 images
- CE90 = 3.6 m



- Based on rigorous (physical) model
- Direct positioning (no adjustment of imagery)
- Sample of 222 stereo pairs
- CE90 = 3.4 m
- LE90 = 3.2m

GeoEye