Geolocation Accuracy Performance of the DigitalGlobe Constellation During 2015

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Introduction

- This presentation collects together geolocation accuracy performance assessments for the DigitalGlobe satellite constellation from imagery collected during 2015.

- The satellites have been performing well and provided good geolocation accuracy performance for 2015.

- CE90 and LE90 estimation is based on the Percentile Method
  - Recommended by NIQU/CCAP
    - Bresnahan, P., Absolute Geolocation Accuracy Evaluation of Worldview-1 Basic 1B Stereo Pairs, JACIE 2010
    - Bresnahan, P., Absolute Geolocation Accuracy Evaluation of GeoEye-1 Basic Stereo Triplets, JACIE 2010
  - https://dg-cms-uploads-production.s3.amazonaws.com/uploads/document/file/38/WorldView_Geolocation_Accuracy.pdf

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DigitalGlobe Constellation Horizontal Accuracy for 2015

Satellite	Mono		
	# images	CE90 (m)	RMSE (m)
WorldView-1	719	4.5	3.0
WorldView-2	718	4.6	3.0
WorldView-3	1796	3.6	2.4
GeoEye-1	129	4.4	3.0

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DigitalGlobe Constellation Stereo Accuracy for 2015

Satellite		Horizontal		Vertical	
	# stereo pairs	CE90 (m)	RMSE (m)	LE90 (m)	RMS (m)
WorldView-1	128	3.7	2.5	2.4	1.5
WorldView-2	147	3.5	2.2	3.9	2.4
WorldView-3	125	3.3	2.0	3.2	2.0
GeoEye-1	37	3.2	2.0	2.7	1.8

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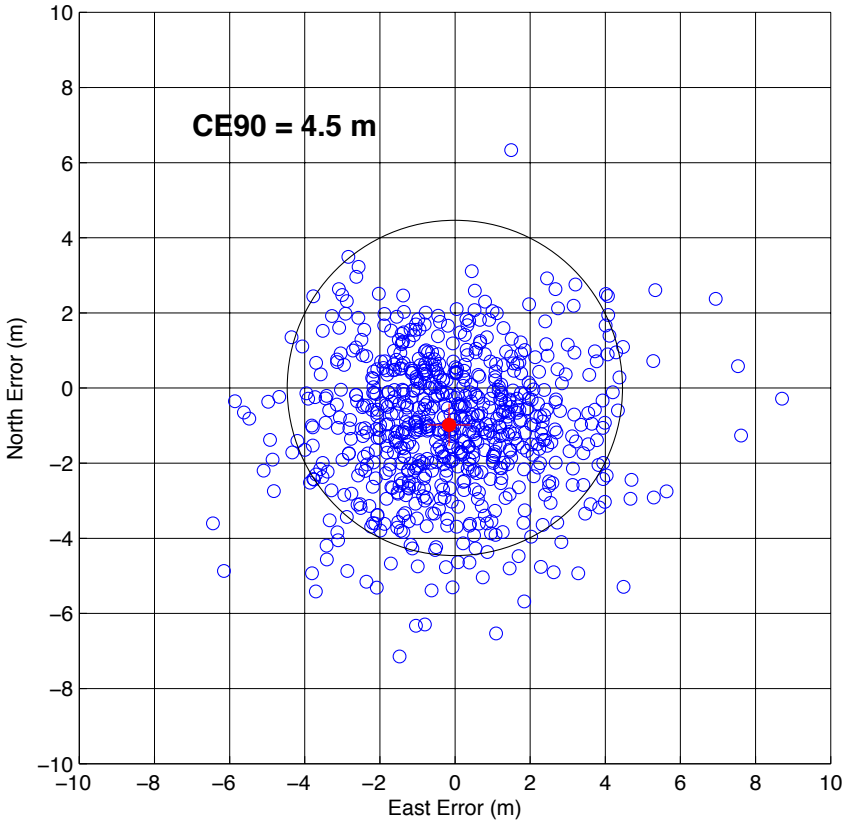
WorldView-1 Mono Horizontal Accuracy: Statistics

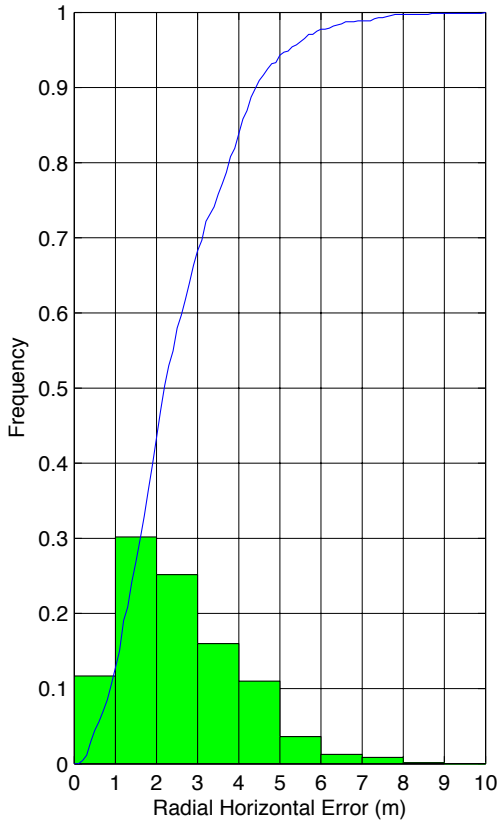
N = 719 images

Avg(East) = -0.2 m Avg(North) = -1.0 m

CE90 = 4.5 m

RMSE = 3.0 m





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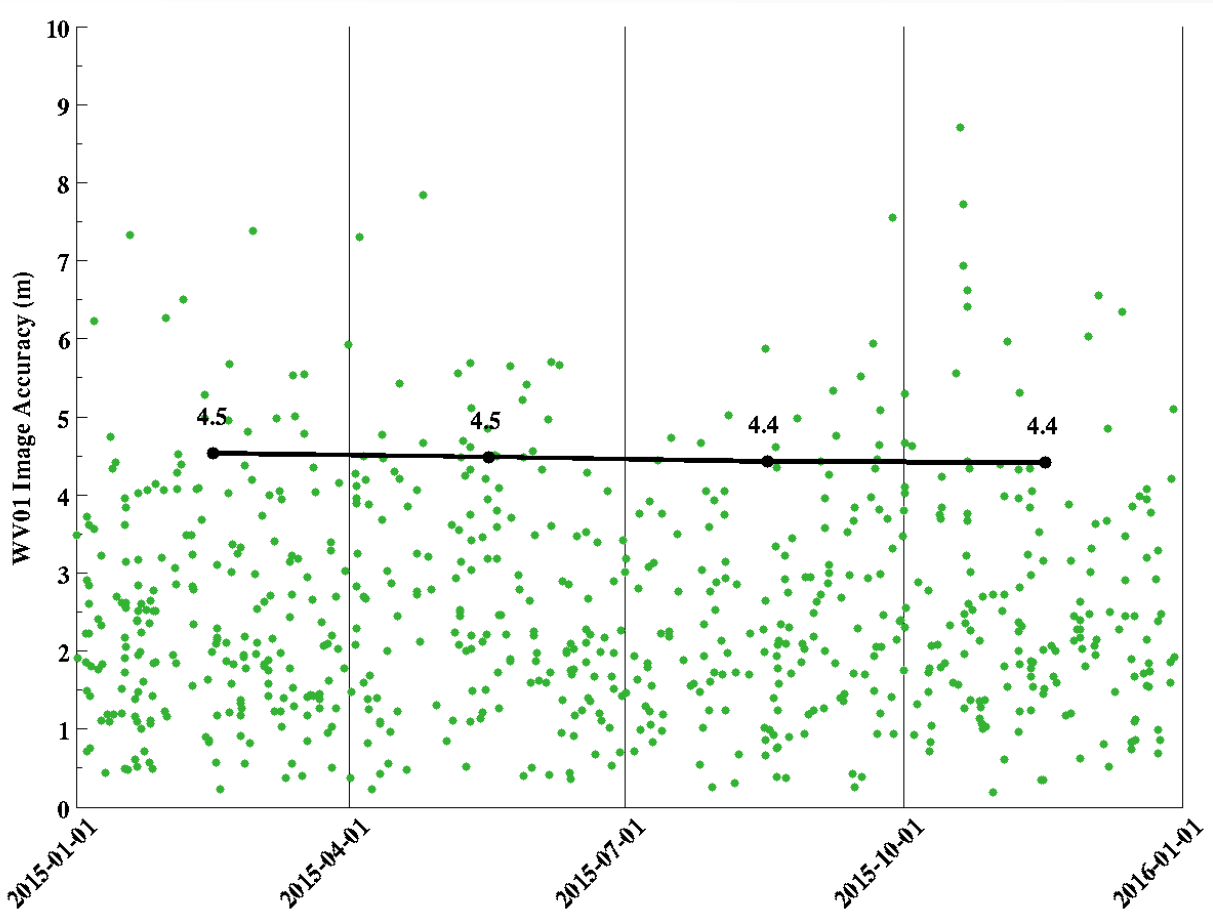
WorldView-1 Mono Horizontal Accuracy: Time Series



Each green dot is the mean radial accuracy of a test image measured in the geodetic frame.

Each black dot is the measured CE90 accuracy for the quarter shown.

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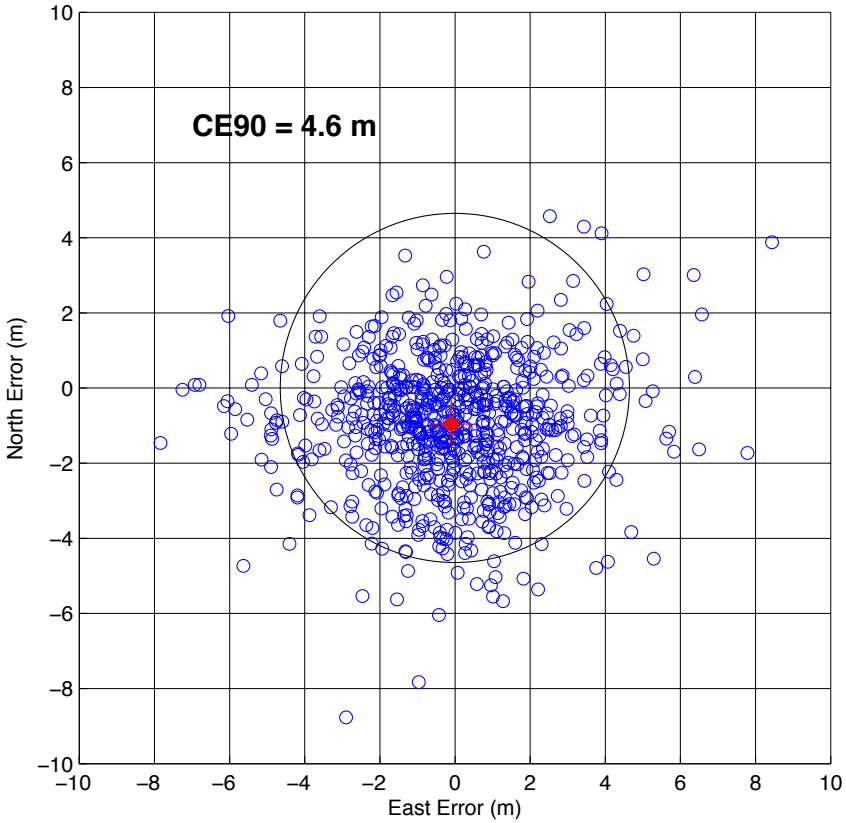
WorldView-2 Mono Horizontal Accuracy: Statistics

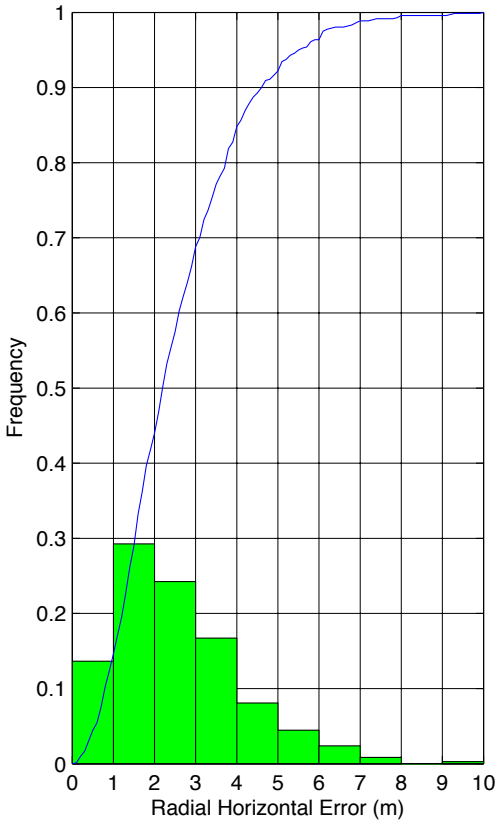
N = 718 images

Avg(East) = -0.1 m Avg(North) = -1.0 m

CE90 = 4.6 m

RMSE = 3.0 m





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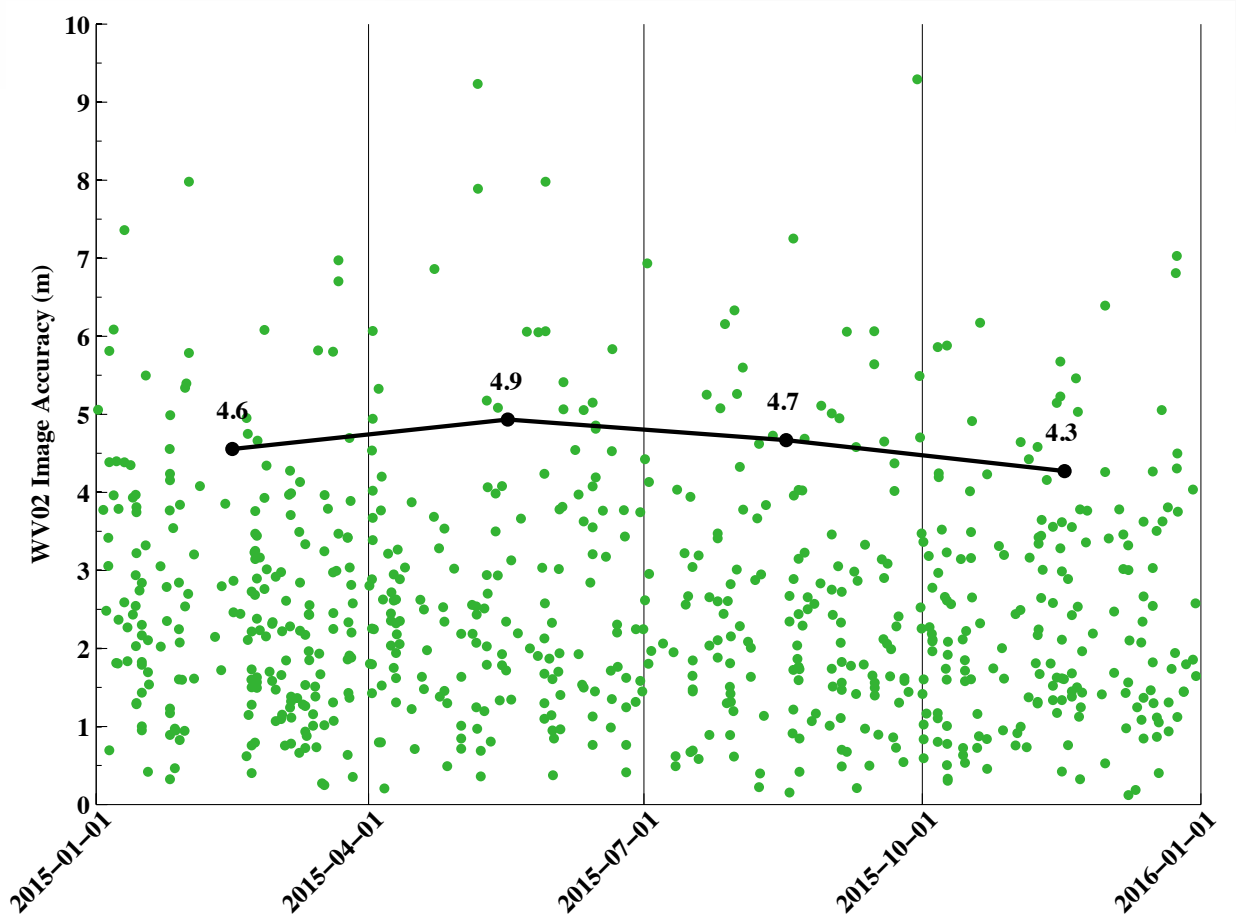
WorldView-2 Mono Horizontal Accuracy: Time Series



Each green dot is the mean radial accuracy of a test image measured in the geodetic frame.

Each black dot is the measured CE90 accuracy for the quarter shown.

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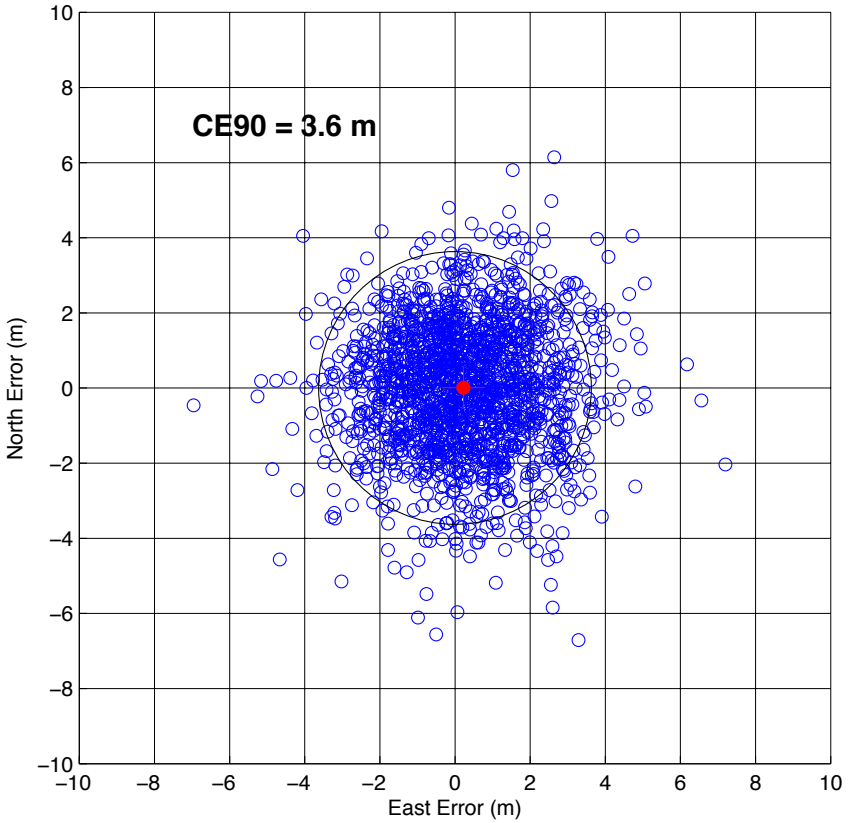
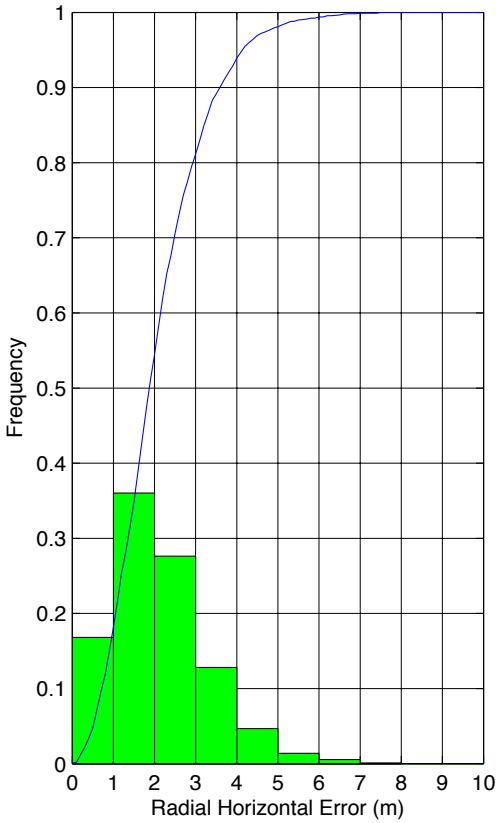
WorldView-3 Mono Horizontal Accuracy: Statistics

N = 1796 images
Avg(East) = 0.2 m Avg(North) = 0.0 m

CE90 = 3.6 m
RMSE = 2.4 m





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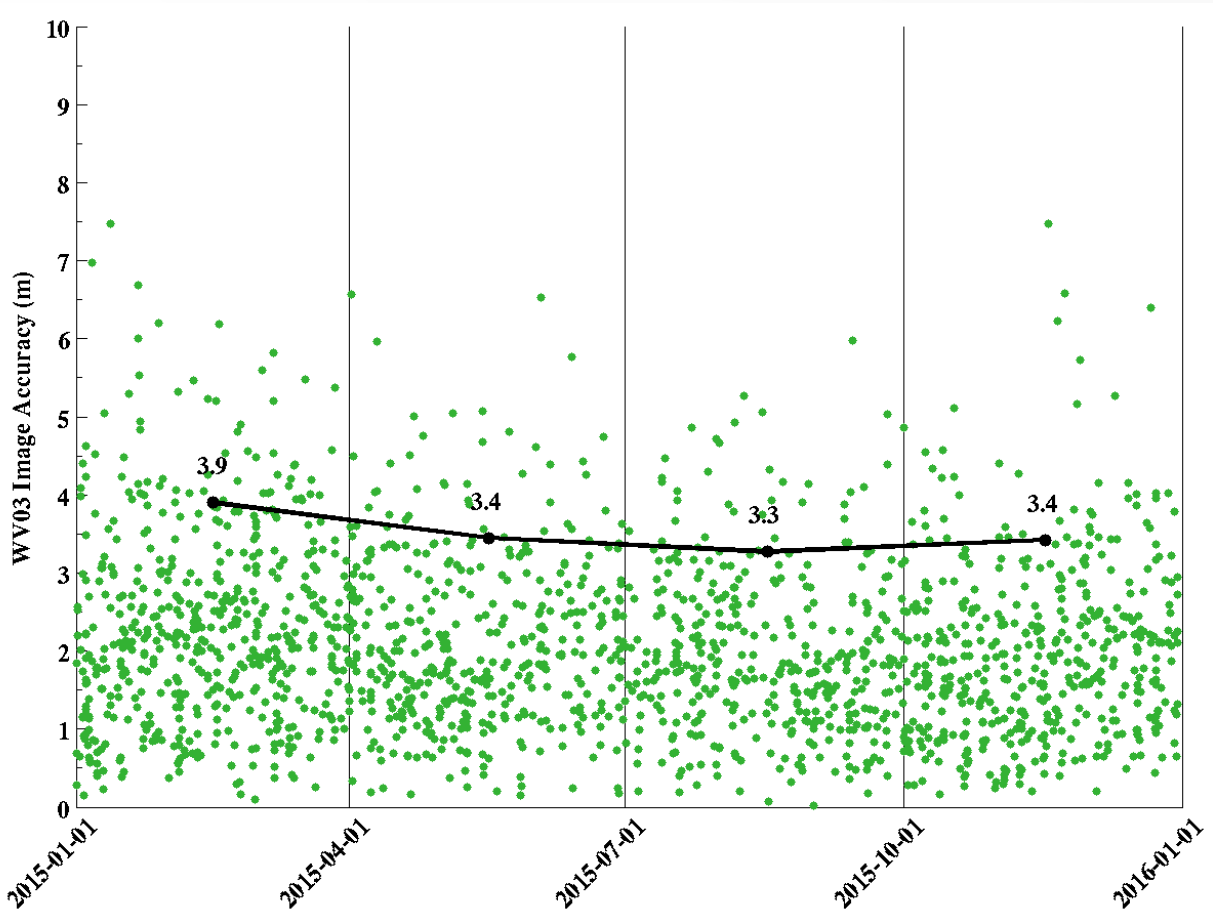
WorldView-3 Mono Horizontal Accuracy: Time Series



Each green dot is the mean radial accuracy of a test image measured in the geodetic frame.

Each black dot is the measured CE90 accuracy for the quarter shown.

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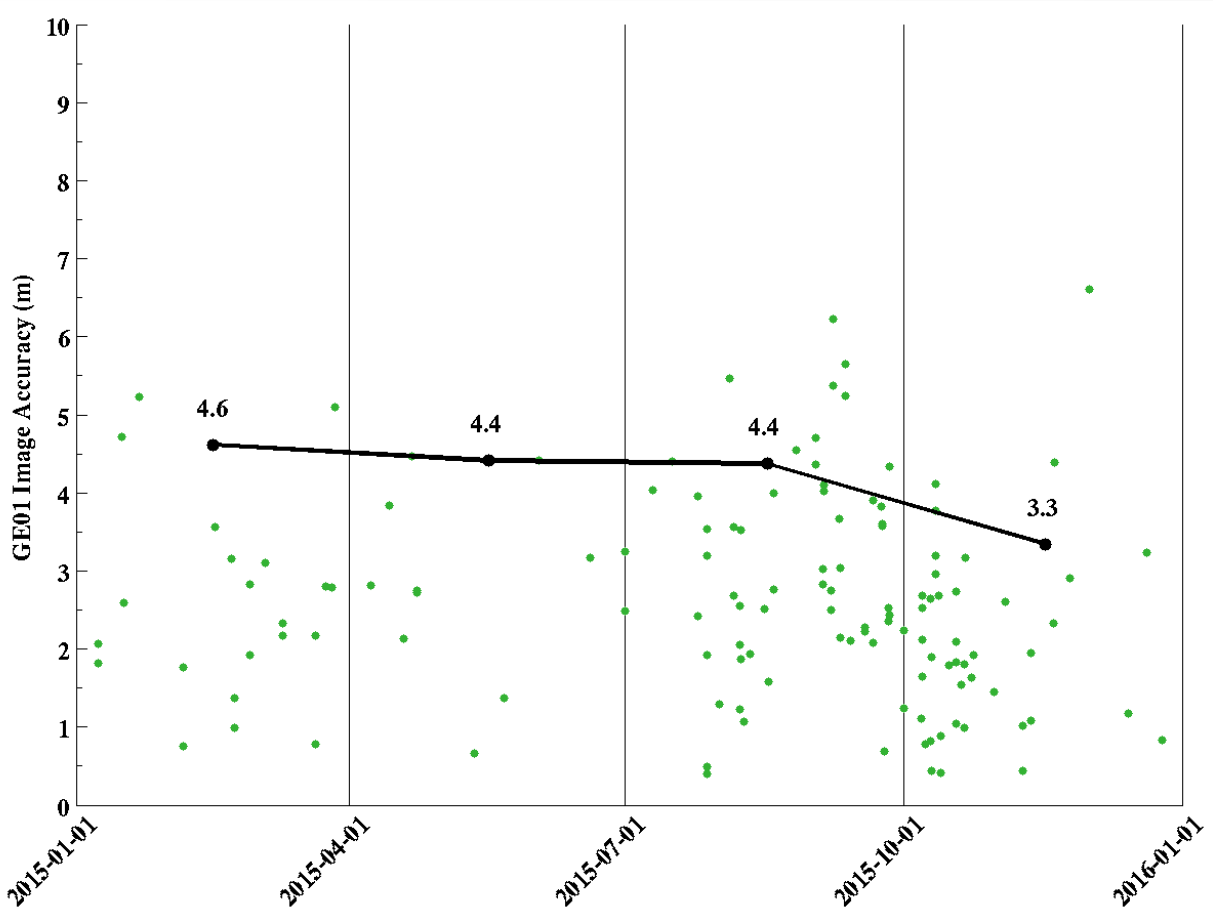
GeoEye-1 Mono Horizontal Accuracy: Time Series



Each green dot is the mean radial accuracy of a test image measured in the geodetic frame.

Each black dot is the measured CE90 accuracy for the quarter shown.

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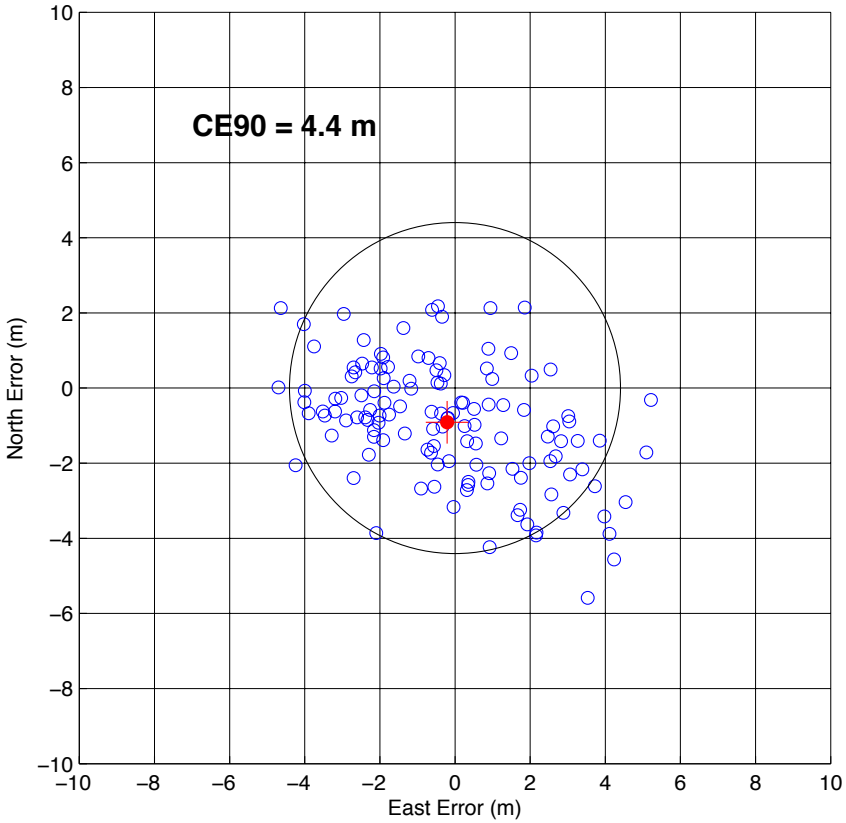
GeoEye-1 Mono Horizontal Accuracy: Statistics

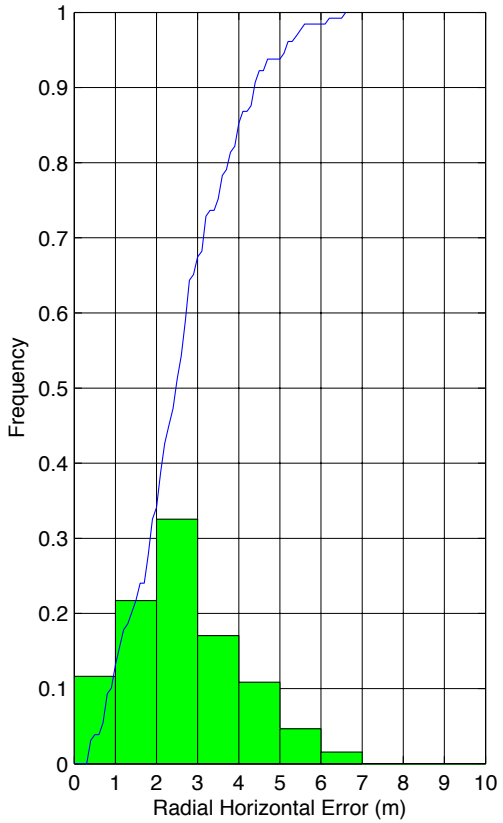
N = 129 images

Avg(East) = -0.2 m Avg(North) = -0.9 m

CE90 = 4.4 m

RMSE = 3.0 m





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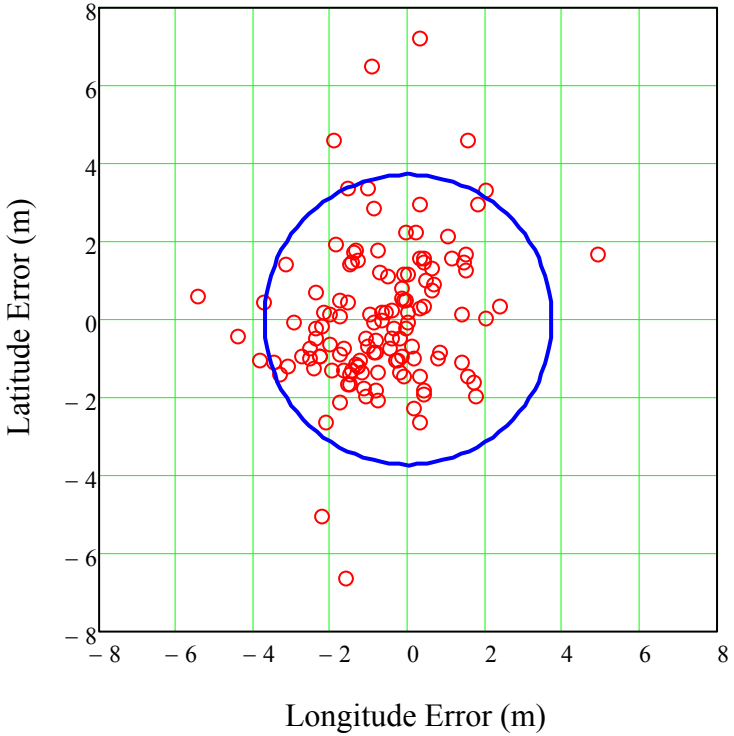
WorldView-1 Stereo Horizontal Accuracy: Statistics

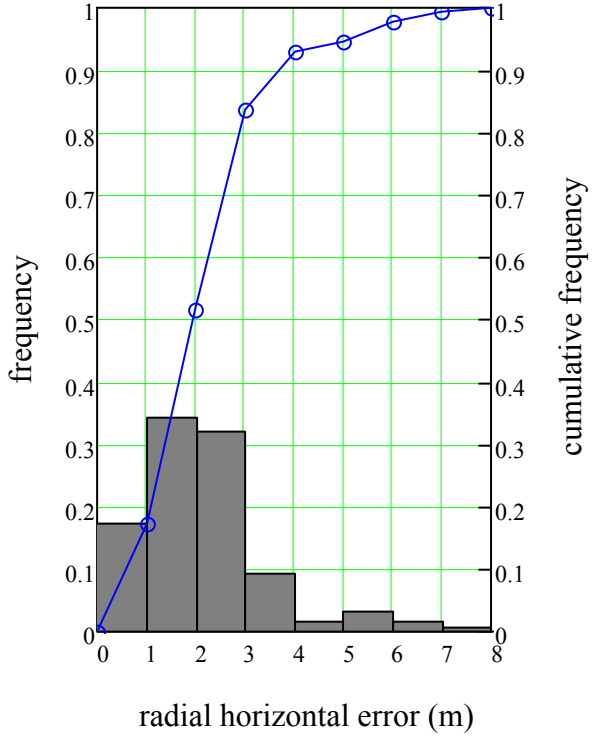
N = 128 images

Avg(East) = -0.7 m Avg(North) = 0.0 m

CE90 = 3.7 m

RMSE = 2.5 m





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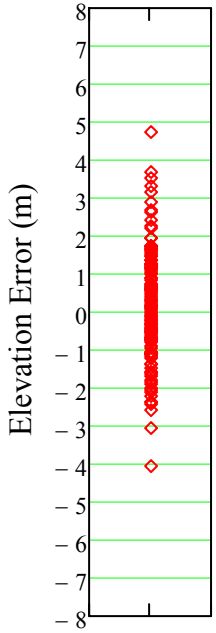
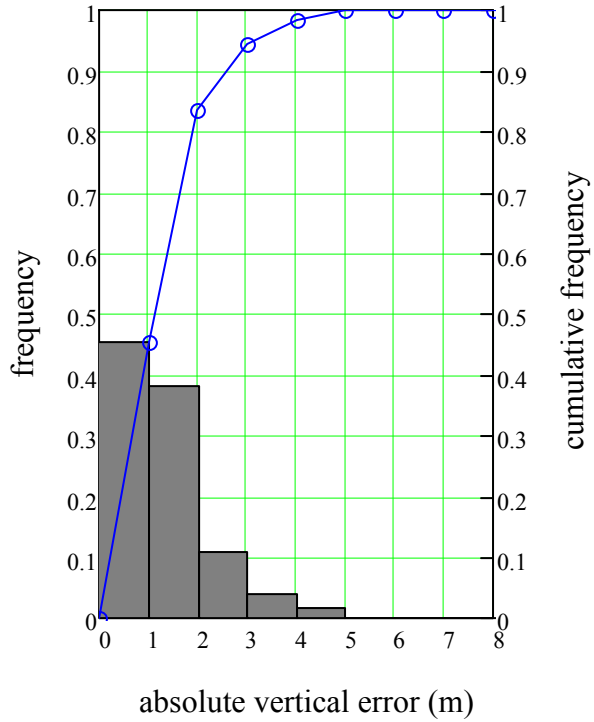
WorldView-1 Stereo Vertical Accuracy: Statistics

N = 128 images
Avg(Height) = 0.2 m

LE90 = 2.4 m
RMS = 1.5 m





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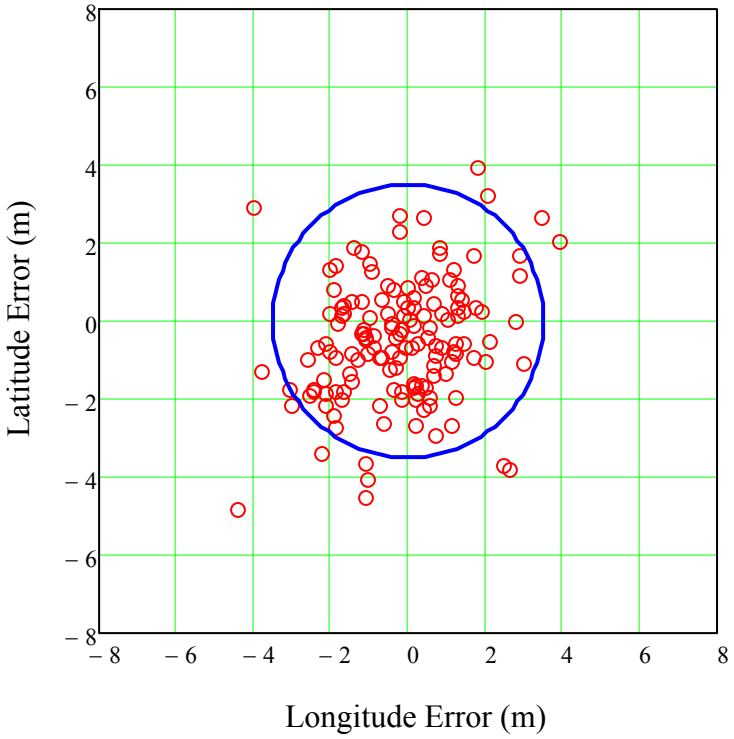
WorldView-2 Stereo Horizontal Accuracy: Statistics

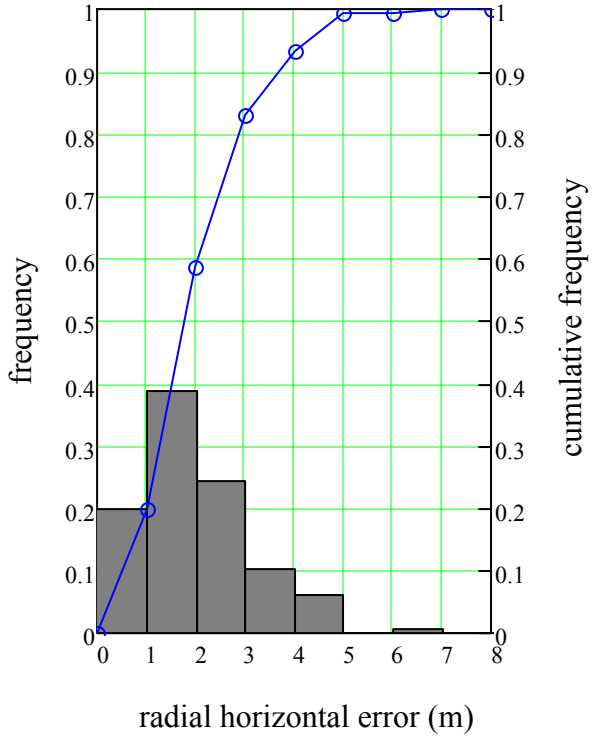
N = 147 images

Avg(East) = -0.2 m Avg(North) = -0.5 m

CE90 = 3.5 m

RMSE = 2.2 m





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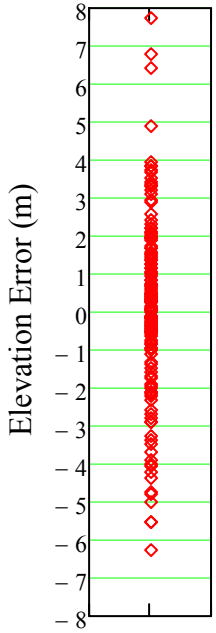
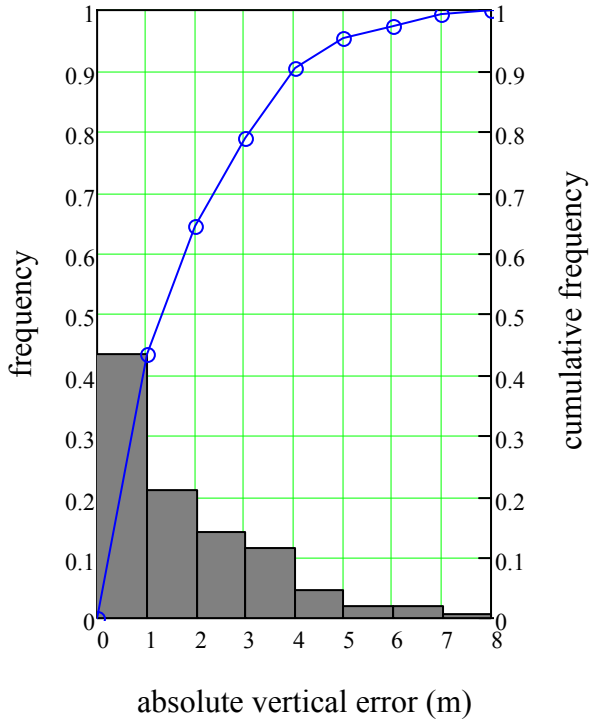
WorldView-2 Stereo Vertical Accuracy: Statistics

N = 147 images
Avg(Height) = 0.1 m

LE90 = 3.9 m
RMS = 2.4 m





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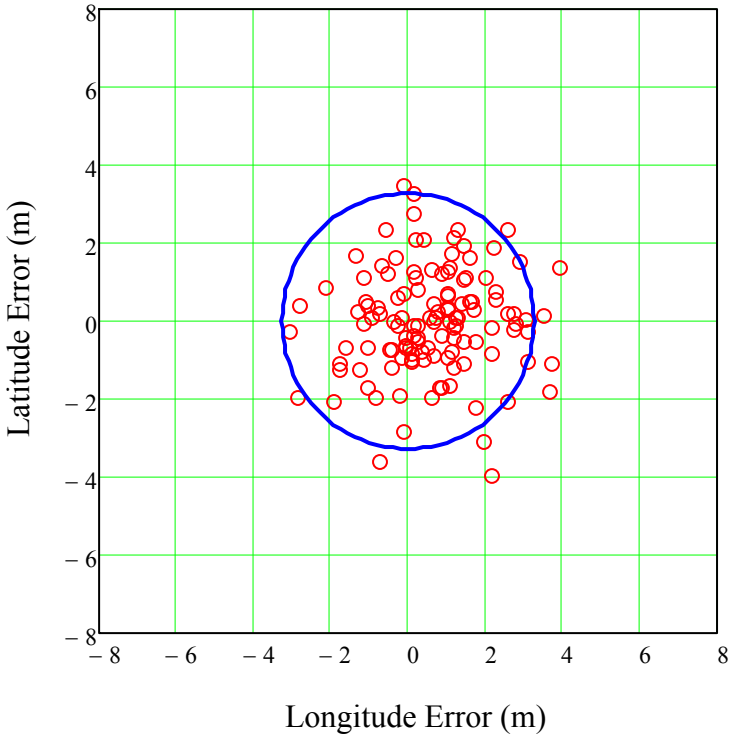
WorldView-3 Stereo Horizontal Accuracy: Statistics

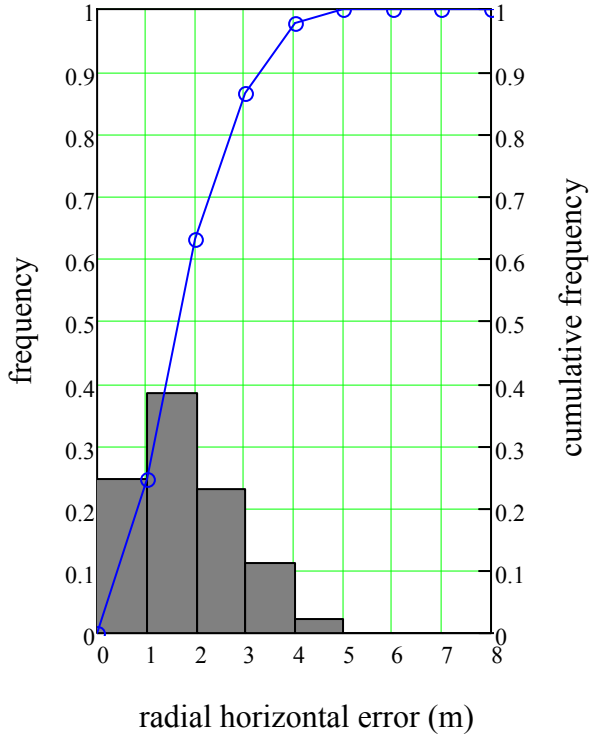
N = 125 images

Avg(East) = 0.6 m Avg(North) = 0.0 m

CE90 = 3.3 m

RMSE = 2.0 m





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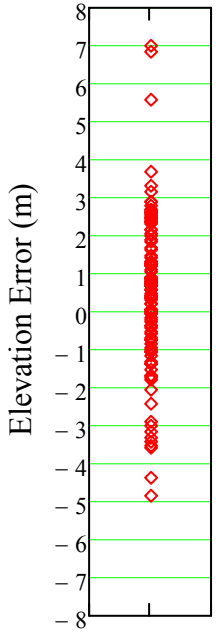
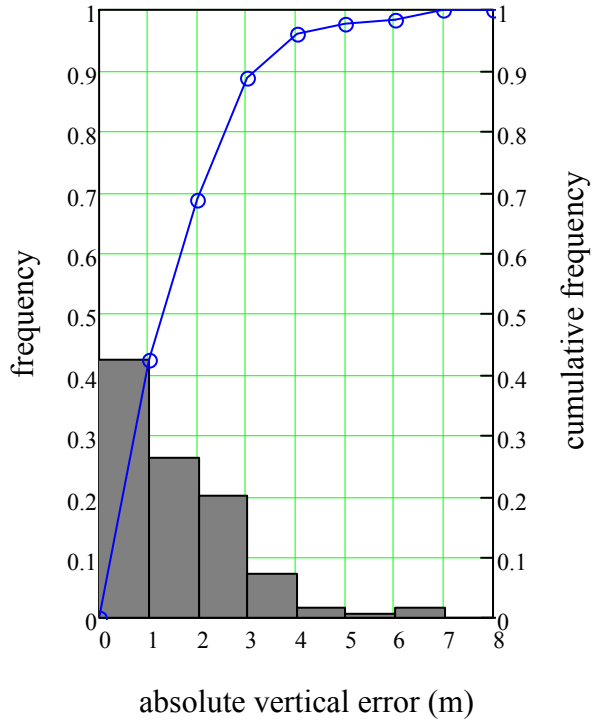
WorldView-3 Stereo Vertical Accuracy: Statistics

N = 125 images
Avg(Height) = 0.5 m

LE90 = 3.2 m
RMS = 2.0 m





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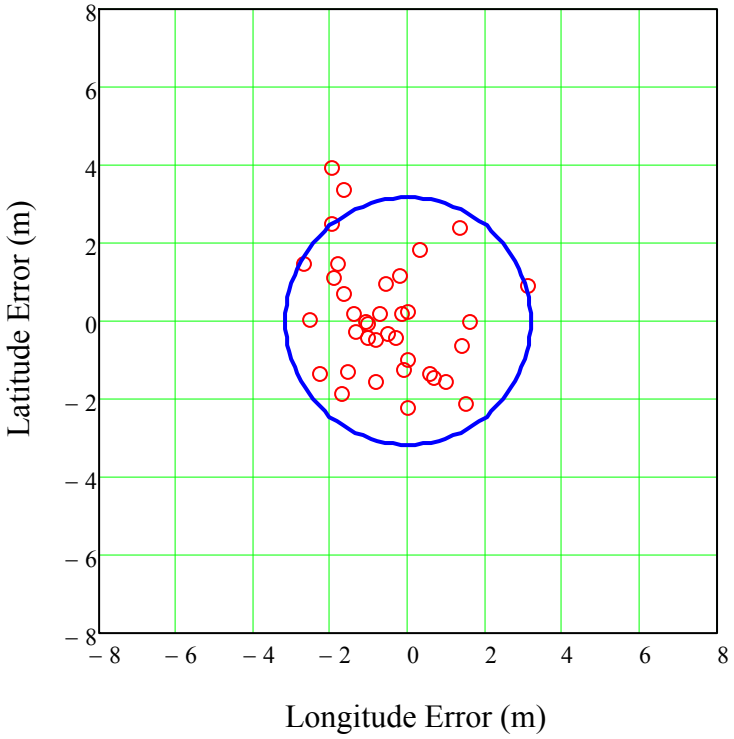
GeoEye-1 Stereo Horizontal Accuracy: Statistics

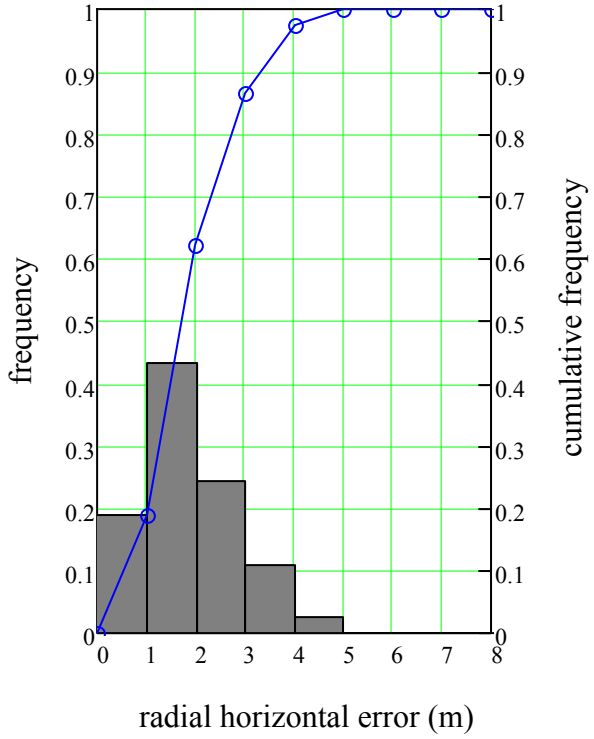
N = 37 images

Avg(East) = -0.6 m Avg(North) = 0.1 m

CE90 = 3.2 m

RMSE = 2.0 m





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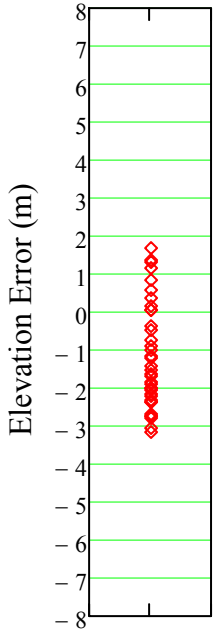
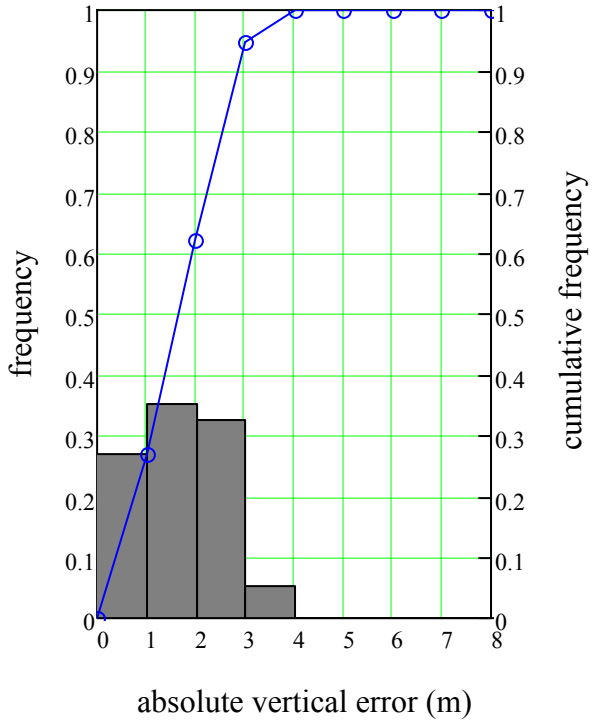
GeoEye-1 Stereo Vertical Accuracy: Statistics

N = 37 images
Avg(Height) = -1.2 m

LE90 = 2.7 m
RMS = 1.8 m





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