What's New in Imagery and Raster at ArcGIS 10

Peter Becker
Hong Xu
Vinay Viswambharan
What’s new in Imagery and Raster at ArcGIS 10?
What’s new in Imagery and Raster at ArcGIS 10?

A Lot!
What’s new in Imagery and Raster at ArcGIS 10?

A Lot!

Agenda

• Overview
• Content
• Management
• Dissemination
• Visualization
• Analysis
• Q&A

Slides will use orange color to emphasis features that are New or Substantially Improved
Geospatial Information, Integrated & Accessible

- Geospatial workflows
- Actionable information & knowledge

Imagery is Core to GIS
ArcGIS – Maximizing the Value of Imagery

• Providing Image Accessibility:
  - Timely
  - Quickly
  - Accurately
  - Collectively
  - Simply

• Exploiting Rich Information Content:
  - Resolution
  - Temporal change
  - Spectral range
  - Dynamic range
Elements of a Complete GIS

- **Content**
  - Base data provided by ESRI
- **Management**
  - Storing, Organizing and Structuring
- **Dissemination**
  - Accessibility to data, information and knowledge
- **Visualization**
  - Interpretability and human understanding
- **Analysis**
  - Gain knowledge to make informed decisions
Imagery Content

*Base Data Provided by Esri*
World Imagery Updates at 10

- Worldwide Imagery at 15m Resolution
- United States Imagery 1m or better
  - Updates to over 50% of United States
  - New Sub-meter Imagery in Metro Areas
    - Formerly available by subscription only
- International
  - GeoEye IKONOS Imagery for Major Metro Areas
  - Expanded Imagery for other Countries
    - GreatBritain, Belgium, France,
      Germany, Czech Republic,
      Luxembourg, Netherlands, Portugal
- Community Map Program
World Landsat Imagery
To be added to ArcGIS.com

- NaturalVue (from MDA)
  - Color Balanced, Orthorectified mosaic

- Global Landsat GLS
  - Image Services
    - L1T, Radiance, TOA-Reflectance, Surface Reflectance
    - 8band, Color 321, False Color 432, PseudoColor 742, NDVI
World Elevation

To be added to ArcGIS.com

- **Multi Source**
  - GTOPO, SRTM,
  - USGS NED (1 and 1/3 arcsecond)
  - Lidar for sample areas
  - EGM2008 Geoid model

- **Services**
  - Elevation Orthometric & Ellipsoidal
  - Hill Shade, Slope, Aspect, Shaded Relieve

- **Tasks**
  - Profile, Viewshed, Contour
Content Demo
Image Management
ArcGIS – For Image Data Management

Storage, Catalog, Metadata & Process

• Workstation User
  “What do I have? How can I easily work with it?”

• Organizations with collections of processed imagery
  “How do I serve all our ortho images?”
  “How can I server my elevation data to multiple users?”

• Enterprises collecting new imagery
  “How do I process and serve imagery that we acquire?”

Catalog all available imagery
Make it quickly accessible in the required form
Wide Variety of Imagery

- Multiple Sources
  - Satellites, Aerial, Terrestrial, Scanning

- Multiple Forms
  - Ortho Images Tiles
  - Image Strips
  - Processed Rasters
    - Elevation models / Lidar
    - Analysis results
    - Thematic maps
  - Scenes
  - Sensor Images

- Multiple Formats
  - TIF, NITF, JP2,…
Improved Read / Write of Formats

- More Formats
  - BigTIF, MapCache, ..
  - NITF Improvements
  - TIF with CCITT4/CCITT3
- Compressed Pyramids
- Faster Read
- Use GDAL Drivers
  - Extensible
- Improved Projection Support
- Improved Color Maps
Mosaic Dataset

**Optimum Model for Image Data Management**

- Within ArcGIS Desktop (Editor/Info)
- Quickly Catalog
  - All raster datasets
  - Imagery from different sensors
- Define – In Geodatabase
  - Metadata
  - Processing to be applied
  - Default viewing rules
- Access – In all ArcGIS applications
  - As Image
    - Dynamic Mosaic, Processed on the fly
  - As Catalog
    - Footprints, Detailed metadata
Mosaic Datasets

As replacement for ISDef, Raster Catalog

- Improvement over Image Service Definition (ISDef)
  - Massive scalability
  - No compile
  - NoData support
  - No extension required
  - Geoprocessing tools for authoring

- Improvement over Raster Catalogs
  - Raster Types
  - Define functions for On-the-fly processing
  - Dynamic Mosaicking
  - Overviews
On-The-Fly Processing

Create Multiple Products from a Single Source

- Imagery processed as accessed
- Processes
  - Stretch, Extract Bands
  - Clip, Mask
  - Reproject, Orthorectify, Pan Sharpen
  - Vegetation Index, Classify
  - Shaded Relief, Slope, Aspect
  - Color Correction
  - …
- Applied to
  - Individual rasters in mosaic
  - Compete Mosaic Dataset
Dynamic Mosaicking

Mosaicking Multiple Images On Demand

- Fuse imagery from multiple sources
- User control of Mosaic Method
  - By Date – ‘Latest’, ‘Closest to May 2001’
  - By Attribute – ‘Highest Sun Angle’
  - By Viewpoint – North, South, East, West
  - Seamline – Feathered blend
- User Query – ‘Landsat imagery, with no cloud, later than June 2001’
- NoData Support
- Set default - Users sees best available imagery

Utilizing information from overlapping images
Enhancing Processing Methodologies

• Conventional Image Processing Workflows are Linear
  - Multiple processes create intermediate results
  - Products created as static mosaic

• Mosaic Datasets Enable Transactional Workflows
  - Processes applied on demand
  - Products created on demand
On-the-fly Processing & Dynamic Mosaicking

Resolves Traditional Image Management and Processing Issues

Processing Time
- Reduces processing

Overlapping Imagery
- Maintain information

Disparate Datasets
- Large NoData areas

Image Quality
- Reduces resampling

Storage
- Reduces storage by removing redundancy

Multi-resolution Data
- No need to sample up or down

Maintenance
- Add imagery as required

Maintain Metadata
- Retain valuable information
Management Demo
Dissemination

Providing Image Accessibility

Sharing: Direct, Static & Dynamic
Access: Multiple Clients
Image Accessibility

To Multiple Applications

- Direct Access
  - Raster
  - Mosaic Dataset

- Static Web Services
  - Map Cache
  - Compact Cache
  - JPGPNG

- Dynamic Image Services
  - Server based processing
  - Image Services, WMS, WCS, KML
  - SOAP, REST interfaces

ArcGIS provides image accessibility
ArcGIS Server - Image Services

Optimized Serving of Imagery and Rasters

- Core capability of ArcGIS Server
- Serve:
  - Raster Datasets
  - Raster Layer – Can include functions
- As Image Service, WMS, WCS, KML
- 1:M – One raster in many forms
- Client defined properties
  - Spatial Reference System
  - Compression for Transmission – For Low Bandwidth Networks
  - Functions – Client defined enhancements
- Export – User defined projection and extents
ArcGIS Server - Image Extension

*Serving large collections of Imagery and Rasters*

- Extends Image Services to **serve Mosaic Datasets**
- Accessible as:
  - Image – Dynamic Mosaicking and On-the-fly processing
  - Catalog – Table, Metadata, Queries
- **M:M** – Many rasters as one or many images
- **Download** – Original Imagery with optional clipping

- **No Separate Install**
- **Windows/Linux/Solaris**
Image Service Client Applications

• ArcGIS Desktop
• ArcGIS Explorer
• 3rd Party Apps – Microstation, AutoCAD
• OGC Standards – WMS, WCS, KML
• Enhanced Web APIs
  - SOAP, REST
    - Service Description
    - Export Image – Extent, Resolution, Function
    - Query – Where ..
    - Identify – Feature, Pixel Size,…
    - Download - RasterID, Envelope/Geometry, Format,…
Visualization

*Interpretability of Imagery*
ArcGIS Desktop – **Accelerated Display**

**Seamless Pan and Zoom**

- Electronic Light Table like display performance
- Integrated geospatial imagery and vectors
- Utilizes Hardware Acceleration
- Dynamic
  - Change: Contrast, Brightness, Gamma, DRA
ArcGIS Desktop - Image Analysis Window

Better Interpretation & Understanding of Imagery

- Single Button Access to
  - Image Enhancements
  - Image Interpretation
  - Image Processing
- Save functions in Layers
Analysis

Exploiting the full value of imagery
Search & Discovery

Finding the Required Imagery

- Simplified through Image Services
  - Best by default
  - User Query
  - User defined mosaic method

- Catalog Access
  - Footprints
  - Metadata

- Selections

- WebBased Query tools
Image Processing

Exploiting the Full Value of Imagery

- Through Image Analysis Windows
  - Ortho
  - PanSharp
  - Composite
  - Mosaic
  - ...
- Applied On-The-Fly
- Stored in Layer
Image Classification Toolbar

Added to Spatial Analyst

- Training Sample Manager
  - Supervise & Unsupervised
  - Class Probability
  - Principle Component Analysis
- Define training areas graphically
- Generate Signature
- Uses functions
- Requires Spatial Analysis Extension
- Not to be confused with Feature Extraction
ArcGIS – A Platform for Complete Imagery Solutions

Information Centric Workflows Enable Efficiency & Interoperability

- ESRI works closely with its partners
- ArcGIS provides THE platform
- Partners provide domain expertise

- Automated Feature Extraction
- Multispectral Analysis
- Hyperspectral Analysis
- Radar
- Specialized Sensor Support
- Stereo Display
- …

Service partners not listed

Trimble (Applanix)
Microsoft (Vexcel)
DigitalGlobe
Pictometry
RapidEye
GeoEye
SPOT

PCI Geomatics
Trimble (Inpho)
LizardTech
i-cubed
MDA

ITT VIS
Definiens
Clark Labs
Overwatch
BAE Systems

DAT/EM
PurVIEW
TerraGo
Qcoherent
ArcGIS

The Platform for Fully Integrated GIS and Imagery

- Integrating Imagery as core to GIS
- Management, Dissemination, Visualization and Analysis
- Solution for wide range of imagery requirements
- Maximizes the value of imagery
Evaluations – Please Fill Out

Your comments help us meet your conference needs each year.
Evaluations – Please Fill Out

Your comments help us meet your conference needs each year.

QUESTIONS?