Content Tour: Imagery

Peter Becker
ArcGIS Provides a Comprehensive Imagery Platform

Seamless integration and analysis of imagery with all spatial data

A scalable platform for working with all forms of imagery (drone, aerial, and satellite) to create valuable information products, integrated with GIS.

Online
Desktop
Enterprise
APIs & SDKs
ArcGIS includes a Living Atlas of the World
Maps and Layers from Esri and Thousands of Contributors

The Collection is growing and changing on a daily basis…

…with Curated Content on Many Topics
Accessing the Living Atlas through ArcGIS

Multiple ways to Experience the Living Atlas through ArcGIS Apps

- **ArcGIS Online & ArcGIS Enterprise (Portal) 10.5 - 10.6.1!**
  - **Content:** Living Atlas Content
  - **Add Data:** Browse Living Atlas Layers
  - **Analysis:** Choose Living Atlas Layers
    - Includes “Esri Boundary Layers” for Enterprise

- **Living Atlas of the World Website**
  - livingatlas.arcgis.com
  - Browse and preview maps, layers, and tools
  - Contribute maps, layers, and data

- **ArcGIS Pro 1.2+**
  - Open Maps, Add Layers, Perform Analysis
Basemaps
Suite of basemaps to support your web maps and applications

- Variety of Basemaps for Different Maps and Apps
  - From neutral background maps to rich foreground maps, emphasizing human or physical worlds

- Now Available in both ‘Vector’ and ‘Raster’ Format

Reference Maps for our World and Context for Your Work
World Imagery
Esri’s flagship imagery basemap

- Multi-scale map featuring Most Recent, High-res imagery from Best Available Sources

- Over 150 million sq. km. of imagery updated in past 1.5 years

- Updated with DigitalGlobe basemap imagery

- Updates from GIS User imagery through Community Maps
  - Hundreds of contributions from national, provincial, and local sources
    - Austria, Netherlands, New Zealand, Spain, Switzerland, City of Berlin, Many U.S. & Canadian Cities, …
World Imagery (Clarity)

Alternative view of the World Imagery map (Beta release)

- View of World Imagery featuring Alternative Imagery from Archive
  - Reveals a curated set of imagery from Esri’s multi-year archive

- Optimized for Image Clarity and Accuracy
  - Less haze or cloud cover, higher positional accuracy
  - Typically less current than default imagery content
  - May feature most recent imagery, if also clearest and/or most accurate

- Designed for Use Cases that Require imagery of Highest Clarity
  - Feature collection and editing, change detection, etc.
World Imagery (Firefly)
Alternative view of the World Imagery map

• View of World Imagery for use as Neutral Background
  - Stylized to de-saturate color so it doesn’t compete with overlays

• Features the Same Imagery as the World Imagery map
  - Transitions to standard full-color imagery at large scales

• Designed for Use Cases that Require Imagery with Muted Color
  - ‘Firefly cartography’, maps with bright overlays, etc.
  - Includes the texture and richness of imagery
World Imagery (Wayback)
Multiple Vintages of the World Imagery map from our Archive (now in Beta release)

- Over 80 Versions of World Imagery going back ~5 years
  - Initially releases from January 2014 through June 2018
  - Published as performant and scalable basemap tile layers

- View Change over Time
  - Reveals typically 3-5 different views of an area in recent years

- Lock In to a Specific Version
  - Reference a specific version for your AOI (e.g. community imagery)
  - Preserve the ‘current state’ at the time of your analysis

- During Beta, Esri will be Adding More Imagery from Archive
Esri Content Portfolio within Living Atlas

- People
- Infrastructure
- Environment
- Imagery
- Basemaps
- Boundaries
- Trending
NAIP Imagery
1m or better resolution multispectral imagery for the Continental United States

- **Type:** Dynamic Image Service
- **Access:** ArcGIS Online Subscription
- **Coverage:** Continental US
- **Dates:** 2010 - 2017
- **Updates:** 2-3 / Year
- **Refresh:** Approximately 3 Years
- **Resolution:** 0.5, 0.6m, 1m
- **Bands:** RGBIR
- **Functions:**
  - Natural Color, False Color IR, NDVI, User Defined

Imagery provided courtesy of USDA FSA
NAIP - Access, Visualization and Analysis
1m or better resolution multispectral imagery for the Continental United States

- Number of image: 800,000
- Volume of data: 200TB
- Storage:
  - Esri managing and hosting all NAIP data on AWS S3 PDS
- DataFormat:
  - Source (TIF)
  - Analytics (MRF)
  - Visualization (JPEG compressed 3band COG)
- Public Access to S3 Bucket (New TODAY)
  - Can be used by any application (requestor pays).
  - Mosaic Dataset will be provided
  - Stand up your own server
  - Use for Analytics
Landsat 8 Imagery
Global 15m / 30m multi-spectral multi-temporal imagery for regional land analysis

- **Type:** Dynamic Image Service
- **Access:** Freely Accessible by all ArcGIS Users!
- **Coverage:** Entire World (Including Arctic and Antarctic)
- **Dates:** 2013 Till Date
- **Updates:** Daily
- **Refresh:** Approximately 12 days (cloud permitting)
- **Resolution:** 15m PAN, 30m MS, 15m PS
- **Bands:**
  - Coastal Aerosol
  - Blue, Green, Red
  - NIR, SWIR1, SWIR2, Cirrus
  - Panchromatic (15m)
- **OTF Processing:** TOA Reflectance

Imagery provided courtesy of the U.S. Geological Survey
Landsat 8 - Access, Visualization and Analysis

- Number of Scenes: 1.15 Million
- Volume of data: Approx. 1PB
- Storage: AWS S3 PDS – Public bucket
- DataFormat:
  - Tiled TIF, Deflate + 3x pyramids
  - Each scene = 8 TIF files
- Option to stand up your own server
- Mosaic Dataset will be provided
Sentinel-2 Imagery
Global 10m imagery for Earth observation

- **Type:** Dynamic Image Service
- **Access:** ArcGIS Online Subscription (no credits required)
  - Open access via Sentinel Explorer
- **Coverage:** 65.4° South/North
- **Dates:** Past 14 months
- **Updates:** Daily
- **Refresh:** Approximately 5 days (cloud permitting)
- **Resolution:** 10m, 20m, 60m
- **13 Bands:**
  - Blue, Green, Red, NIR (10m)
  - VRE1, VRE2, VRE3, NarrowNIR, SWIR1 (20m)
  - Coastal Aerosol, Water Vapour, SWIR-Cirrus (60m)
  - 3 Red-Edge bands for enhanced vegetative analysis

**Functions:** Agriculture with DRA, Bathymetric with DRA, Color Infrared with DRA, Natural Color with DRA, Short-wave Infrared with DRA, Geology with DRA, Agriculture, Bathymetric, Color Infrared, Geology, Natural Color, Short-wave Infrared, NDVI Colormap (Colormap applied over NDVI values stretched over 8 bit), NDMI Colored (Colormap applied over NDMI values stretched over 8 bit), NDVI Raw, Normalized Burn Ratio, Normalized Difference Built-Up Index, NDVI-VRE only Raw, NDVI with VRE Raw, +UserDefined

Sentinel-2 is part of the European Commission (EC) Earth observation program - Copernicus Imagery courtesy of the European Space Agency (ESA)
Sentinel 2 - Access, Visualization and Analysis
Global 10m imagery for Earth observation

- Number of Granules: 2.6 Million
- 14 months rotating window data
- Volume of data: Approximately 100 TB
- Storage:
  - AWS PDS in Frankfurt Region – Requestor pays
- DataFormat:
  - JP2000
  - Cloud Free/Recent: LERC compressed MRF
  - Each granule =13 files
- Stand up your own server
- Mosaic Dataset will be provided
World Terrain
Global 10m imagery for Earth Observation

- **Type:** Dynamic Image Service
- **Access:** Type: Dynamic Image Service
- **Access:** ArcGIS Living Atlas, ArcGIS Online Subscription
- **Coverage:** Entire World
- **Dates:** Vary
- **Updates:** 3-4 times/Year
- **Resolution:** 24m Airbus WorldDEM, 1m USGS, Japan etc

Functions: Aspect, AspectMap, GrayScale Hillshade, MultiDimensional Hillshade, Ellipsoidal Height, Slope Degrees, Slope Map, Slope Percent, Elevation Tinted Hillshade, + **User Defined**
World Terrain: Access, Visualization and Analysis

- Number of rasters: Approx 200,000
- Volume of data: around 6 TB
- Storage: AWS in Oregon
- Data Format: MRF - LERC

Contributors

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Arctic Elevation
3m temporal elevation of the Arctic

- Type: Dynamic Image Service
- Access: Type: Dynamic Image Service
- Access: ArcGIS Living Atlas, open and free
- Coverage: Arctic Region
- Dates: 2005-2018
- PixelSize: 2m & 5m
- Updates: 2-3 times / year
- Data Created by : PGC (NSF/NGA)
- Source : DG WorldView Satellite Imagery

Aspect Degree, Aspect Map, Hillshade Gray, Hillshade Multidirectional, Height Ellipsoidal, Slope Degrees, Slope Map, Slope Percent, Hillshade Elevation Tinted, Contour 25, Contour Smoothed 25, User Defined
Arctic Elevation: Access, Visualization and Analysis

- Number of rasters: 62791
- Volume of data: around 10 TB
- Storage: AWS in Oregon
- Data Format: MRF - LERC
- Next release in September
- + Antarctic
HYCOM

- Type: Dynamic Image Service
- Access: Type: Dynamic Image Service
- Access: ArcGIS Living Atlas ArcGIS Online Subscription
- Coverage: Global – Ocean coverage
- Dates: - 7 day forecast for previous 30 days
- Updates: Daily
- Data Source : Hycom.org
- Refresh: N/A
- Resolution: .08 degree ( 8905 meters)
- Bands: Multi Dimensional

Functions: Sea Water Temperature Celsius, Aspect Map, Sea Surface Elevation Meters, Sea Water Salinity, Sea Water Temperature Fahrenheit, Sea Surface Elevation Feet, Sea Surface Elevation Feet, Eastward Sea Water Velocity (u), Northward Sea Water Velocity (v), Contour Water Temperature, Contour Sea Surface Elevation, User Defined
HYCOM: Access, Visualization and Analysis

- Number of image: 46529
- Volume of data: around 10 TB
- Storage: AWS in Oregon
- DataFormat: MRF - LERC
- Next release in September
Landscape Layers

- Landcover
- Protected Areas
- Rainfall
- Soils
- Soils Moisture
Content Partners

DigitalGlobe
Imagery + Analytics
Integration with GBDX

Deimos Imaging
Kanvas Origin
Esri ready Imagery Services

ClarkLabs
American Land Change Modeler

Nearmap

Vexcel Imaging
DigitalGlobe: Imagery + Analytics

- Connect your ArcGIS Enterprise to DigitalGlobe current and archive imagery
- Subscription offering
- Order AOIs from 100 PB Archive
- Imagery Accessible to your ArcGIS Enterprise + Image Server with Raster Analytics
- Running on AWS infrastructure – Federated with your Org.
- Dynamic Image Services + Raster Analytics + Access to GDBX
Clark Labs – The American Land Change Explorer

- Predictive land change modeling
- Potential of land to transition by 2050
- Predicted land cover for 2050
- Predicted change in land cover from 2011 to 2050
- Subscribe to enable your to define own specific areas of interest and time lines
70% of US Population multiple times per year
- Monitor change over time
- 2.8” GSD
- Oblique Imagery
Vexcel Imaging – Vexcel Data Program

Currently in Development

• Entire U.S. in high-resolution nadir imagery, 20cm GSD with geospatial data
• Ultra-high-res imagery and data of top 150 metro areas, 7.5cm GSD
  - Ortho imagery
  - Oblique imagery
  - 360 Street-view
  - 3D mesh with precise building geometry
  - Digital Terrain and Elevation models (DTM / DEM)

• Disaster Response
  - Wide Area Aerial
  - Oblique Imagery
  - 360 Streetview
Scaling to Many Data Provides / Sources

Enterprise GIS

Apps

Derived Products

Enterprise Data

ArcGIS Online

Landsat
NAIP
Elevation, ...

Enterprise GIS

Apps

Derived Products

Enterprise Data

Enterprise GIS

Apps

Derived Products

Enterprise Data

Enterprise GIS

Apps

Derived Products

Enterprise Data
Extending Imagery Modalities

Mosaic Dataset
Oriented Imagery

Access imagery at any angle, for any location

Pro Add In

Web App Widget

Management and Publishing Tools

Integration with many Content Providers

Available from the Marketplace, free

Early Adopter Release - UC 2018
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Select the Feedback tab

Complete answers and select “Submit”