



# Imagery and Raster Data in ArcGIS

Abhilash and Abhijit

**Esri Developer Summit  
Middle East & Africa**

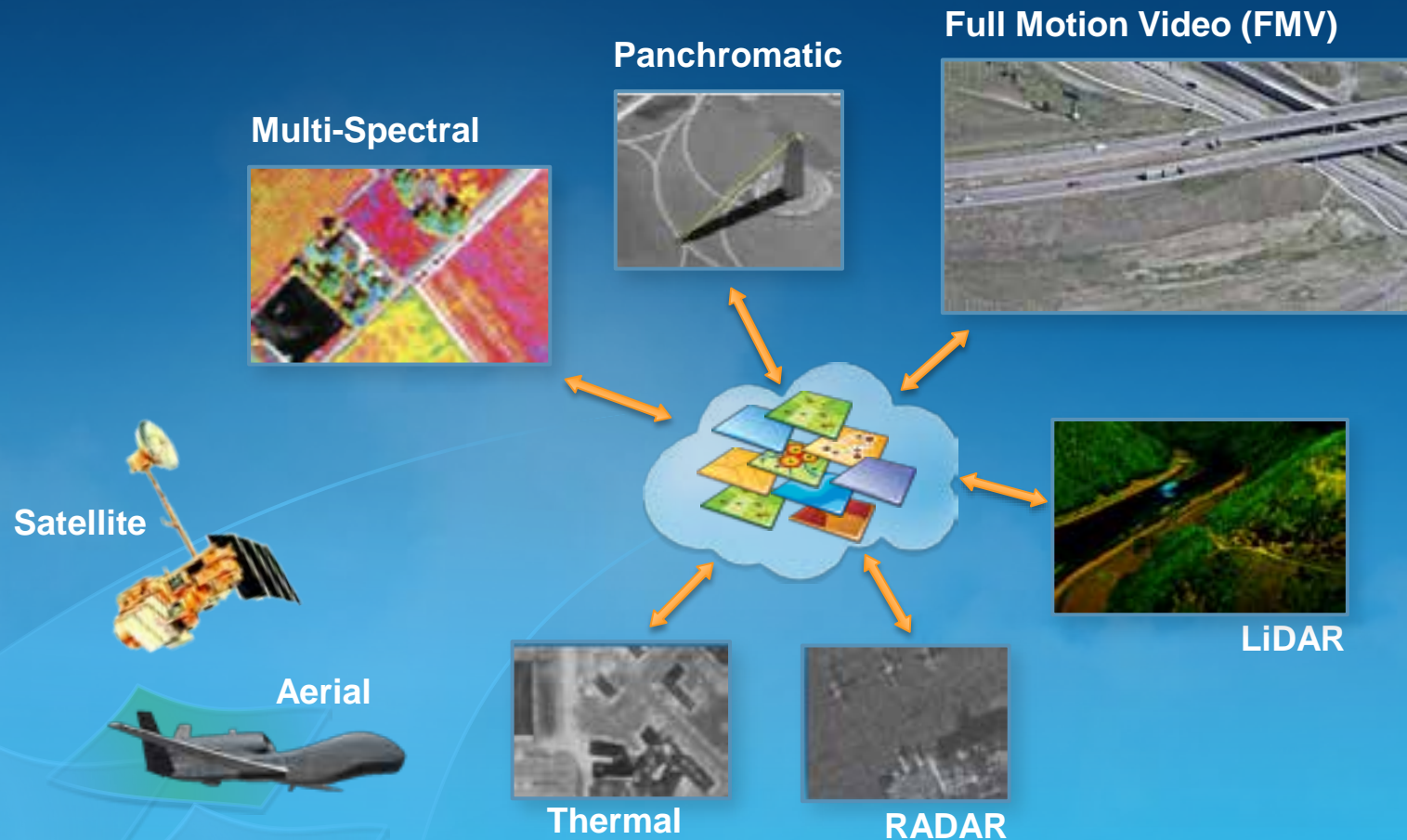
19-21 November 2013  
Park Hyatt Dubai

# Agenda

- **Imagery in ArcGIS**
- **Mosaic datasets**
- **Raster processing**

# ArcGIS is a Comprehensive Imagery System

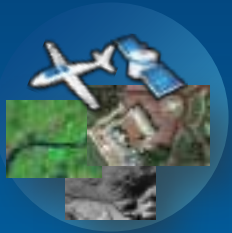
Integrating All Types, Sources, and Sensor Models



*Making Imagery Accessible*

*... Imagery is a Fundamental Part of the Systems*

# ArcGIS is a Comprehensive Imagery System



**Comes with Imagery**



**Provides Advanced Imagery Tools**



**Manages Massive Image Collections**

# ArcGIS Comes With Imagery

## Esri Curated

World Imagery



Landsat Natural View



World Landsat GLS



World Elevation



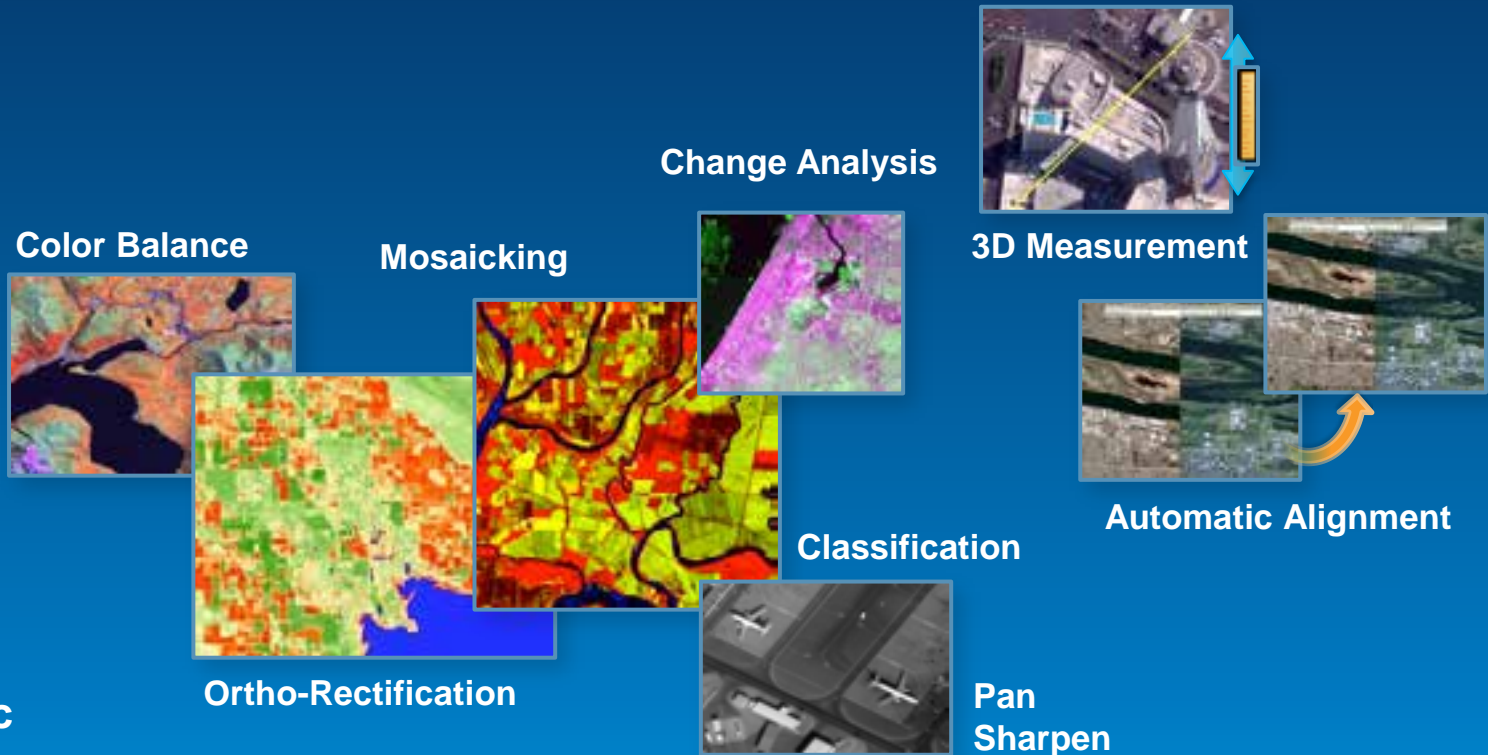
From Imagery Providers

From ArcGIS Users



# ArcGIS Provides Advanced Imagery Tools

Visualization, Processing and Analysis



- Fast
- Dynamic
- Massively Scalable

*Open and Leveraged by Partners*

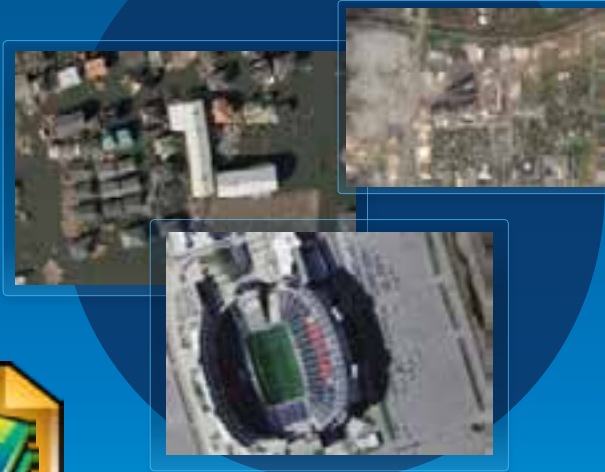
# ArcGIS Manages Massive Image Collections

Providing Accessibility to all Forms of Imagery

Wide Range of Sensors & Sources

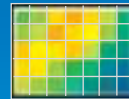


Imagery

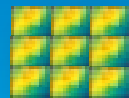


Satellite, Aerial, Scanned, Processed  
Nadir, Oblique, FMV, Lidar, Radar  
Pan, Multispectral, Float, Categorical

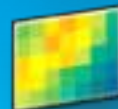
Levels of Imagery



Static Cache (Backdrop)



Preprocessed (GIS Ready)



Raw (Unprocessed)

# Image Management Workflow

## Using Mosaic Datasets

*Highly Scalable, from Small to Massive Volumes of Imagery*

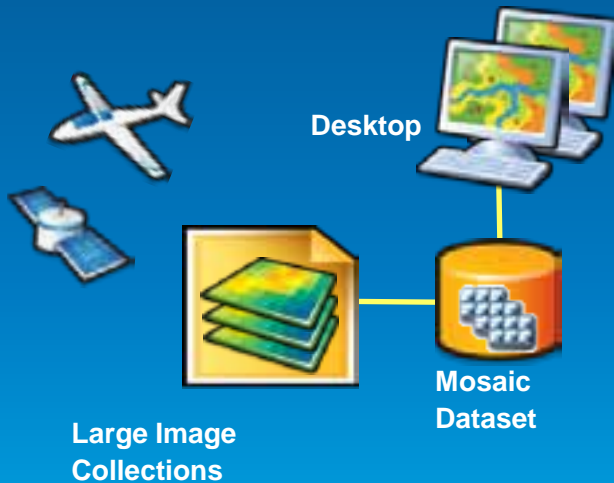


Create Catalog of Imagery

Reference Sources

Ingest & Define Metadata

Define Processing to be Applied



Apply:

On-the-fly Processing

Dynamic Mosaicking

Access as Image or Catalog



# Image Dissemination

## ArcGIS Online

### Integrating with & in the Cloud



**Register with ArcGIS Online**

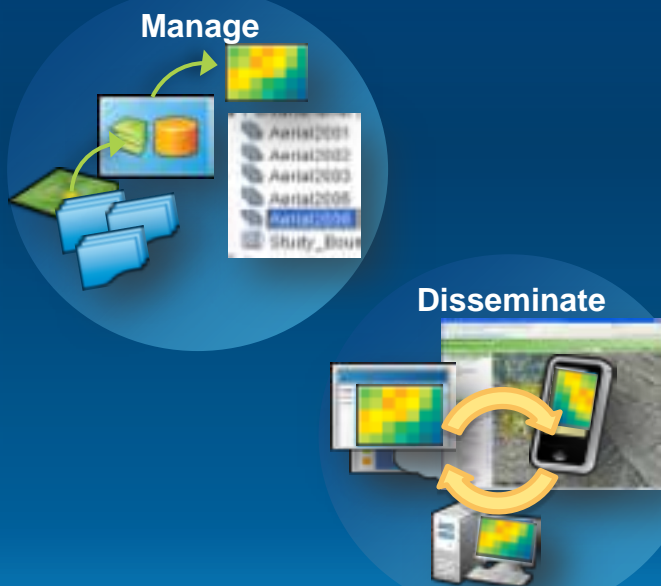
**Massive Accessibility**

**Content Management**



# ArcGIS Enables Tools for the Two key User Groups

## Imagery Managers



Large Collections of Imagery

## Imagery Users



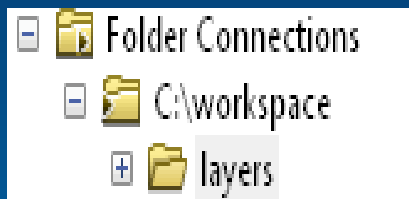
Simple Accessibility

## Image Management Workflows in Imagery Resource Center

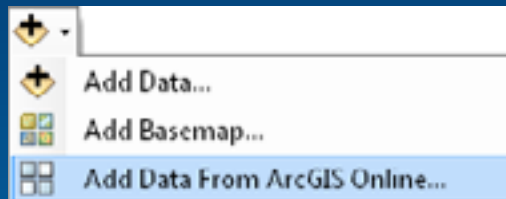


# Accessing imagery and raster data

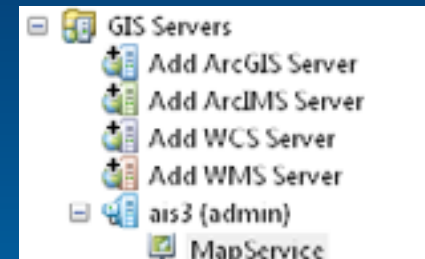
## File on Disk



## ArcGIS Online



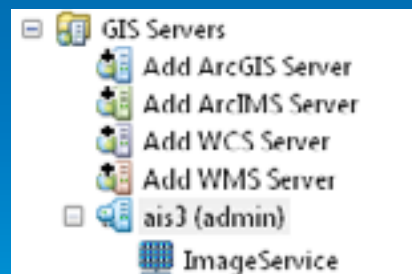
## Map Service



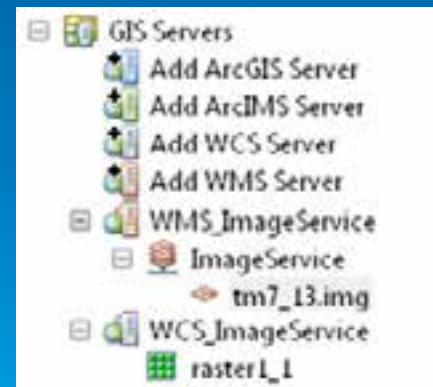
## GeoDatabase



## Image Service



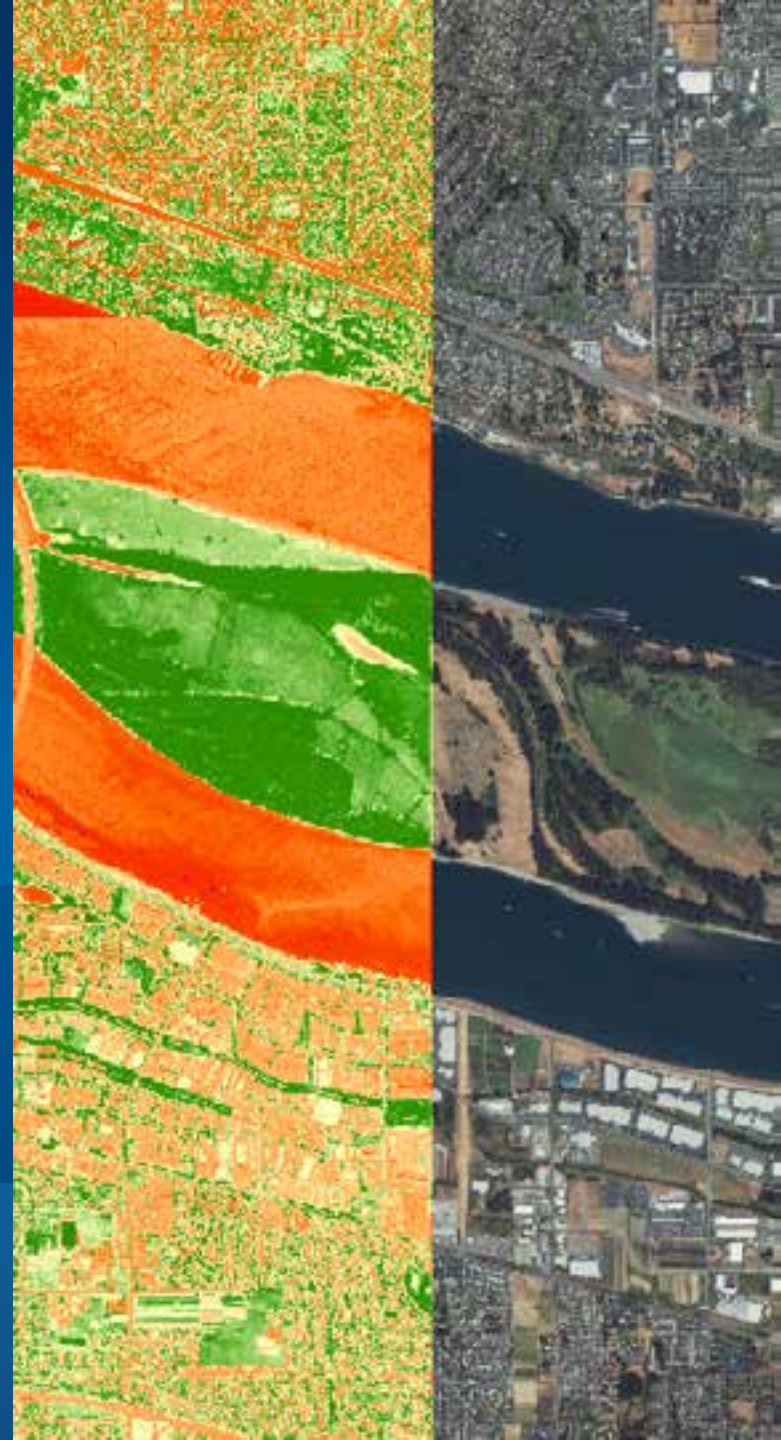
## WCS / WMS Service



Demo

# Accessing Imagery In ArcGIS

Abhilash



# Mosaic Datasets

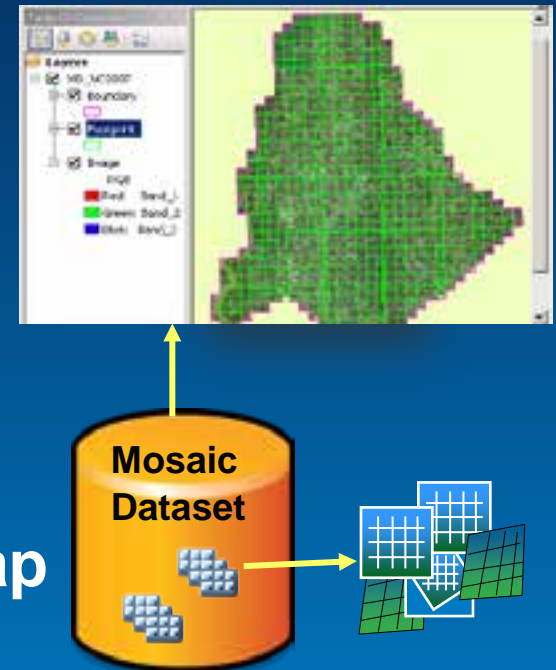
Abhijit





# Mosaic Dataset - Storage

- A model in geodatabase
- Stored as set of tables
  - Footprint table references source images
  - Boundary, Seamlines
  - Raster type, color correction
- Displayed as a composite layer in Map
  - Boundary
  - Footprint
  - Image





# Why Mosaic Dataset?

- **A lot of images**

- Ortho images, DEM, scanned maps -> mosaic
- Sensor images -> process
- Manage and catalog-> search and retrieve

- **Advantages**

- Store efficiently (reference images)
- Process fast (on-the-fly)
- Scalable
- Search easily (selection and query)
- Update easily
- Multiple clients



# Mosaic Dataset – Mosaic Method

- **Mosaic method to set the display order**
  - North west (default)
  - Closest to center
  - By attribute
  - Closest to nadir
  - Seamline
- **Mosaic operator to resolve the overlaps**
  - First/Min/Max/Mean/Blend

Closest to the center



By attribute: cloud cover

# Creating a Mosaic Dataset

Create Mosaic Dataset tool – Create table schema

OID	Shape	Raster	Name	MinPS	MaxPS	LowPS	HighPS	Category	...
1	Polygon	<Raster>	P01.met	0	90	10	30	Primary	

- **Footprint table** – internal raster catalog with more fields
- **Parameters to set**
  - Define spatial reference
    - Web Mercator or spatial reference used by your organization
  - Number of bands and pixel types
  - **Product definition**
    - Used for automatic band matching
    - Examples: RGB, RGBI, Landset, etc

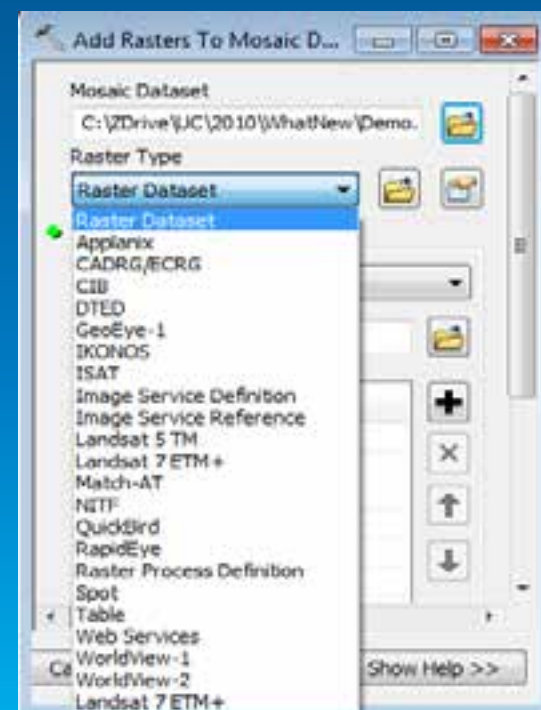
Band Name	Wavelength Min	Wavelength Max
Red	630	690
Green	530	570
Blue	490	480
Infrared	770	830

# Adding Rasters

## Add Rasters to Mosaic Dataset tool - Populate field values

OID	Shape	Raster	Name	MinPS	MaxPS	LowPS	HighPS	Category	...
1	Polygon	<Raster>	P01.met	0	90	10	30	Primary	
2	Polygon	<Raster>	P02.met	0	90	10	30	Primary	

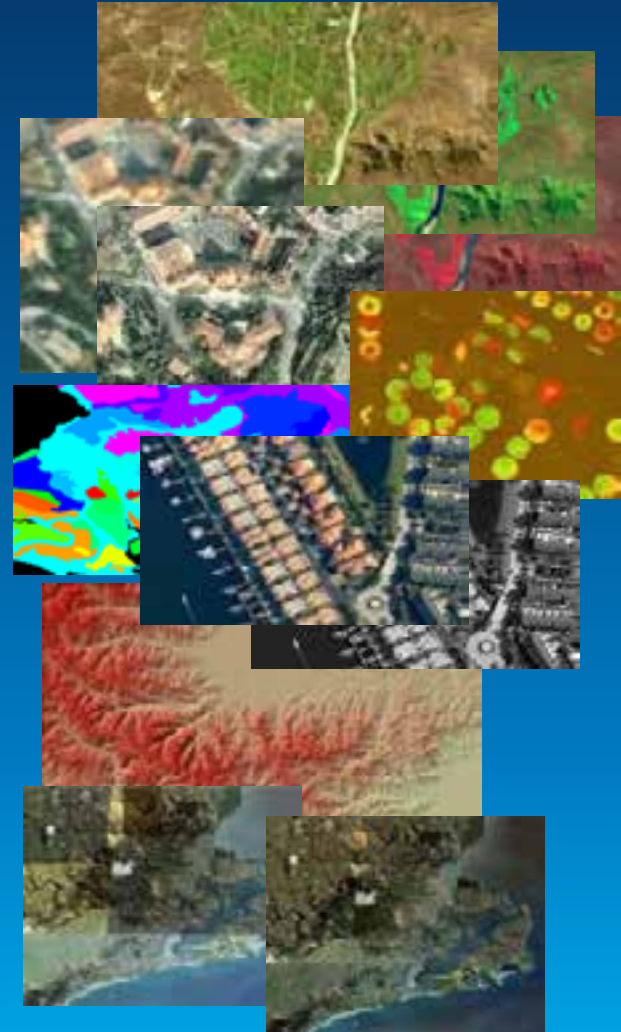
- **Raster value contains a raster function (process definition)**
  - References images on disk
  - Process on the fly
  - Contains metadata, statistics, thumbnails
- **A raster type defines what to add**
  - Understand sensor metadata
  - Construct the raster function
  - Add additional fields
    - Sensor, CloudCover, etc.



# Raster Function: 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, Color Correction
  - Vegetation Index, Classify
  - Shaded Relief, Slope, Aspect
  - Dynamic mosaicking
- Applied to
  - Raster datasets
  - Individual rasters in mosaic
  - Compete Mosaic Dataset



*Utilizing the full image information content*

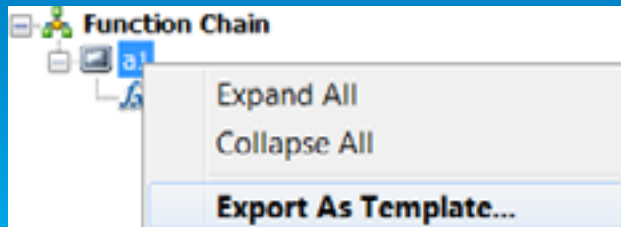
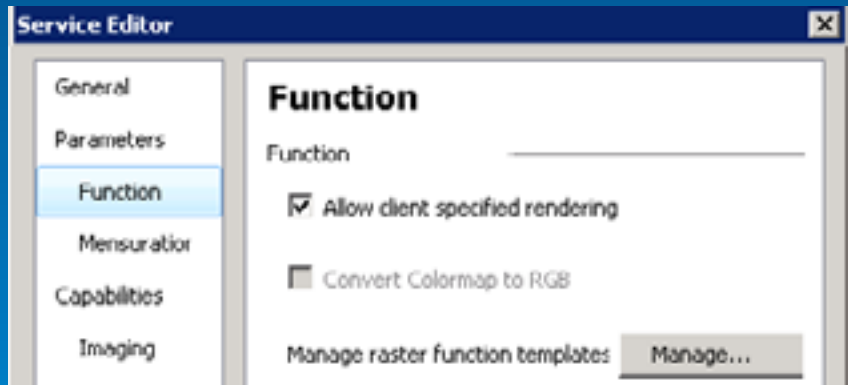
# Enhancing Mosaic Dataset

- Refining Footprint
- Building Seamlines
- Color Correcting Mosaic Dataset
- Build Overview



# Publish Image Services

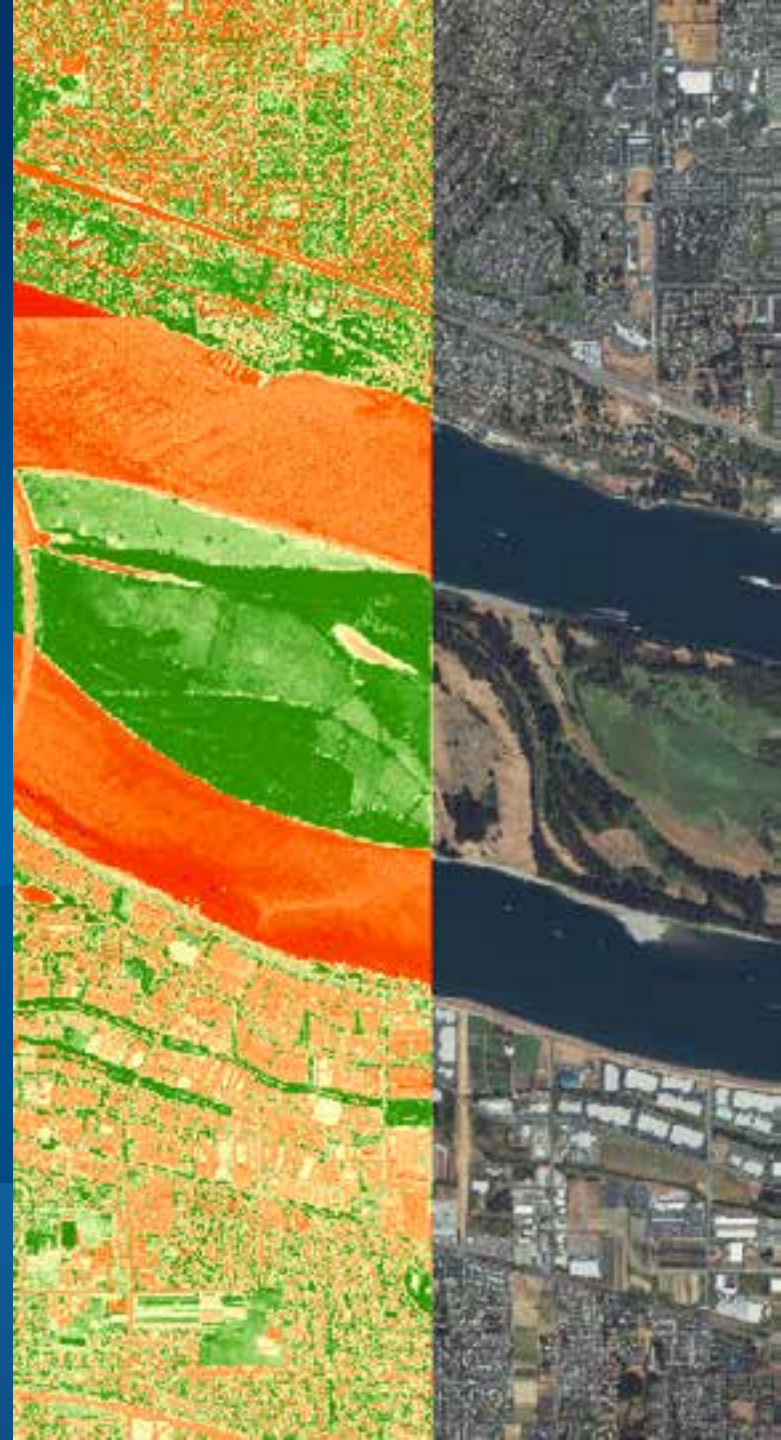
- **Capabilities**
  - **Mosaicking, catalog**
  - **Mensuration, editing**
- **Parameters**
  - Transmission format (JPEG, LZ77/LERC)
  - Mosaic methods
  - etc
- **Server raster functions**
  - Register using function template
  - response to client's request
  - server side on-the-fly image processing



Demo

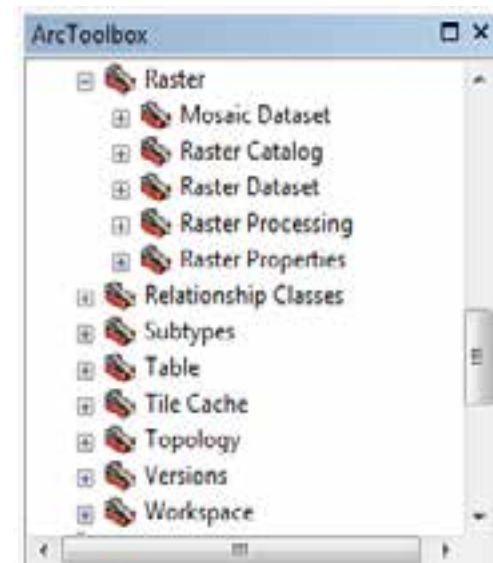
# Mosaic Dataset

Abhilash



# Processing raster in ArcGIS

Abhijit

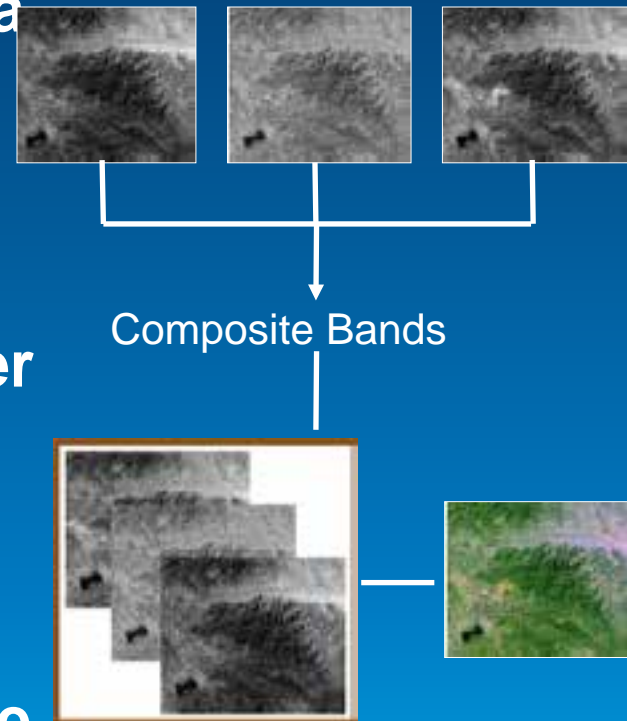


# Processing raster data in ArcGIS

- Combining bands
- Clipping
- Mosaicking
- Pansharpening
- Orthorectifying
- ...

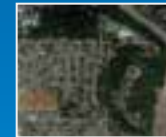
# Combining Bands

- Combine many images into a multi-band raster
- Input bands can be from a single or multiple band raster dataset
- Composite with geoprocessing tool, or Image Analysis window



# Clipping

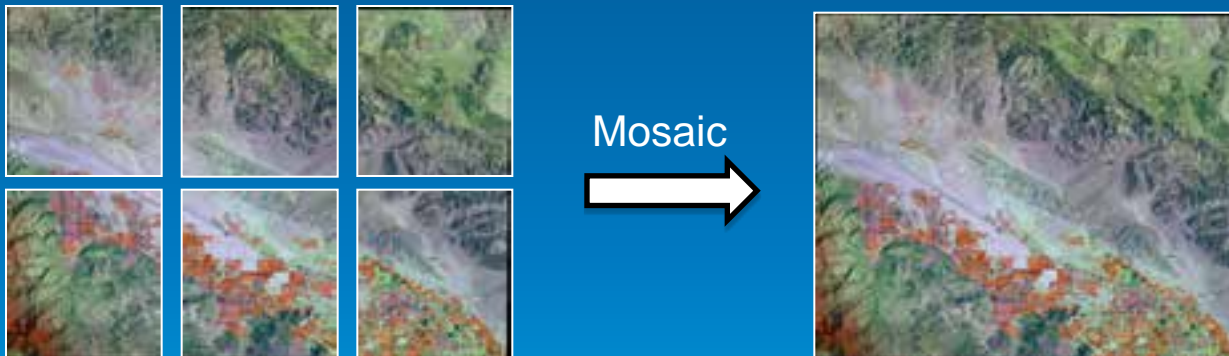
- **Clip a portion of raster to fit your study area**
- **Clip with geoprocessing tool, or Image Analysis window.**





# Mosaicking

- Combine two or more adjacent and overlapping rasters together
- Mosaic with geoprocessing tool, or Image Analysis window



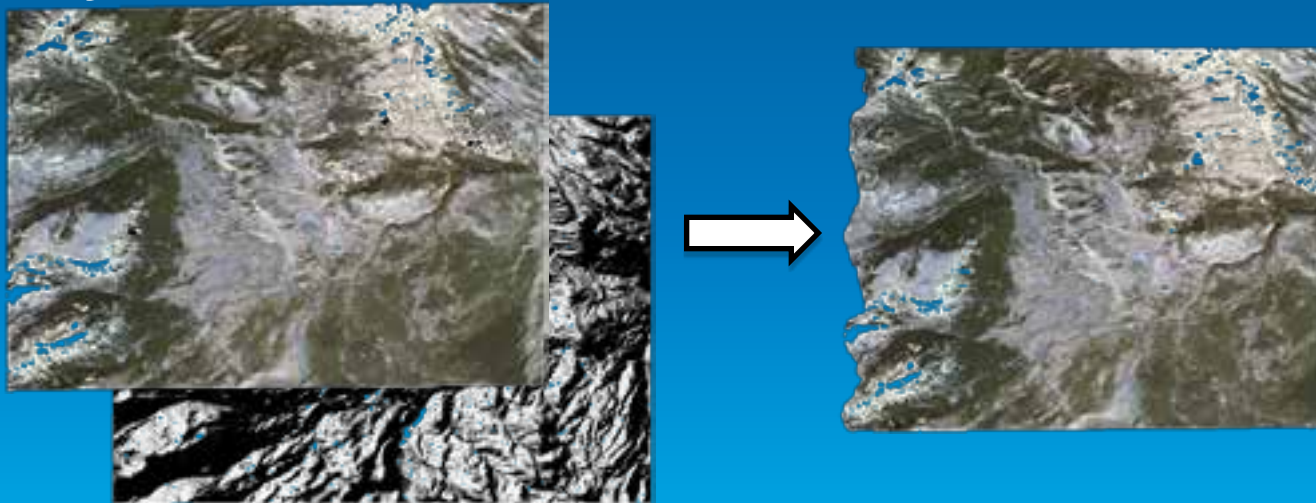
# Pansharpening

- Fuse a low resolution RGB image with a high resolution panchromatic image
  - Output is a high resolution color image
- Pansharpen with geoprocessing tool, or Image Analysis window

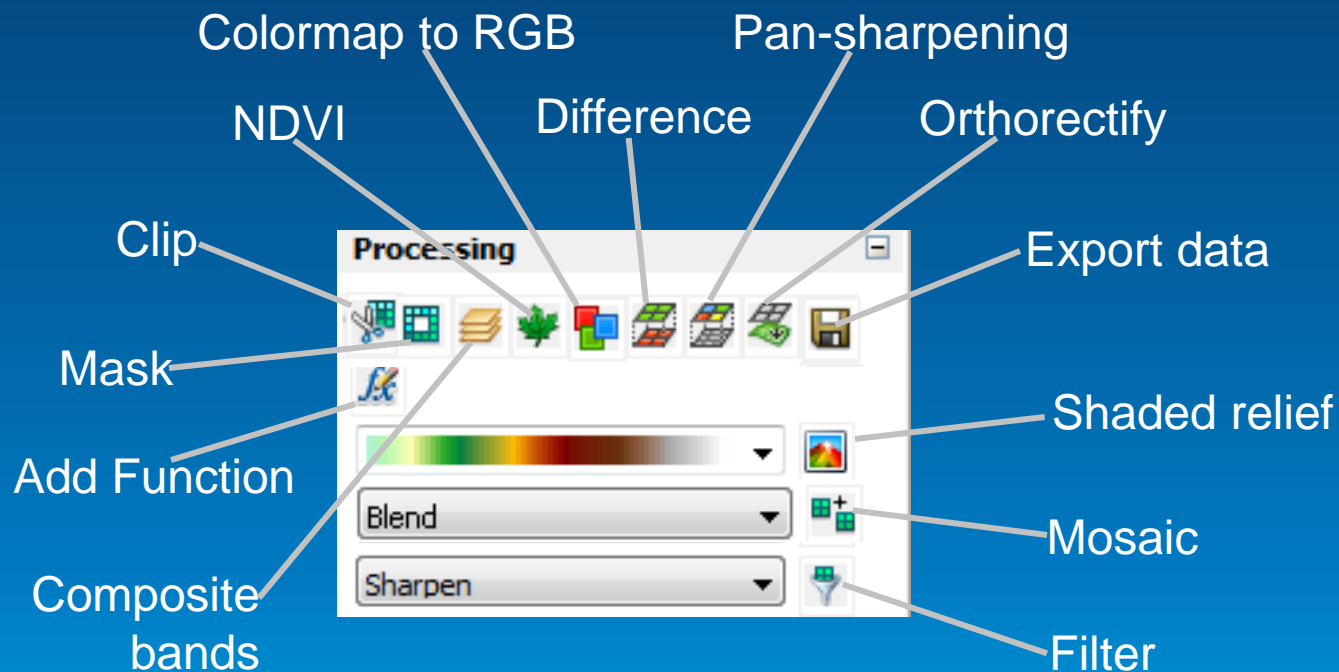


# Orthorectify

- Increase the geographic accuracy of an image
  - Requires an image with sensor model and an elevation source
- Orthorectify with geoprocessing tool, or Image Analysis window



# Image Analysis window



Demo

# Raster Processing

Abhilash



# What's New in Imagery at 10.2

- **More Imagery in ArcGIS Online**
- **Search for Imagery from Desktop**
- **More Sensors**
- **More Raster Functions**
- **Automated Workflows**
- **Improved Geoprocessing Tools**
- **Caching Imagery and Publishing to ArcGIS Online**
- **Enhanced APIs for Image Services**
- **Enhanced Use of Image Services in WebMaps**





Understanding our world.