ArcGIS for Server Imagery Update

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Outline

• Mosaic dataset
• Management and dissemination of imagery
  - Dynamic image services, Tiled Cache
• Visualization and analysis of imagery
  - Imagery on AGOL
• New in 10.1
  - LiDAR
• Demos
Brief Audience Survey

• What % using
  - ArcGIS 9.3?    Image Server?
  - ArcGIS 10.0?   ArcGIS Server?

• How do you use imagery:
  - Simple background
  - Image processing → output products
  - Technical image analysis

• What % using LiDAR

• Usage:
  - Detailed DEM
  - Point Analysis
Managing and Using Imagery in ArcGIS

**Imagery Managers**
- Management
- Dissemination

For Large Collections of Imagery

**Imagery Users**
- Visualization
- Analysis

Of Ubiquitous Imagery
ArcGIS Solutions for Imagery Managers

Imagery Managers

Management

Dissemination

For Large Collections of Imagery
ArcGIS is Used to Manage All Levels of Imagery

- Cached Imagery
  - Web Optimized Tiles

- Preprocessed Imagery
  - Mosaicked & Color Balanced

- Rectified Images
  - Pre Rectified / Orthorectified

- NonRectified Images
  - Direct from Sensor

Most Imagery Providers are Esri Business Partners
Mosaic Dataset

Optimum Model for Image Data Management and Processing

• Quickly Catalog All Imagery & Rasters
  - Ingest Metadata
  - Define Processing
• Create Imagery Products
• Author and Directly Use in ArcMap
• Image Service via ArcGIS Server
  - Web apps (WMS, WCS, KML etc.)

• Accessible as
  - Catalog (Footprints, Detailed Metadata)
  - Imagery
Dynamic Mosaicking

- **Processing Time**
  - Time consuming

- **Overlapping Imagery**
  - Loss of information

- **Disparate Datasets**
  - Large NoData areas

- **Loss of Image Quality**
  - Sampling degrades quality

- **Additional Storage**
  - Mosaicking requires storage

- **Multi-resolution Data**
  - Need to sample up or down

- **Maintenance**
  - Difficulty making changes

- **Loss of Metadata**
  - Valuable information

Resolves Issues with Traditional Image Management
Dynamic Mosaicking

Demo – Mosaic Dataset

Dynamic Mosaicking
On-The-Fly Processing
Create Multiple Products from a Single Source

- Processing can be applied to raster or service level

- Processes include:
  - Enhance
  - Extract Bands
  - Orthorectify
  - PanSharpen
  - Vegetation Index
  - Classify
  - Crop to Footprint
  - Visualize Elevation
    - Hillshade, Slope…
Derived mosaic datasets

Hierarchical data management – best practices

- Use “Table” raster type
- Used to merge the content of other mosaic datasets
  - N:1 relationship
- Must use synchronize tool to update

Source Imagery  Mosaic Datasets  Derived: Master Mosaic Dataset
Referenced mosaic datasets

Hierarchical data management – best practices

- Created from MD using geoprocessing tool
  - 1:1 relationship
- Attribute table read-only; updated automatically

- Useful for
  - refining (subsetting) output
  - for creating various products
  - restricting access when sharing

Ref: Pan Sharpen
Ref: NDVI
Ref: Limit Extent
Ref: Other…

Derived: Master Mosaic Dataset
Demo – Mosaic Dataset
On The Fly Processing
Image Management Workflow

ArcGIS has a Standardized Model for Image Management and Processing
Image Management Workflow

ArcGIS has a Standardized Model for Image Management and Processing
Image Management Workflow

ArcGIS has a Standardized Model for Image Management and Processing
Dissemination

*Image Services Provide Dynamic Access to Imagery*

Accessible as:

**Image Services**
- Image
- Catalog
- Functions

**OGC**
- WMS
- WCS
- KML

**WebApps**
- SOAP/REST
- ArcGIS Web APIs

Server
On Premise or In Cloud

Large Image Collections

Desktop Workgroup

Optional Cache

Desktop, Web & Mobile Users
Dissemination

Register Imagery with ArcGIS Online
## Tile Cache vs. Dynamic Image Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Tile Cache</th>
<th>Dynamic Image Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastest performance</td>
<td>Fast performance (if optimized)</td>
<td></td>
</tr>
<tr>
<td>Compatible with simplest clients (browsers)</td>
<td>Compatible with simple clients (WMS, WCS, KML, Web Apps via SOAP, REST)</td>
<td></td>
</tr>
<tr>
<td>“Wallpaper” background imagery</td>
<td>Single data source → multiple products (minimize disk space)</td>
<td></td>
</tr>
<tr>
<td>User control of server:</td>
<td>User control of server:</td>
<td></td>
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<tr>
<td>Compression</td>
<td>Compression</td>
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</tr>
<tr>
<td>“What’s on top?”</td>
<td>“What’s on top?”</td>
<td></td>
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<tr>
<td>Server-side processing</td>
<td>Server-side processing</td>
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</tbody>
</table>
Using Imagery in ArcGIS

Imagery Users

Visualization

Analysis

Of Ubiquitous Imagery
Imagery Visualization and Analysis

• ArcGIS enables users to:
  - Find best imagery
  - Visualize with optimum interpretability
  - Analyze to extract information
ArcGIS Online provides content that can be directly used in Desktop, Web and Mobile Apps

ArcGIS enables you to discover (search for) the best imagery content
Visualization

Improving Interpretability and Human Understanding

- **ArcGIS provides**
  - Integrated Imagery and Vectors
  - Fast Display Performance
  - Dynamic Image Processing
    - Change: Contrast, Brightness, Gamma, DRA
    - Functions to: Orthorectify, PanSharpen, …

- In Both Desktop and Web Environments
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

Extract Information from Imagery

- ArcGIS Enables you to:
  - Define accurate location based on imagery
  - Measure distances & heights
  - Extract features
  - Perform image classification
  - Perform spatial analysis
  - Run automated geoprocessing models
What’s New for Imagery in 10.1

A few examples:

• More free content – ArcGIS Online
• Image services based on categorical imagery
  - Attributes available to image service clients
  - Easier to build useful image services of analysis results
• Raster Products (advanced sensor definitions)
• Easier management of mosaic datasets
• LiDAR support

ArcGIS 10.1 builds on ArcGIS 10.0
Mosaic datasets produce higher quality products

- Improved color correction
Mosaic datasets produce higher quality products

- Improved seamlines

ArcGIS 10.1 builds on ArcGIS 10.0
It is easier to georeference imagery

- Automatic image-to-image registration
- Dual-window user experience
- Auto-completion of control points

ArcGIS 10.1 builds on ArcGIS 10.0
Integrates and Manages Lidar

Providing rapid accessibility to Lidar data and derived products

Las Files

Integrates and Manages Lidar

Providing rapid accessibility to Lidar data and derived products

Rasters

TINs

Dynamic Integration

Point Clouds

Supporting Improved Visualization and Analysis
Elevation

Used by large percentage of ArcGIS users

- Traditionally:
  - Search, Download, Manage, Process
  - Visualize, Analyze locally

- Esri World Elevation Services:
  - Single Endpoint
  - Directly Access & Use
  - Visualize

- Utilizes ArcGIS Server and Mosaic Datasets (all 10.0)
- Shows best practice for management of elevation data
World Elevation Data Sources

Digital Terrain Models, Digital Surface Model & Bathymetry

1km GEBCO TopoBathy
250m GMTED
93m SRTM
60m NED
30m NED
10m NED
5m IFSAR
3m NED
0.9m Lidar

Datasets courtesy of Intermap, DOGAMI, USGS, NGA, GEBCO
Summary

ArcGIS enables
• Management & analysis of existing imagery
• Rapid use of new (custom) imagery

ArcGIS Online provides
• Access to more free data (imagery & elevation)
• A simple cloud solution for sharing