



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY
Know the Earth... Show the Way... Understand the World

Commercial Imagery Overview

Presenter:

Michael Franklin
Contractor, NGA-SLMR

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Outline

- **Introduction**
- **U.S. Commercial Space Program**
- **Commercial Imagery Today**
- **Copyrights and Licenses**
- **MGCP Processes and Parameters**
- **MGCP Program Lessons learned**
- **Questions, Comments and Concerns**



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

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Introduction



NGA Overview

Know the Earth... Show the Way... Understand the World

Mission – *What we do...*

NGA provides timely, relevant, and accurate Geospatial Intelligence in support of national security.

Vision – *What we aim to do...*

- We provide Geospatial Intelligence in all its forms, and from whatever source - imagery, imagery intelligence, and geospatial data and information - to ensure the knowledge foundation for planning, decision, and action.
- We provide easy access to Geospatial Intelligence databases for all stakeholders.
- We create tailored, customer-specific Geospatial Intelligence, analytic services, and solutions.



Commercial Imagery Overview

“Commercial Imagery” IS:

- Collected by private companies
- Provided by both U.S. and foreign vendors
- Unclassified



“Commercial Imagery” IS NOT:

- Near-real-time, typically
- Restricted to U.S. Government systems



Commercial Imagery Overview

So why USE commercial imagery? BECAUSE IT IS:

- Commercial Imagery is UNCLASSIFIED
- License agreements allow for broad SHARING of products and data
- VERSATILITY allows for accomplishment of a multitude of missions



(U) Images are UNCLASSIFIED



Imagery We Can Share

Natural disaster preparedness and response

Environmental and agricultural analysis

Security and Events

Domestic

Maritime





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The U.S. Commercial Space Program



Timeline of Significant Events

1984 – Land Remote Sensing Commercialization Act

1992 – Land Remote Sensing Policy Act

2002 – DCI memo to D/NIMA

2003 – U.S. Commercial Remote Sensing Space Policy
2003 – ClearView Contract

2005 – DoD Directive 8581.1

2010

1980

1990

2000

2005

2006 – U.S. Space Policy

2007 – NextView Contract

2009 – DoD Directive 5105.60

2010 – U.S. Space Policy

2010 – EnhancedView Contract



(U) Timeline is UNCLASSIFIED



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Commercial Imagery Today



Commercial Imagery Today

U.S.-based Commercial Satellite Imagery Sensors



IKONOS (GeoEye)

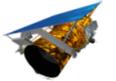
QuickBird (DigitalGlobe)

OrbView-3 (archive only) (GeoEye)

MGCP Imagery sources



WorldView-1 (DigitalGlobe)



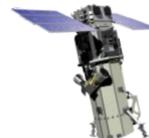
GeoEye-1 (GeoEye)



WorldView-2 (DigitalGlobe)



System Capabilities



Coming
2014

Parameter	QuickBird	WorldView-1	WorldView-2	WorldView-3
Aperture (m)	0.6	0.6	1.1	1.1
Nominal Altitude (km)	482	496	770	620
Pan GSD at Altitude (m)	0.65	0.50	0.46	0.31
Pan or Pan + MSI	Pan + 4 MSI	Pan	Pan + 8 MSI	Pan + 8 MSI



Coming
2013

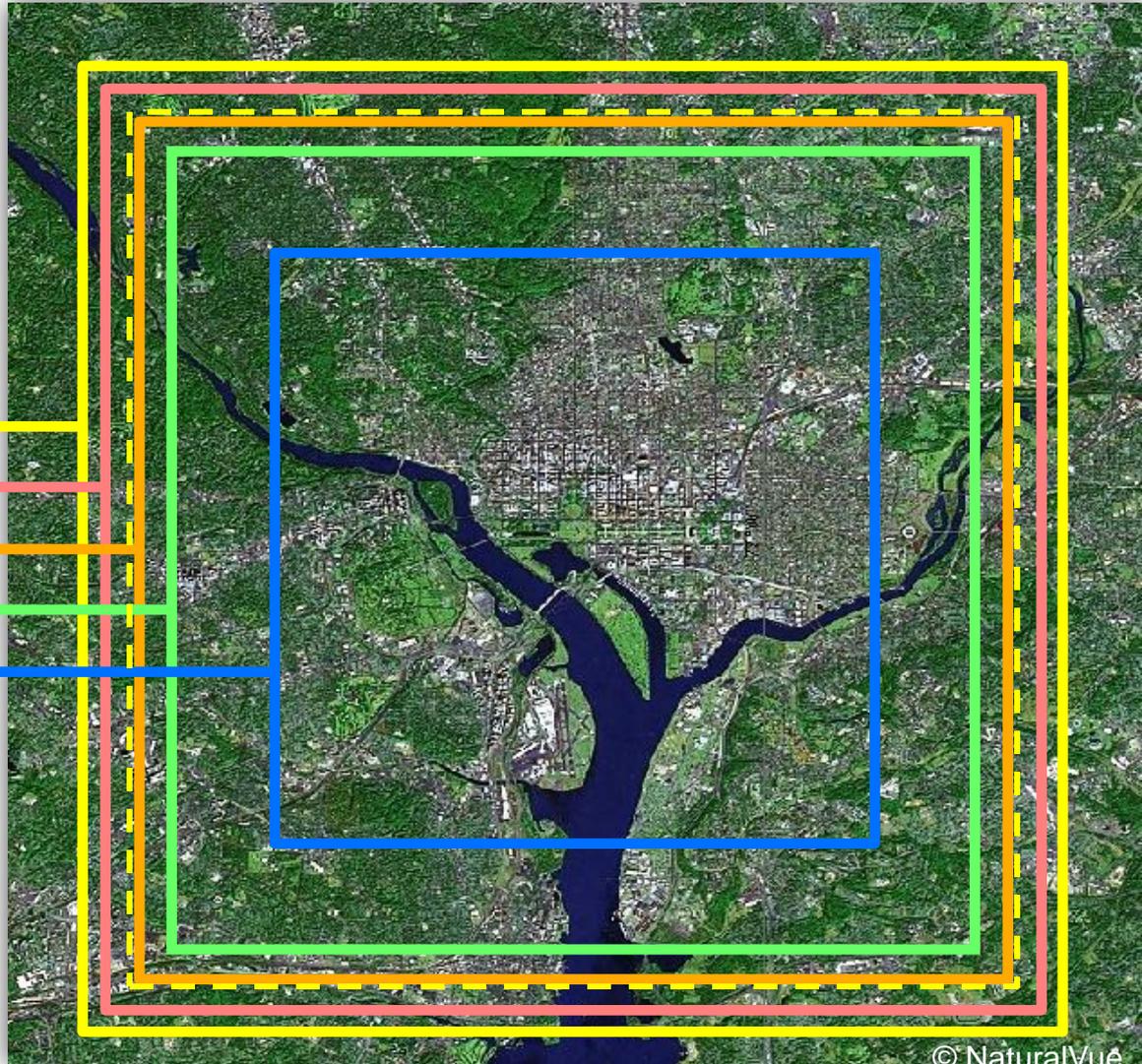
Parameter	IKONOS	GeoEye-1	GeoEye-2
Aperture (m)	0.7	1.1	1.1
Nominal Altitude (km)	680	680	680
Pan GSD at Altitude (m)	0.81	0.41	0.37
Pan or Pan + MSI	Pan + 4 MSI	Pan + 4 MSI	Pan + 4 MSI



Commercial Imagery Today

U.S. Commercial Satellite Imagery Footprints*

QuickBird: 18.0 km
WorldView-1: 17.6 km
WorldView-2: 16.4 km
GeoEye-1: 15.2 km
Ikonos: 11.3 km



* For point targets at nadir



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Copyrights and Licenses



Licensing and Copyrights

Copyright - who owns the data

License - who is authorized to use and what can be done with the data (licensee & temporarily licensed users)

Think of commercial imagery the same way you view software you purchase for your home computer.



Licensing and Copyrights

NextView License

U.S. Government including, all branches, departments, agencies, and offices

Temporary Licensed Users :

- State Governments
- Local Governments
- Foreign Governments and inter-governmental organizations
- NGO's and other non-profit organizations

All high-resolution commercial satellite imagery purchased by NGA is NextView licensed.

USG may **provide the imagery** to the above organizations when collaborating on an **official purpose**

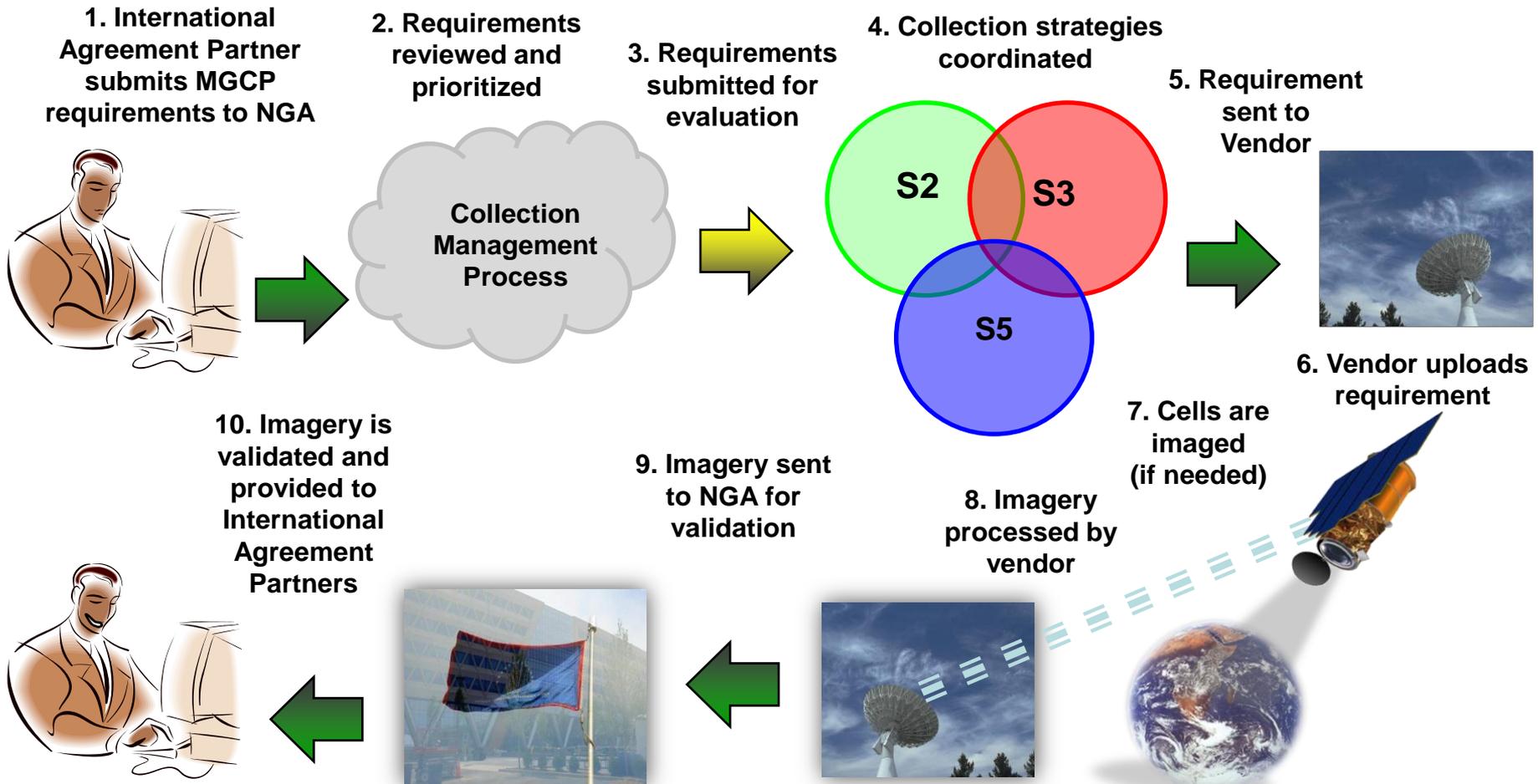


MGCP

Imagery source Process and Parameters



Collection Process: MGCP Commercial Imagery Requirements





Imagery Collection Parameters

MGCP Overview

MGCP Strategy

Commercial Imagery source data...

Currency –

2 - 3 year currency of quality commercial imagery coverage

Collection angle –

25° or better off nadir collection angle

Cloud Coverage –

5 -10% cloud coverage or better per 1° by 1° cell

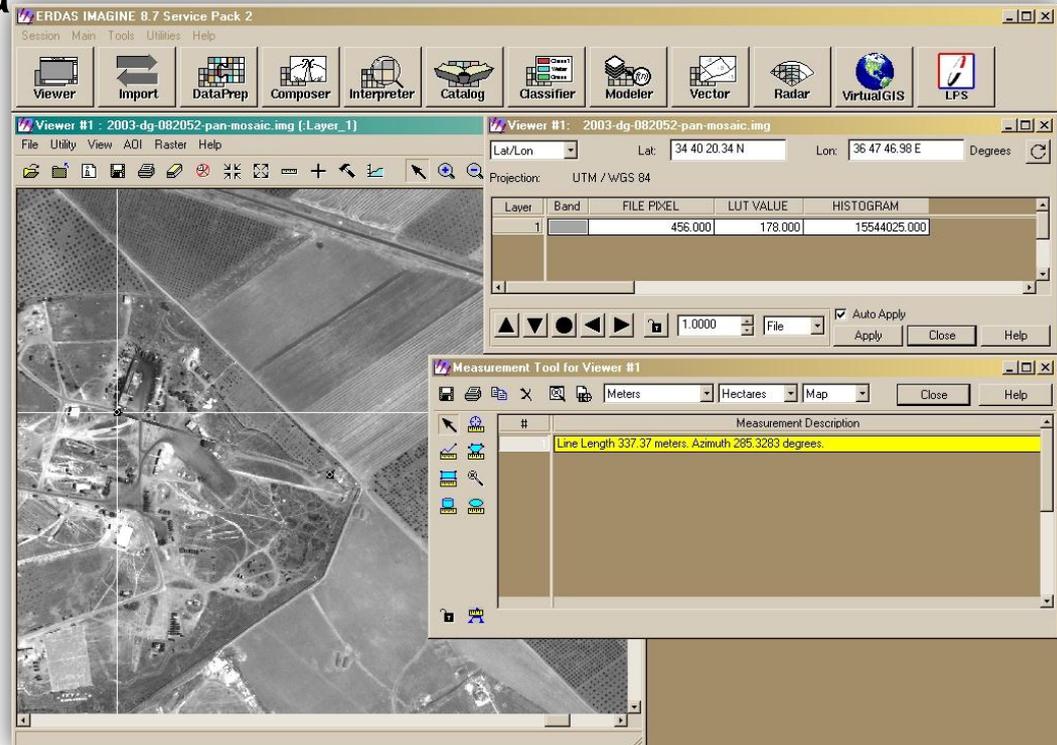
Imagery resolution –

1 meter or better resolution



Orthorectification

- Every image has inherent distortions derived from data collection and storage
 - Sensor tilt angles
 - Ground elevation changes
- Orthorectification is the process of removing distortions
 - Aligns features to be geographically correct
 - Allows the image to resemble a map



337 meters off before
Ortho process.



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MGCP program lessons learned



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Collection timeline–

2 - 3 year currency is relaxed when cells fall in difficult to cover areas

Collection angle –

25° or better off nadir collection angle helps to deal with mountainous regions

Cloud issues –

5 -10% cloud coverage or better per cell because we discovered, the 20% CC allowed by the contract can be problematic in feature dense areas

Collection timeframes –

Some cell collection is seasonally turned off due to loss of sunlight in the higher latitude or limited windows of opportunity due to weather

Miscellaneous issues–

Other factors that we have also encountered are snow coverage and areas of heavy vegetation



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Collection timeline–

2 - 3 year currency is relaxed when cells fall in difficult to cover areas

- Cloud belt countries – areas where weather reduces the satisfaction rate
- Lack of availability of quality coverage or time for new collection accomplishment



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Collection angle –

25° or better off nadir collection angle helps to deal with mountainous regions

- The need to orthorectify the commercial imagery to correct the inherent distortions in the data before the feature extraction is conducted
- The orthorectifying process can be done with the use of DEMs only



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Cloud issues –

5 -10% cloud coverage or better per cell because we discovered, the 20% CC allowed by the contract can be problematic in feature dense areas

- Cloud belt areas– areas where weather reduces the satisfaction rate
- Annually there are limits to the amount of cloud free days that vary across the globe



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Collection timeframes –

Some cell collection is turned off due to loss of sunlight in the higher latitudes or limited windows of opportunity due to weather

- Latitude above 70N – 50N begin losing visibility or become very icy and snow covered between Oct – Dec respectively
- Regions are also limited by both rainy seasons and winters that effect the window of available coverage for satisfaction of some cells



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Miscellaneous issues—

Other factors that we have also encountered are snow coverage and areas of heavy vegetation

- The contract vehicle for obtaining the commercial imagery does not address snow coverage as it does cloud coverage
- Some cells in areas of heavy vegetation also require MSI coverage to help in evaluating certain features



MGCP Program Lessons learned

MGCP Strategy

Commercial Imagery source data...

Bottom line....

***Human evaluation throughout the entire process from ordering the commercial imagery collection of cells to disseminating the satisfied MGCP requirements is essential to the program's success**

- QC of all the imagery to ensure that the source meets all the necessary parameters ($\leq 5-10\%$ CC, $\leq 25^\circ$ off nadir angle, no snow as possible, ≤ 3 yrs currency)
- QA of all cells is conducted to ensure the completeness and correctness of coverage for each cell before dissemination



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Questions?



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