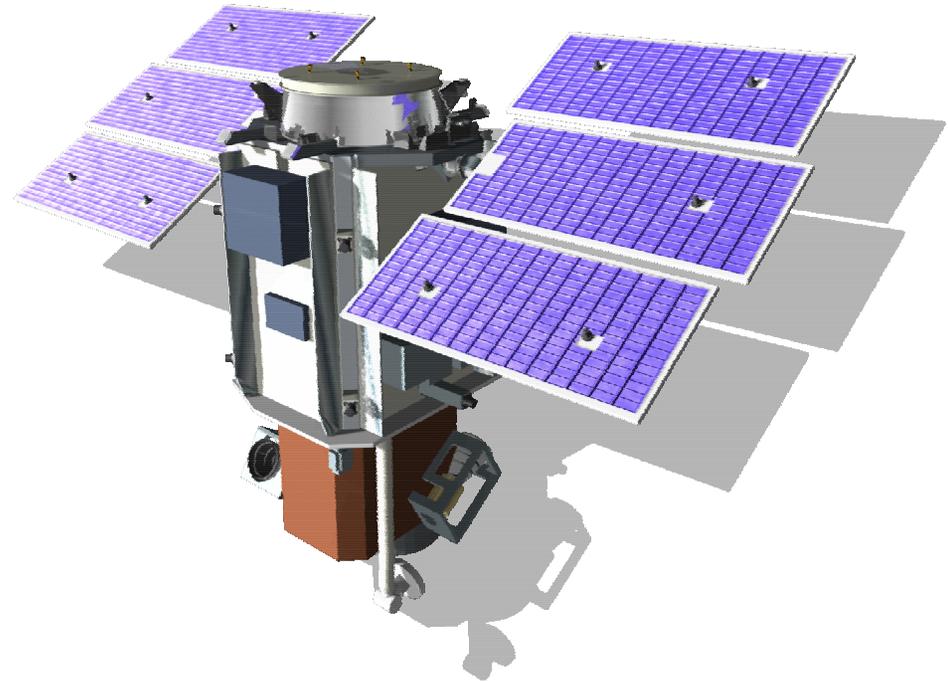


# QuickBird Imagery Products



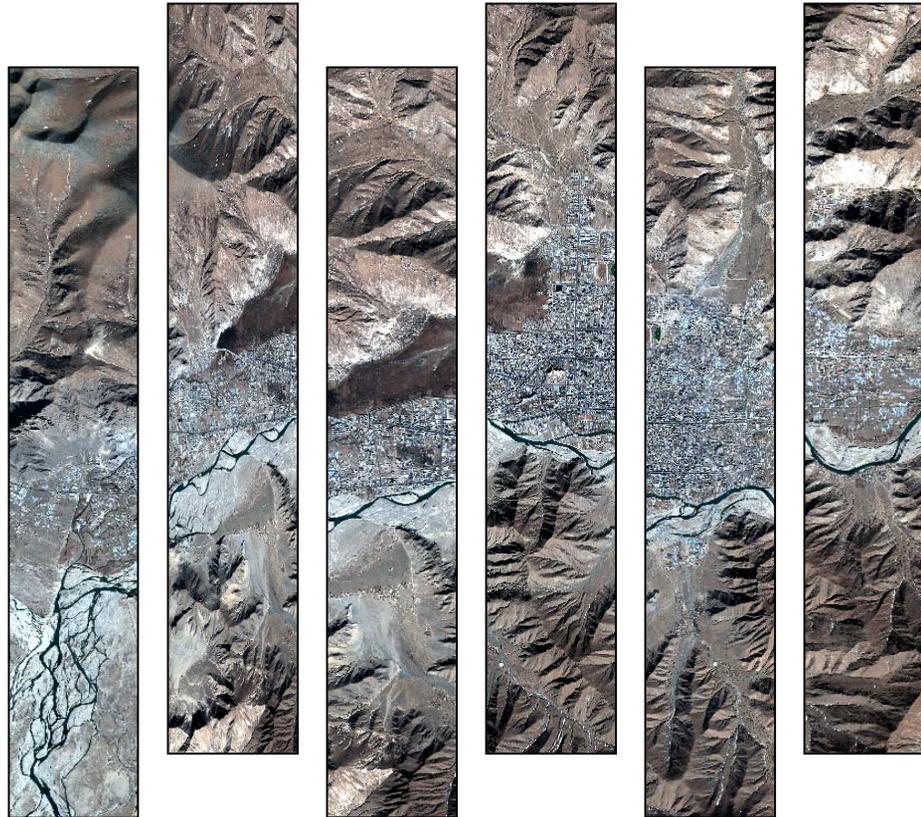
Jim Friedel

DigitalGlobe, Inc.

Senior Director, New Product Development

# QuickBird Raw Data

- Six individual images, each corresponding to a Detector Chip Assembly (DCA)



Lhasa, Tibet

# QuickBird Basic Imagery

- **Essentially “Raw” imagery**

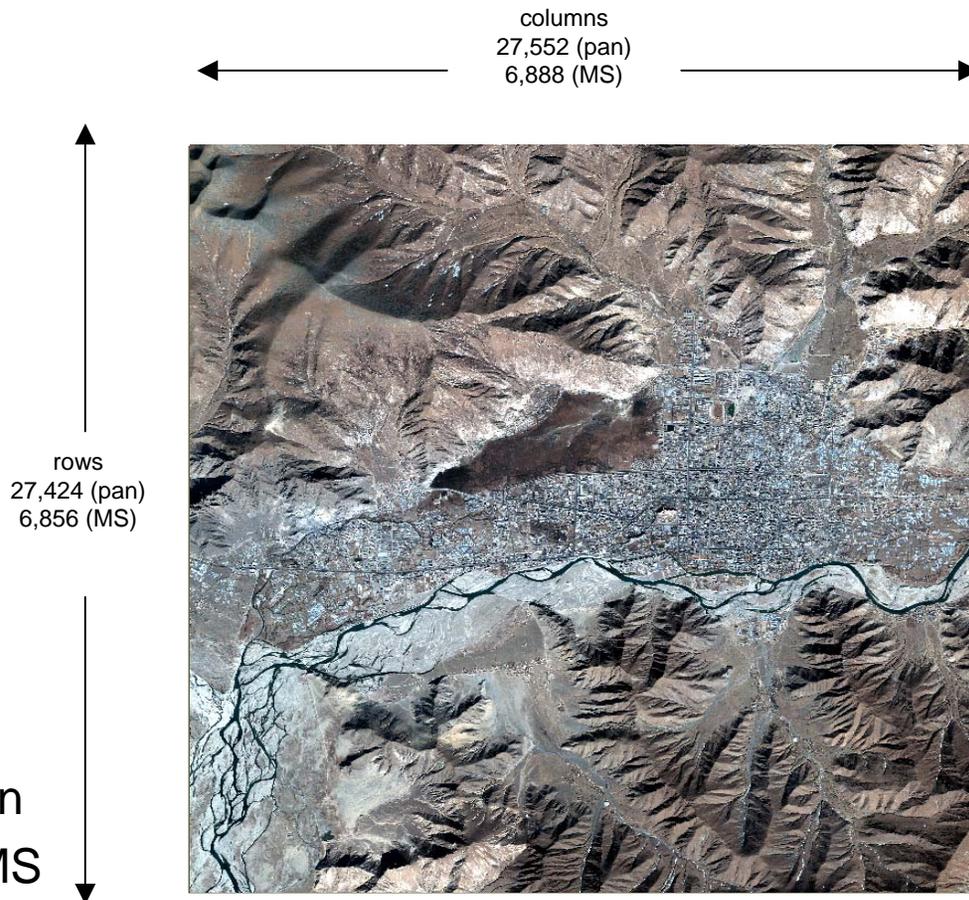
- Virtual Linear Array
  - Sensor corrections
  - No geometric corrections
  - Radiometric corrections

- **Product options**

- Full scene delivery
- Panchromatic, Multispectral or Bundle (Pan and MS)
- Pansharpening not available

- **GSD varies with off-nadir angle**

- 61-cm (nadir) to 72-cm (25°) Pan
- 2.44-m (nadir) to 2.88-m (25°) MS



Lhasa, Tibet

### Typical File Size

	Panchromatic	Multispectral
8 bit	800MB	200MB
16 bit	1.6GB	400MB

- Product use:
  - Orthorectifiable using COTS tools
    - Using supplied Image Support Data
      - No extra charge for Image Support Data
  - Orthorectification Methods
    - QuickBird Rigorous Model
    - RPCs
- Accuracy
  - Delivered in satellite frame of reference, no “implied” accuracy
  - 23m CE90%, excluding terrain displacement and viewing angle distortion, achievable using supplied Image Support Data
  - In practice, 3 to 10 m CE90% (2 to 6 m RMSE)  
using high quality DEM and GCPs (DTED 2, submeter GCPs)

# Standard Imagery

- **Geometrically corrected**
  - Radiometric corrections
  - Sensor corrections
  - Map projected
  - Corrected using coarse DEM
- **Product Options**
  - Customer defined area
    - Available by square kilometer
  - Panchromatic, Multispectral, Bundle (Pan and MS), or Pansharpened
- **Resampled to standard pixel spacing**
  - 60cm or 70cm for Pan or Pansharpened
  - 2.4m or 2.8m MS



Paris, France

## Typical File Size

		Pan 60-cm	MS 2.4-m	Pansharpened 60-cm (3 band)
64km <sup>2</sup>	8 bit	192MB	48MB	544MB
	16 bit	384MB	96MB	1.1GB
100km <sup>2</sup>	8 bit	300MB	75MB	850MB
	16 bit	600MB	150MB	1.7GB

# Standard Imagery (cont)

- Product use:
  - Low cost, worldwide availability, rectified imagery
  - Not Orthorectifiable “after the fact”
- Delivered Accuracy:
  - 23m CE90%, excluding terrain distortion and viewing geometry
  - There will be some distortion due to ‘coarse’ terrain model

Geography	Additional geospatial displacement due to terrain model (meters)	
	viewing angle up to 15°	viewing angle up to 25°
United States, Europe (not including United Kingdom), Russia, Asia, Middle East, India, Mexico, Central America, southern Canada, New Zealand	0 - 25	0 - 42
South America, Africa, United Kingdom, northern Canada, Australia, Greenland, Malaysia, Indonesia	0 - 78	0 - 136
Borneo, some parts of Bolivia, southern tip of South America (Chile and Argentina)	0 - 123	0 - 213
Antarctica	variable	variable

# Ortho Ready Standard Imagery

- **Geometrically corrected**
  - Same Corrections as Standard
  - Projected to fixed elevation (Ellipsoid or Base Elevation - no DEM)
- **Product Options**
  - Customer defined area (same as Standard)
  - Panchromatic, Multispectral, Bundle (Pan and MS) or Pansharpening (soon)
- **Resampled to standard pixel spacing**
  - 60cm or 70cm for Pan or Pansharpened
  - 2.4m or 2.8m MS



**Palm Island, Abu Dhabi**

# Ortho Ready Standard Imagery (cont)

- Product Use:
  - Orthorectifiable using COTS tools
    - RPCs supplied at no additional charge
  - Orthorectification Methods
    - RPCs only
      - Note: QuickBird sensor model cannot be used with Ortho Ready Standard Imagery
- Accuracy
  - As delivered, 23m CE90%, excluding terrain distortion and viewing geometry
  - Achievable Accuracy
    - 5 to 16 m CE90% (3 to 10 m RMSE), using high quality DEMs and GCPs (DTED 2, submeter GCPs)

# Orthorectified Imagery

- Ortho corrected
  - Radiometric corrections
  - Sensor corrections
  - Map projected
  - Topographic distortions removed
- Customer defined area
  - Available by square kilometer
- Resampled to standard pixel spacing
  - 60cm or 70cm for Pan or Pansharpener
  - 2.4m or 2.8m MS
- Available in standard map scales



**Mexico City, Mexico**

# Orthorectified Imagery (cont)

- Accuracy

Orthorectified Product Level	CE90%	RMSE	Geographic Availability
1:25,000	12.7 m	7.72 m	worldwide
1:12,000	10.2 m	6.2 m	US only
1:4800	4.06 m	2.47 m	US only
custom	variable	variable	worldwide

- Delivered Accuracy
  - As dictated by orthorectified product level
  - Current product offering – up to 2.5m RMSE
- Internal testing has achieved accuracies as good as 0.4m RMSE



Ottawa, Canada

# QuickBird Product Comparison

<b>Basic Imagery</b>	<ul style="list-style-type: none"><li>• Supports highest orthorectification accuracy, by end-user using Rigorous Model, or RPCs</li><li>• Customer has complete control of project</li><li>• Image Support Data delivered at no extra charge</li></ul>
<b>Standard Imagery</b>	<ul style="list-style-type: none"><li>• Georeferenced, coarse elevation correction</li><li>• GIS ready, area-based product</li><li>• No need for image support data or DEMs and GCPs</li></ul>
<b>Ortho Ready Standard Imagery</b>	<ul style="list-style-type: none"><li>• Georeferenced</li><li>• Designed to support area-based orthorectification</li><li>• Image Support Data, including RPCs, delivered at no extra charge</li></ul>
<b>Orthorectified Imagery</b>	<ul style="list-style-type: none"><li>• Available in many options: (1:25,000, 1:12,000, 1:4800, Custom)</li></ul>

# Software Partners

Partner	Software	Version	Support	Status
BAE Leica	 	Socet Set 4.4.1 4.4.1	RPC Rigorous	Available Available
PCI		Geomatica 8.2.1 8.2.2	RPC Rigorous	Available Available
Z/I Imaging		Image Station 4.2 4.2	RPC Rigorous	Available Available
Research Systems		ENVI 3.5 & 3.6 3.5 & 3.6	RPC Rigorous	Both available via 3 <sup>rd</sup> party plug-in (Mojave)
Leica		ERDAS Imagine 8.5.x 8.6	RPC Rigorous	Available End of July Expected
Sensor Systems		Remote View - PC 2.2.1	RPC Rigorous	Available In progress
Leica		AV Image Analysis	RPC Rigorous	End of July Expected End of July Expected
ER Mapping		ER Mapper	RPC Rigorous	In progress Not planned

# Recent Product Offerings

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- Mini-Basic Product
  - a full Basic Product area segmented into approximately 5 separate scenes, same widths as Basic
  - individual images able to be written to CDs, includes a tile map
  - individual RPCs, same accuracy capability as full Basic Product
  - Currently available to limited set of customers
  
- Basic Stereo Pair
  - in-track, same-pass capability - which eliminates problems due to radiometric, temporal or seasonal variations

# Recent Product Offerings

- 1:4800 QuickBird Orthorectified Imagery products (1"=400')
  - GIS-ready, cloud free mosaic product feature 2 foot resolution
  - panchromatic, with selection of projection and datum
  - currently 500 U.S. cities
  - ideal for creating and revising mapping and GIS databases, or for registering existing feature layers



1999 Orthophoto of new construction (not to scale)



2002 DigitalGlobe Orthorectified Imagery of the **same area** (not to scale)

