

A hand is shown holding a glowing blue wireframe globe. The globe is composed of many small triangles and is positioned over a laptop screen. The background is a blurred image of a laptop on a wooden desk.

OPEN DATA & OPEN KNOWLEDGE Workshop

Imagery to Decision Ready Information

Simplifying the Process

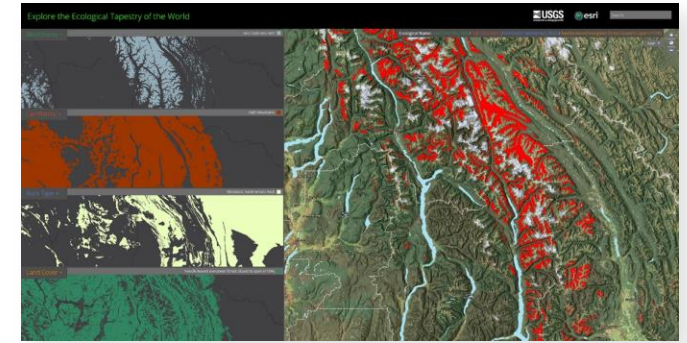
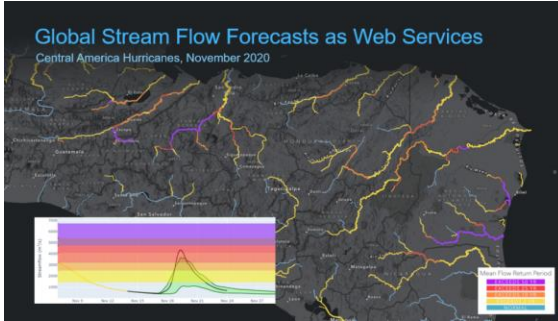
Steve Kopp

Pat Cummins

GEO Associate



A History of collaboration & partnership with GEO



AfriGEO: The African Group on Earth Observations

An initiative of the African community in GEO aimed at providing a coordination framework and platform for Africa's participation in GEO.

About

The AfriGEO initiative, developed within the GEO framework, strengthens the link between the current GEO activities with existing capabilities and initiatives in Africa, providing the necessary framework for countries and organizations to access and leverage on-going bilateral and multilateral EO-based initiatives across Africa. It thereby creates synergies and minimizing duplication for the benefit of the entire continent.

This coordination initiative has been recognized essential to enhance Africa's capacity for producing, managing and using Earth observations, thus also enabling the Region's participation



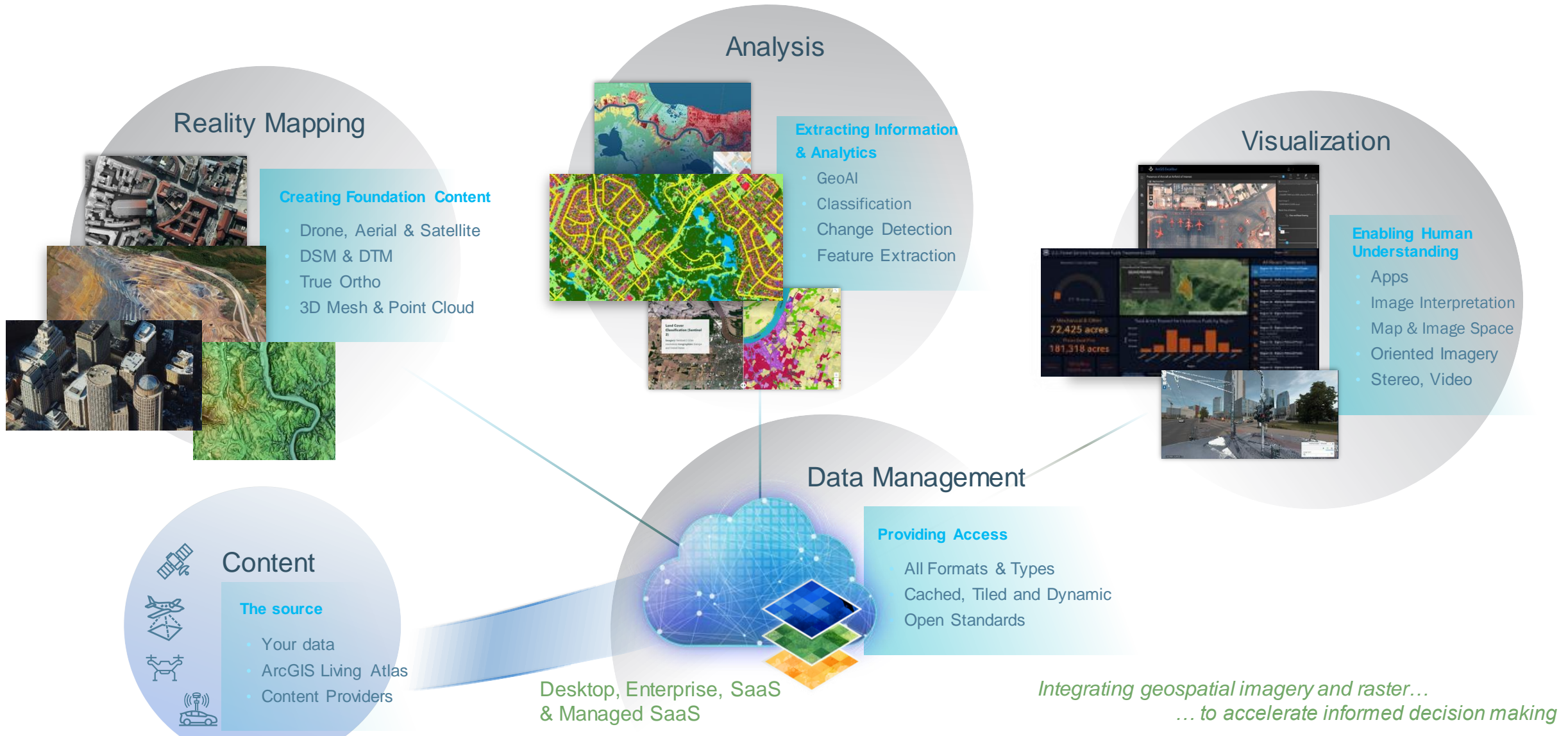
How does Esri support GEO mission & work programs?

Support Many Types of Workflows and Engagements



Can Esri work with Earth Observations data?

Comprehensive Imagery Management System - Integrates all aspects of imagery



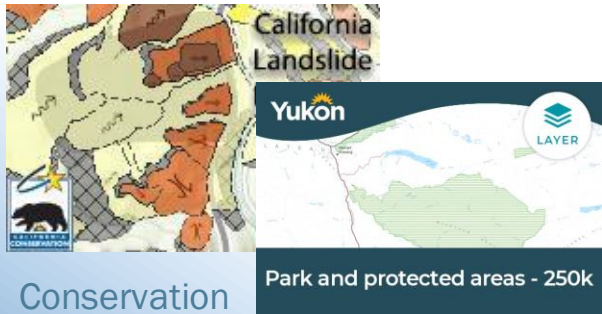
IMPROVING DATA ACCESS

Esri offers an Ecosystem of Open Data

Providing a Global Geospatial Infrastructure of Useful & Authoritative Content



User Shared Apps, Maps, and Data . . .



• Millions of Public Items
• Billions of Views Yearly

. . . on Many Topics



Built by and for the ArcGIS Community

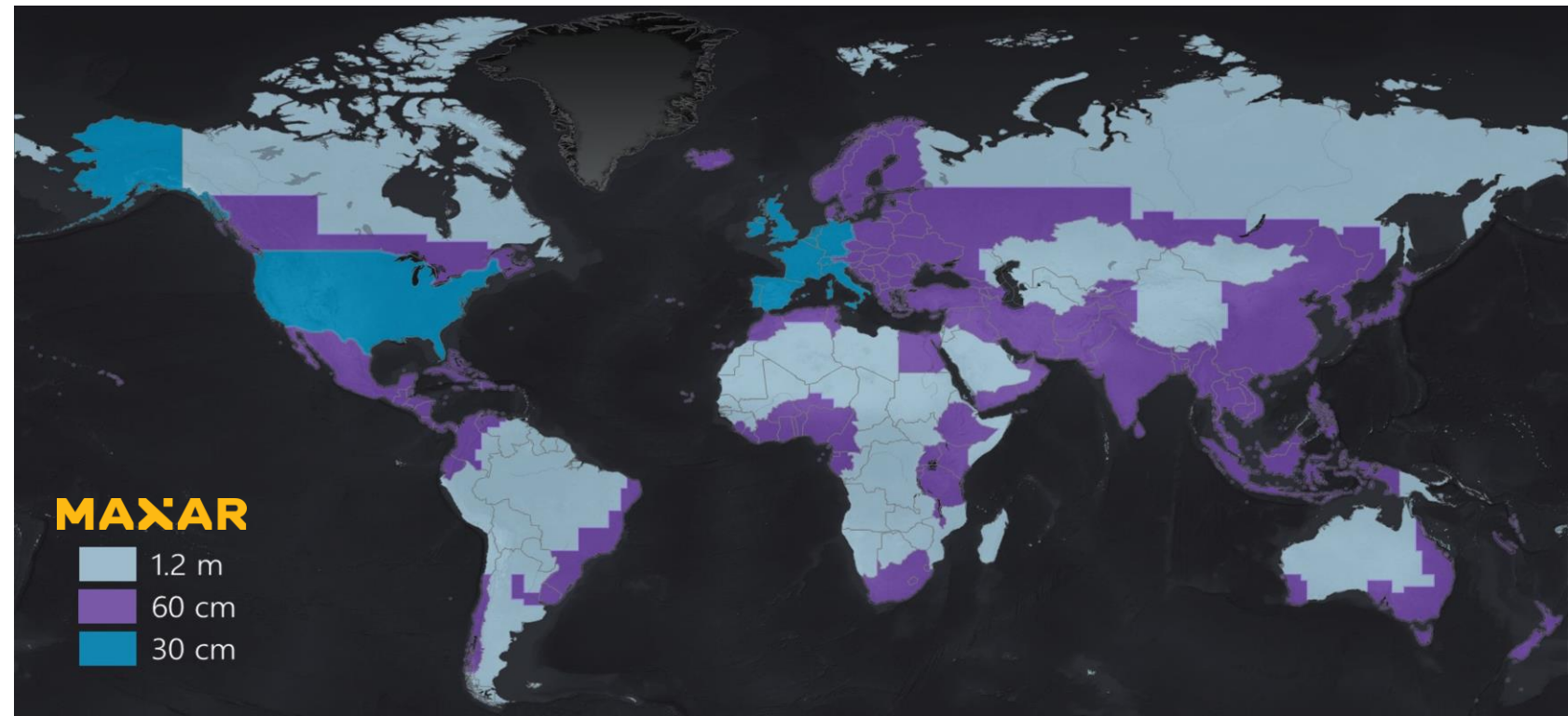
World Imagery

Esri's flagship imagery basemap

- Features Most Recent, High-res imagery + metadata
- New data updates monthly
- Higher resolution from GIS User imagery through Esri Community Maps

Hundreds of countries and cities

Typically, 30cm or better aerial imagery



Historic High Resolution Imagery

Explore archive of World Imagery updates for the past several years

- Currently ~150 Versions of World Imagery
 - Releases from *January 2014 through Present*
 - Published as performant and scalable tile layers
 - Includes metadata with source, date, resolution, etc

Explore imagery at livingatlas.arcgis.com/wayback



Beijing Daxing International Airport

Global Multispectral Imagery

Image Services and Scalable Analytics

- Imagery

- Full Landsat 4-9 Archive (1984-present)
- Sentinel-1, 2, 5P
- Digital Earth Africa
- Deep learning packages*

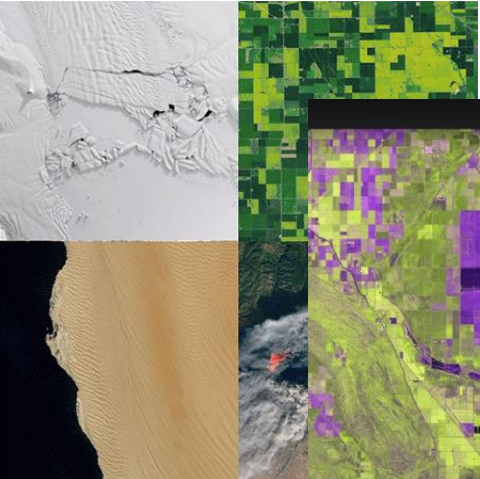
- Landscape

- Global 10m Esri Landcover 2017-2022 (improved model)
- Global 2050 Landcover (Matched with Chelsa projections)
- New Landcover explorer app

Scalable compute collocated with the data



Landsat



Sentinel



DE Africa



Sentinel-2 Explorer



Belize Drone Mapping

Belize Coastal Zone Management Authority and Institute

182 collections in support of Coastal Planning

3-5 centimeter resolution

- Base mapping of remote areas
- Essential Biodiversity Variables
- Tracking development and degradation
- Mangrove mapping

Drone flight planning and processing with ArcGIS

Published in ArcGIS Online





2009
60 cm resolution
96% mangrove



2017
7 cm resolution
66% mangrove





2005
60 cm resolution
63% mangrove



2017
6 cm resolution
89% mangrove



Work with high resolution vendor imagery

Simplifying the process

Satellite Tasking direct to your ArcGIS account

- Request new data acquisition from BlackSky app
- Image collection goes directly to your ArcGIS Online or ArcGIS Enterprise account
- As fast as 90 minutes from acquisition

<https://www.blacksky.com/esri>



A screenshot of the BlackSky 'New Order' web interface. The interface is divided into several sections:

- Header:** 'New Order' title, search bar, and 'Checkout' button with 'Submit Order' and 'Cancel' options.
- Map:** A map of Geneva, Switzerland, with a large blue circular area indicating the tasking location. Labels on the map include 'Le Grand Saconnex', 'Chambésy', 'Le Petit Saconnex', 'Geneva', 'Châtelaine', 'Eaux-Vives', and 'Chêne-Bougeries'.
- Form Fields:**
 - Name:** Organisation Météorologique Mondiale, Avenue de la Paix, 1202, Genève, CH
 - Location:** 46.2232, 6.1463
 - Opportunities:** 48
 - Timeframe:** try until 2023-06-15 23:59 UTC. Options: 1 day (until Jun 2), 3 day (until Jun 4), 1 week (until Jun 8), 2 weeks (until Jun 15), Other.
 - Cloud Cover:** Maximum Cloud Cover has a 30% to 100% range. Options: 30% or less, 50% or less, 70% or less, 90% or less, Other.
 - Sun Elevation:** at time of capture. Min: 10, Max: 90. A sun elevation diagram shows a 90-degree angle and a 10-degree angle.
- Navigation:** A sidebar on the left contains icons for 'New Order', 'Order History', 'Add Data', 'Get Help', and 'Sign Out'.

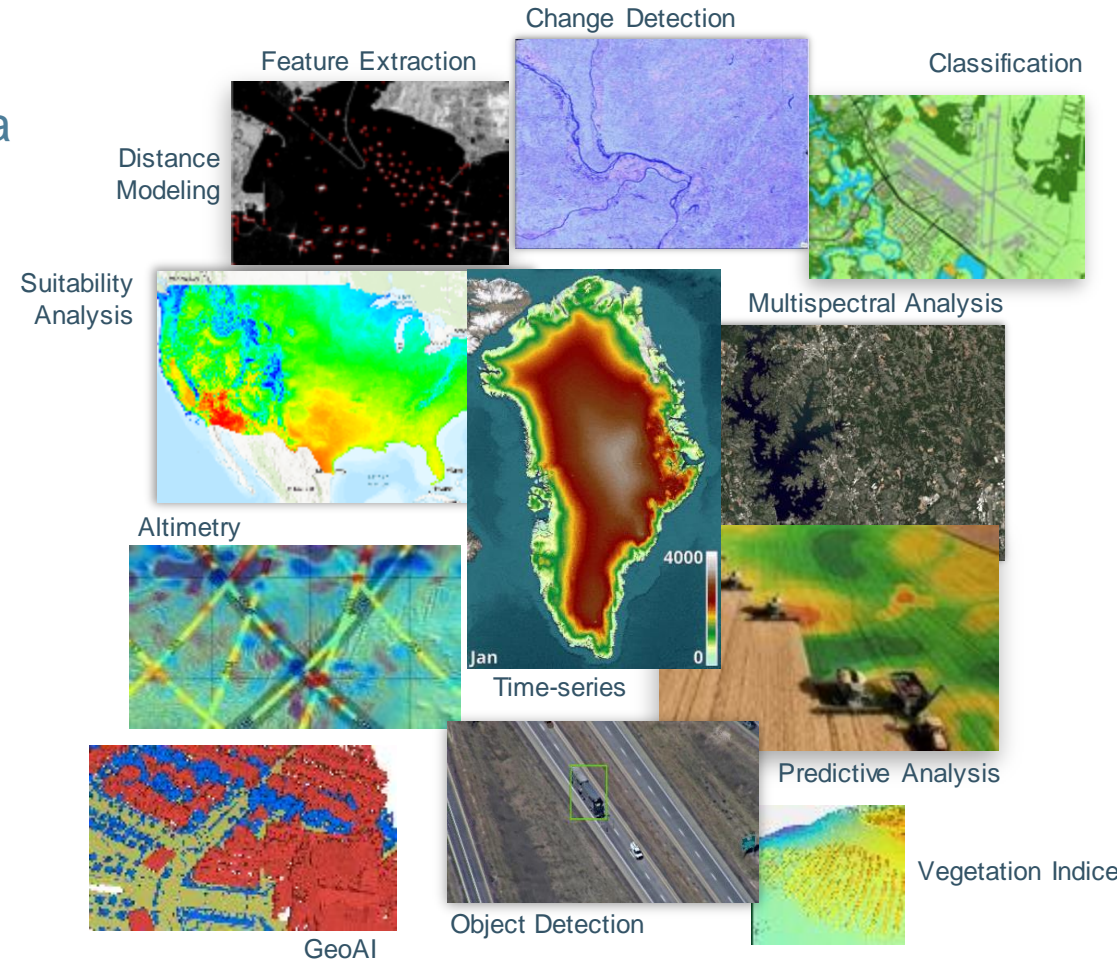
EXTENSIVE IMAGE ANALYSIS

Simplified Image and Raster Analysis

Turn earth observations into actionable information

Integrating all forms of geospatial data

Satellite Habitats
 Motion Landcover
 Soils Imagery Hydro
Climate Elevation
 Raster Radar
 Oceans
Drone Biodiversity
 Boundaries Infrastructure
 Overhead Imagery
Oriented Imagery



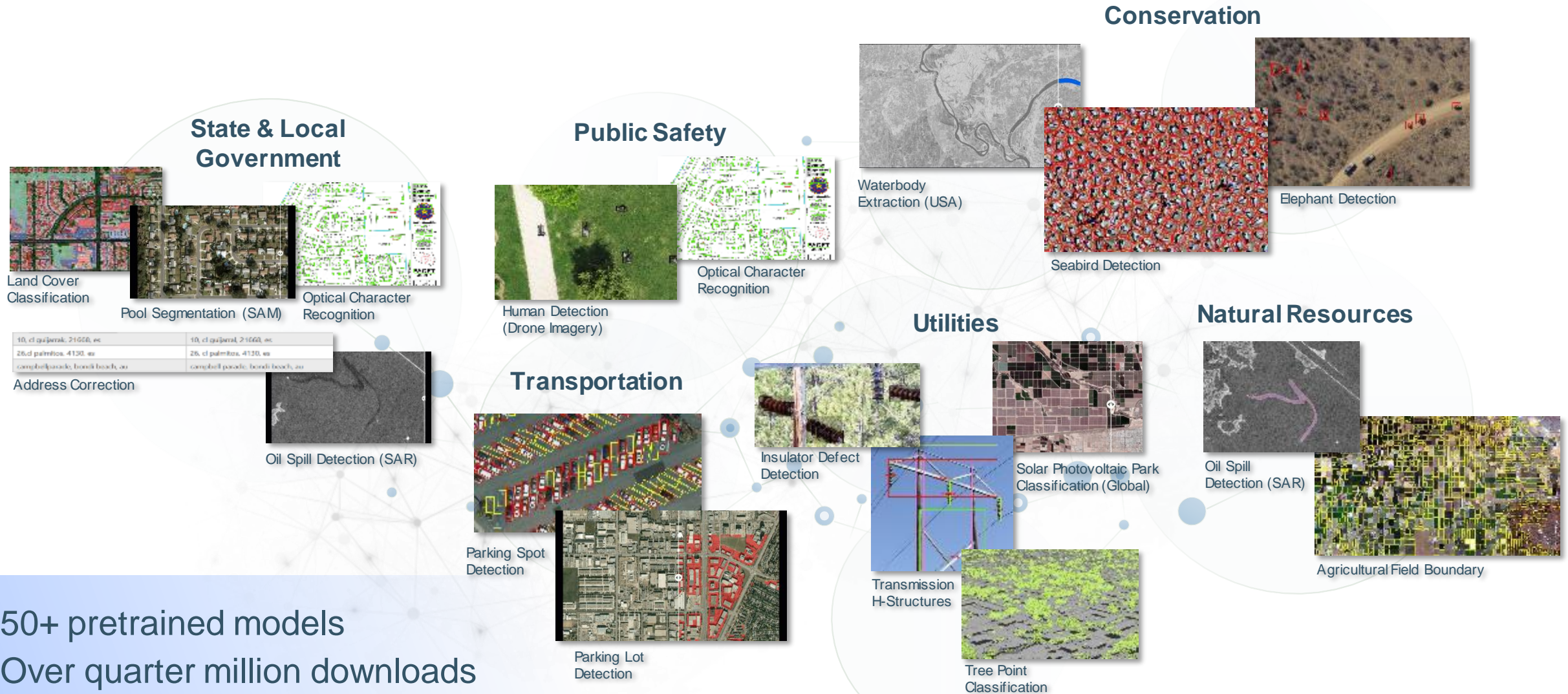
New & Improved

- Trajectory dataset
- New Radar sensors
- Deep Learning tools/models/UX
- Raster analysis in Map Viewer
- ArcGIS for Microsoft Planetary computer
- API enhancements

*Scalable Image Analysis. . .
to Solve Local & Global Problems*

Pretrained Deep Learning Models for Imagery

Streamlining analysis workflows



- 50+ pretrained models
- Over quarter million downloads
- New - Segment Anything Model (SAM)

Does Esri offer cloud hosting and analytics?

Imagery hosting and raster analytics in the cloud

Recent Improvements

- Raster tools in the Map Viewer
- Multidimensional analysis UX
- API enhancements (STAC & Mdim)
- Analysis history

Coming in July

- Raster Functions in the Map Viewer
- Animate Multidimensional data
- **Analysis against Sentinel and Landsat Services**
- Raster Function Editor

Drone Terrain Ortho mosaics Aerial
 Multidimensional Satellite Image Cubes
Upload Any Imagery Bathymetry
 Radar



**ArcGIS Online
SaaS**



Image
Services

Image Classification

Raster
Analytics

Object Classification

Spectral Analysis
Instance Segmentation

Advanced
Raster Functions

Object Detection

Terrain Analysis

Multidimensional Analysis

Change Detection

Suitability Analysis

Hydrological Modeling

Map Algebra

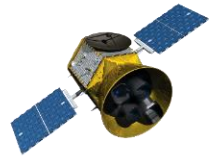
Pixel Classification

Distance Modeling

Enables Massive Image Processing & Raster Analysis

Can Esri work with High Resolution Imagery sources?

Creating Accuracy Digital Representations of the World



Generate Foundational Content

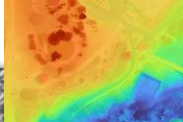
Point Cloud



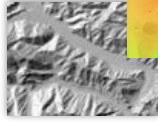
True Ortho



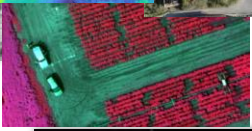
Surface Model



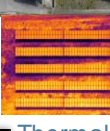
Terrain Model



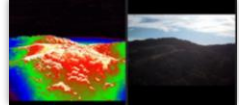
Multispectral



Thermal



Geospatial Video

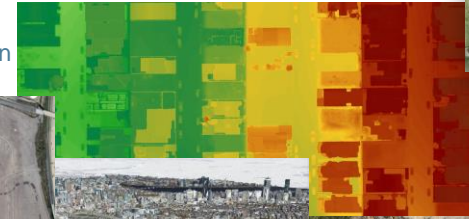


3D Mesh



Accurate and Analysis Ready

Analyze Terrain



Monitor Vegetation



Track Progress



Extract Information



Inspect Infrastructure

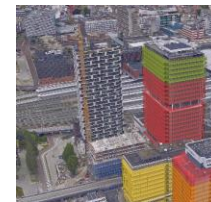


Build your 3D GIS

Model the Environment



Integrate BIM



Create Simulations



Manage Assets



Bring 2D GIS to Life



- Desktop & SaaS
- Any Scale & Any Extent

CAPACITY DEVELOPMENT RESOURCES

How is Esri contributing to Capacity Development?

Extensive Library of Workflow and Tutorial materials

The screenshot displays the Esri documentation website's 'Tutorials' section. On the left, there is a 'Filter' sidebar with dropdown menus for 'Imagery & Remote Sensing', 'All Products', 'All Topics', 'All Types', 'All Regions', 'All Levels', and 'All Accounts', along with a 'Clear Filters' button. The main content area is a grid of tutorial cards, each featuring a representative image, a title, a brief description, and a duration/level indicator. The cards include:

- Construct realistic buildings with multipatch editing** (TUTORIAL, 1 hr 30 min, Intermediate): Create detailed 3D building models with real-world image textures.
- Explore satellite imagery for Africa** (SERIES, 2 hr 20 min, Beginner): Discover satellite imagery for the African continent, perform image analysis on real life examples, and learn the fundamental concepts of imagery.
- 5. Assess a shrinking lake with ArcGIS Notebooks** (NOTEBOOK, 40 min, Advanced): Use ArcGIS API for Python and imagery to assess how Lake Mead in the US has been shrinking over the years, and learn how to use Python lists and loops to run an analysis over an entire imagery time series.
- Get started with change detection for Africa** (TUTORIAL): Use satellite imagery to identify and extract change due to a wildfire, water.
- Classify Imagery to detect flooding with Python** (NOTEBOOK): Follow instructions in notebooks to learn how to write Python code to classify.
- Reveal lake shrinkage due to severe drought** (TUTORIAL): Use the World Imagery Wayback app to create a story with swipe maps and...
- Analyzing Imagery with ArcGIS Online**: Find resources describing how to analyze imagery in the Map Viewer using ArcGIS Image for ArcGIS Online.
- Performing Image Change Detection**: Find resources describing how to perform pixel-to-pixel and time-series change detection in ArcGIS.
- Analyzing Multidimensional Data**: Find resources describing how to perform analysis on scientific data across multiple variables and dimensions.
- Analyzing Imagery Using Raster Functions**: Find resources explaining how to use raster functions to perform dynamic, on-the-fly processing and analysis on imagery and rasters.
- Performing Image Classification**: Find resources describing how to classify imagery using machine learning to identify patterns and...
- Site Suitability Analysis**: Find resources describing how to perform raster-based site suitability analysis to find locations that meet...
- Distributed Processing with Raster Analytics**: Find resources describing how to use distributed image processing and...
- Using Deep Learning for Feature Extraction**: Find resources describing how to use deep learning tools in ArcGIS to...

Esri Supporting GEO Members and Programs

- Open data access and integration
- Easy to build and serve your own data and apps
- Cloud based data publishing and image analytics
- Cutting edge image and GIS analysis tools
- Extensive, free capacity development resources

- *All in a single, open integrated platform designed to work together*

CONTACT DETAILS



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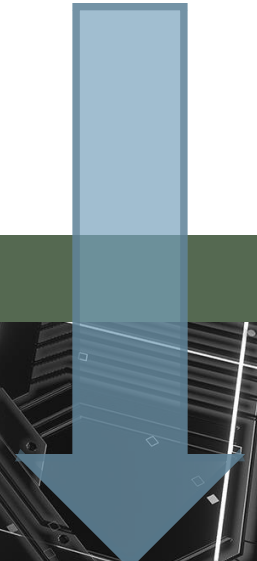
pcummings@esri.com



PHONE NUMBER

+1 (909) 793-2853

Presentation Links



Presentation Links

Data

Esri Living Atlas

<https://livingatlas.arcgis.com/en/home/>

World imagery basemap

<https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>

Community Maps imagery

<https://communitymaps.arcgis.com/home/what>

Imagery Wayback (historic imagery)

<https://livingatlas.arcgis.com/wayback/#active=46399&ext=6.14255,46.22018,6.15157,46.22593&localChangesOnly=true>

Analysis

Image Analysis capabilities in ArcGIS

<https://pro.arcgis.com/en/pro-app/latest/tool-reference/image-analyst/an-overview-of-the-image-analyst-toolbox.htm>

Deep Learning models

<https://www.esri.com/en-us/arcgis/deep-learning-models>

<https://livingatlas.arcgis.com/en/browse/?q=dlpk%20detection#d=2&q=dlpk+detection>

Cloud hosted image analysis

<https://www.esri.com/arcgis-blog/products/arcgis-online/imagery/introducing-arcgis-image-for-arcgis-online/>

<https://www.esri.com/arcgis-blog/products/arcgis-image-for-arcgis-online/imagery/whats-new-in-arcgis-image-for-arcgis-online-november-2022/>

Drone and Reality mapping

<https://www.esri.com/en-us/arcgis/products/arcgis-reality/platform/drone-mapping>

<https://www.esri.com/en-us/arcgis/products/arcgis-reality/overview>

Presentation Links

Capacity Development

Free capacity development resources

<https://learn.arcgis.com/en/gallery/#?c=imagery>

<https://doc.arcgis.com/en/imagery/workflows/gallery/>

Full catalog of available training resources

<https://www.esri.com/training/>

No cost and low cost Esri licensing

ArcGIS Pro free trial

<https://www.esri.com/en-us/arcgis/products/arcgis-pro/trial>

ArcGIS Online free trial

<https://www.esri.com/en-us/arcgis/products/arcgis-online/trial>

Africa GeoPortal account

<https://www.africageoportal.com/>

Conservation grant program

<https://www.esri.com/en-us/industries/conservation/program-application>

Education K-12 global grant program

<https://www.esri.com/en-us/industries/k-12-education/schools-software>

Individual Developer Account

<https://developers.arcgis.com/sign-up/>

ArcGIS for Personal Use

<https://www.esri.com/en-us/arcgis/products/arcgis-for-personal-use/overview>