OrbView-3 Technical Performance Evaluation 2005

OV-3 Specifications

Sun-synchronous orbit

  470 km
  10:30 am descending node crossing

Ancillary sensors

  Viceroy GPS receiver
  Two Sordern star trackers
  Fiber Optic Gyros

Camera

  2.78 meter focal length
  Panchromatic band has 8032 detectors at 6 microns, 1 meter GSD
  Multispectral bands (4) have 2008 detectors each at 24 microns

Image collection

  North-South, East-West, West-East, and South-North
  Other azimuths are also possible

Imaging Mode	Panchromatic	Multispectral
Ground Sample Distance (Nadir)	1 m	4 m
Spectral Bandwidth	450 – 900 nm	450 – 520 nm
		520 – 600 nm
		625 – 695 nm
		760 – 900 nm
Imaging Array Width	8032 detectors	4 x 2008 detectors
Swath Width (Nadir)	8 km	
Pixel Quantization	11 bits per pixel per channel	
Compressed Bit Rate (Downlink)	2 bits per pixel per channel	

Product Specifications

Product Name	Description	Pan Mono	Pan Stereo	MS Mono	MS Stereo	Tie Point Triangulation	Control Pt Triangulation	File Format	OV-3 Accuracy (CE/LE 90) Pan	OV-3 Accuracy (CE/LE 90) MS
OrbView BASIC Express	Satellite Geometry Image(s); RFCs Based on Downlinked Metadata	X	X	X		N/A	N/A	NITF 2.0 NITF 2.1 Tiff	60m	65m
OrbView BASIC Enhanced	Satellite Geometry Image(s); RFCs Based on Precise GPS Ephemerides and PPAD	X	X	X		N/A	N/A	NITF 2.0 NITF 2.1 Tiff	25m	37m
OrbView BASIC 1:50K	Satellite Geometry Image (s); Improved RFCs Based on Variance Constrained Triangulation	X	X	X		X	N/A	NITF 2.0 NITF 2.1 Tiff	25m / 8m	30m / 12m
OrbView BASIC 1:24K	Satellite Geometry Image(s); Improved RFCs based on Rigorous Block Adjustment with Control Points	X	X	X		If Available	X	NITF 2.0 NITF 2.1 Tiff	12m / 5m	15m / 10m

Geolocation Accuracy Methodology

Primary methods used were monodrop and stereo measurement compared to ground truth
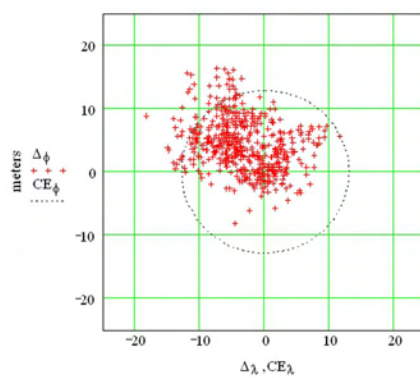
  Rigorous model was used for both methods
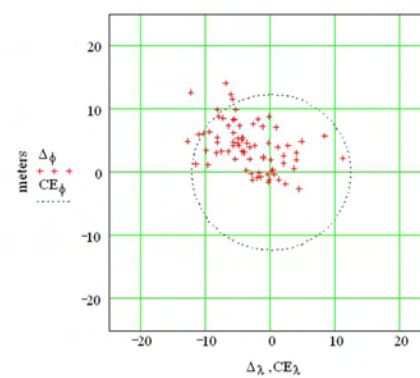 Pre/post rational functions were not used

Mono-drop Comparison

  Image Coordinates converted to object space
  Difference between Satellite determined position and GCP are computed
 Results in observed CE

Stereo Measurement Method

  No GCPs used in solution of the Block adjustment
  Least squares is used to obtain the satellite determined 3-D coordinates of the ground truth points
  Difference between Satellite determined position and ground truth points are computed
  Results in observed CE and LE

Test and Evaluation Program

26 Sites world wide imaged throughout the year

  Approximately 10 GCPs in each site

Used to confirm OV-3 operates within mission requirements

  Geolocation Accuracy
  MTF Evaluation
  Relative Radiometric Calibration

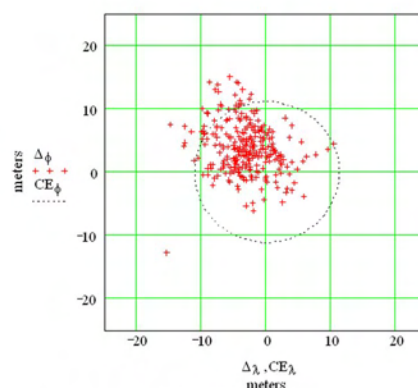## Geolocation Accuracy Results

Mono-drop Comparison
76 Images
698 Mono-drop Points
CE = 12.9
CE < 25m Therefore OV-3 Meets Req.

Mono-drop Comparison
Mean Lat/Long Bias
76 Images
CE = 12.3m
CE < 25m Therefore Meets Req.
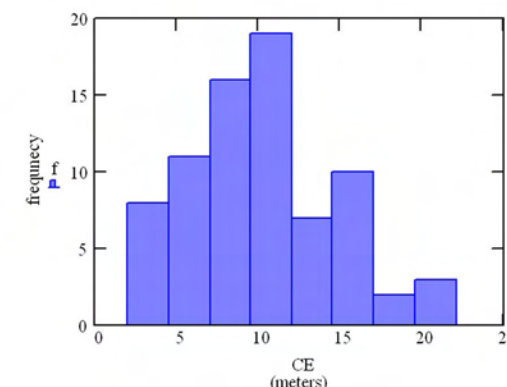
Mono-drop Comparison
Mono-drop CE Value Histogram
76 Images
All CE Values < 25m

Stereo Measurements
33 Stereo Pairs
300 Points
CE = 11.2m
LE = 7.8m
CE & LE < 25m Therefore Meets Req.

Site	# Points	μ Line (Pixels)	μ Sample (Pixels)	σ Line (Pixels)	σ Sample (Pixels)
Gafsa	105	0.0	0.0	0.9	0.7
Guarani	60	0.0	0.0	1.7	1.1
Holloman	97	0.0	0.0	0.9	0.8
Little Rock	55	0.0	0.0	1.8	1.0
Cannon	90	0.0	0.0	1.3	1.0
Dobbins	45	0.0	0.0	0.7	0.5
Grand Bahama	90	0.0	0.0	1.0	0.9
Seeb	60	0.0	0.0	1.8	0.8
Carriel Sur	110	0.0	0.0	1.0	0.8
China Lake	60	0.0	0.0	1.3	0.8
Sangter	60	0.0	0.0	0.9	0.6
Sidi Slimane	60	0.0	0.0	0.7	0.7
Clark	63	0.0	0.0	0.8	1.1
Enrique Malek	30	0.0	0.0	0.6	0.1
Laoag	36	0.0	0.0	0.5	0.5
Menara	75	0.0	0.0	1.9	1.1
Whiteman	32	0.0	0.0	2.5	0.1
μ		0.0	0.0	1.1	0.8
σ		0.0	0.0	0.8	0.3

Image Residuals for Stereo Measurements

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