



Commercial Imagery, Data, and Programs Overview

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NGA Source CIDAP
JACIE Presentation
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CIDAP's Responsibilities

CIDAP executes two distinct NGA functions

- Develops/executes the NSG Commercial Imagery Strategy. Provides mission support to US and coalition partners
 - National Security
 - Wartime
 - Peace-keeping
 - Natural Disasters

- Oversees/manages outsourced GeoSpatial data and production contracts



Commercial Imagery Topics

Today we will discuss:

- Electro-Optical Satellite Capacity
- Commercial Synthetic Aperture Radar
- Value-Added Programs
- Data Production Services
- Imagery Examples



Current Program Focus

- Advance commercial technologies
- Deepen industry partnerships
- Drive greater collection capabilities
- Expand and leverage international partnerships
- Evolve security & policy directives/guidance (INFO,OPSEC)
- Revolutionize data production, integration and access of Commercial EO, SAR, and Airborne data across the NSG
- Improve ease of use (automation and web capabilities)



Challenges and Changes We Face

- Broad access to rapid technology advancements
- “Put the Power of GEOINT into the Hands of the Users”
- Changing customer expectations – “I want it. I want it now. I want it in the manner that I need it.”
- Future budget expectations

**How do These Challenges Relate to Image Quality?
How can Image Quality Teams Assist?**



EO Way Ahead Decision – March 30, 2009

- Government systems
- NGA Program
 - Purchase the equivalent of two additional 1.1m aperture medium-resolution EO satellites using an Service Level Agreement (SLA) with US commercial companies; executed by NGA
 - Integrate these capabilities, developed by NGA into the national imagery infrastructure, to include Commercial Secure Operations

EO Way Ahead decision links Government and Commercial performance and strategies

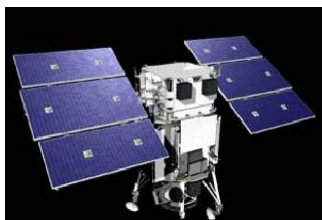


Expanding US Commercial Imagery Constellation

Digital Globe



Quickbird,
Launched 18 Oct 2001



Worldview-1
Launched 18 Sep 2007

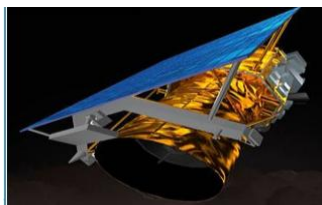


Worldview-2
Launched 8 Oct 2009

GeoEye



Ikonos
Launched 24 Sep 1999



GeoEye-1
Launched 6 Sep 2008



GeoEye-2
Planned: 2013

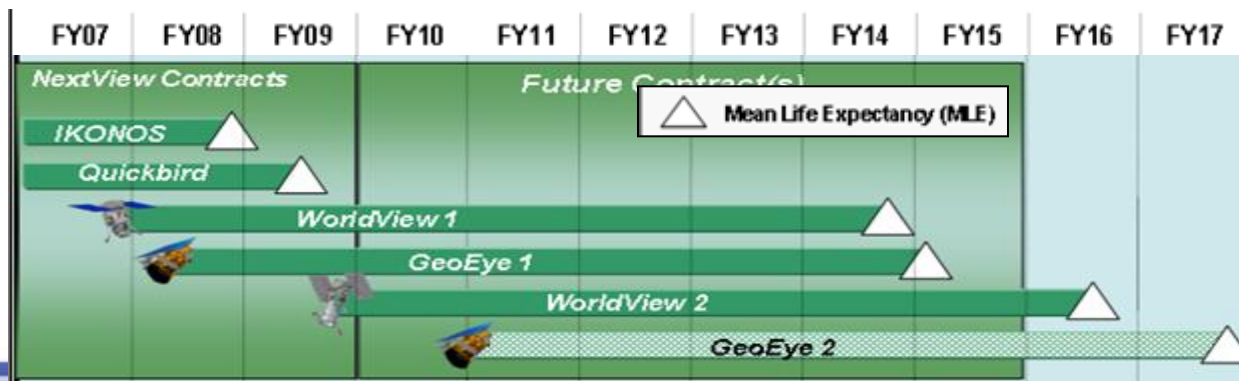
Best Resolution:
CRS: .50m (.41m USG)

Mission Areas:
CRS: Civil, Mapping, Natural Disasters
Increased ops and intelligence support

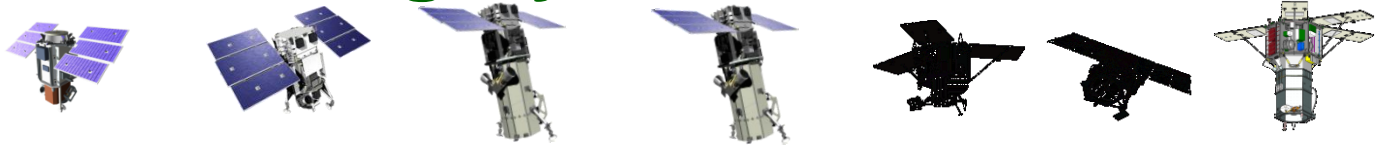
Sensor Types:
CRS: Black & White (Pan) & Color (MSI)

Security (satellite to ground data & products):
CRS: data encrypted, unclassified products

Timeliness (best case, over target area):
CRS: Tasking to delivery within 2-3 hours



Commercial Imagery Assets

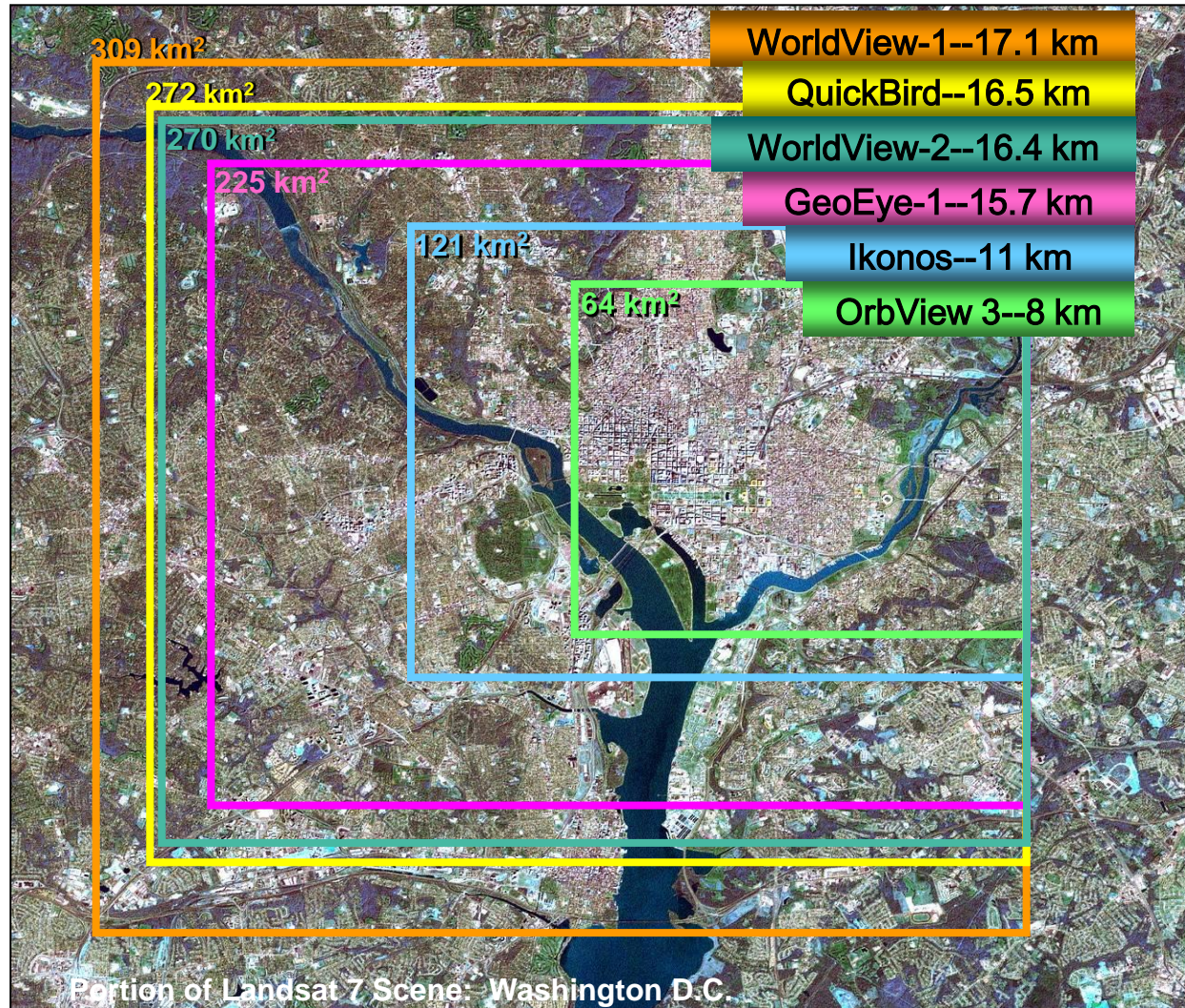


Parameter	QuickBird	WorldView-1	WorldView-2	WorldView-3	IKONOS	GeoEye-1	GeoEye-2
Launch	18 Oct 2001	18 Sep 2007	8 Oct 2009	TBD 2014	24 Sep 1999	8 Sep 2008	TBD 2013
Design Life (years)	5	7.25	7.25	7.25	7	7.25	7.25
Aperture (m)	0.6	0.6	1.1	1.1	0.7	1.1	1.1
Nominal Altitude (km)	450	496	770 / 680	TBD	680	680	TBD
Nodal Crossing	1030	1030	1030	TBD	1030	1030	TBD
Pan Nadir GSD (m)	0.61	0.50	0.46 / 0.41	TBD	0.81	0.41	TBD
Quantization (bits/pixel)	11	11	11	11	11	11	11
MSI Nadir GSD	2.41	N/A	1.88/1.64	TBD	3.24	1.64	TBD
Agility	Low	High	High	High	Low	Low	TBD
On-board Storage (Gb)	128	2,200	2,200	2,200	80	1,000	1,000

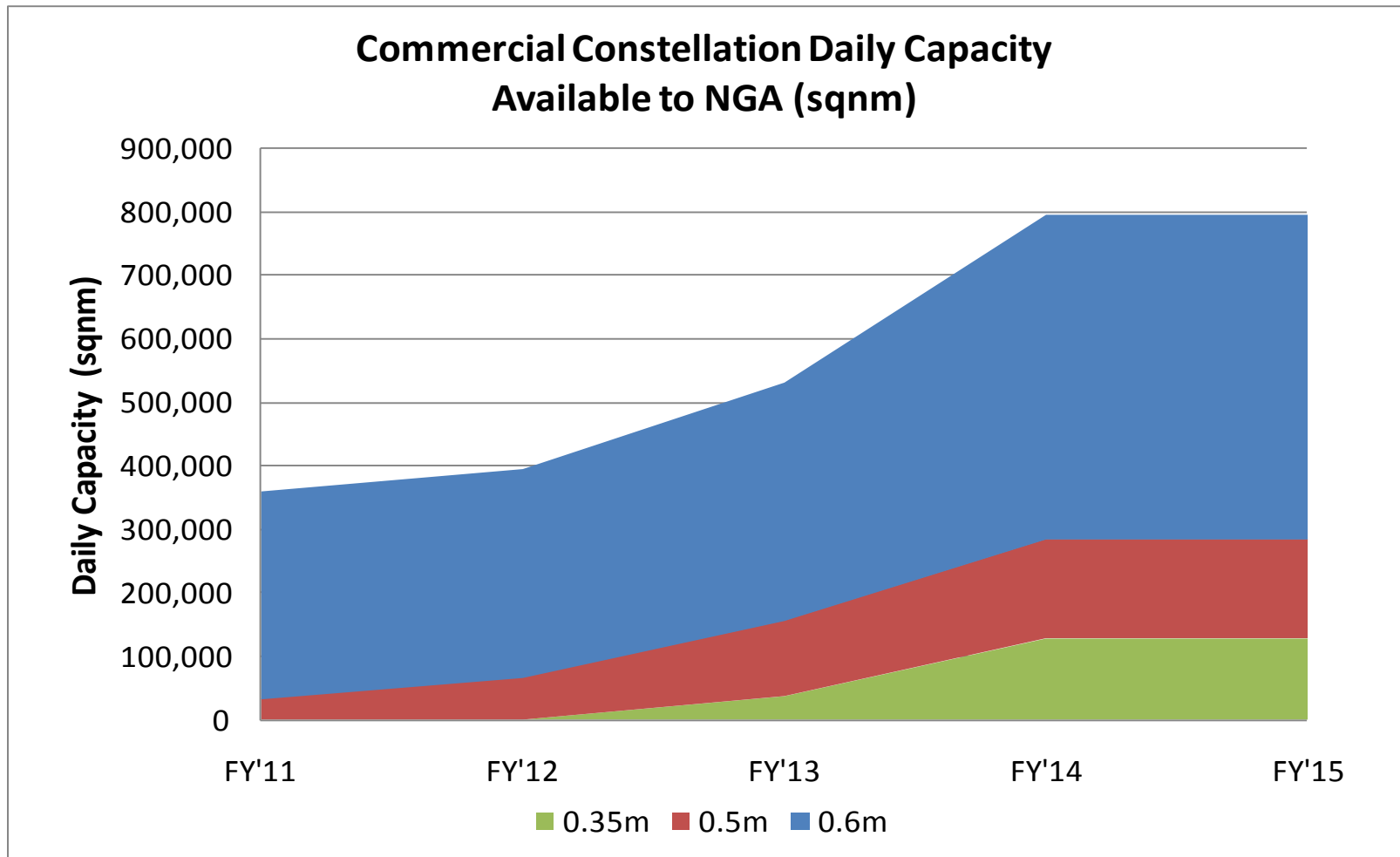


Commercial Imagery Today

United States
Commercial
Satellite Imagery
Footprints



Available Commercial Imagery Daily Capacity



Commercial Imager Characteristics

Characteristic	Objectives
Panchromatic MTF	Nadir imagery shall exhibit $MTF_{Nyquist} \geq 0.1$
Pan Q	$Q \leq 1.3$
Pan SNR	SNR ≥ 10 taken with target elevation ≥ 60 degrees, sun elevation > 30 degrees in mid-latitude atmosphere over random sample of land imagery
Multispectral GSD	Nadir GSD of MSI is no worse than 4x that of PAN imagery
Multispectral MTF	Nadir imagery shall exhibit $MTF_{Nyquist} \geq 0.1$
Multispectral Band-to-Band Registration	For all MS bands, pixel centroids registered to within ≤ 0.25 MS pixel pitch, per axis
Banding and Streaking	$\leq 4\%$ within a spectral band



SAR Pilot Project

Center for Southeastern Tropical Advanced Remote Sensing



- Commercial SAR Pilot (2009/09-2010/09)
 - Conducted at the University of Miami CSTARS facility
- Objectives
 - Operational pilot to demonstrating fast regional support to SOUTHCOM, CENTCOM, Navy and other select customers
 - Develop and test transformational SAR architecture
 - Based on radar complex image... source of nearly all derived products
 - Sensor Independent processing of multiple systems
 - Extensible architecture based on plug-ins and Application Programming Interface (API)
- Operational Use
 - Collection and imagery support for crisis response (Haiti earthquake, Gulf Oil Spill)

Success with Pilot resulted in development of JCTD with AFSPACE in response to DoD inquiries/direction to support COCOMS



CIDAP – Services for Warfighters

Agile Access Image Access Solution

- Working closely with USAF (480th IW) to leverage A2 IAS across the NSG
- Deploying 2 IAS servers for users in theater – providing access to forward staged imagery held at NGA locations
- Deploying IAS servers at both CDPs to improve timeliness & increase access to all data collected, regardless of cloud cover
- IAS will expand dissemination of Rapid Delivery of Online GEOINT (RDOG) foundation layers & commercial imagery data through its streaming service



Commercial Value-Added Program

- **Rapid Delivery of Online GEOINT (RDOG)**: Orthorectified/orthomosaiced imagery in multiple formats; geometrically corrected, snow & cloud free imagery available within 24 hours of imagery receipt.
- **Rapid Response Orthomosaic Program**: Allows NGA to provide Customers with Orthomosaics over key AOIs in days for most requests.
- **Controlled Image Base (CIB)/Globepix**: Supports variety of missions; critical for Intel and Military operations.
- **Ortho Images**: Controlled, accurate imagery used for mission planning, counter-terrorism, & homeland security.
- **Urban Atlases**: Unclassified books coupling maps and high-res imagery; very popular among US and coalition forces.
- **Other Products**: 3-D models, city/urban area color mosaics, airfield and harbor graphics to support multiple IC/DoD and Department of State needs.



Commercial Imagery Support

Disaster Support – Earthquake in Chile

DOI: 28FEB2010
GE0: 332327 S0704739W

Damage to POL Storage
Arturo Merino Benitez Intl Afld Santiago, Chile



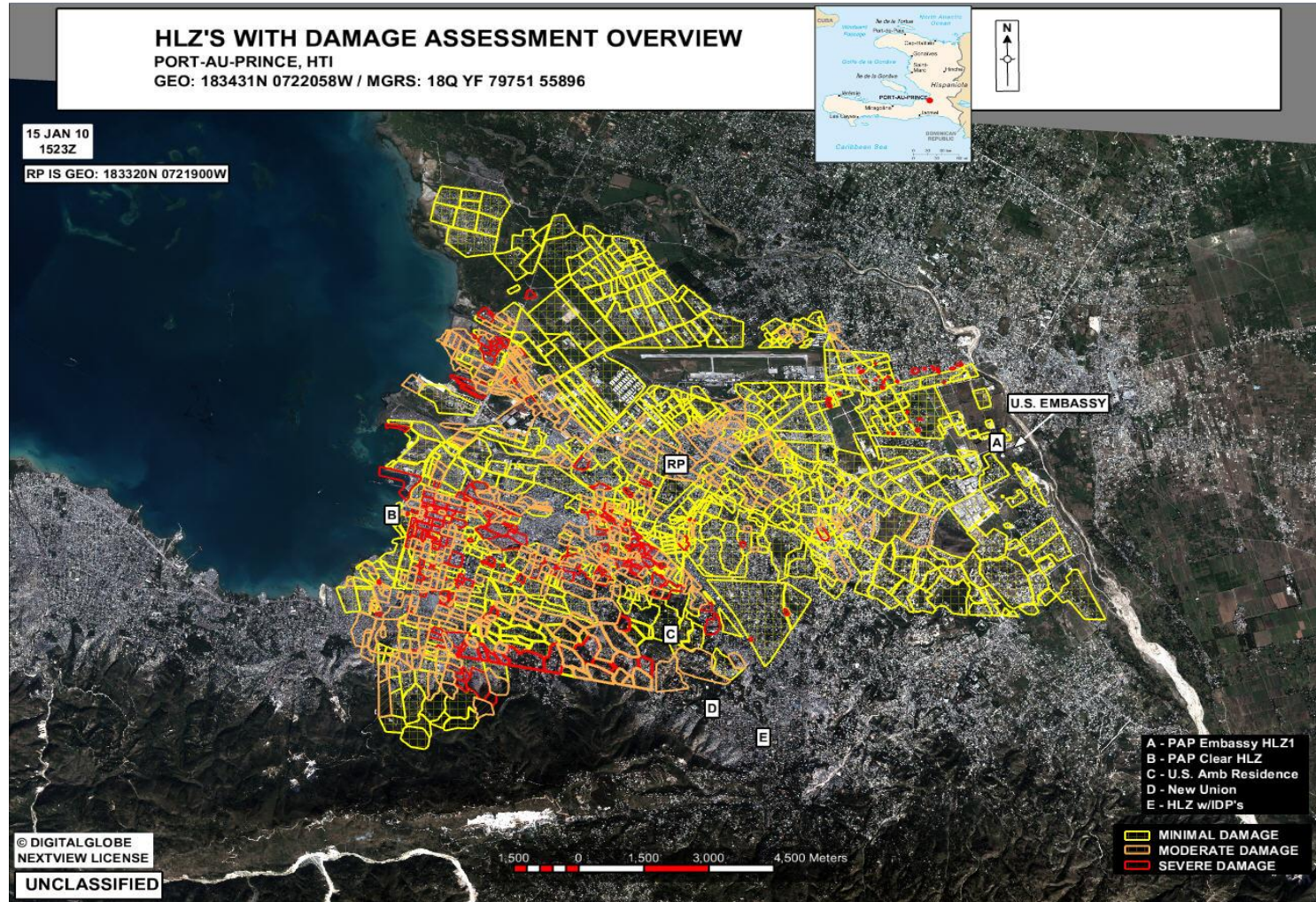
UNCLASSIFIED

Not for Commercial Purposes
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Commercial Imagery Support

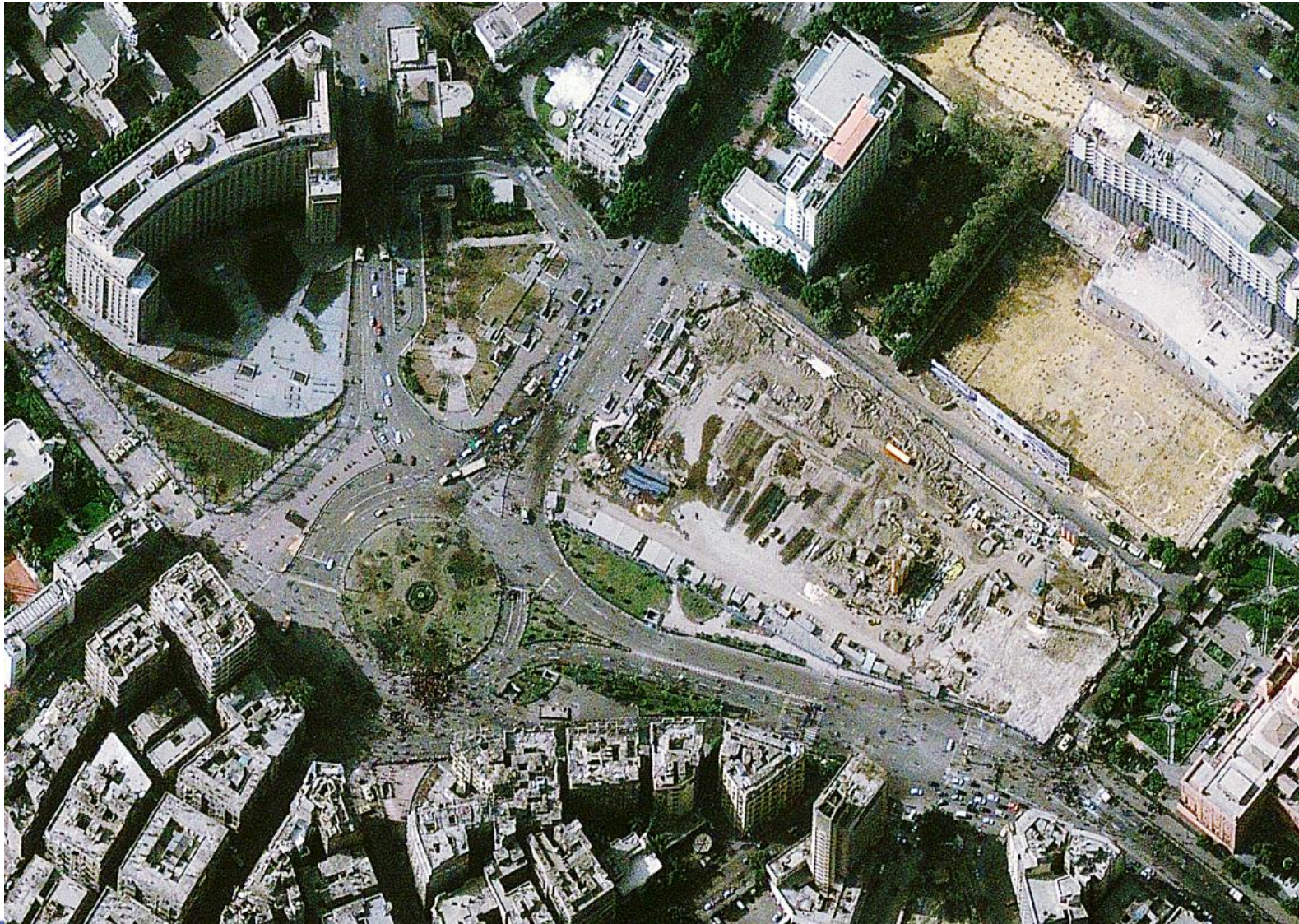
Disaster Support – Earthquake in Haiti



Examples from CDP's



Commercial Imagery Support – Cairo, Egypt



GeoEye, Inc





Pearl Square Protests

Manama, Bahrain

26.13 48N 50.33 40E



DigitalGlobe's Natural Color Satellite Image
February 22, 2011

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Men Distinguishable from Women From Space!

Manama, Bahrain
26 13 48 N 50 33 40 E



Crowd of Women in Black Burqas

Group of Men

DigitalGlobe's Natural Color Satellite Image
February 22, 2011

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Polling Stations

Juba, Sudan

04 50 58 N 31 34 55 E



Garang Mausoleum



Long Line of People Waiting to Vote



Tyler Hicks/The New York Times

DigitalGlobe's Natural Color Satellite Image
January 9, 2011

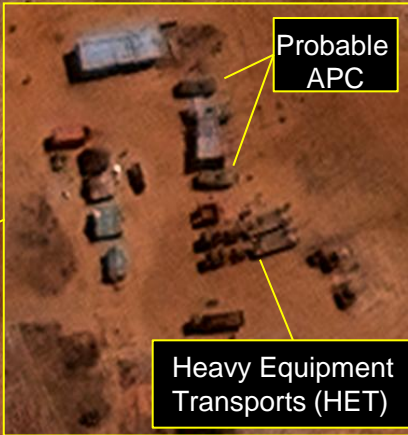
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Muglad Outpost

Muglad, Sudan



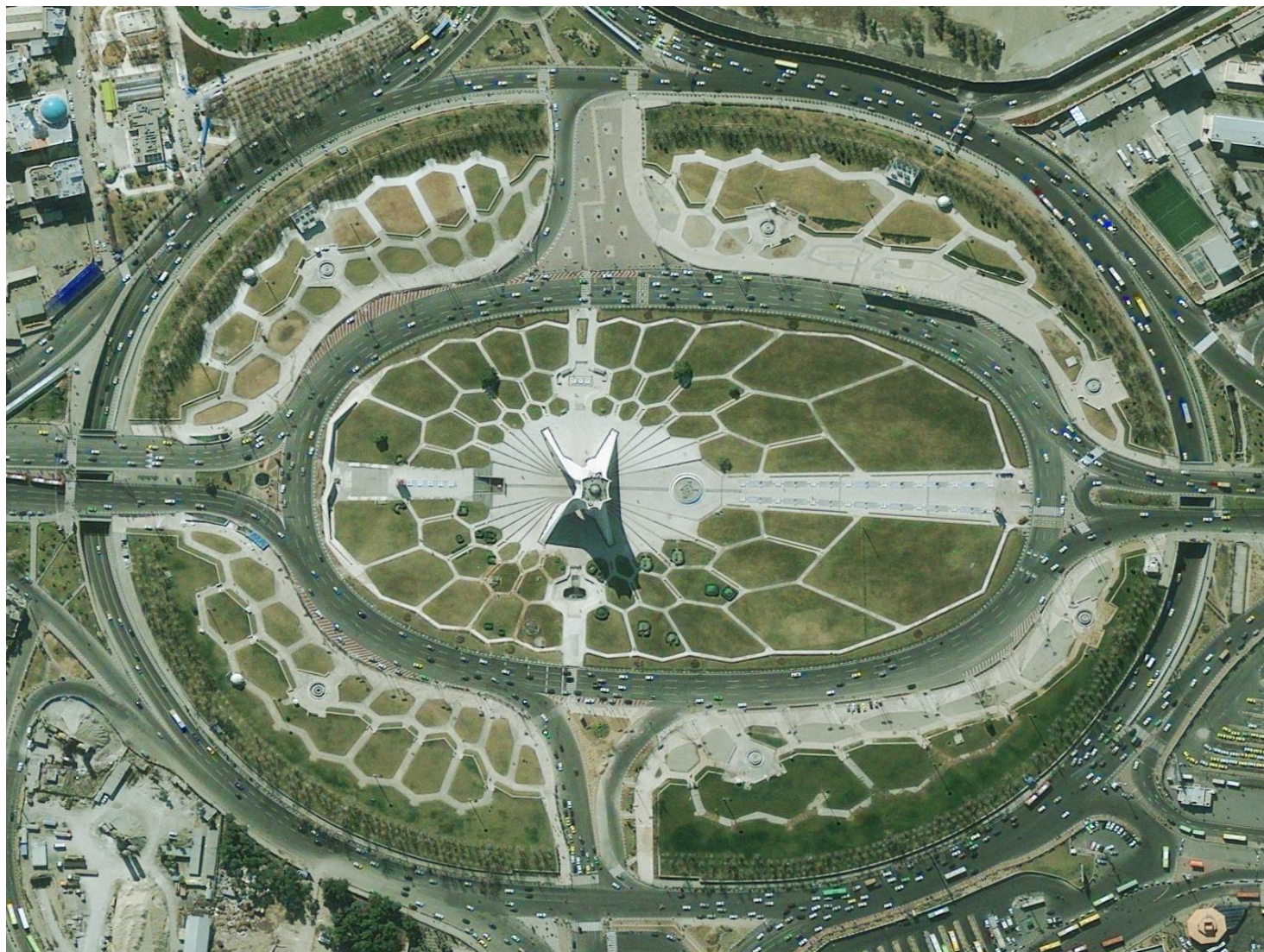
DigitalGlobe's Natural Color Satellite Image
January 12, 2011

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Commercial Imagery Support – Tehran, Iran



GeoEye, Inc



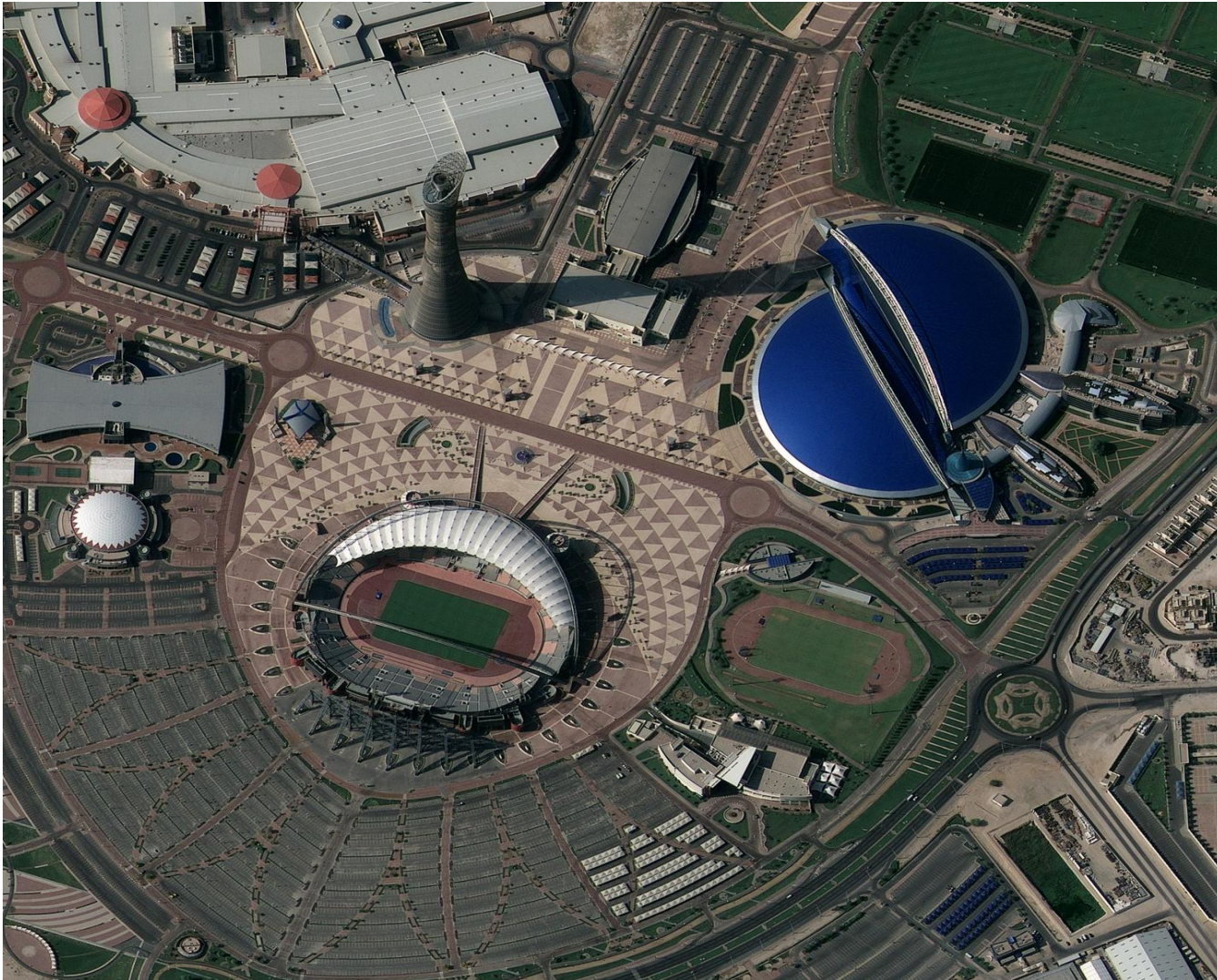
Commercial Imagery Support – Tehran, Iran



GeoEye, Inc



Commercial Imagery Support – Doha, Qatar



GeoEye, Inc



Commercial Imagery Support – Kennedy Space Center



GeoEye, Inc

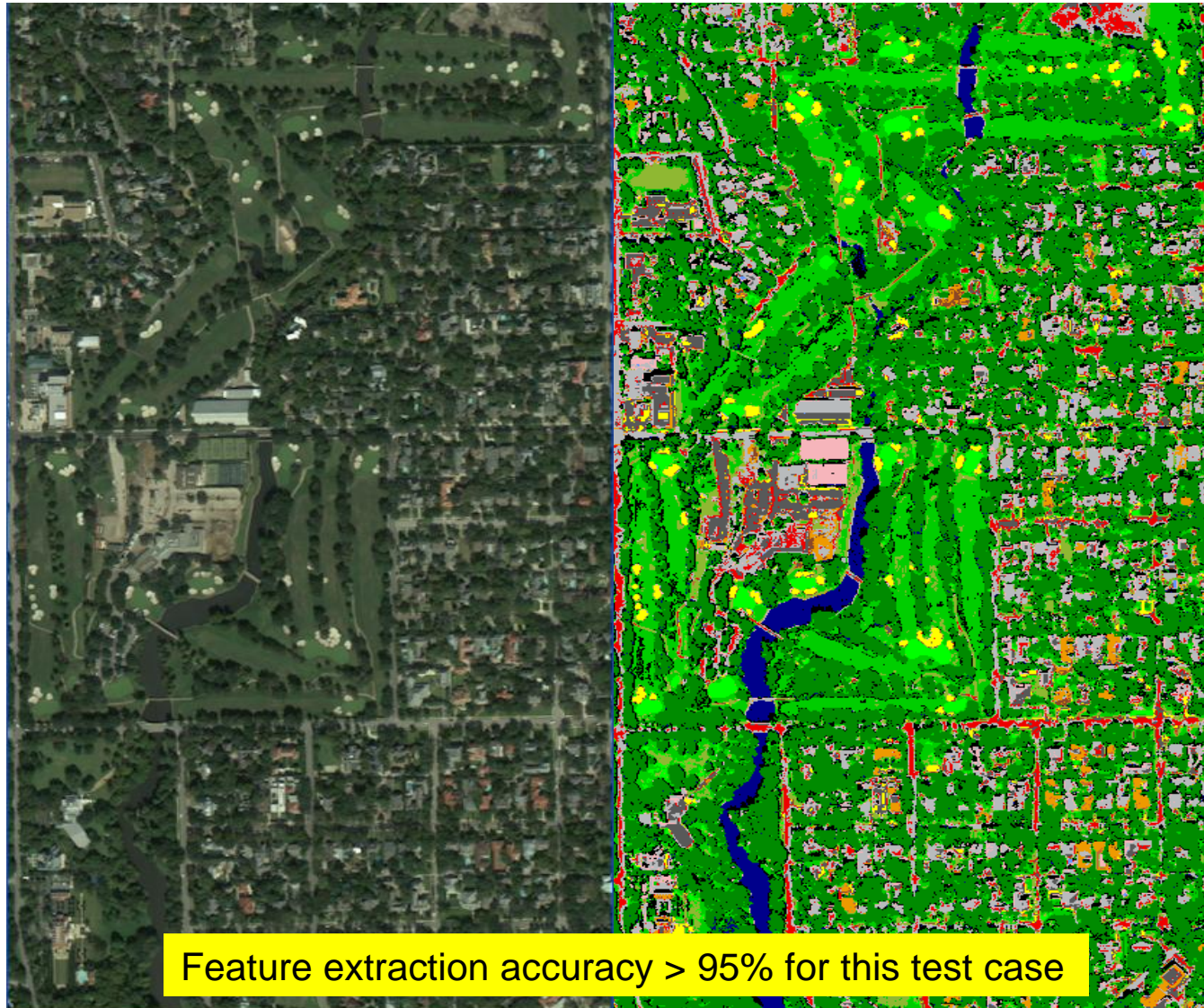


The Power of 8 Bands - Tree Ensemble Classification

WorldView-2

15 Land Cover Classes
Dallas, TX

- water
- shadow
- tree
- fairway
- grass
- golf_green
- sport_fields
- asphalt
- concrete
- sand
- gray_roof
- pool
- soil
- clay
- red_roof



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Take Away Thoughts

- Commercial Imagery is a multi-faceted program blending Service Level Agreements, Enterprise Integration, Tech Advocacy, and Operational Support
- Assured Product Quality is an important element across the program
- How might QA/QC be improved?

























