



OGC Services User Guide

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Introduction

The Saskatchewan Geospatial Imagery Collaborative

The Saskatchewan Geospatial Imagery Collaborative (SGIC) is a partnership of organizations sharing knowledge and costs relating to acquisition and use of remotely sensed imagery for mutual and public benefit. The collaborative operates servers providing a web mapping client and OGC- standard Web Service (WMTS and WMS) for sharing geospatial imagery. Members of the public are welcome to use a limited set of the SGIC's geospatial imagery holdings, while SGIC members gain access to an expanded set of imagery products.

What This Manual Covers

This manual covers basic usage of the SGIC's OGC®-Standard Web Services. This manual applies to both free public access and to SGIC members- only access. It also has two appendices for further reading:

- Appendix A – Accessing WMTS and WMS data with a Web Browser, and
- Appendix B – Accessing WMTS and WMS data with ESRI ArcGIS.

Support

If you need help using the SGIC web mapping client or Web Services, please send an e-mail to the SGIC help desk at: sgic@src.sk.ca.

Chapter 1

Introduction to the OGC® Services

Web Map Tile Service (WMTS)

The Open Geospatial Consortium provides the following description of the Web Map Tile Service on its web site:

“WMTS complements earlier efforts to develop services for the web based distribution of cartographic maps. The OGC WMTS provides a complementary approach to the OGC Web Map Service (WMS) for tiling maps. WMS focuses on rendering custom maps and is an ideal solution for dynamic data or custom styled maps (combined with the OGC Style Layer Descriptor (SLD) standard). WMTS trades the flexibility of custom map rendering for the scalability possible by serving of static data (base maps) where the bounding box and scales have been constrained to discrete tiles. The fixed set of tiles allows for the implementation of a WMTS service using a web server that simply returns existing files. The fixed set of tiles also enables the use of standard network mechanisms for scalability such as distributed cache systems.

Some of the key features of the Web Map Tile Service are:

- It is an open standard, supported by a variety of vendors through the OGC®
- It uses the internet standard HTTP protocol
- It allows the user to request a set of map tiles covering an area
- It is highly scalable for large numbers of users

Web Map Tile Service is the key technology used within the SGIC web mapping client to provide map images. End users can take advantage of the same service to provide map images within their own applications.

Versions

The Saskatchewan Geospatial Imagery Collaborative supports version 1.0.0 of the Web Map Tile Service specification

Standard Documentation

Documentation describing the complete Web Map Tile Service is open and freely available through the OGC® web site, at:

<http://www.opengeospatial.org/standards/wmts>.

Web Map Service (WMS)

The Open Geospatial Consortium provides the following description of the Web Map Service on its web site:

“The OpenGIS® Web Map Service Interface Standard (WMS) provides a simple HTTP interface for requesting geo- registered map images from one or more distributed geospatial databases. A WMS request defines the geographic layer(s) and area of interest to be processed. The response to the request is one or more geo-registered map images (returned as JPEG, PNG, etc) that can be displayed in a browser application. The interface also supports the ability to specify whether the returned images should be transparent so that layers from multiple servers can be combined or not.”

Some of the key features of the Web Map Service are:

- It is an open standard, supported by a variety of vendors through the OGC®
- It uses the internet standard HTTP protocol
- It allows the user to request a map image consisting of a set of layers
- The returned map image can be provided in a variety of formats
- Map images can be transparent so that maps with similar extents, served by different servers, can be overlaid to form a composite image.

Versions

The Saskatchewan Geospatial Imagery Collaborative supports all versions of the Web Map Service specification. It will handle version negotiation if your client is so equipped. Version 1.1.1 tends to have better support with client software.

Standard Documentation

Documentation describing the complete Web Map Service is open and freely available through the OGC® web site, at:

<http://www.opengeospatial.org/standards/wms>.

Chapter 2

Using the SGIC OGC Web Services

Introduction

This section describes general characteristics for using the SGIC OGC Web Services. For specific details on using the Services with your GIS client software, refer to your vendor documentation.

Free Public Service

The free public service provides the SGIC 62 cm color OrthoPhoto imagery, SPOT satellite imagery at 10 meter-per-pixel resolution, along with SaskGrid, Administrative Boundary, and National Road Network vector layers. The URL for access is:

<https://www.flysask2.ca/cubewerx/cubeserv>

No user name or password is required to access the free public service.

Secure Members Service

The secure members service provides the SGIC SPOT satellite imagery at 2.5 meter-per-pixel resolution, the 62 cm FlySask orthophoto imagery, and imagery resources that have been contributed by SGIC members, such as 10 cm imagery of the cities of Regina and Saskatoon. This service also contains vector layers for added context. The URL for access is:

<https://www.flysask2.ca/cubeserv/htcubeserv>

You must provide a user name and password in order to use the secure members service. Use the same user name and password that you use to access the SGIC web mapping client. If you need a user name or password, contact the SGIC user account administrator for your organization.

Appendix 1

Accessing WMTS and WMS with a Web browser

Introduction

Because the OGC Web Services are provided through the internet-standard HTTP protocol, it is possible to access them using a web browser such as Internet Explorer. This is often a good way to test your connectivity to the service.

Download Capabilities Document

The first request type we will examine, that all servers support, is a GetCapabilities request. It looks like this:

WMTS
[https://www.flysask2.ca/cubewerx/cubeserv?
service=wmts&version=1.0.0&request=GetCapabilities](https://www.flysask2.ca/cubewerx/cubeserv?service=wmts&version=1.0.0&request=GetCapabilities)

WMS
[https://www.flysask2.ca/cubewerx/cubeserv?
service=wms&version=1.1.1&request=GetCapabilities](https://www.flysask2.ca/cubewerx/cubeserv?service=wms&version=1.1.1&request=GetCapabilities)

Note that you will have to save the resulting file on your computer with a name and the extension “.xml”. For example, I saved mine on the Desktop as sgic-public.xml.

Open the resulting XML file. You should see a human-readable description of all the capabilities the server supports. At the highest level, it contains a <Service> element providing some metadata about the server, and a <Capabilities> element that includes <Layer> elements describing all the layers the server supports and what formats the layers can be downloaded in.

Tip: If you open the XML file in Internet Explorer, you can click on the +/- signs next to individual tags to expand or contract them and make the display more readable.

Download a WMTS tile

The preferred way to access SGIC OGC services is through the Web Map Tile Service (WMTS). This method is much faster and more scalable than WMS access. Clients construct WMTS maps through a series of GetTile requests. WMTS supports both Key-Value Pairs and REST encoding for client access.

KVP Example:

```
<ServiceRoot>?SERVICE=WMTS&REQUEST=GetTile&VERSION=version&Layer=&Style=&Format=  
=&TileMatrixSet=&TileMatrix=&TileRow=&TileCol=
```

Rest Example:

```
<ServiceRoot>/{layer}/{TileMatrixSet}/{TileMatrix}/{TileRow}/{TileCol}[.Format]
```

Download WMS Map Image

The WMS server retrieves maps through a GetMap request. It is entered similar to a GetCapabilities request, but it supports a few more parameters:

&Service=WMS	- The service type
&Version=1.1.1	- The WMS Specification version
&srs=EPSG:26913	- Spatial Reference System EPSG code (UTM13 closed)
&format=image/jpeg	- Image format type
&styles=	- Style to apply (usually left blank)
&bbox= 120000,5400000,770000,6678000	- Bounding box in the co-ordinate system of the SRS ; This example shows Saskatchewan bounding box
&width=600	- Width of image
&height=600	- Height of image
&layers= spot10m	- Layers to download, separate multiple layers with a comma

<http://www.flysask2.ca/cubewerx/cubeserv?request=GetMap&service=WMS&version=1.1.3&styles=&srs=EPSG:26913&format=image/jpeg&width=600&height=600&layers=prov&bbox=120000,5400000,770000,6678000&layers=SPOT10m>

There are several layers in the SGIC database to choose from, and you can combine layers to form detailed maps.

Tip: The capabilities document lists the EPSG codes supported by the server. By changing the SRS in your request, you can change the map projection. More information on EPSG codes is available at:

<http://www.epsg-registry.org/>

Tip: The bounding box in the example above is specified in decimal degrees. If you change to a projection that uses degrees, such as Latitude and Longitude Geographics with epsg =4326 , you must change your bounding box to match!

<https://www.flysask2.ca/cubewerx/cubeserv?service=wms&version=1.1.3&request=GetMap&srs=EPSG:4326&format=image/jpeg&styles=&bbox=-111,49,-100,61&width=600&height=600&layers=spot10m>

Tip: Not all layers in a WMS can be downloaded – some are there to provide logical groupings of sub-layers. The layers that can be downloaded all have a <Name> tag.

Tip: If the response you receive is an attempt to download a document instead of

a JPEG image in your web browser, the server is trying to send you an error message. Save the resulting file with a name such as error.xml and then open it with Internet Explorer to view the error message.

Appendix 2

Accessing WMTS and WMS from ESRI ArcGIS

Introduction

Adding a Web Map Tile Service (WMTS) or Web Mapping Service (WMS) to your Geographic Information System (GIS) is quite easy to do. The process will take approximately ½ hour to 1 hour to make the connections you want and organize things properly for efficient operation.

Once the connection is made and the service properly authored to run efficiently within your system, you can expect 1-3 second refresh displays of the imagery, without having to store and manage multi terabytes of imagery data within your organization.

Most times when people add a Service to their GIS they will already have a project started with considerable data layers already set up to which the FlySask imagery will be very complementary.

FlySask Public WMTS and WMS URL:
<https://www.flysask2.ca/cubewerx/cubeserv>

FlySask Members WMTS and WMS URL:
<https://www.flysask2.ca/cubewerx/htcubeserv>

Connecting to the FlySask WMTS

Connecting to the FlySask WMTS service requires ArcMap version 10.1 or greater. The instructions which follow describe how to add a FlySask WMS to ESRI ArcMap 10.1. Other GIS systems which support WMTS will have variations on this but be somewhat similar.


WMTS server content can be used in ArcMap (as well as ArcGlobe) as map layers.


To add WMTS services to your map, do the following:

Using the Add Data dialog box, choose an existing server connection or make a new connection, then add the WMTS service to your map (these steps are outlined below).

Connect to a WMTS server in the Catalog window, choose a tile service, then drag it into your map.

Steps:

1. Click the Add Data button  on the Standard toolbar to open the Add

- Data dialog box.
2. Click the Look in arrow and choose GIS Servers. This gives you a list of servers you have previously used.
 3. If the server you want is not listed, you can connect to a WMTS server.
 4. After connecting to a WMTS server, the service is shown in the Add Data dialog box with this icon: .
 5. Select this service.
 6. Click Add.

The service is added as a map layer.

Using the FlySask WMTS in ArcMap

WMTS services are pregenerated images that are stored as small tiles covering the entire map extent and for multiple scales. These services do not have any legend and do not allow you to turn on/off individual sublayers inside the map service layer.

Getting information about the WMTS service layer

Information about the WMTS service layer is available on the service layer's **Source** tab. To access the **Source** tab,

1. Double-click on the service layer in the *Table of Contents* window, or
2. Right-click on the service layer and select **Properties**

The **Source** tab contains information regarding the WMTS service URL, file (image) format, dpi, cache scales, and coordinate system of the service.

The **Set Data Source** button on the **Source** tab enables you to repair the map service layer if for any reason the connection to the server was interrupted when opening the map. You can tell if the layer needs repairing because it won't be drawn, its check box in the table of contents will be unavailable, and there will be a red exclamation point next to its check box.

Changing the WMTS service layer configuration

The WMTS service layer supports updating its configuration in the **WMTS** tab of the *Layer Properties* dialog box. To access the **WMTS** tab,

1. Double-click on the service layer in the *Table of Contents* window, or
2. Right-click on the service layer and select **Properties**

The WMTS service layer supports style, tiling scheme, and dimensions configuration properties.

1. **Style**—lists all available representations of the map.

2. **Tiling scheme**—lists the WMTS tile matrix sets, which contain information regarding the coordinate system, map scales, extent, tile size, and tile matrix size.
3. **Dimensions**—lists the available dimensions, if the WMTS service is a multidimensional tile service. For example, a multidimensional WMTS service may contain tiles that were generated for each value of a dimension such as time or elevation.

Connecting to the FlySask WMS

The instructions which follow describe how to add a FlySask WMS to ESRI ArcMap 9.2. Other GIS systems which support WMS will have variations on this but be somewhat similar.

Open ArcMap, either an existing project with layers already established or an empty map.

1. Go to “Add Layers”
2. Select “GIS servers” from the “Look in” dialogue box
3. Select “Add WMS server” as desired
4. Then in the next screen add the URL for the WMS; i.e. (See the Public and Members URLs above)
5. The Members secure service will require a username and password, and the dialogue box will ask for those credentials.
6. Once the service has connected you will see the service name on the left with a + sign beside it. You should also see a spinning globe at the bottom of the screen indicating that the data is loading.

Using the FlySask WMS in ArcMap

When you start a Web Map service, ArcMap automatically turns on the first 20 layers of information and if these layers contain a lot of information, like raster imagery, this may take a long time to load (2-5 minutes or so). This is normal because you are initially asking for all the information. This will not be a problem once your service is added and set up to function properly.

On the left side beside the service name, click the + sign and then turn all of the layers off except for perhaps the Spot 10m. Then highlight the Spot 10m and with a right click of the mouse click zoom to layer. This is a way to check that the data is coming in appropriately and you can easily see what coordinate system it is in, geographic or UTM for instance. (This may take a couple of minutes or so).

If you wish to change the Coordinate System, highlight the name of the service, right click and select “Change Coordinate System” from the menu. (More on coordinate systems below)

Authoring (or organizing) your Web Map Service display

Once the above has been done and the data service is connected, you will want to organize your display to suit your needs. Most services contain multiple layers of information, not all of which every user wants to implement.

Organizing Layers

For this, you once again highlight the service name on the left of your screen, and with a right click, go to “Properties”. As this pop-up menu opens you will see 4 tabs. Open the “Layers” menu and you will see the list of layers in the WMS on the left side. You can then select the layers you wish to display in ArcMap and add them to the right side. You can also move the layers up or down to organize which layers will overlay the others. (**Note:** You may want your vector data on top of the imagery to see it more easily when you wish to turn it on)

Authoring Display Scales

With this done now you will want to go to the “General” tab within the properties menu and organize the scales at which each layer should display. If you don’t do this you will in fact, be asking the system to display all the data, from all the layers you’ve selected, all the time. This is a lot of data and will result in long redraws and frustration at system performance.

A better approach is to set the display scale for each layer you’ve selected, to maximize performance efficiency, and to only show this information at the optimum views.

We know that SPOT10m has a 10 meter pixel resolution, Spot2.5m has a 2.5 meter pixel resolution and SGIC Orthophotos have a 62.5 cm pixel resolution. Therefore we should organize these for best viewing as follows:

<u>Imagery Type</u>	<u>Optimum Viewing Scales</u>
SPOT10m	1:500,000 – 1:50,000
SPOT2.5m	1:50,000 – 1:10,000
OrthoPhoto 60cm	1:10,000 – 1:2,000
Regina 30 cm	1:2,000 – 1:500
Saskatoon 20cm	1:2,000 – 1:500

The above are only suggested display scales and each user will have some unique reasons to change some of the above to suit their needs. Organizing the

imagery with scales as above will result in display rates to most desktops in the 1-3 second range, which for most projects would be very acceptable. Keep in mind that the smaller the area is before turning on the Imagery, the better your performance will be.

Save for “Always Ready” state

Once your service connection is established within your project and set up and “authored” as you like it, then save the entire project. From then on each time you load or start your GIS project, the service layers will be there at your disposal, whenever you need them.

If you don’t need the layers for a while you can just turn them off but leave everything connected and they are always at your service.

Public versus Members Services

The FlySask Public Services contains all those layers available to the public. The FlySask Members Services contains the public layers in addition to those layers only available to the SGIC members.

Coordinate Systems

If you are adding the Web Services to a blank project, ArcMap will automatically load the Service and display in the Geographic coordinate system (Lat/long). You then have the option of transforming the coordinate system to anything else you wish, for instance, UTM NAD83 (CSRS).

If you are adding the Service to an existing project where a coordinate system is already defined, the Services will automatically display in the pre-defined projection (as long as that projection has been previously identified in the Services by the system administrator, which UTM Nad83 CSRS is for various zones).

FlySask Supported Projections

The FlySask WMS service supports a large list of projections by default. If a particular projection you are looking for is not in the list, contact technical support and it can be added.

Other GIS Systems

These services should work with any GIS system that has enabled OGC connections in accordance with the standards of the Open Geospatial Consortium for web services. Some of the processes may be different, but likely very similar. We would like to hear of any user experiences in using the FlySask services with other systems.

Appendix 3

Accessing WMTS and WMS From ESRI ArcCatalog

Introduction

This appendix describes accessing the SGIC Web Services from ESRI ArcGIS.

Procedure

1. Load ArcCatalog
2. In the catalog listing expand the "GIS Servers" to show its sub listings
3. Double-click the "Add WMTS Server" or "Add WMS Server" which opens a dialogue box that will allow you to enter the web server address(url), user name and password.
4. Click the "OK" button after entering your information, the dialogue box will disappear and a new line will be added to the "GIS Servers" listing
5. This new listing can be renamed and when expanded will show the data sets available from the web server.

