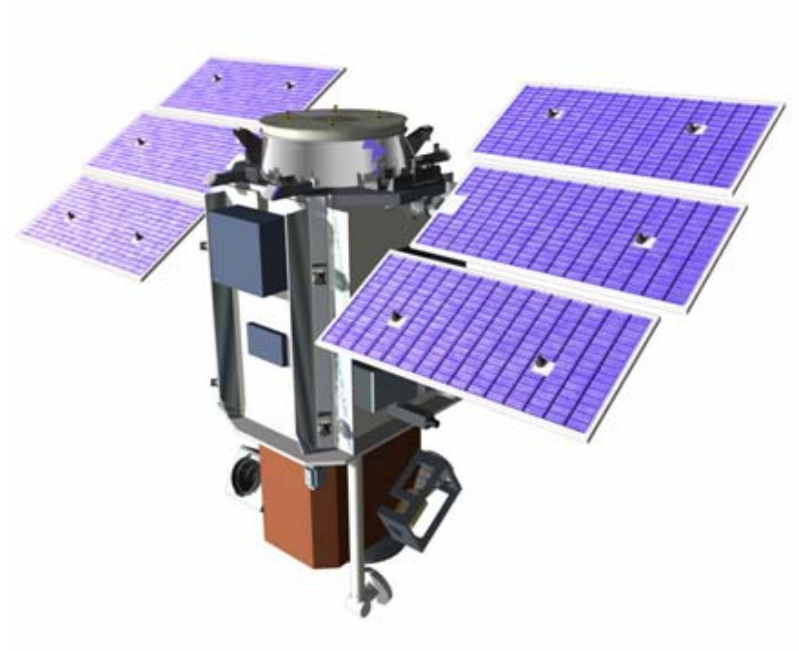


**DigitalGlobe Incorporated**  
**Civil Commercial Imagery Evaluation Workshop**  
**Corporate and System Update**  
**March 14, 2006**



DigitalGlobe operates  
the world's highest resolution  
commercial imaging satellite



**QuickBird !**

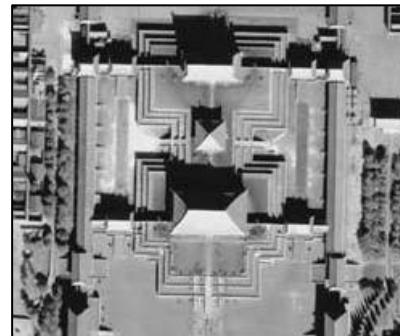
# QuickBird Specifications

- Launched Oct. 2001; Fully Operational Jan. 2002
- 60cm (2-foot) panchromatic resolution (at nadir)  
450-900 nm (grayscale)
- 2.44 meter multispectral resolution (at nadir)
  - 450-520 nm (blue)
  - 520-600 nm (green)
  - 630-690 nm (red)
  - 760-900 nm (near IR)
- 60cm (2-foot) digital color (natural or near-IR)
  - Image Detail Comparable to 1-foot film
- Collection capacity: 15 orbits/day; ~57 scenes/orbit;  
= ~27 million mi<sup>2</sup> (70 million km<sup>2</sup>) per year
- Large 10.3 x 10.3 mi (16.5 x 16.5 km) scene/footprint
- 11 bit dynamic range



# QuickBird Imagery Types

- Panchromatic
  - 60 Centimeter Resolution
  - 11-bit Dynamic Range
  - 450-900 nm Spectral Range
- Multispectral
  - 2.4 Meter Resolution
  - 11-bit Dynamic Range
  - 4 Spectral Bands
    - Blue: 450-520 nm
    - Green: 520-600 nm
    - Red: 630-690 nm
    - Near Infrared: 760-900 nm
- Pan-Sharpener (Fused)
  - 11-bit or 8-bit dynamic range
  - Natural Color (3 Bands)
  - Color Infrared (3 Bands)
  - 4 Bands



Forbidden City,  
Beijing, China



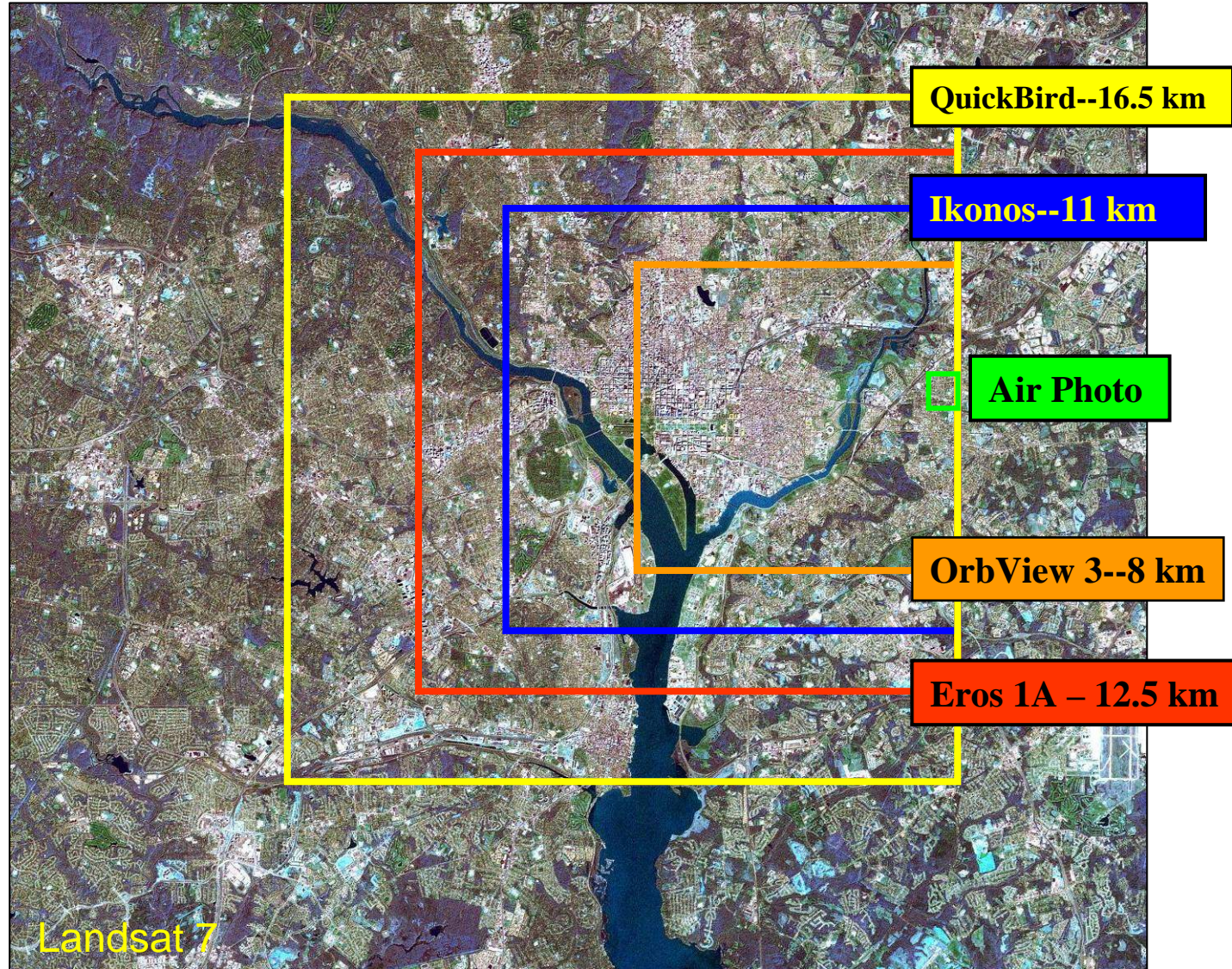
Port-au-Prince, Haiti



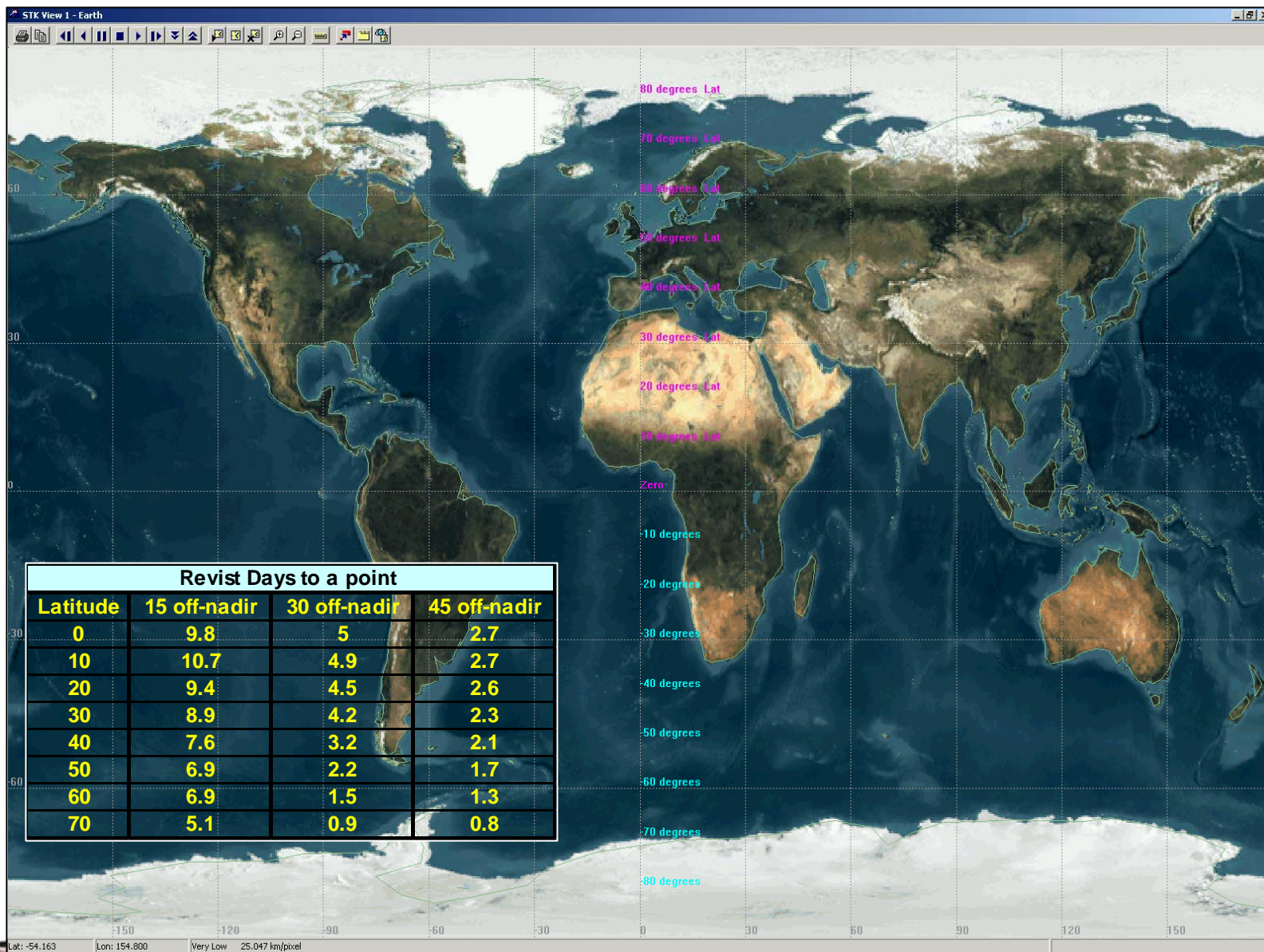
Abu Dhabi, UAE

# Large Imaging Footprint

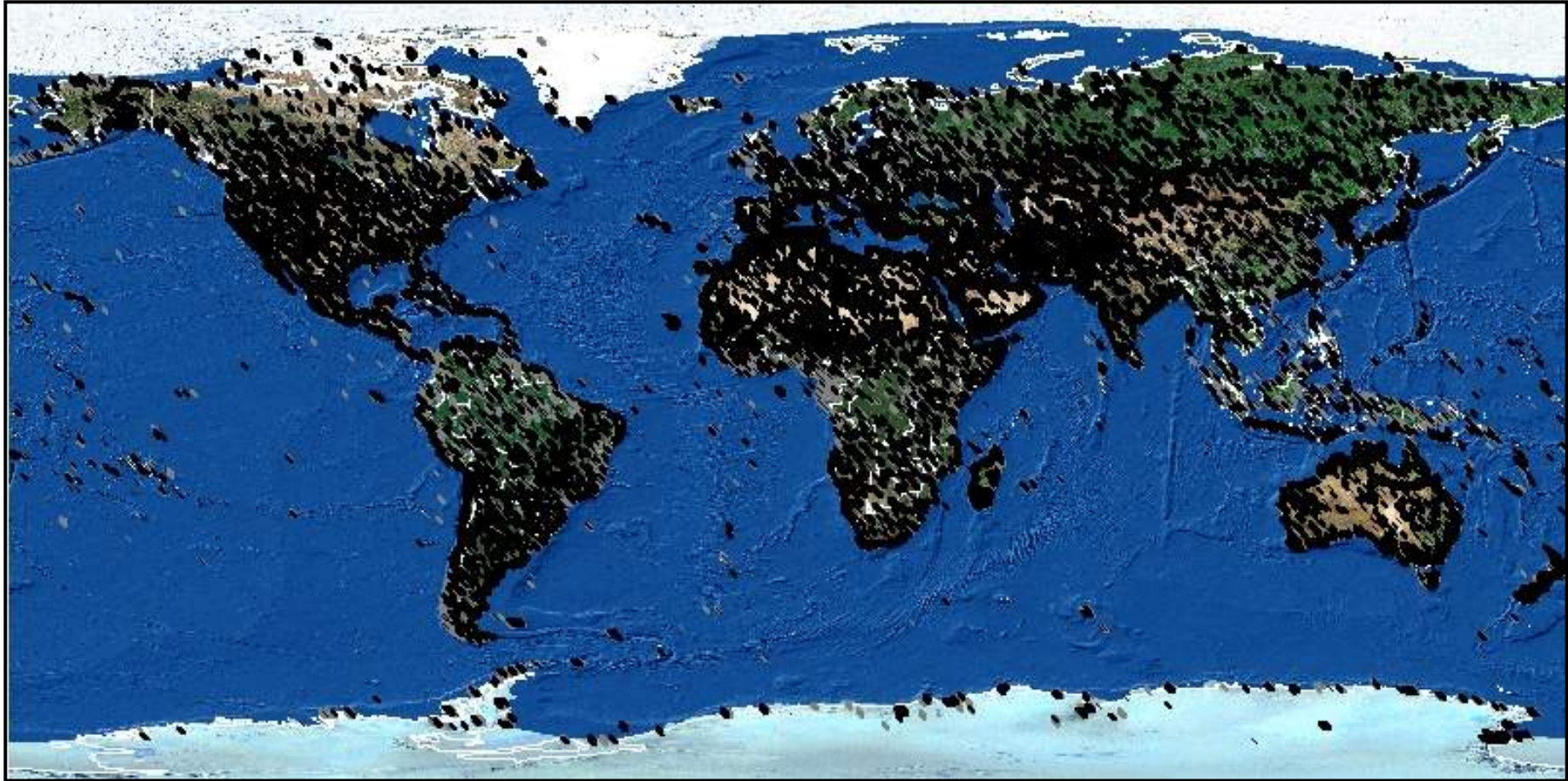
- More targets of interest per scene
- Builds Image Library faster
- Easier Image Mosaicking
- Fewer GCPs
- Faster large area collection



# QuickBird Satellite Revisit



# A Growing Imagery Library



- Currently Contains ~162,000,000 km<sup>2</sup> or ~596,000 QuickBird images
- Growing at a rate of 3,500 scenes per week
- 45 Percent Have Less Than 20 Percent Cloud Cover

# The On-Line Search Tool

DIGITALGLOBE  
CLEARLY THE BEST.
MAP TOOLS 
HIGHLIGHT TOOLS 
HELP ?

SET MAP VIEW ?

**Center Point:**  
-76.7 Lon 38.4 Lat

SEARCH CRITERIA ?

**Cloud Cover:**  
20% or less

**Image Quality:**  
50 - Fair or better

**Off Nadir Angle:**  
30 degrees or less

**Begin Date:**  
2002-01-19

**End Date:**  
2003-07-07

LAST 30 DAYS

SHOW ALL

DEFAULT CRITERIA

Server Load:  
**Moderate**

ENTIRE ARCHIVE
 HIGHLIGHT
 MEETS CRITERIA
 BASKET

SEARCH RESULTS

SHOPPING BASKET


BASKET	HIGHLIGHT	DETAILS	ACQUISITION DATE	CLOUD COVER	OFF-NADIR	QUALITY	CATALOG ID ↑
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-01-26	0%	7	90 - Excellent	1010010000175801
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	29	90 - Excellent	101001000018EB01
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	29	90 - Excellent	101001000018EB02
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	28	90 - Excellent	101001000018EB03
<input type="checkbox"/>	<input checked="" type="checkbox"/>	view	2002-02-08	0%	27	90 - Excellent	101001000018EB04
<input type="checkbox"/>	<input checked="" type="checkbox"/>	view	2002-02-08	0%	26	90 - Excellent	101001000018EB05
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	26	90 - Excellent	101001000018EB06
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	25	90 - Excellent	101001000018EB07
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	24	90 - Excellent	101001000018EB08
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	23	90 - Excellent	101001000018EB09
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-08	0%	23	90 - Excellent	101001000018EB0A
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-18	0%	14	90 - Excellent	101001000018FB01
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-02-26	0%	12	90 - Excellent	1010010000238601
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-21	0%	8	90 - Excellent	1010010000363301
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-21	0%	6	90 - Excellent	1010010000363302
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-21	0%	5	90 - Excellent	1010010000363303
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-21	0%	5	90 - Excellent	1010010000363304
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-21	0%	4	90 - Excellent	1010010000363305
<input type="checkbox"/>	<input type="checkbox"/>	view	2002-03-29	0%	15	90 - Excellent	10100100003C7601



# The On-Line Search Tool

DIGITALGLOBE  
CLEARLY THE BEST.
ARCHIVE SEARCH

Catalog ID: **10100100001BEB05** Acq Date: **08-Feb-2002 15:55:33GMT** Lat/Long: **38.91895° / -77.38992°**  
 Off Nadir Angle: **26°** Target Azimuth: **234°** Cloud Cover: **0%** Image Quality: **90**



**Washington Dulles International, United States**

To Order Call: 303-702-5561 or 800-496-1225  
 Email: [orders@digitalglobe.com](mailto:orders@digitalglobe.com)  
 Or Click Here To Find Your DigitalGlobe Reseller

©DigitalGlobe 2002. All Rights Reserved.

Image Metadata	
ACQUISITION DATE	2002-02-08
CLOUD COVER	0%
CATALOG ID	10100100001BEB05
PAN RESOLUTION	0.75 meters
MULTI RESOLUTION	2.98 meters
QUALITY	90 - Excellent
OFF-NADIR	26 degrees
STEREO PAIR ID	NONE

Image Location		
Vertex	Latitude	Longitude
southwest	38.8161	-77.507
northwest	38.9998	-77.509
northeast	39.0228	-77.27
southeast	38.8371	-77.272
center	38.919	-77.3895

Close

Image Metadata	
ACQUISITION DATE	2002-02-08
CLOUD COVER	0%
CATALOG ID	10100100001BEB05
PAN RESOLUTION	0.75 meters
MULTI RESOLUTION	2.98 meters
QUALITY	90 - Excellent
OFF-NADIR	26 degrees
STEREO PAIR ID	NONE

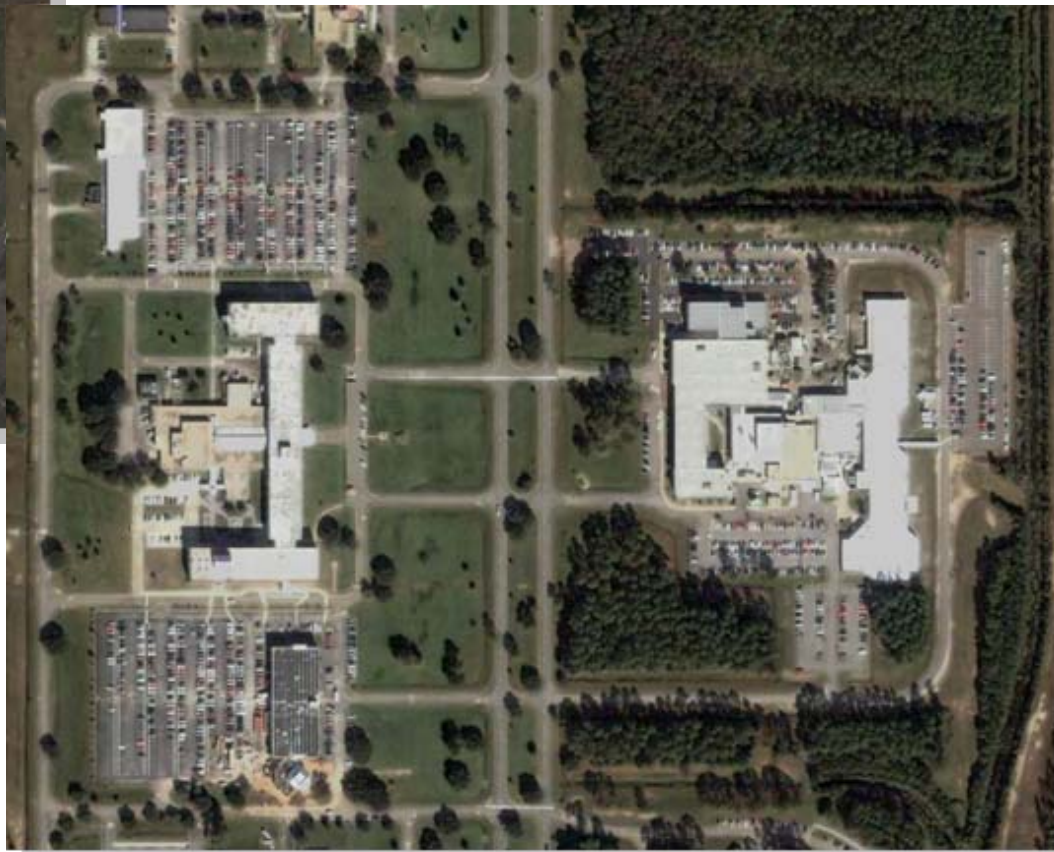
Image Location		
Vertex	Latitude	Longitude
southwest	38.8161	-77.507
northwest	38.9998	-77.509
northeast	39.0228	-77.27
southeast	38.8371	-77.272
center	38.919	-77.3895

Close



2-foot Resolution Natural Color  
QuickBird Imagery  
1:20,000

2-foot Resolution Natural Color  
QuickBird Imagery  
1:2,000



# ***Aftermath of Hurricane Katrina: New Orleans, LA September 3, 2005***



**A Plea for Help: Downtown  
New Orleans**



**Louisiana Superdome**



**Metairie, LA: Rescue  
Staging Base at Zephyr Field**

# Rescue Operations Underway



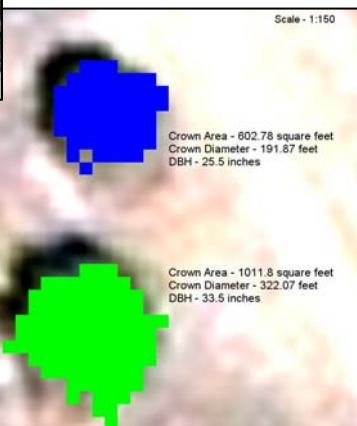
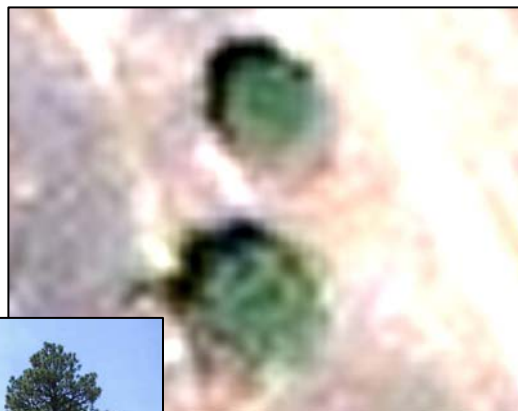
# 17<sup>th</sup> Street Canal: Levee Repairs



QuickBird Natural Color Image  
September 3, 2005

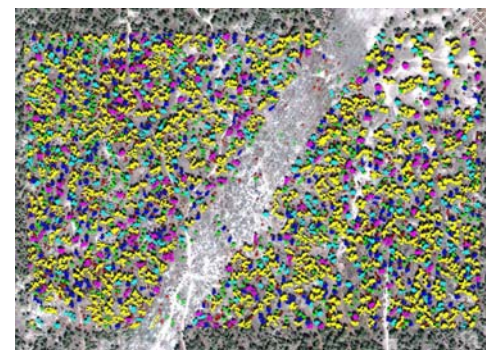
- Base Mapping
  - For virtually ALL applications, rapid response and long term planning
- Environmental Assessment
  - Landcover III, Wetlands, Land Classification and Management, and Sensitive Areas
- Disaster and Emergency Response, Planning & Mitigation
- Water and Waste Water Management
- Watershed Master Planning and Management
- DOQQ Updating
- Environmental Monitoring
- Tax Assessment
- Parcel Mapping
- Transportation (Corridor Planning and Mapping, etc.) Apps
- Natural Resource ([Forestry](#), Agriculture, etc.) Applications

- Forested/non-forested classification
- Fire/Pest Damage Monitoring and Assessment
- Crown mapping
- Species identification
- Health assessment
- Individual Tree Count
- Inventory assessment
- Stem diameter (volume) estimates
- Timber density
- Canopy closure
- Open space measurements
- Stand delineation
- Commercial operation infrastructure



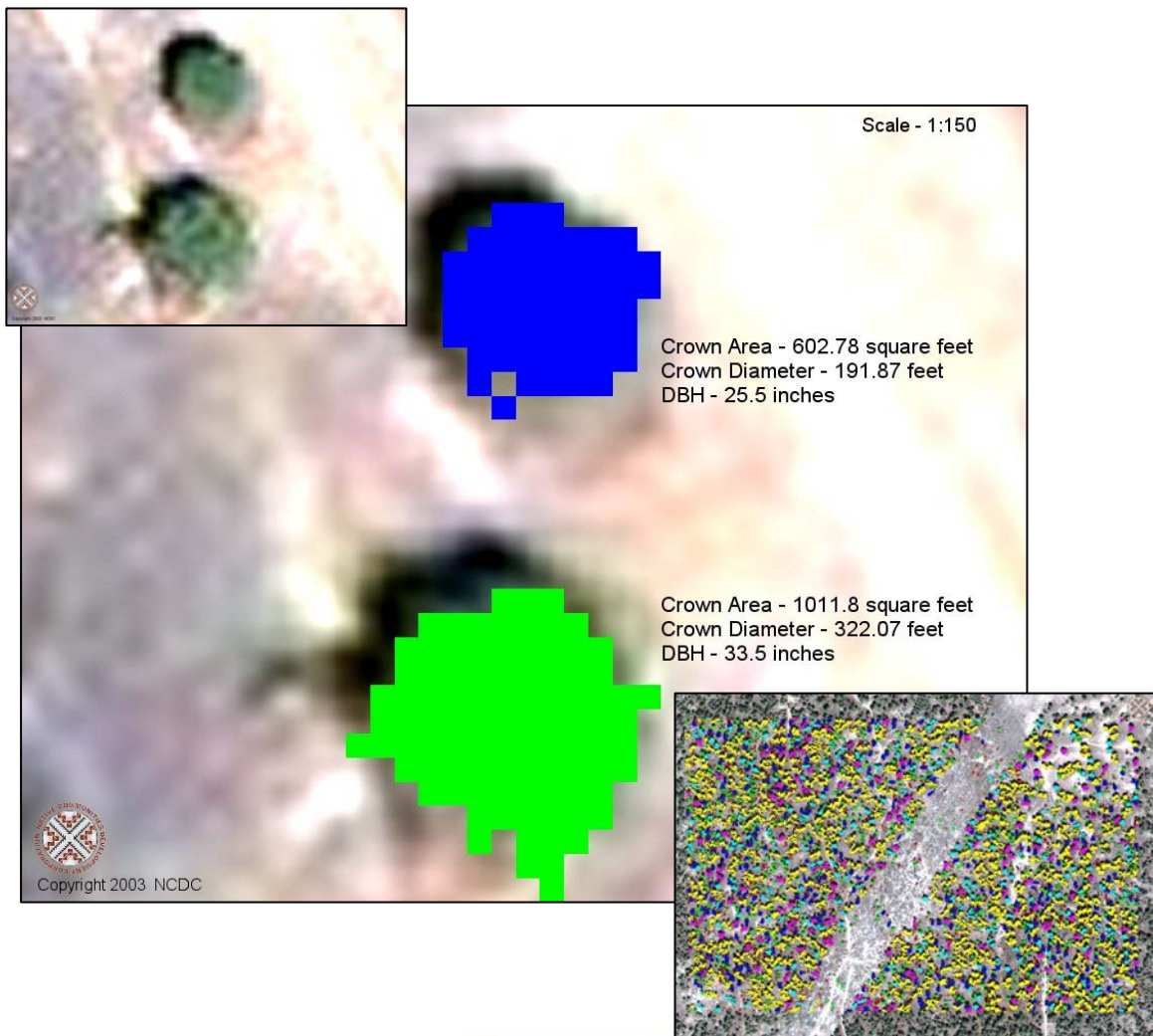
**Crown Mapping with Ground Verified Diameter Breast Height Data**

- Crown maps derived from high resolution imagery provide the basis for most automated and semi-automated forest assessment applications.
- 60 cm imagery represents an optimum resolution feature recognition as applied to forest resource assessment
- Individual crowns may be derived from crown maps and classified according to size and species



**Crown mapping with four size classification based on crown diameter and ground verified sample data**

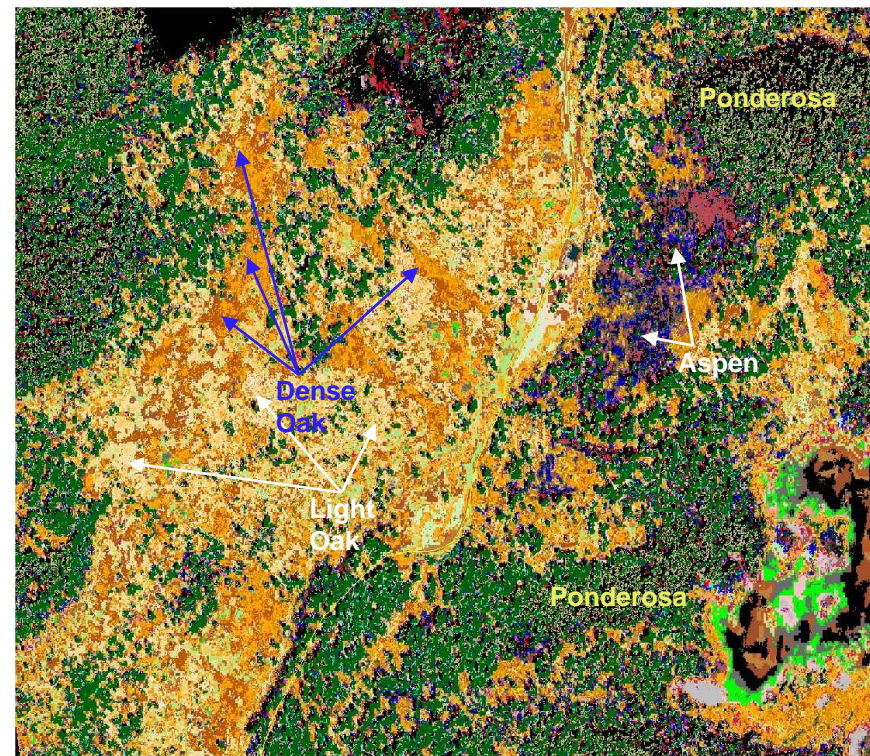
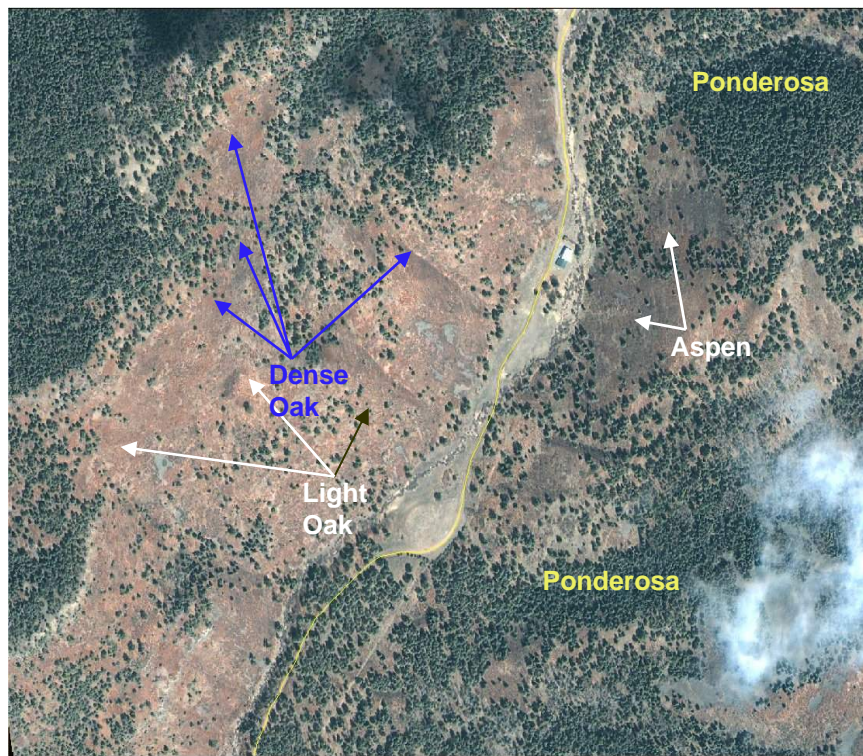




- Tree diameter, or Diameter at Breast Height (DBH), is inferred from size of Crown area.
- DBH is an important component in determining timber volume in a given stand

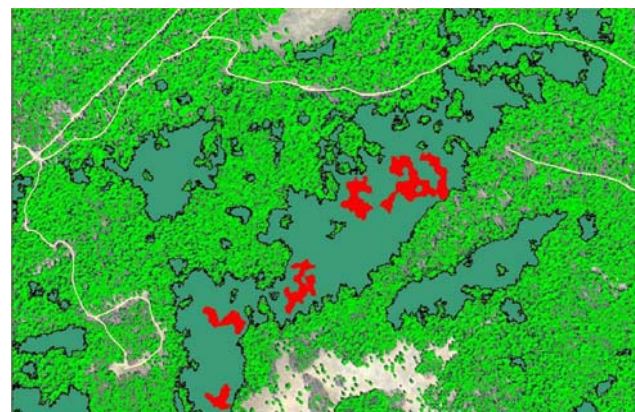
# Species Classification

- QuickBird 2.4m, 4-band multispectral data provides the spectral depth necessary for species-level classification



- **Forest composition maps are derived from canopy density analyses**
- **Based on crown size and degree of canopy closure**
- **Direct application for mapping thinning projects or fire risk assessment zone maps**

Timber Density Mapping



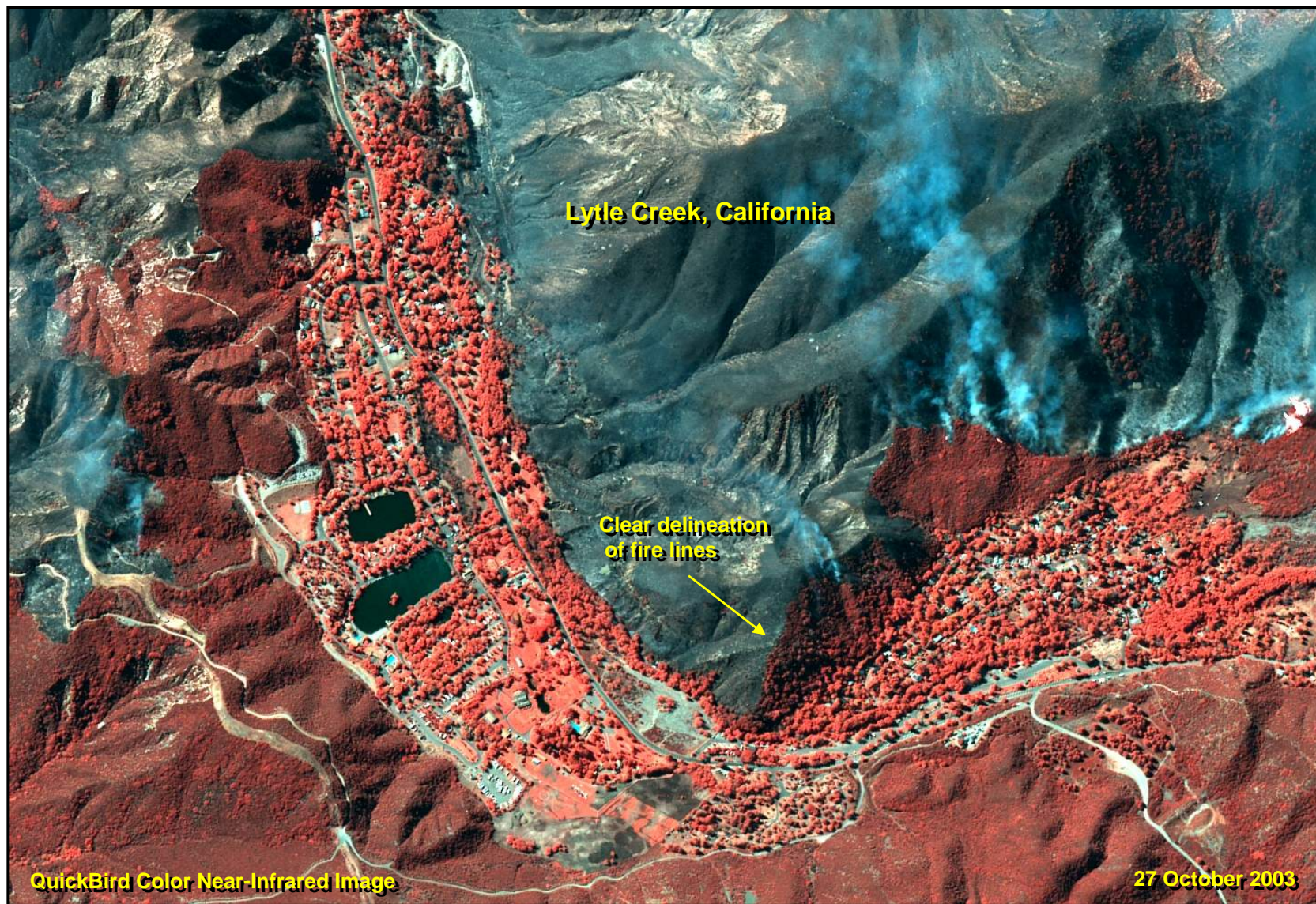
High density larger diameter stands in dark green and high density smaller diameter stands in red with moderate to low density timber illustrated in bright green as minimum tree units.

# Grand Prix Fire, California

DIGITALGLOBE™



# Grand Prix Fire, California



# 1-Foot Resolution Traditional Orthophoto vs. 2-Foot Resolution QuickBird Orthoimage



1-Foot Traditional Orthophoto



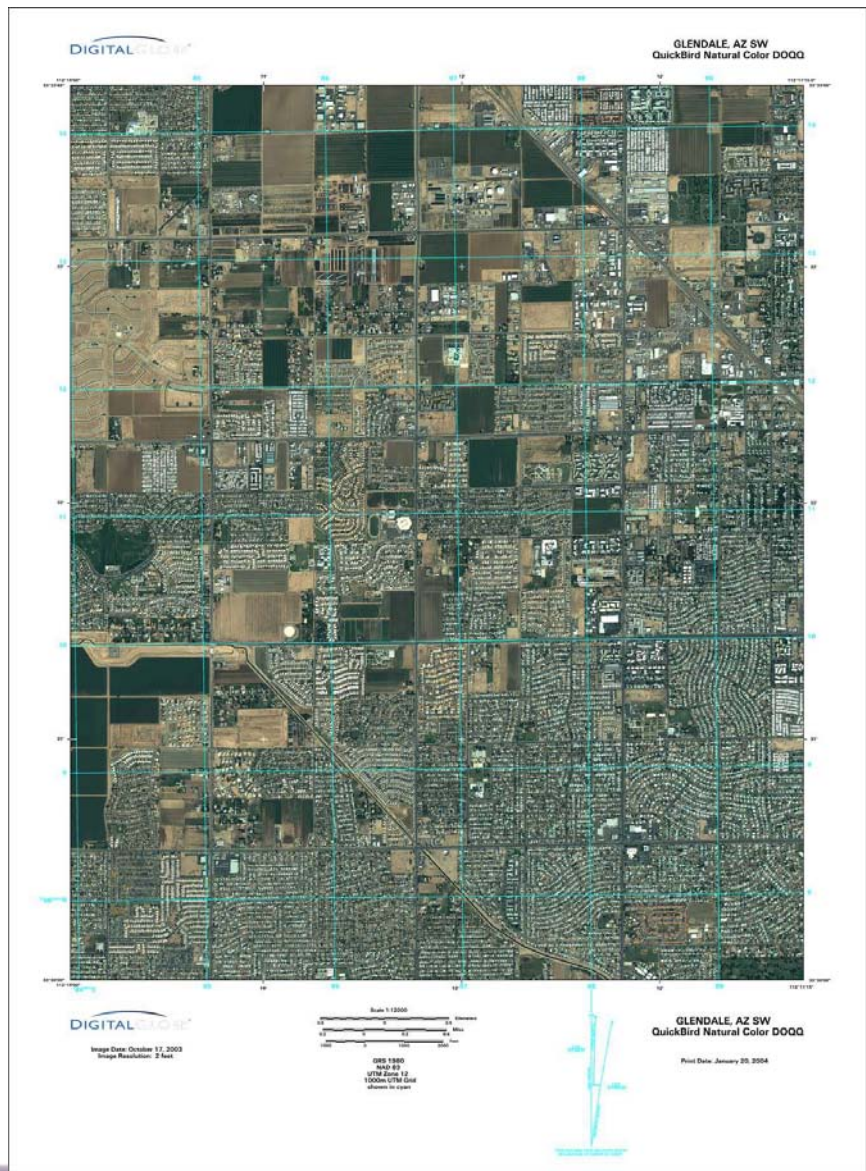
2-Foot QuickBird Orthoimage

## QuickBird Dynamic DOQQ Specifications

- Same naming conventions and image footprint as USGS DOQQs
- Offered at 2-foot or 1m GSD
- B&W, Natural Color, CIR, 4-band options
- Overlap options of 0 & 300 meters
- Cloud-Free & Snow Free
- Edge matched as required
- Accurate to 1:12,000 scale (6.2m RMSE)
- FGDC Metadata Compliant
- 8 or 16 bit dynamic range
- State plane, geographic or UTM projections available
- As low as \$399/DOQQ

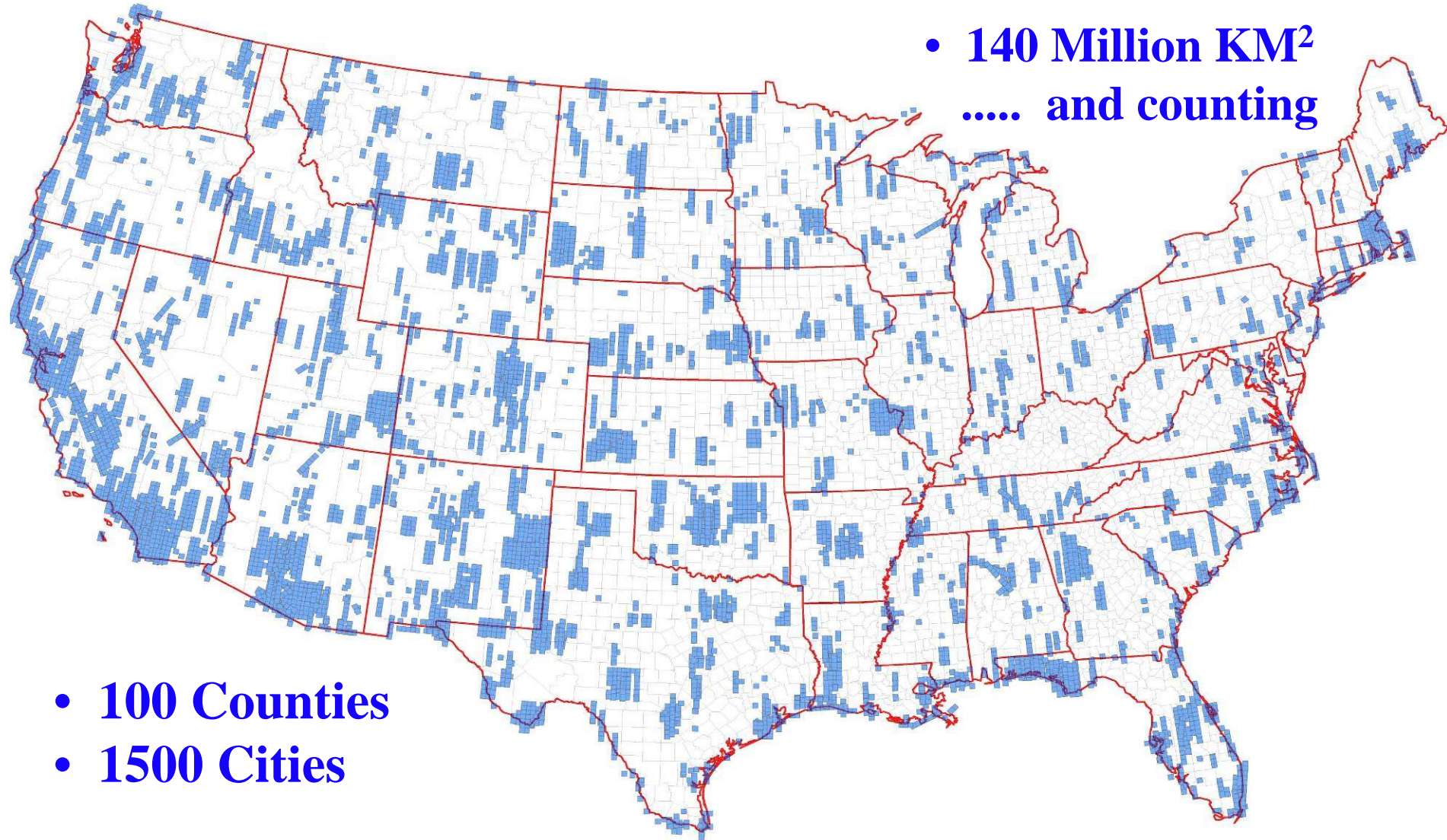
DigitalGlobe Dynamic DOQQ

2-Foot Natural Color



- 140 Million KM<sup>2</sup>  
..... and counting

- 100 Counties
- 1500 Cities







# DigitalGlobe DOQQ, 2-foot, Color



- CitySphere™
  - Current off-the-shelf orthomosaics of high resolution QuickBird imagery for 200 pre-selected cities worldwide



CitySphere  
Madrid

- Pre-selected 200 Worldwide Cities
  - ~50 US and ~150 International
- GIS-ready imagery
  - High Resolution QuickBird data – 60 cm (2 foot) resolution
  - Accurate – 1:4800 orthomosaics
- Two Product Options
  - **Basemap GIS** - Color (RGB), 8 bit
  - **Basemap Advanced** – 4 band (NRGB), 16 bit
- Repeatable, Consistent Coverage
  - Each city will be updated every year
  - Imagery no older than 24 months

## International

City Name	Country
Amman	Jordan
Athens	Greece
Baghdad	Iraq
Barcelona	Spain
Basra	Iraq
Belgrade	Serbia and Montenegro
Belo Horizonte	Brazil
Brasilia	Brazil
Brisbane	Australia
Canberra	Australia
Cape Town	South Africa
Casablanca	Morocco
Durban	South Africa
Fortaleza	Brazil
Guadalajara	Mexico
Istanbul	Turkey
Karachi	Pakistan
Lima	Peru
Lisbon	Portugal
Madrid	Spain
Naples	Italy
Perth	Australia
Reval	Estonia
Rio de Janeiro	Brazil
Rome	Italy
San Salvador	El Salvador
Santiago	Chile
Santo Domingo	Dominican Republic
Skopje	Macedonia
Tunis	Tunisia
Windhoek	Nambia

## North America

City Name	Country
Aguas Calientes	Mexico
Albuquerque	USA
Anchorage	USA
Atlanta	USA
Austin	USA
Boise	USA
Charlotte	USA
Colorado Springs	USA
Fairbanks	USA
Guadalajara	Mexico
Halifax	Canada
Helena	USA
Honolulu	USA
Las Vegas	USA
Los Angeles	USA
Oakland	USA
Oklahoma City	USA
Orlando	USA
Portland	USA
Quebec	Canada
Regina	Canada
San Antonio	USA
San Francisco	USA
San Jose, California	USA
Saskatoon	Canada
Spokane	USA
Tucson	USA
Vancouver	Canada
Winnipeg	Canada

- Most cities currently available
- All 200 cities will be available by May 2006
- New cities will be released every month
- See [www.digitalglobe.com](http://www.digitalglobe.com) for updates

# CitySphere Product Example

DIGITALGLOBE™



**Downtown San Francisco**

A View Into DigitalGlobe's Next Generation System

- Better Resolution
- Better Collection Capacity
- Better Revisit

Teaming with:

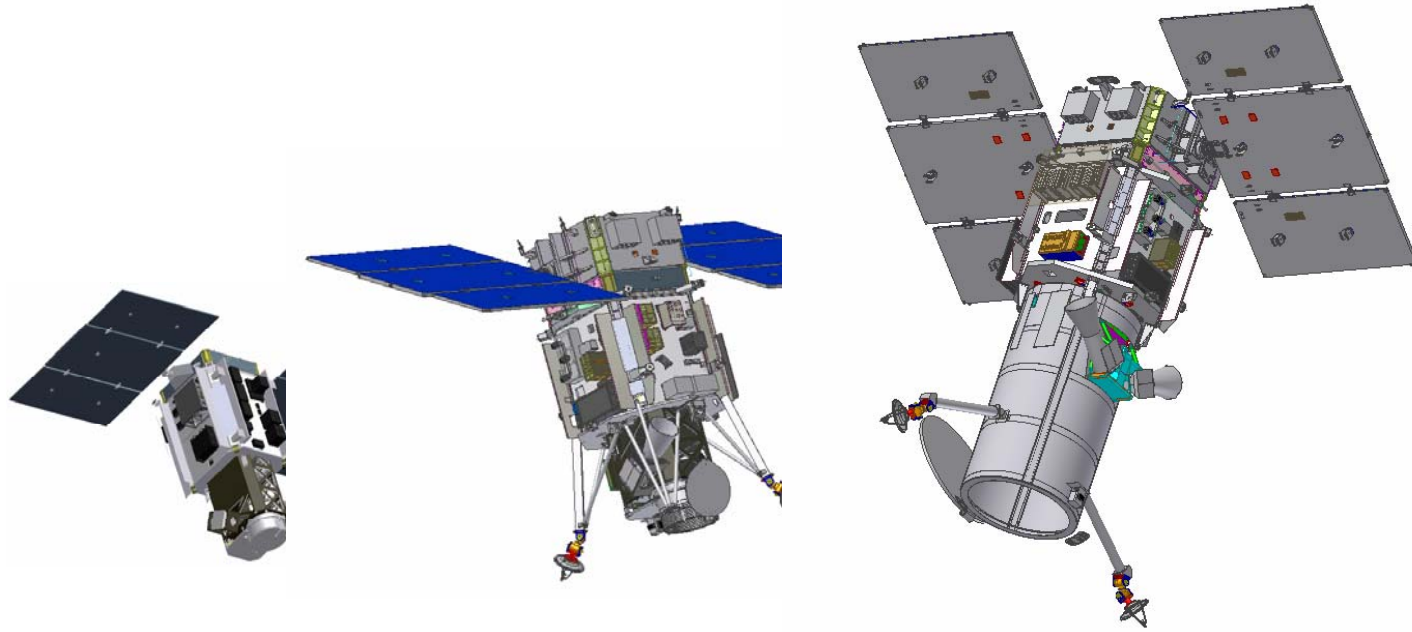
BAE SYSTEMS  
AERO-METRIC  
Ball Aerospace  
Boeing  
EarthData  
ESRI  
Harris  
IBM  
InSequence  
Kodak  
SPOT

DIGITALGLOBE  
CLEARLY THE BEST

# WorldView

## DigitalGlobe's Next Generation Satellite System

# DigitalGlobe Satellite Comparison



QuickBird

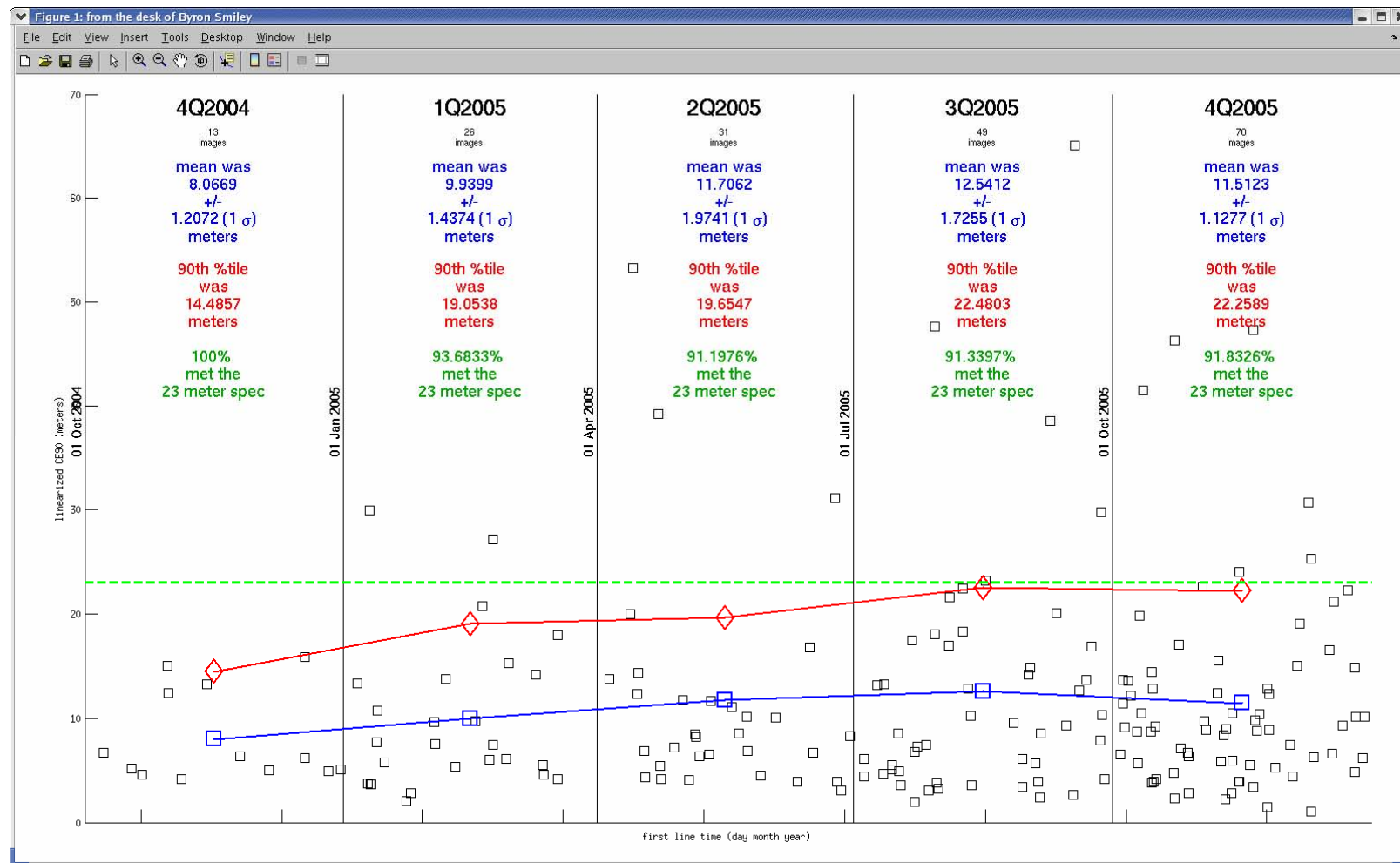
WorldView-60

WorldView-110

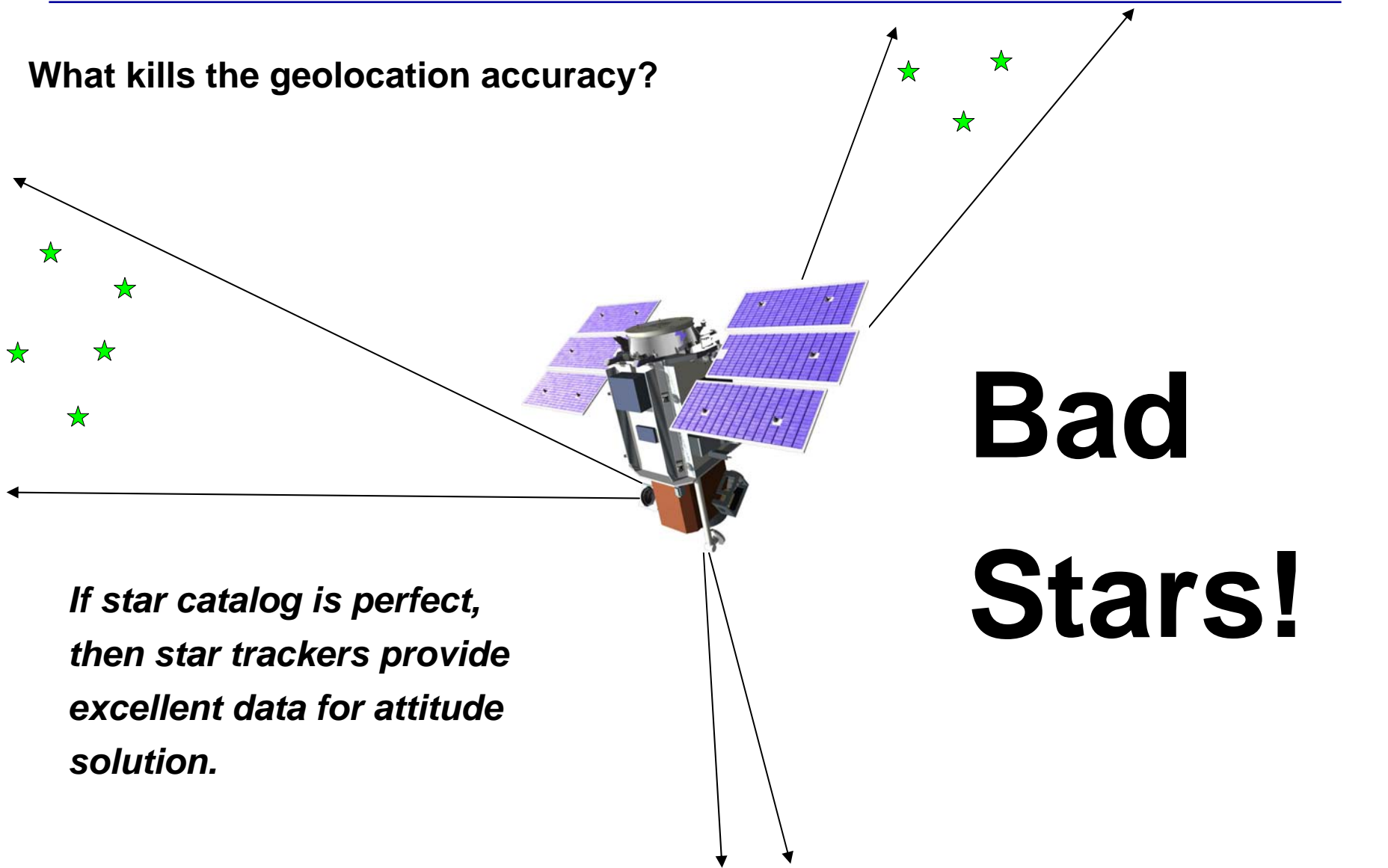
Operational Altitude	450 km	450 km	770 km
Weight Class	2000 lbs	5700 lbs	5700 lbs
Pan / MS GSD (nadir)	0.6 / 2.4 m	0.5 / 2.0 m	0.5 / 2.0 m
Standalone CE90 (avg / max)	13 m / 23 m	7 m / 9 m	11 m / 14 m
Avg revisit at 1m resolution (40 deg latitude target)	2.5 days	1.7 days	1 day
Swath width	16.5 km	16 km	16 km
Monoscopic area capacity	1 X	> 3.5 X	
Single-Pass Mono Area Coverage (scenes)	1 x 10 (< 30 deg off nadir)	4 x 4 (< 40 deg off nadir) 1 x 10 (< 40 deg off nadir)	
Single-Pass Stereo Area Coverage (scenes)	1 x 1 (< 10 deg off nadir)	2 x 2 (< 30 deg off nadir) 1 x 10 (< 30 deg off nadir)	
Attitude Control	Reaction Wheels	Control Moment Gyros	
Onboard Storage	128 Gbits	1600 Gbits	
Wideband Link Rate	320 Mbps	800 Mbps	



The CE90s of recent QB imagery have gotten uncomfortably close to our 23 meter spec.  
*some absolute geolocation accuracy statistics:*



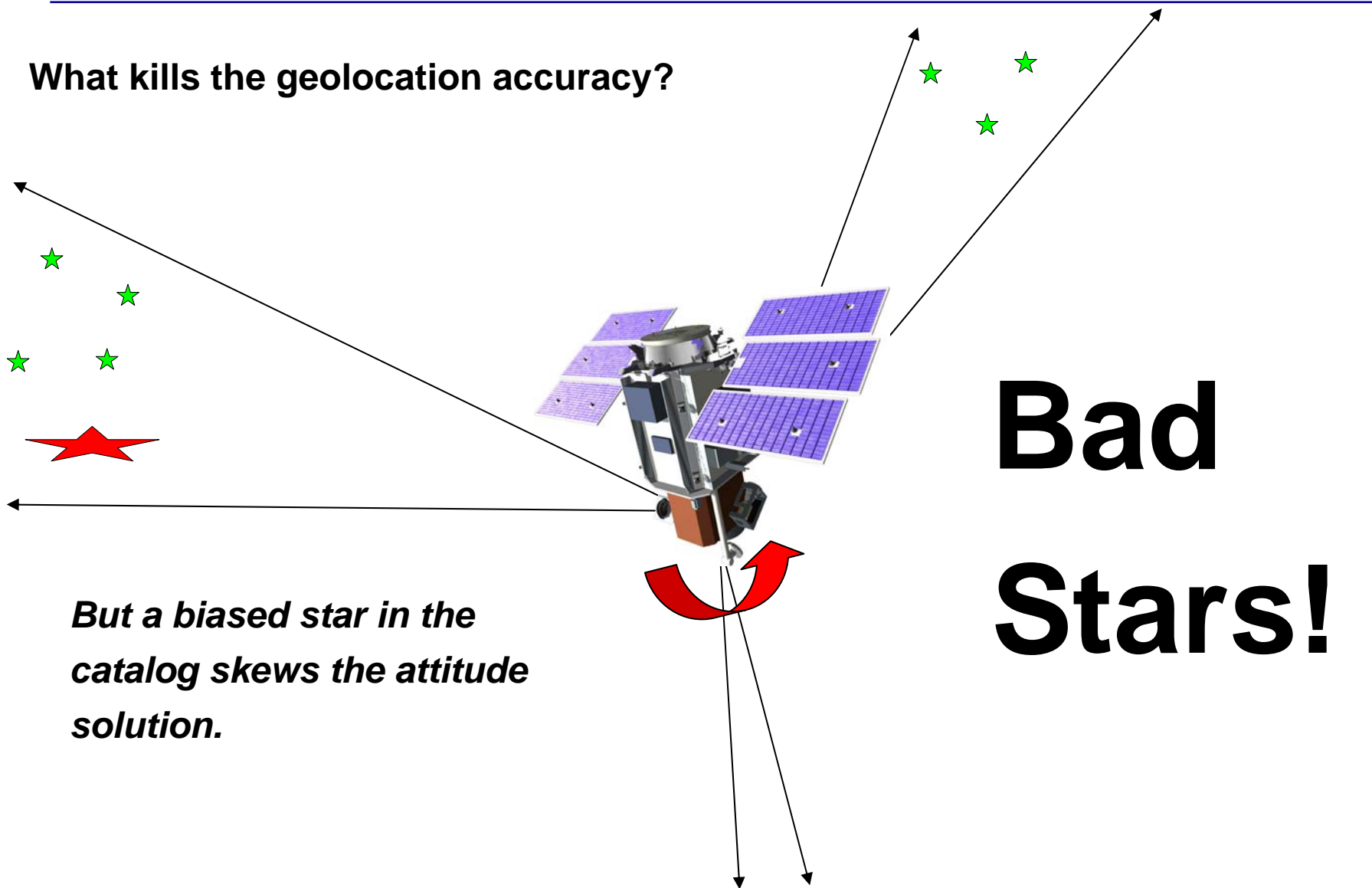
What kills the geolocation accuracy?



*If star catalog is perfect,  
then star trackers provide  
excellent data for attitude  
solution.*

# Bad Stars!

What kills the geolocation accuracy?



# Bad Stars!

*But a biased star in the catalog skews the attitude solution.*

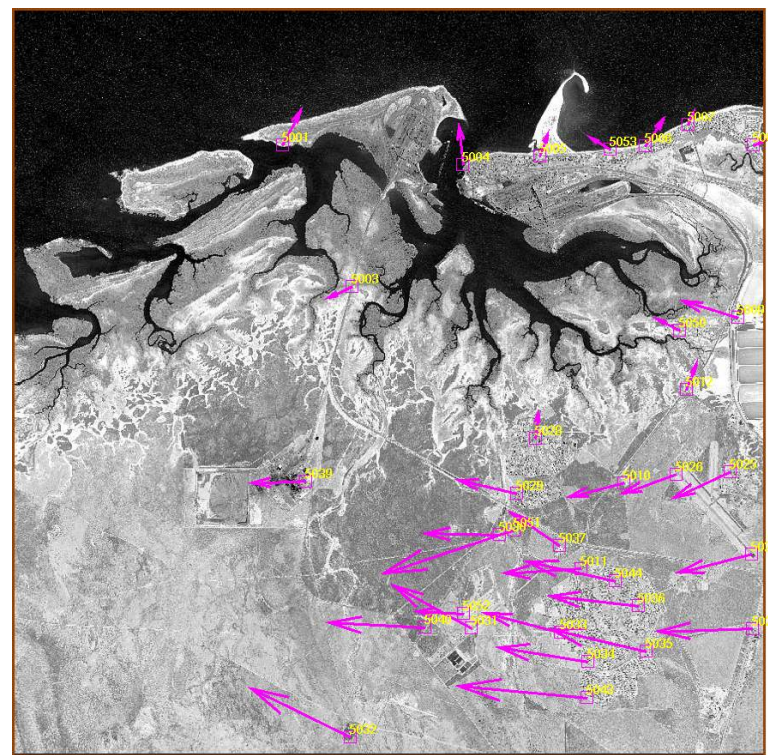
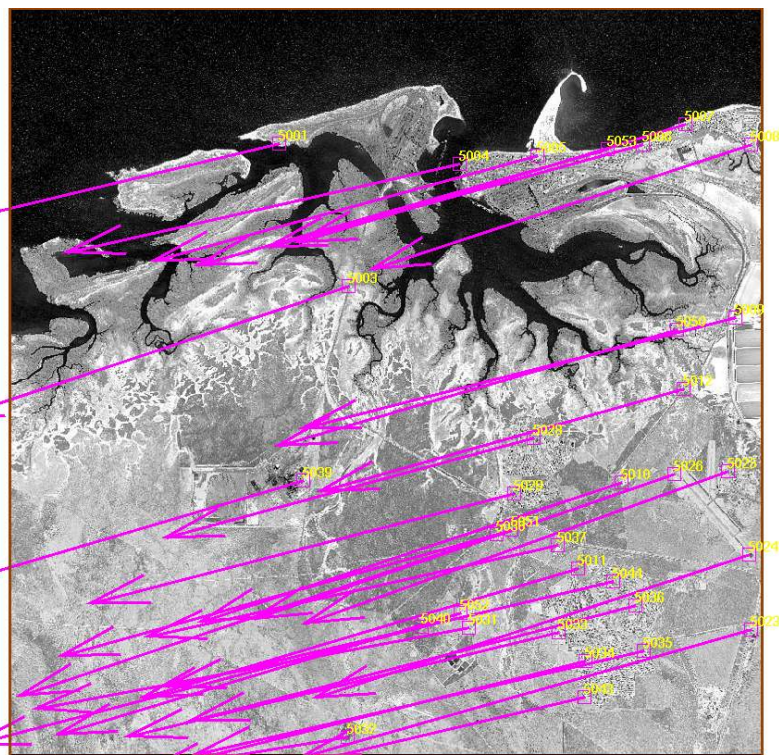
Can it be fixed? Absolutely! Just reprocess the attitude...

## Port Hedland, Australia

4 Aug 2005 02:37 UTM

adp216, current

adp40, experimental



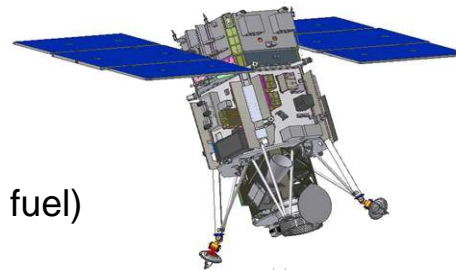
CE90: 16.97 meters

CE90: 3.53 meters

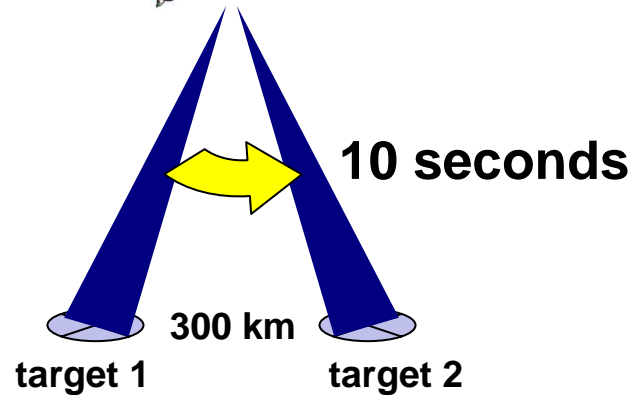
- Accuracy
  - Standalone max CE90 roughly twice as good as QuickBird
  - Accuracy Transfer improves standalone accuracy significantly (demonstrated better than 6 meter CE90 in testing with QuickBird; WorldView will be better given higher quality gyros)
- Revisit
  - Daily revisit at 1 meter resolution or better
  - Much better chance of collection in high cloud regions
- Area collection capacity + storage + downlink data rate
  - Over 3.5x the total capacity of QuickBird, so faster collection
- Agility (10x QuickBird) + altitude (1.7x QuickBird)
  - MUCH greater local collection capacity
  - MUCH greater capacity to collect competing orders within the same region
  - MUCH faster collection of orders in high competition areas

## WorldView-1

Control Moment Gyros  
Large Propulsion System (>7 yrs fuel)  
2 Single Axis Solar Array Wings  
Large Ni-H Battery  
Star Tracker, SIRU, GPS

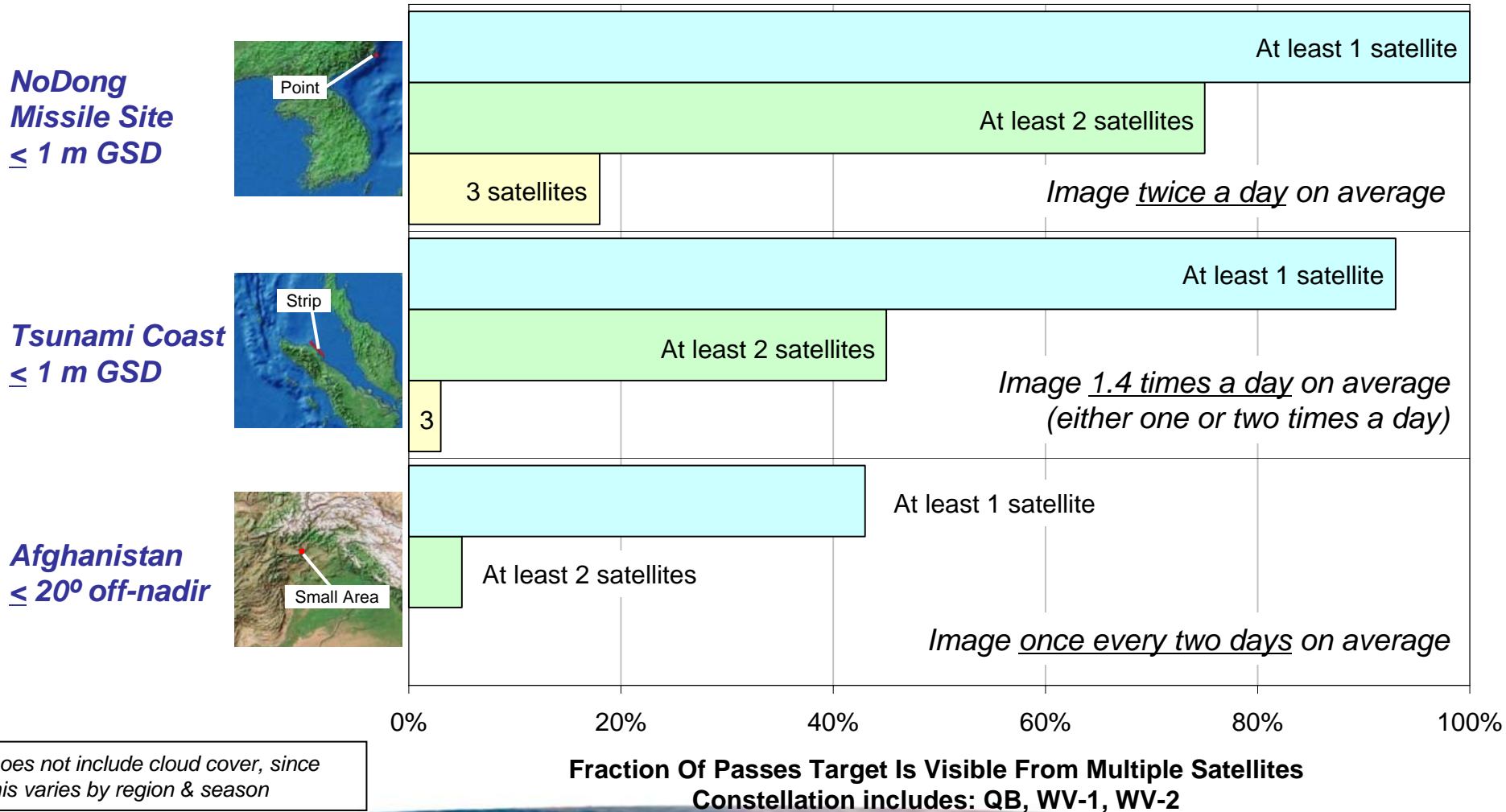


WV-60 Telescope (60cm Aperture)  
Pan only, Dual Direction FPA  
2 Terabit Recorder  
800 Mbps Downlink

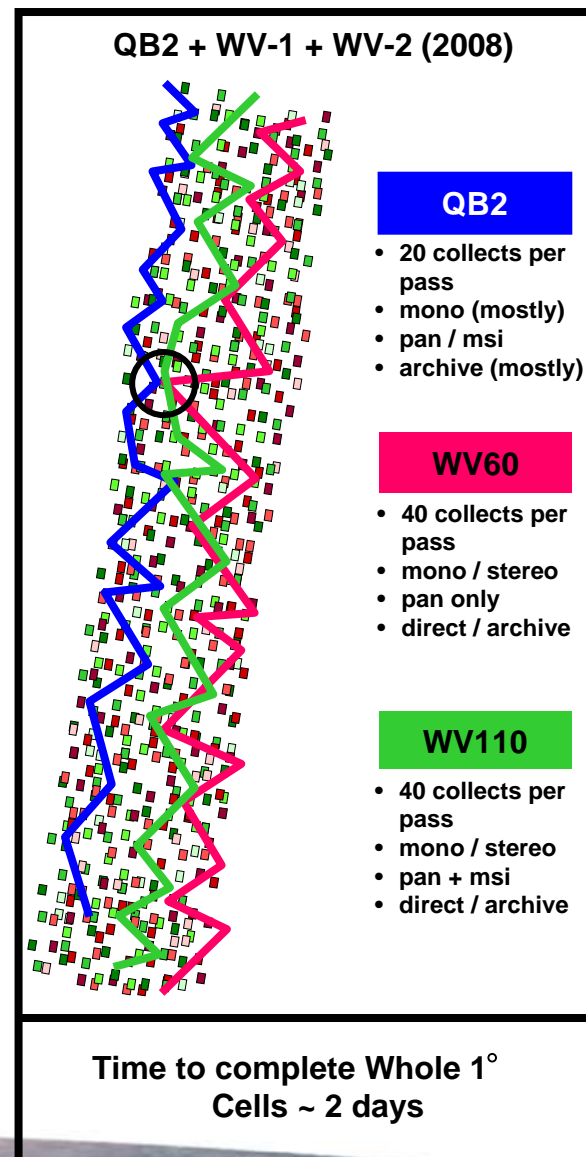
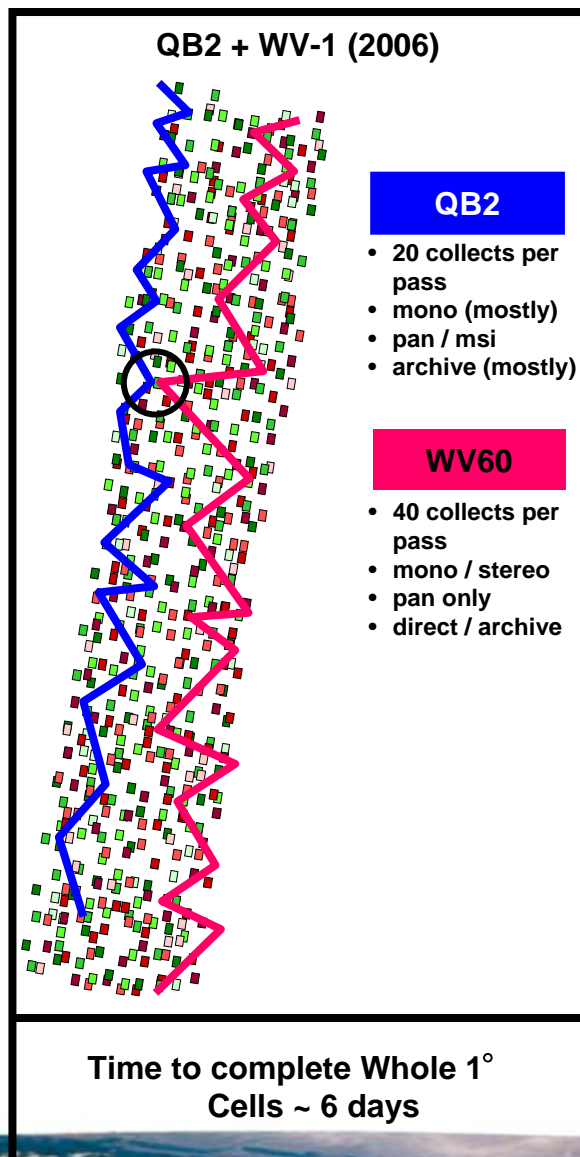
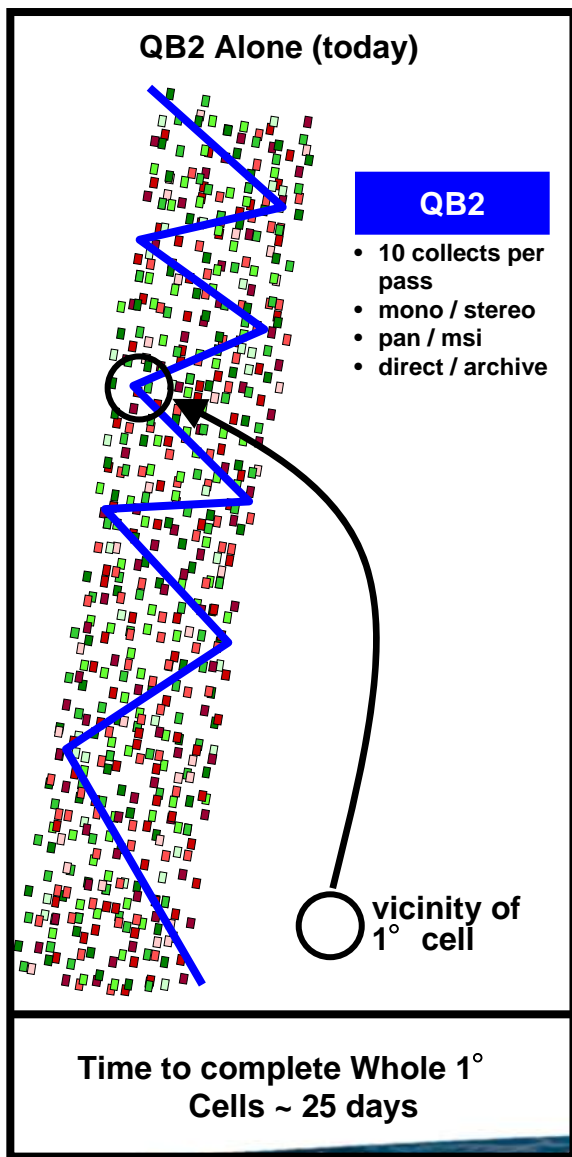


For typical target separations, WorldView slew time is  
**2 to 3 times faster** than the next highest performing system

# WorldView Constellation (QB, WV-1, WV-2) Offers Many Same-Day Imaging Opportunities For A Variety Of Scenarios



# Efficient Constellation Tasking Means Quicker Order Fulfillment

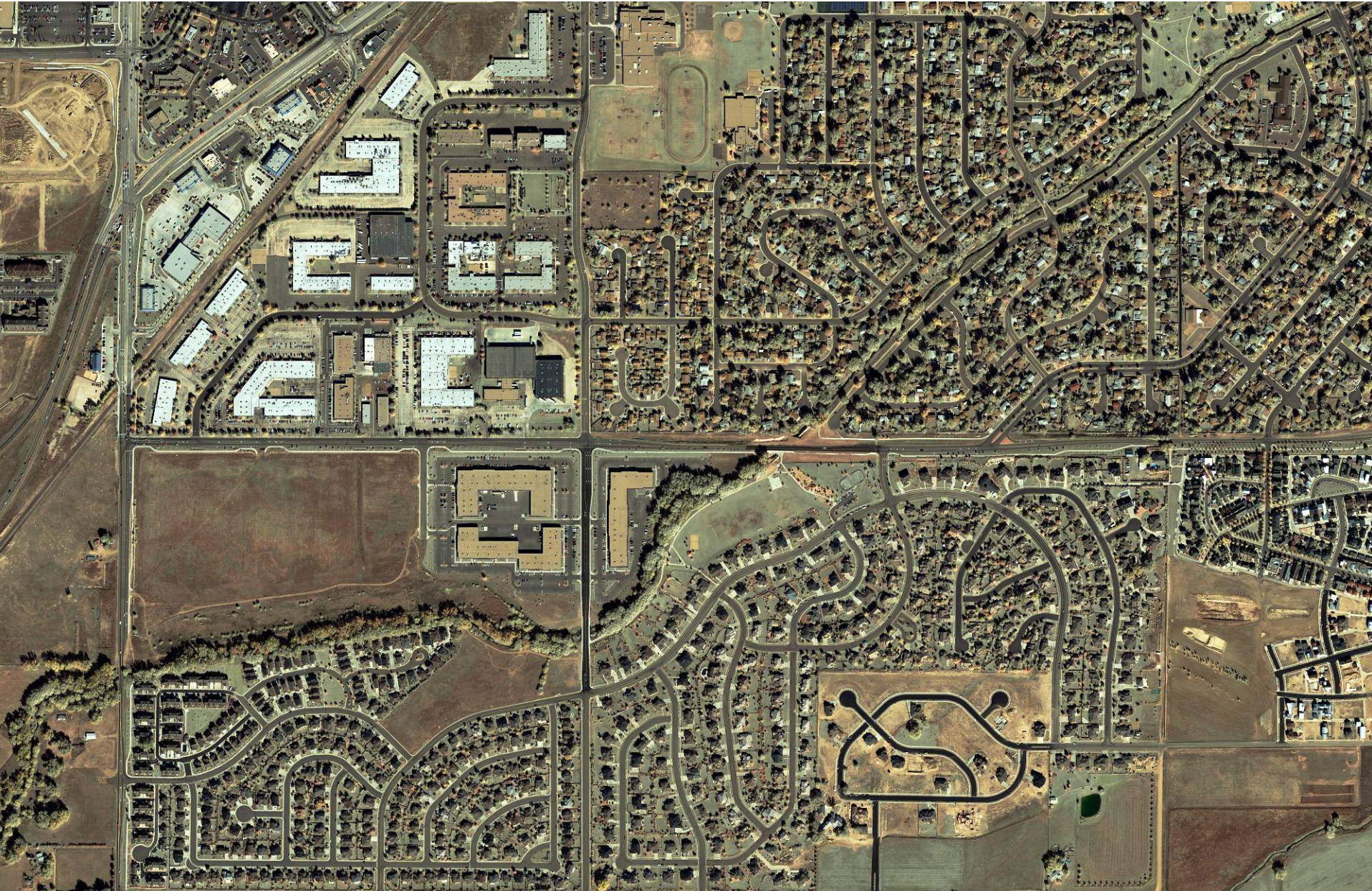




- WorldView will offer dramatic improvements over current commercial satellite capability in:
  - Timeliness
  - Capacity
  - Agility
  - Accuracy
  - Multisourcing
  - Product Diversity
  - Integration with NGA Systems
  - Cost-effectiveness: a better product for a dramatically lower price
- The program is on schedule to support:
  - WorldView-60 launch by late-2006
  - WorldView-110 launch 12-18 months following WV1

Thank You

DIGITALGLOBE™





**For Additional Information:**



DIGITALGLOBE™

**Brett Thomassie**

**(985) 643-3652**

**(228) 688-1607**

**[www.digitalglobe.com](http://www.digitalglobe.com)**