

Working with OGC WCS Services

- WCS in ArcGIS

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OGC WCS introduction







- The Open Geospatial Consortium, Inc. (OGC) Web Coverage Service (WCS) provides an open specification for sharing coverages (image/raster datasets) on the web
- WCS Core establishes three request types to serve the coverages:
 - GetCapabilities: returns XML-encoded descriptions of service properties and the coverages offered by the WCS service requested
 - DescribeCoverage: returns XML-encoded descriptions of coverages properties (such as their location in space and time) offered by the WCS service requested
 - GetCoverage: returns a coverage in a specific data format after processed by request parameters (bounding box, spatial reference, interpolation method, rows/columns, resolution, a slice in multi-dimensions etc.)

OGC WCS support in ArcGIS – Overview

- ArcGIS Server side WCS support:
 - ArcGIS WCS Server exposes as an extension of an ArcGIS Image Server, Map Server, or Geodata Server
 - ArcGIS WCS service can be consumed in 3rd party client apps. e.g. QGIS.
- ArcGIS Client side WCS support:
 - WCS Server connection and WCS consumption through ArcGIS Desktop (ArcMap, ArcGIS Pro)
 - ArcGIS SDKs for customizing WCS client apps:
 - ArcGIS JavaScript APIs
 - ArcObjects .NET/Java/C++ SDKs
 - ArcGIS WCS client can consume WCS service hosted by 3rd party GIS server. e.g. GeoServer.

OGC WCS support in ArcGIS Server

- ArcGIS WCS Server is a fully complaint product (version 1.0.0, 1.1.1, and 2.0.1) and certified by OGC.

ArcGIS Enterprise 10.5 		 satish sankaran	Registered: 2016-10-27
	KML 2.2.0		Certified: 2016-11-17
	WCS 2.0 Interface Standard- Core: Corrigendum 2.0.1		Certified: 2016-12-02
	Web Coverage Service (WCS) Implementation Specification (Corrigendum) 1.0.0		Certified: 2016-11-17
	Web Coverage Service (WCS) Implementation Specification Corrigendum 1 1.1.1		Certified: 2016-11-17
	Web Feature Service 2.0 Interface Standard (also ISO 19142) 2.0		Certified: 2016-11-17
	Web Map Service (WMS) Implementation Specification 1.3.0		Certified: 2016-11-17
	Web Map Service Client (WMS) Implementation Specification 1.3.0		Certified: 2016-11-17
	Web Feature Service 1.0.0		Certified: 2016-11-17
	Web Map Service 1.1.1		Certified: 2016-11-17

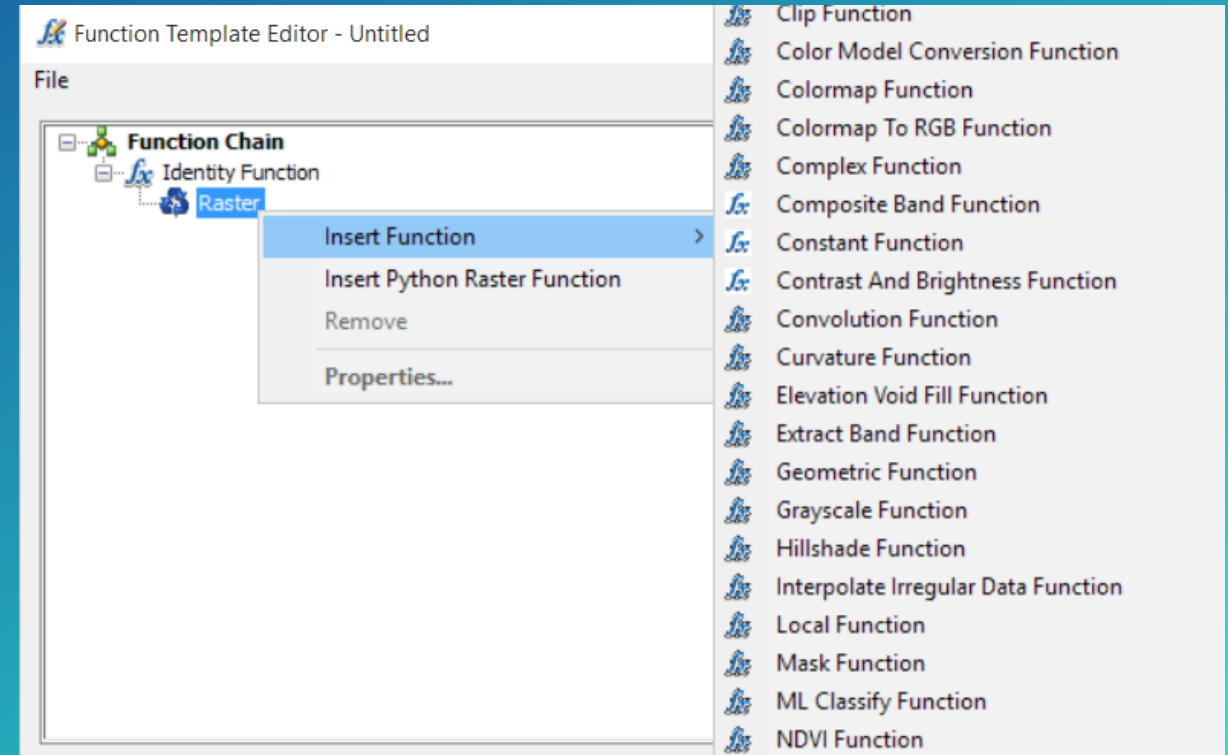
OGC WCS support in ArcGIS Server

- ArcGIS WCS Server is implemented through ArcGIS Server Image Server, Map Server, and Geodata Server
- Support serving WCS in version: 1.0.0, 1.1.0, 1.1.1, 1.1.2, and 2.0.1
- Support multiple WCS 2.0.1 extensions:
 - Service Extensions: Scaling Extension; Range Subsetting Extension; CRS Extension; Interpolation Extension
 - Protocol Extensions: KVP/GET; XML/POST
 - Format encoding extensions: GeoTIFF
- ArcGIS WCS Server 1.X.X supports GetCoverage in formats: GeoTIFF, NITF, HDF, JPEG, JPEG2000, and PNG
- ArcGIS WCS Server 2.0.1 supports GetCoverage in formats: TIFF and BIP

OGC WCS support in ArcGIS Server – Beyond specifications

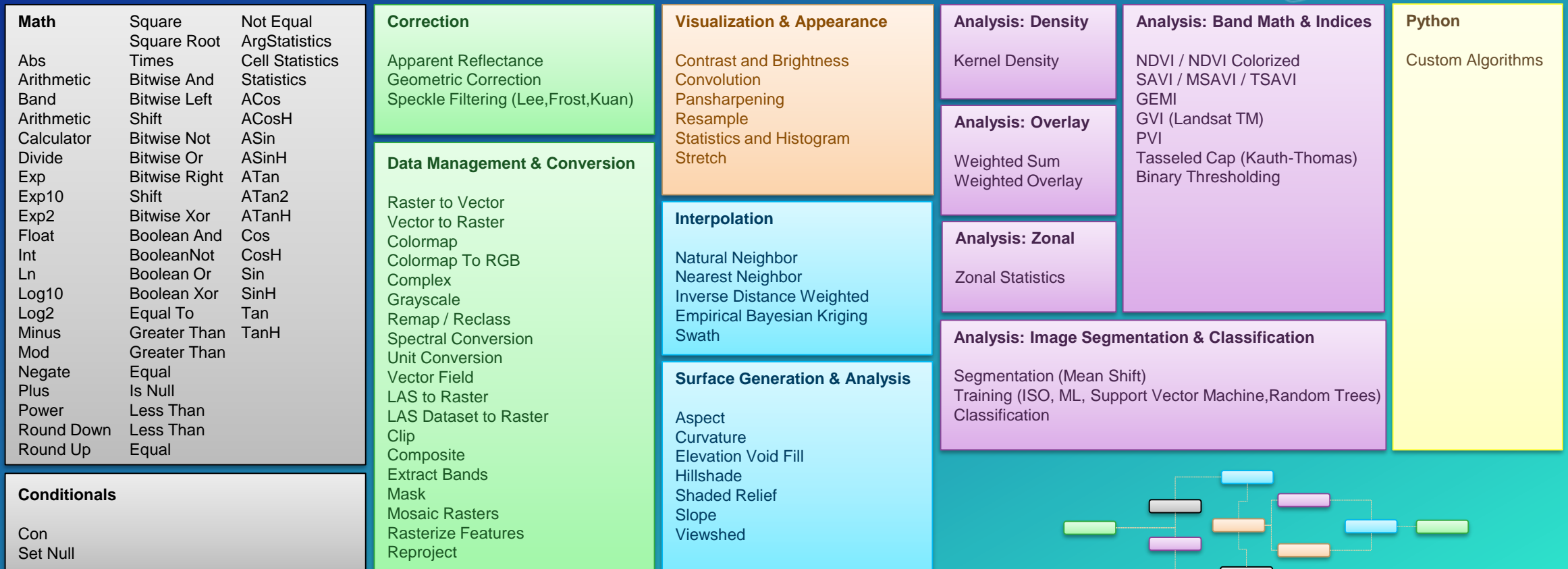
- Raster function template as additional coverages:
 - ArcGIS WCS Server does not serve the coverages only, it also serves ArcGIS's powerful raster processing potentials at server side.

```
<wcs:Contents>
  <wcs:CoverageSummary>
    <ows:WGS84BoundingBox>
      <ows:LowerCorner>11.844983388185224 49.435255019116688</ows:LowerCorner>
      <ows:UpperCorner>11.875971639622849 49.453907101476155</ows:UpperCorner>
    </ows:WGS84BoundingBox>
    <wcs:CoverageId>amberg</wcs:CoverageId>
    <wcs:CoverageSubtype>GridCoverage</wcs:CoverageSubtype>
  </wcs:CoverageSummary>
  <wcs:CoverageSummary>
    <ows:WGS84BoundingBox>
      <ows:LowerCorner>11.844983388185224 49.435255019116688</ows:LowerCorner>
      <ows:UpperCorner>11.875971639622849 49.453907101476155</ows:UpperCorner>
    </ows:WGS84BoundingBox>
    <wcs:CoverageId>amberg_SharpenAndStretch</wcs:CoverageId>
    <wcs:CoverageSubtype>GridCoverage</wcs:CoverageSubtype>
  </wcs:CoverageSummary>
</wcs:Contents>
```



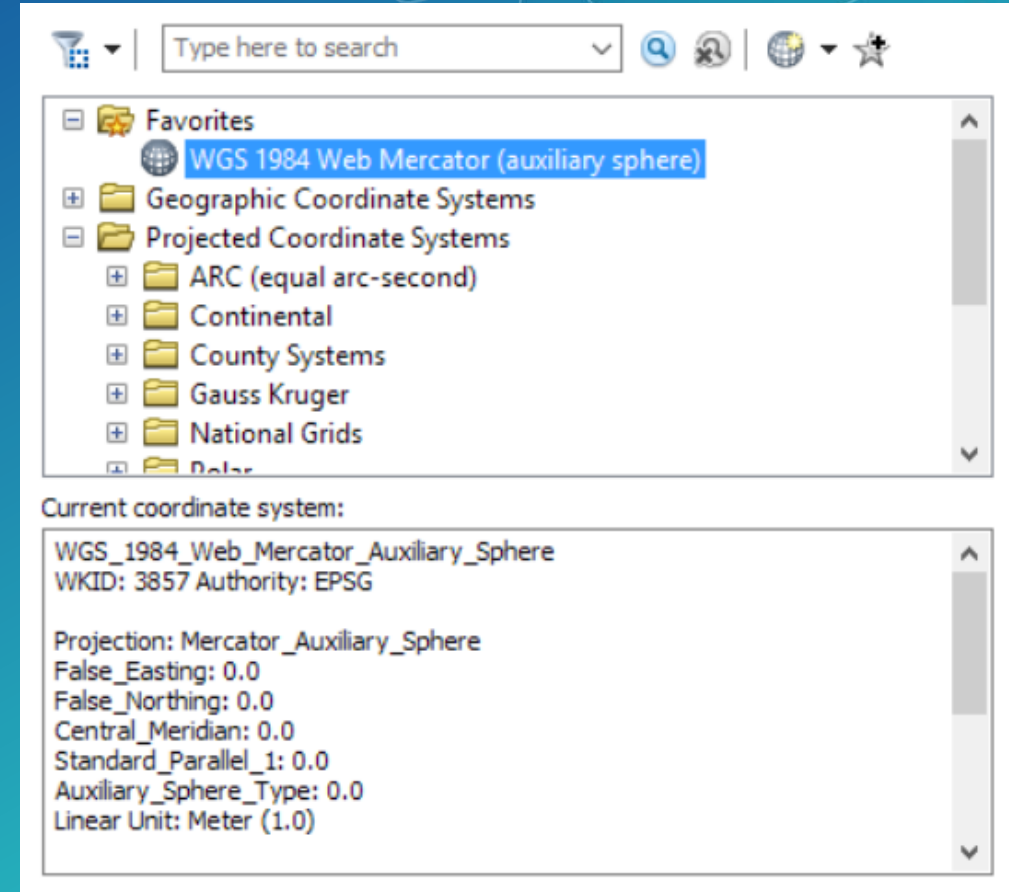
OGC WCS support in ArcGIS Server – Beyond specifications

- Raster function template can chain multiple ArcGIS build-in raster functions and customized Python raster functions together.



OGC WCS support in ArcGIS Server – Beyond specifications

- More projections available:
 - Not limited to “crsSupported” inside the xml response of DescribeCoverage or GetCapabilities requests.
 - ArcGIS WCS Server integrates with ArcGIS projection engine to support all EPSG+ESRI WKID-based spatial reference reprojections (~6000 projections).
- Backed by mosaic dataset + GetCoverage through IMAGES or TIME parameter query:
 - <http://gisserver.domain.com:6080/services/myservice/ImageServer/WCSServer?IMAGES=4,5,6>
 - <http://gisserver.domain.com:6080/services/myservice/ImageServer/WCSServer?TIME=2000>



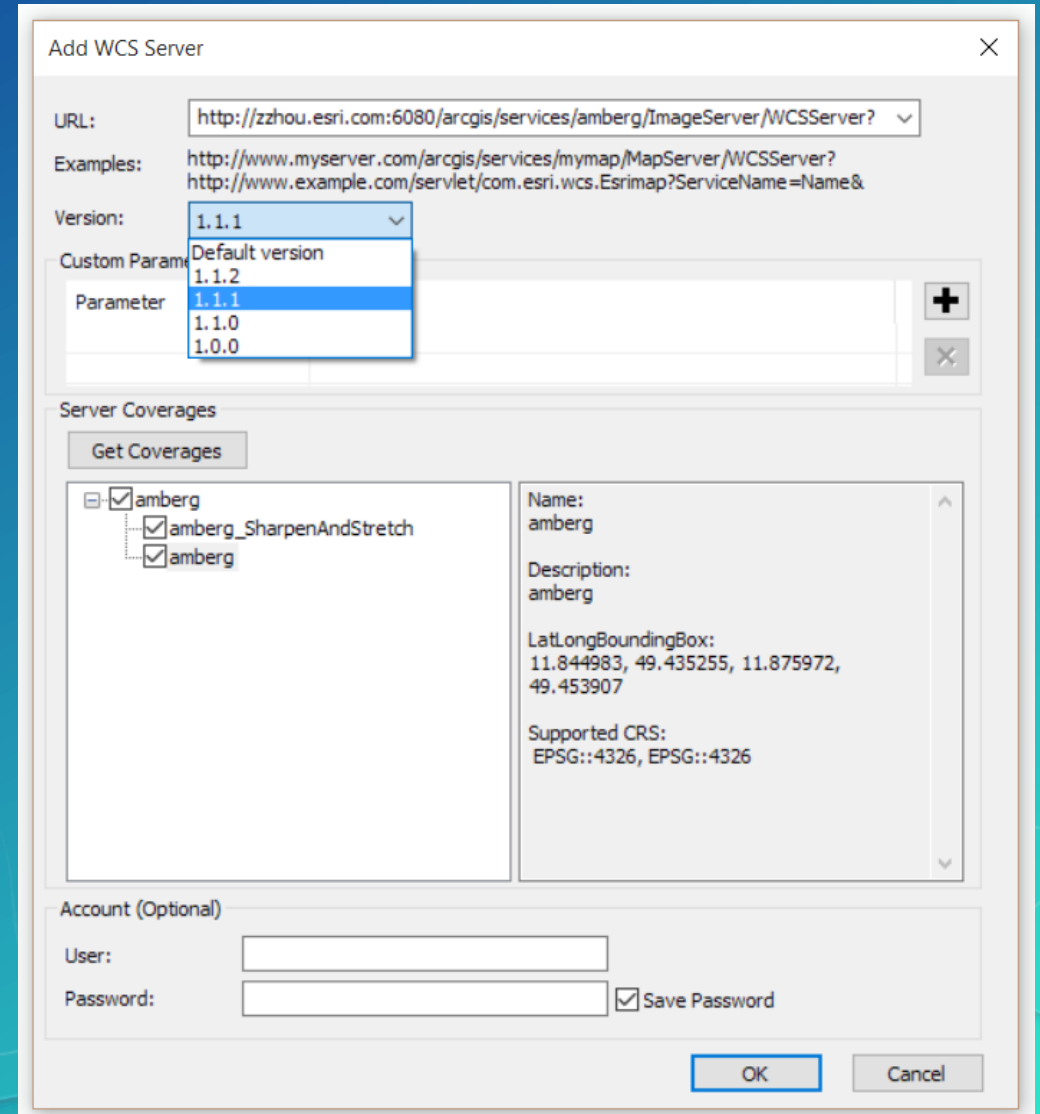
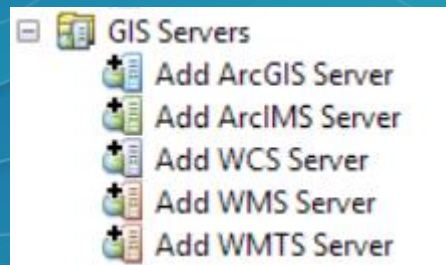
OGC WCS support in ArcGIS Server

- Licensing:
 - GIS Server license
 - Standard – single raster datasets
 - Advanced – raster functions
 - Image Server license
 - For mosaic dataset served as WCS
- Security:
 - Inherits ArcGIS Server's security model
 - The security for a WCS service is managed by controlling the security of its parent map, geodata, or image service. It supports token-based security and you can add a valid token in a http request for a secured WCS service. If a particular service user is denied access to an ArcGIS service coverage resource, it will not be able to access the coverage resource regardless of whether they try to consume it through SOAP, REST, or WCS interfaces.

Demo 1: Publish a mosaic dataset as an WCS service to ArcGIS Server

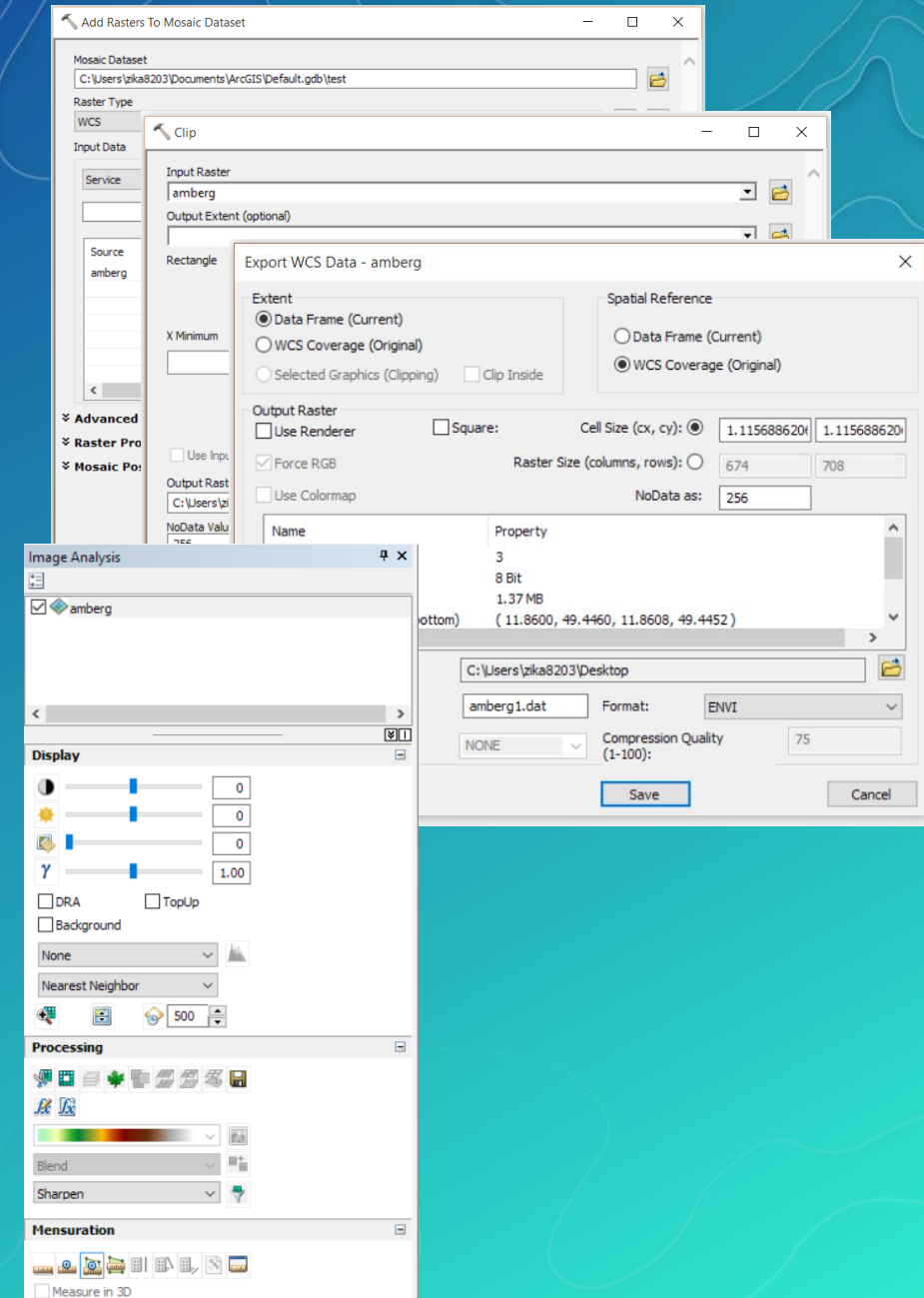
OGC WCS support in ArcGIS Desktop

- Support consuming WCS in version: 1.0.0, 1.1.0, 1.1.1, and 1.1.2
- Support basic authentication through http/https
- Support optional parameters that can be used by GetCoverage as defined by the WCS server
- Support displaying coverage properties from DescribeCoverage

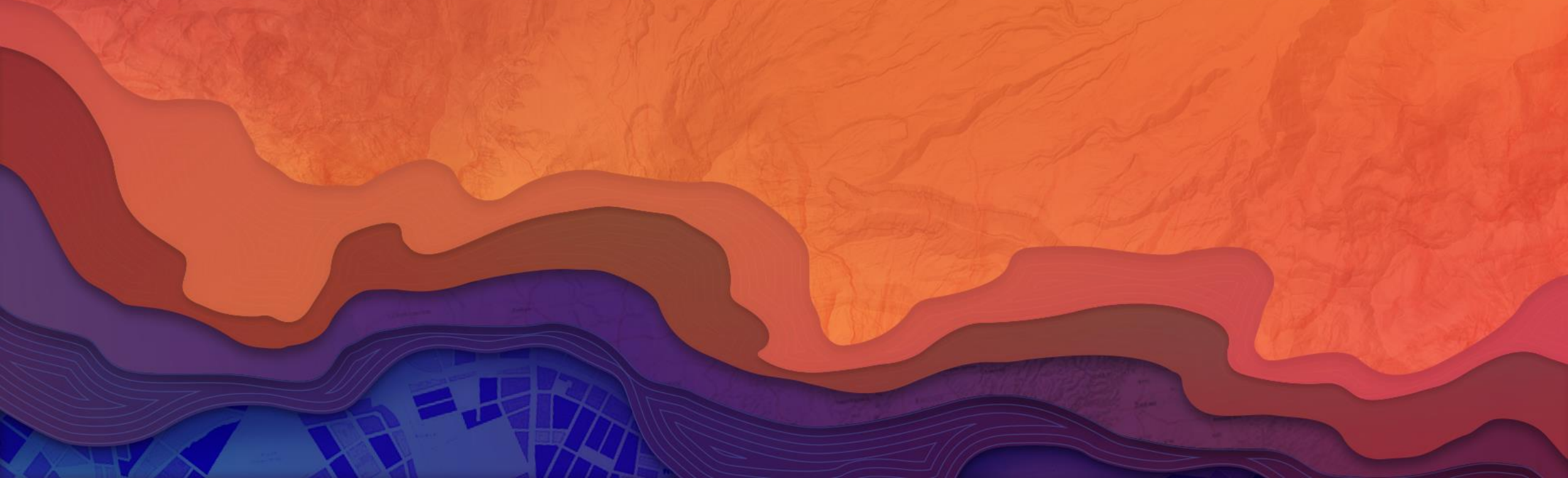


OGC WCS support in ArcGIS Desktop

- After importing the WCS layer into the ArcGIS Desktop:
 - Support identifying pixel values of coverage
 - Support measuring distance and area of AOI on the coverage
 - Support displaying coverage in various new renders and raster function templates
 - Support displaying coverage in various data frame projections supported by ArcGIS, including all EPSG coordinate systems; even if WCS Server doesn't have them in supported CRSs
 - Support converting coverage to various raster formats supported by ArcGIS; even if WCS Server doesn't have them in supported formats
 - Coverages can be consumed throughout ArcGIS, in Geoprocessing tools, Image Analysis Window, mosaic datasets etc, just like any other local raster datasets



Demo 2: Consume a WCS service using ArcGIS Desktop applications



OGC WCS support in ArcGIS SDKs – ArcGIS JavaScript API

- Available in ArcGIS JavaScript API 3.18+ only. (not supported in 4.x yet)
- Support accessing and consuming WCS in versions: 1.0.0, 1.1.0, 1.1.1, 1.1.2, and 2.0.1.
 - For version 2.0.1, it supports servers that support GEOTIFF coverage and implements the following extensions: Scaling, Interpolation, Range Subsetting, CRS, and KVP/Get.
- Class: `esri/layers/WCSConnection`
 - A helper class to discover available coverages in an OGC Web Coverage Service
- Class: `esri/layers/WCSCoverageDescription`
 - Models the coverage properties offered by the WCS Server. This class normalizes the variations across different versions of WCS Coverage Description
- Class: `esri/layers/WCSLayer`
 - Retrieves coverage (raster) data and renders it on the client app.

OGC WCS support in ArcGIS SDKs – ArcObjects SDKs

- WCSLayer CoClass:
 - WCSLayer accesses a coverage served through an OGC WCS service and visualize the pixels of the coverage in ArcGIS.
 - A WCSLayer supports most of the functions that a RasterLayer provides. The display can be manipulated by accessing through IRasterLayer interface as all other raster layers.
- IWCSLayer Interface:
 - IWCSLayer Interface provides access to the properties and methods of WCSLayer.

[C#]

```
//WCS service uniform resource locator (URL).
string URL="http://liaoning1/arcgis/services/dem/mapserver/wcsserver?";

//Create WCSLayer from the first coverage.
IWCSLayer wclayer=new WCSLayerClass();
wclayer.Create(URL, "1", "1.0.0");

//Access raster.
IRasterLayer rasterlayer=(IRasterLayer)wclayer;
IRaster2 raster=(IRaster2)rasterlayer.Raster;

//Access raster dataset.
IRasterDataset rasterdataset=raster.RasterDataset;
```

	All ▾	Description
■	CoverageName	The WCS coverage name.
←	Create	Creates a WCS layer from given WCS coverage definition.
←	Refresh	Refreshes layer once any of layer properties has changed.
■	ResamplingType	The request resampling (interpolation) type.
■	ServiceURL	The WCS service URL.
■	Timeout	The request timeout value in seconds.
■	Version	The WCS service version.

Demo 3: Display WCS layers using ArcGIS JavaScript API

OGC WCS support in ArcGIS – Road ahead

- On current plan:
 - Server side:
 - Support EO-WCS application profile.
 - Support MetOcean-WCS application profile.
 - Client side:
 - Support WCS 2.0.1 in ArcGIS Desktop.
 - Support WCS layer type items in ArcGIS Online/Portal for ArcGIS.
- We value your input for our future plans:
 - Please take our survey and put your comment.

Please Take Our Survey on the Esri Events App!

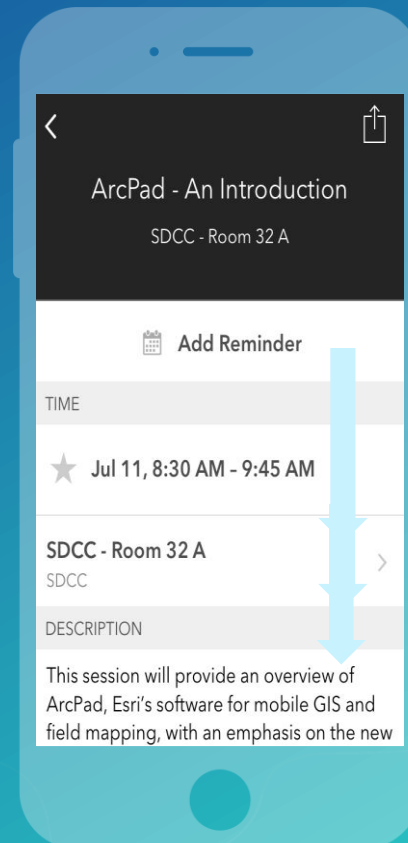
Download the Esri Events app and find your event



Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



Please Take Our Survey on the **Esri Events App!**

Scroll down to find “Comment” section –

Please help ArcGIS to improve OGC WCS support by answering questions:

- What client/server side OGC WCS features do you feel in need but missing in ArcGIS?
 - WCS version support? Extension/Application profiles? Support in ArcGIS native client apps? Client side APIs/SDKs? ...
- Why choosing OGC WCS over ArcGIS Image Service?
 - Users requirement? Other 3rd party software compatibility? Open specs? Functionality and performance? ...



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