



User Guide

Web Services Data

Subscription Access

How to connect COTS software to Intermap's Data
Subscription services demo data using OGC

Version 1.3

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Table of Contents

1. Introduction	3
2. End Points & Credentials.....	3
3. OGC Standards	4
3.1. Web Mapping Service (WMS).....	4
3.2. Security and Authentication.....	4
4. How to connect Visualization Data with Global Mapper	5
4.1. Connecting to Web Mapping Service(WMS) with Global Mapper.....	5
5. How to Connect Visualization Data with QGIS v2.18.....	9
5.1. Connecting to Web Mapping Service (WMS) with QGIS	9
6. How to Connect Visualization Data with ArcMap	15
6.1. Connecting to Web Map Service(WMS) with ArcMap	15
7. Download Raw Data (WCS).....	20
7.1. Notes about WCS.....	20
7.2. Intermap WCS Downloader Tool	20
7.3. Global Mapper.....	24
8. NEXTMap Global Analytics.....	25
8.1. Profile.....	25
8.2. Viewshed.....	29

1. Introduction

Intermap's Data Subscription web services allows users flexible, on-demand access to Intermap's high resolution, wide-area data layers through OGC standards-compliant Web Services. This "data as a service" platform natively supports Web-enabled discovery, acquisition, analysis, and delivery of geographic data. Since our data subscriptions are Web-based, users retain full and immediate access to data, and the traditional needs for on-site data storage and management become obsolete.

This document provides instructions on how to access Intermap's Web services and sample data. Data can be accessed through any Open Geospatial Consortium (OGC) compliant software application and through the web-enabled applications. This document focuses on step by step instructions for OGC in commercial GIS packages and also provides guidance for interacting with the web-enabled applications.

Intermap provides two OGC services:

- **Web Map Service (WMS)** – a low cost service used for visualization of data layers
- **Web Coverage Service (WCS)** – a higher cost service used for downloading native datasets for use in detailed analysis and modelling

This document provides instructions for the following Consumer-Off-The-Shelf (COTS) software packages and how to connect to Intermap's demo data using WMS:

- **GlobalMapper** - <http://www.bluemarblegeo.com/products/global-mapper.php>
- **ArcGIS** - <https://www.arcgis.com/>
- **QGIS** - <http://www.qgis.org/>

For downloading raw data, this document includes instructions on using Intermap's **WCS Downloader Tool, Viewshed Tool, and Profile Tool**.

2. End Points & Credentials

Before you begin -- to access the web services the following endpoints must be used along with appropriate credentials (login and password).

<https://api.intermap.com/api/opengis/wms/samples>



Valid credentials are required for access to any sample subscription data. Credentials can be requested or renewed from Intermap.

3. OGC Standards

Intermap's® Web Services use the Open Geospatial Consortium, (OGC) OpenGIS® end points. OGC is an international, voluntary, consensus standards organization. It originated to bring commercial, governmental, nonprofit, and research organizations to an open consensus on the development and implementation of standards for geospatial content and services, GIS data processing, and data sharing.

Please refer to <http://www.opengeospatial.org/standards> for details of the WCS and WMS protocols.

3.1. Web Mapping Service (WMS)

The OpenGIS Web Map Service (WMS) Interface Standard provides a simple HTTP interface for requesting geo-registered map images from a geospatial database. A WMS request is defined by the geographic layer(s) in the area of interest to be processed. The response to the request is a georegistered map image (returned as JPEG, PNG, TIFF, etc.) that can be displayed in a browser application or OGC-compliant software. The WMS specification displays the map contents as layers using XML. The interface allows users to specify the transparency of the returned images to combine layers from multiple services.

WMS service is provided to be used as an overlay / layer in GIS applications or software applications (for example shaded reliefs, imagery, slope maps, etc). Data in WMS is streamed for visualization and constantly requested from the server.

Note: In WMS service v1.3.0 specification axis orientation changed compare to the previous version



1.1.1. Intermap's WMS server implements version 1.3.0 exactly how is specified by OGC standard however most well-known COTS software do not. Many (including Arc) ignore the definition of swapped axes in 1.3.0. Thus, it is often required to enforce correct axes orientation (like in QGIS) or to enforce WMS 1.1 protocol version (Global Mapper 15+, ArcGIS 10).

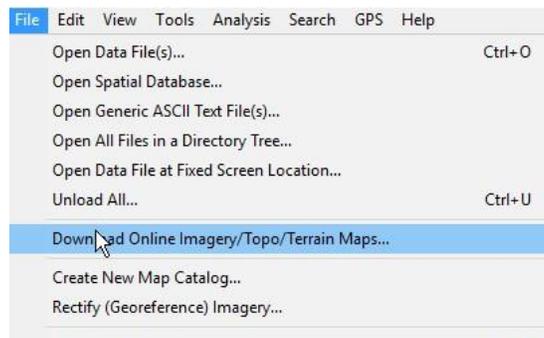
3.2. Security and Authentication

Intermap's Web Services require the client to implement SSL protocol (to secure the communication as well as basic authentication to identify who is the client using the tool). Many GIS tools don't support either SSL or basic authentication or both. The solution for that issue is a small desktop application that handles SSL and authentication for the GIS tool. The user just needs to install the application.

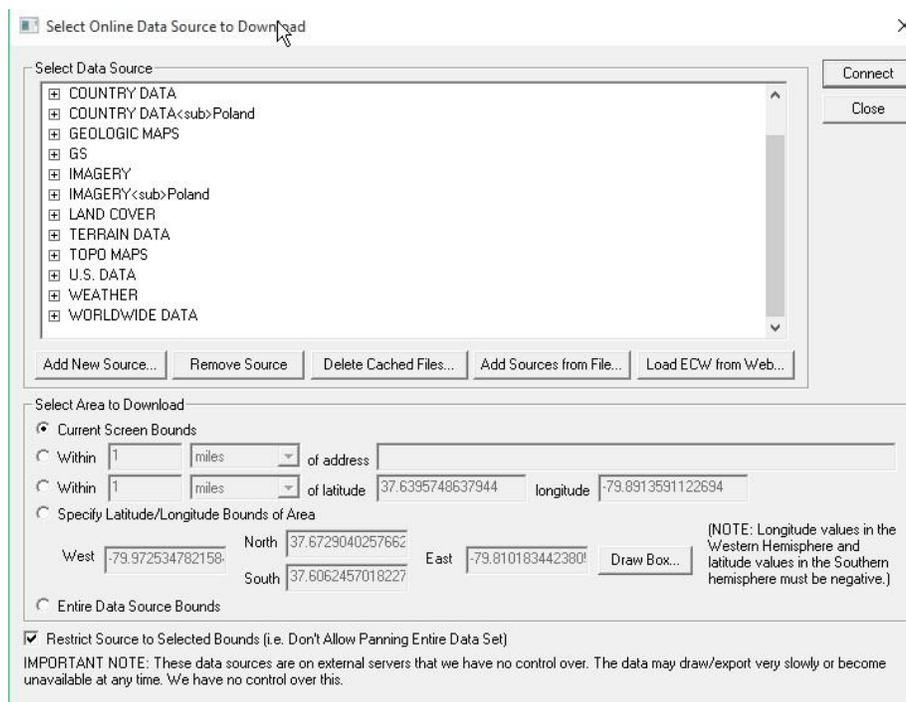
4. How to connect Visualization Data with Global Mapper

4.1. Connecting to Web Mapping Service (WMS) with Global Mapper

- 1) Start Global Mapper with an empty project
- 2) Access the “Download Online Imagery / Topo / Terrain Maps” in the file menu



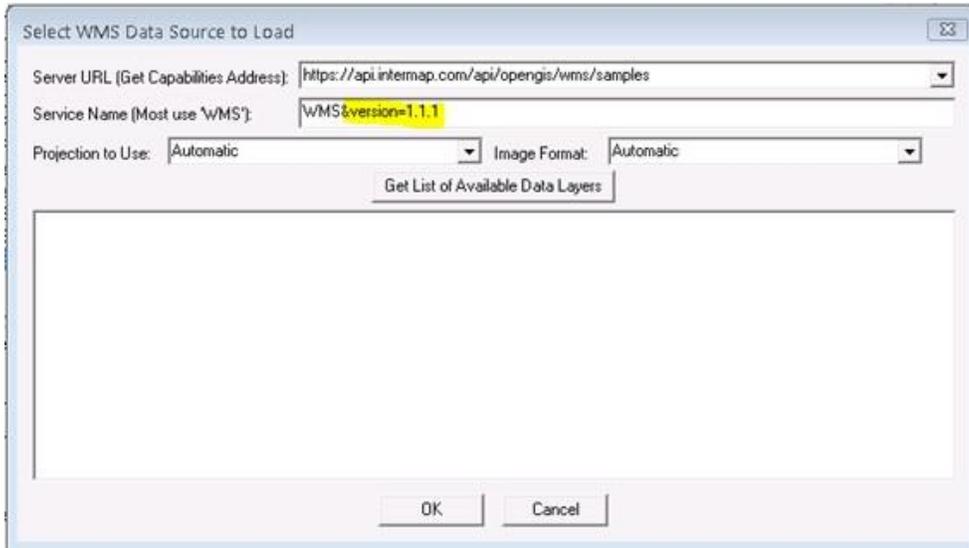
- 3) A Selection Online Data Source Dialog will appear



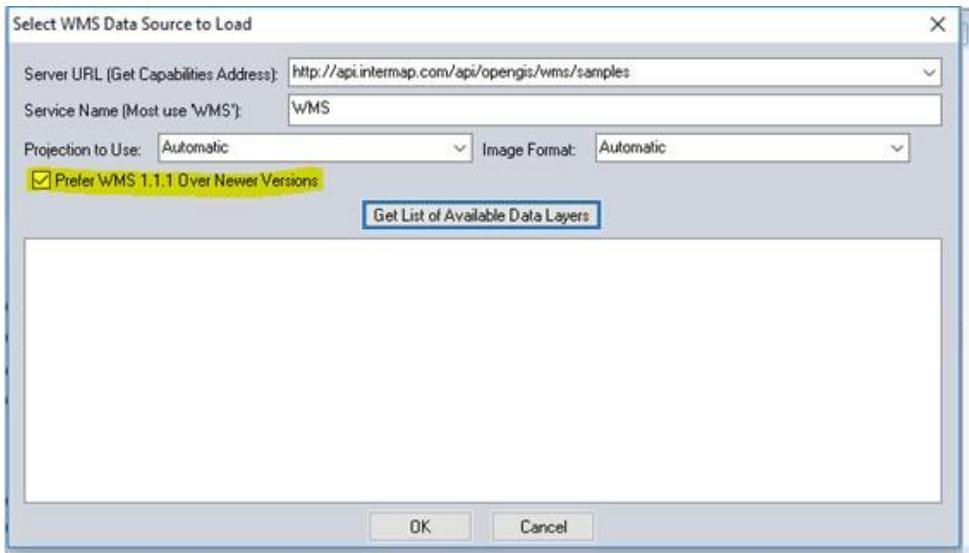
- 4) To add a new Source, click on “Add New Source”
- 5) Fill in the **Server URL** to Intermap’s WMS server to <https://api.intermap.com/api/opengis/wms/samples>

6) Change compatibility to 1.1.1

- a. In Global Mapper 14, 15: Add the text “&Version=1.1.1” to the Service Name as shown below

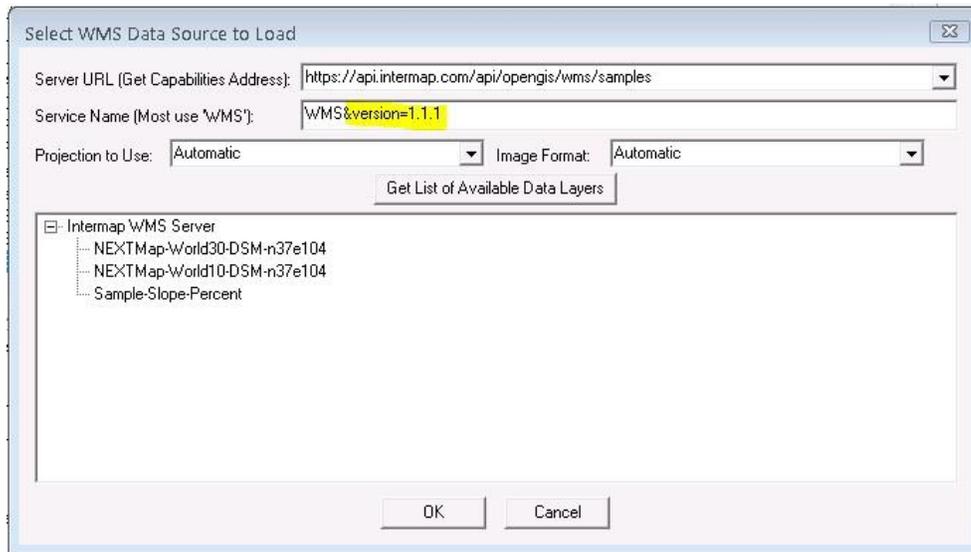


- b. For Global Mapper 16+, select “**Prefer WMS 1.1.1 Over Newer Versions**”

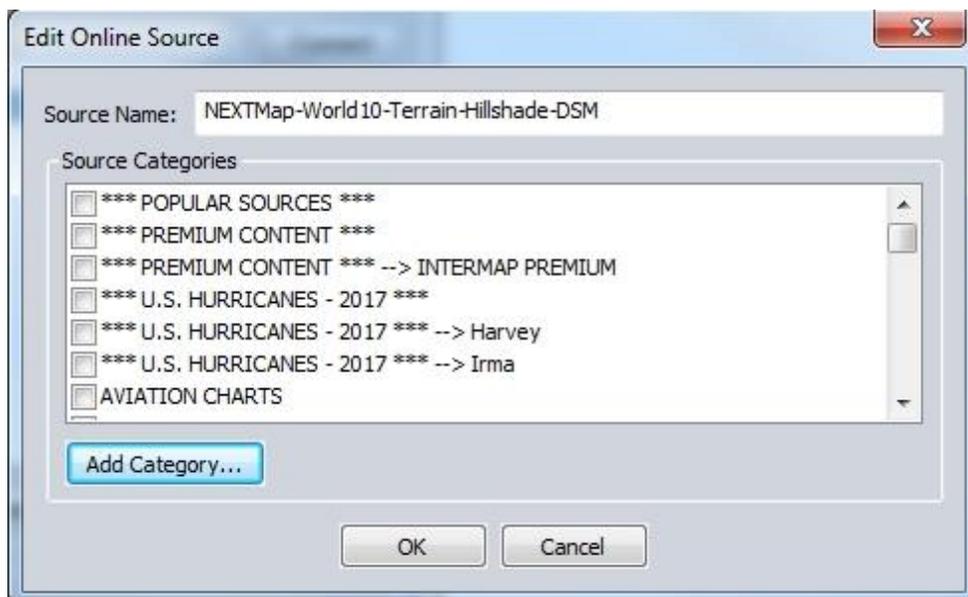


7) Select “**Get List of Available Data Layers**”

- a. You will be prompted for your username and password (enter your Web Services credentials provided to you by Intermap)
- b. If successful a list of data layers will appear

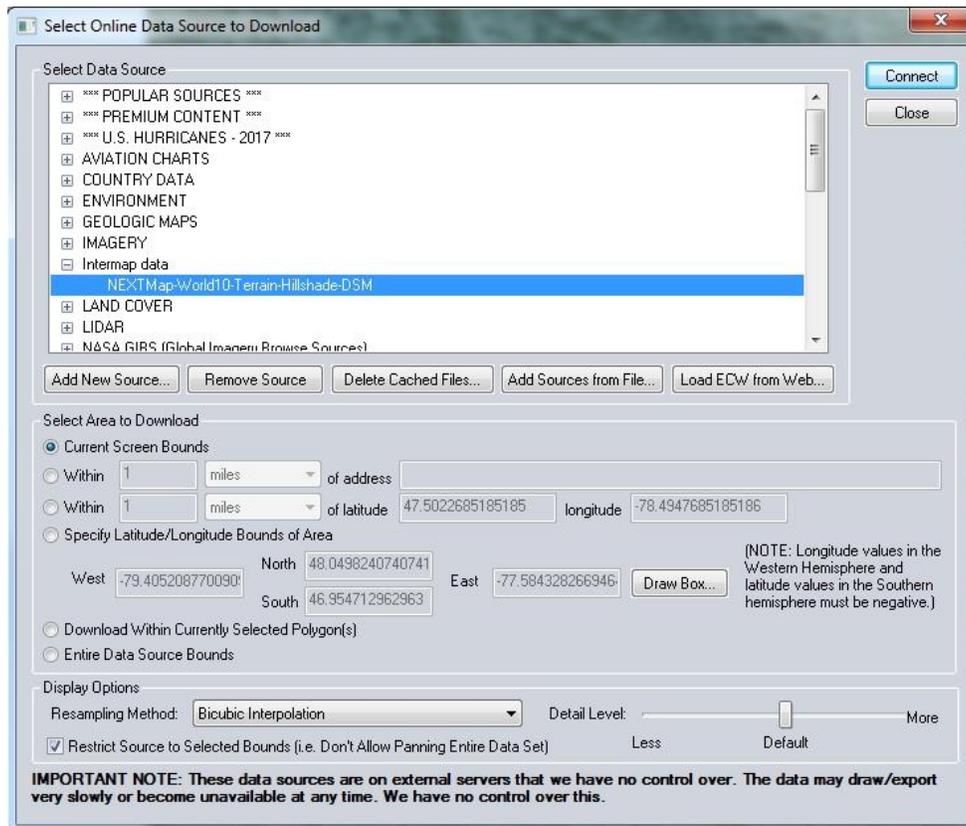


- 8) Select a Data Layer and click **OK**
 - a. Edit Online Source will appear



Select or add a Source category under which the selected data layer will be listed. Note that if no Source category is selected the data layer will be added as a separate source category at the end of the list. Click **OK**.

- b. In the Select Online Data Source to Download window select the new data source from the list and click Connect



- c. The data is loaded as a layer in Global Mapper
- d. If this is your first data layer in Global Mapper, the data is centered on the screen

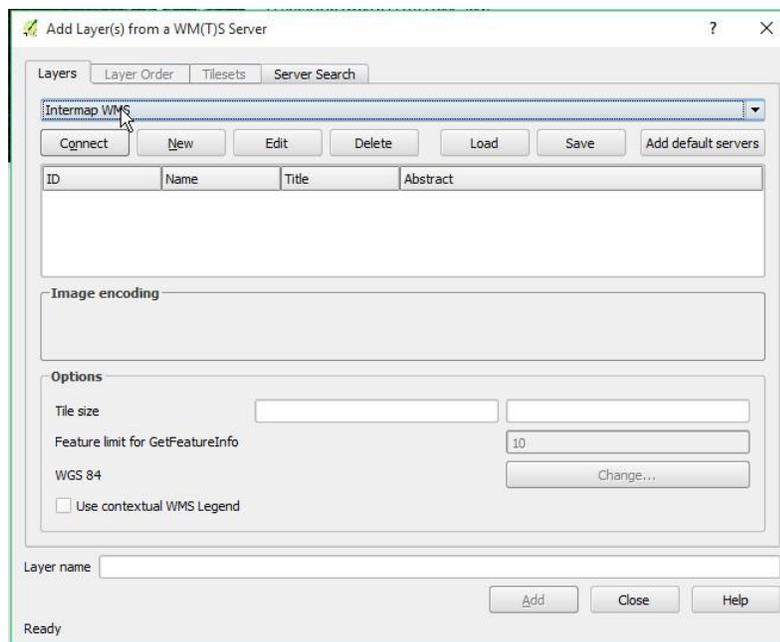
5. How to Connect Visualization Data with QGIS v2.18

5.1. Connecting to Web Mapping Service (WMS) with QGIS

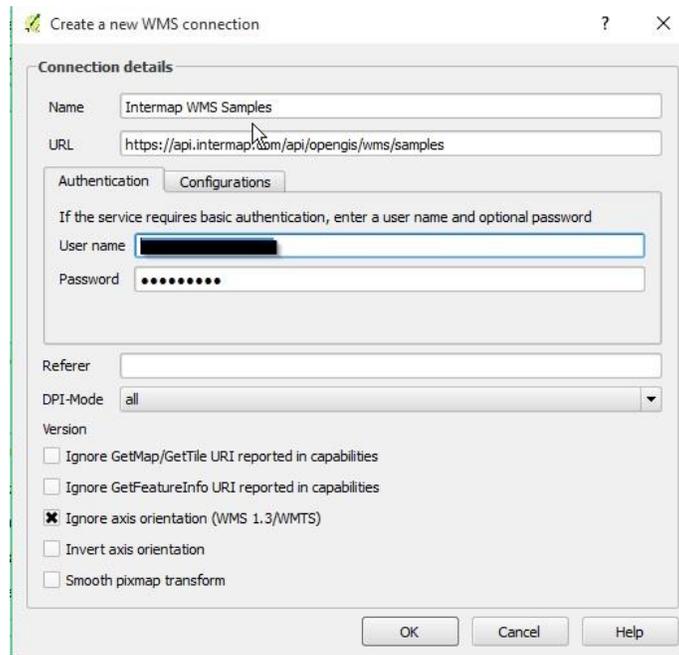
- 1) Start QGIS with an empty project
- 2) Select the “**Add WMS/WMTS Layer...**”, or press Ctrl+Shft+W



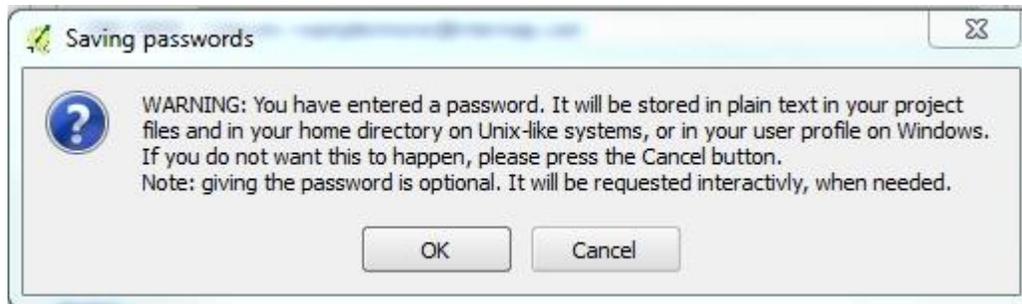
- 3) The Add Layer(s) from a WM(T)S Server Dialog box will appear



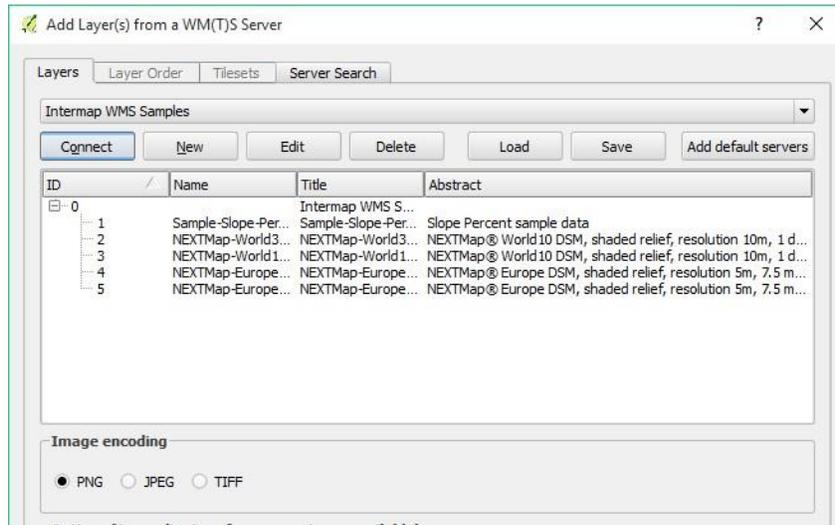
- 4) Select the **“New”** button and complete all of the details as shown below



- a. Ensure the **“Ignore axis orientation (WMS 1.3/WMTS)”** is selected. For older versions of QGIS, the **“Invert axis orientation”** can be used instead.
- b. Ensure the user name and password provided is entered correctly
- c. Select **OK** to close the dialog
- d. **“Saving password”** will appear asking you if you want to save your credentials.



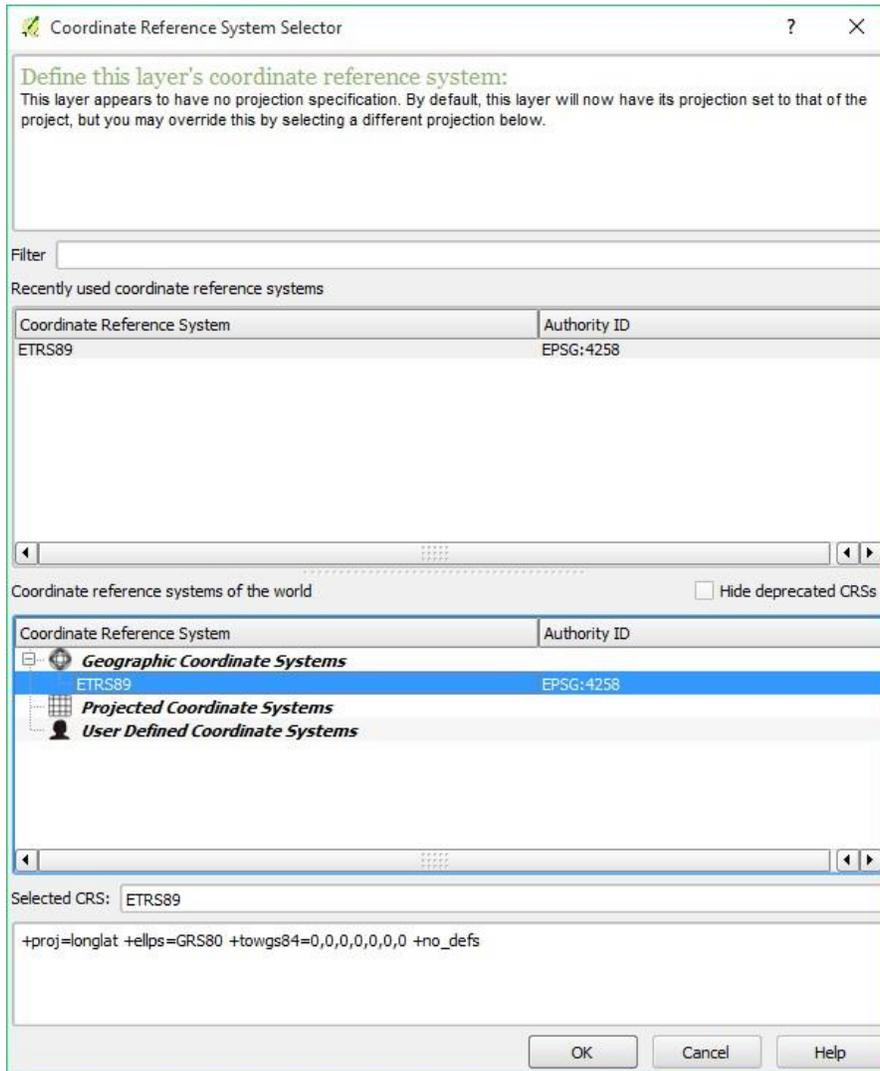
- 5) Select the **“Connect”** button to connect to the service to retrieve a list of available data layers. If successful a list of data layers will populate.



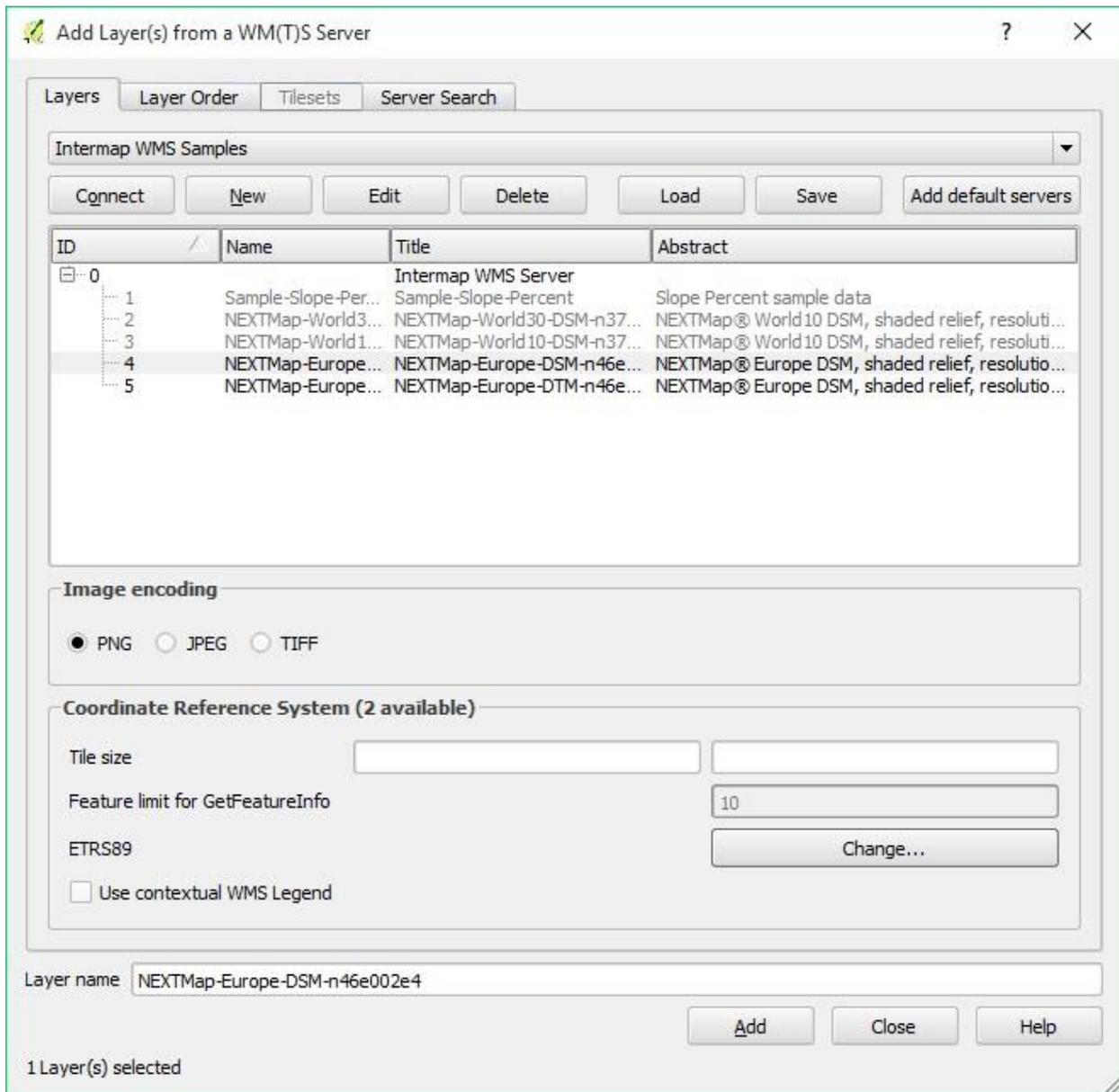
- 6) Select a data layer (for example NEXTMAP-Europe-DSM..)
 - a. QGIS may require you to select the coordinate Reference System (CRS) before allowing you to “**Add**” the layer
 - b. In the Coordinate Reference System box, select “**Change**”



- c. The Coordinate Reference System Selector Dialog will appear
 - d. Expand the Geographic Coordinate Systems and select the coordinate system of interest (in this example ETRS89) and press “**OK**” to close the dialog

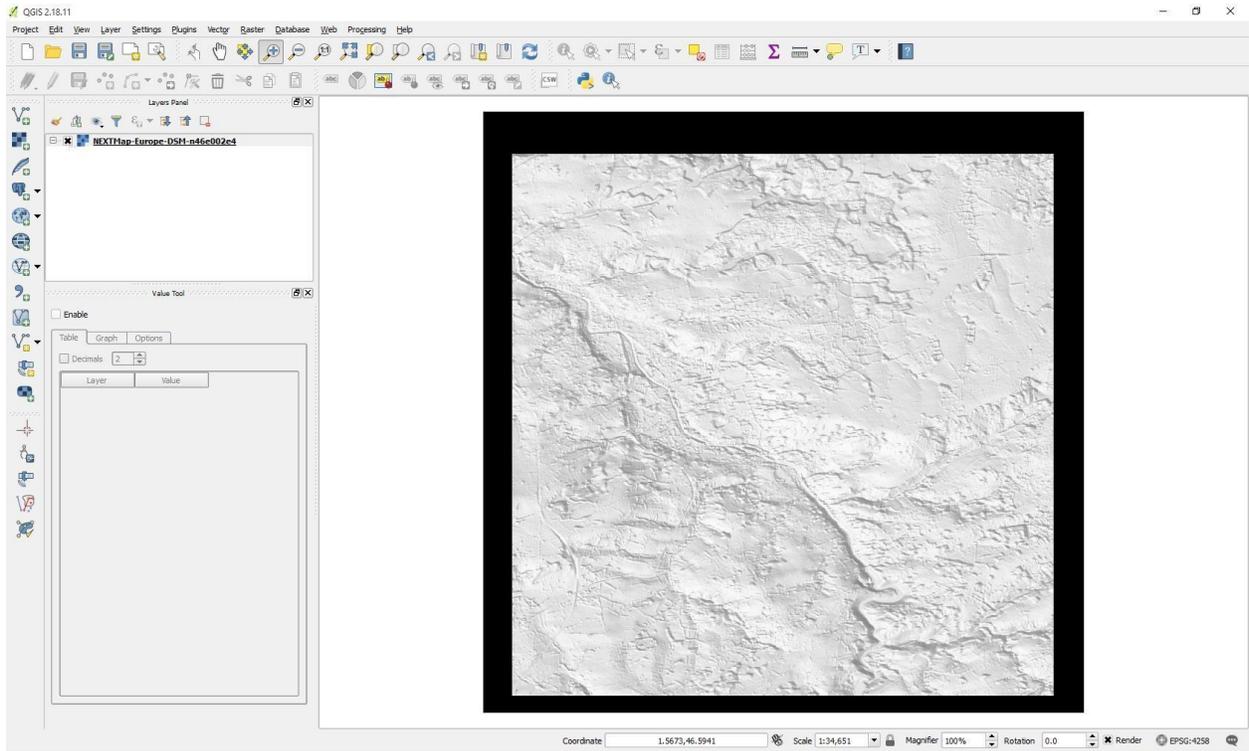


7) Add the layer into the project



- The Layer Name should be automatically populated.
- Select **“Add”** to connect and add the layer into the project.
- Select **“Close”** to close the dialog box

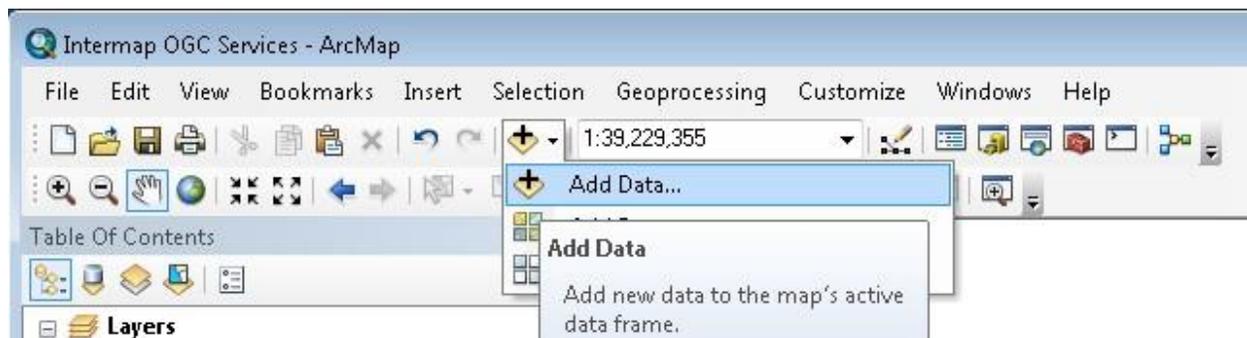
8) The data is now loaded into QGIS



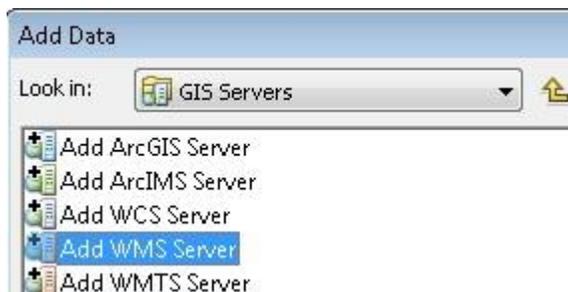
6. How to Connect Visualization Data with ArcMap

6.1. Connecting to Web Map Service (WMS) with ArcMap

- 1) Start ArcMap
- 2) Connect data using the Add Data button



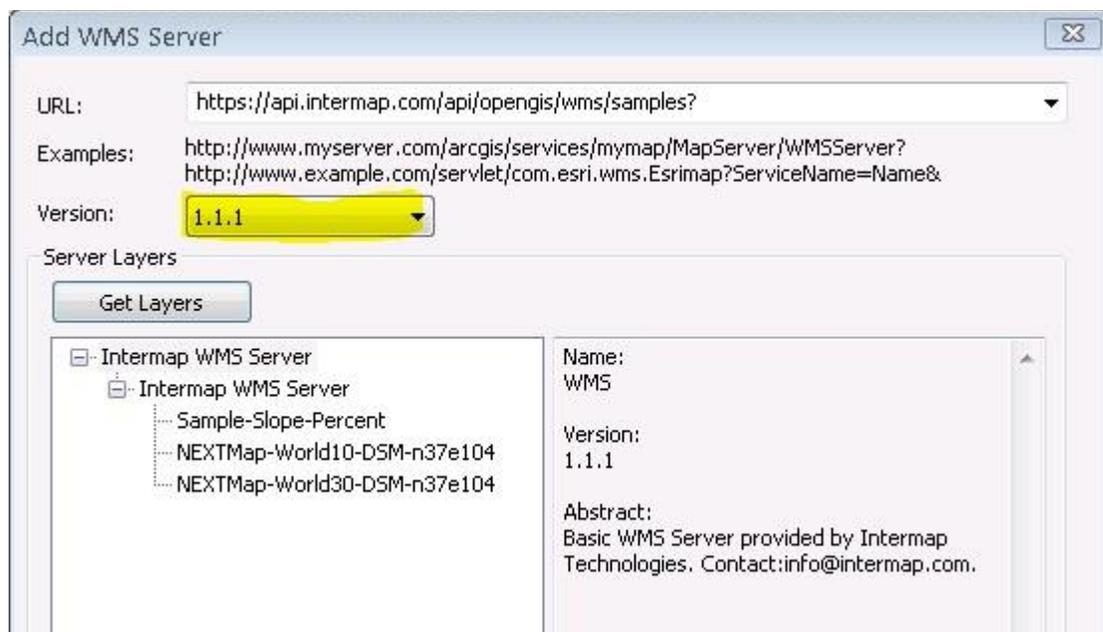
- 3) Select GIS Servers - **Add WMS Server** and click on **Add** button



- 4) Enter the WMS Server URL : <https://api.intermap.com/api/opengis/wms/samples>
- 5) Select version 1.1.1
- 6) Click on the **Get Layers** button
- 7) GIS Server Connection dialog is displayed – insert your credentials and click on **OK** button

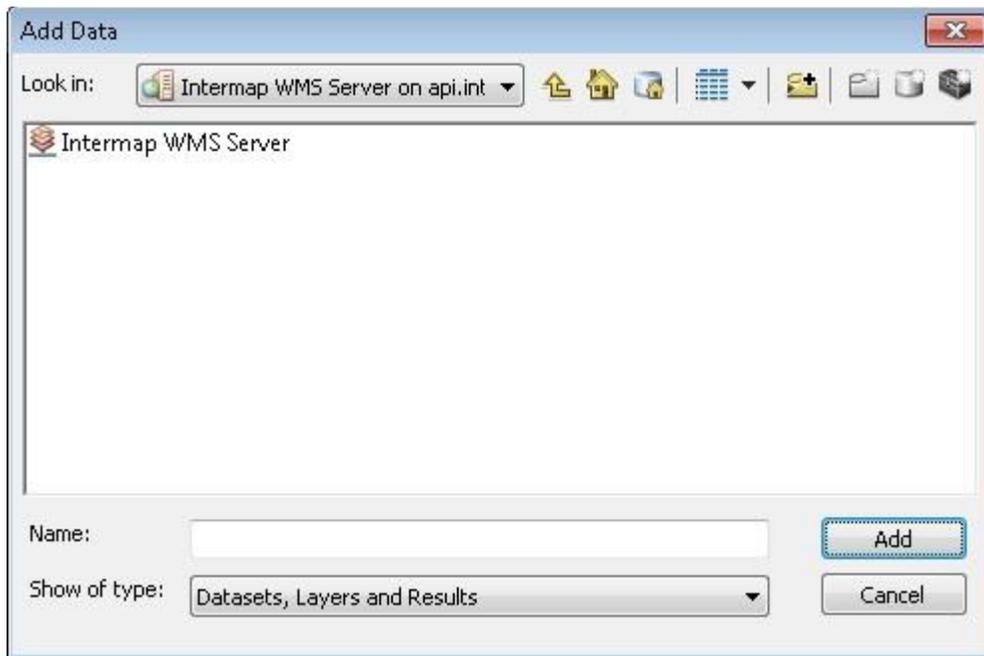


8) Click on **OK** button in Add WMS Server dialog box

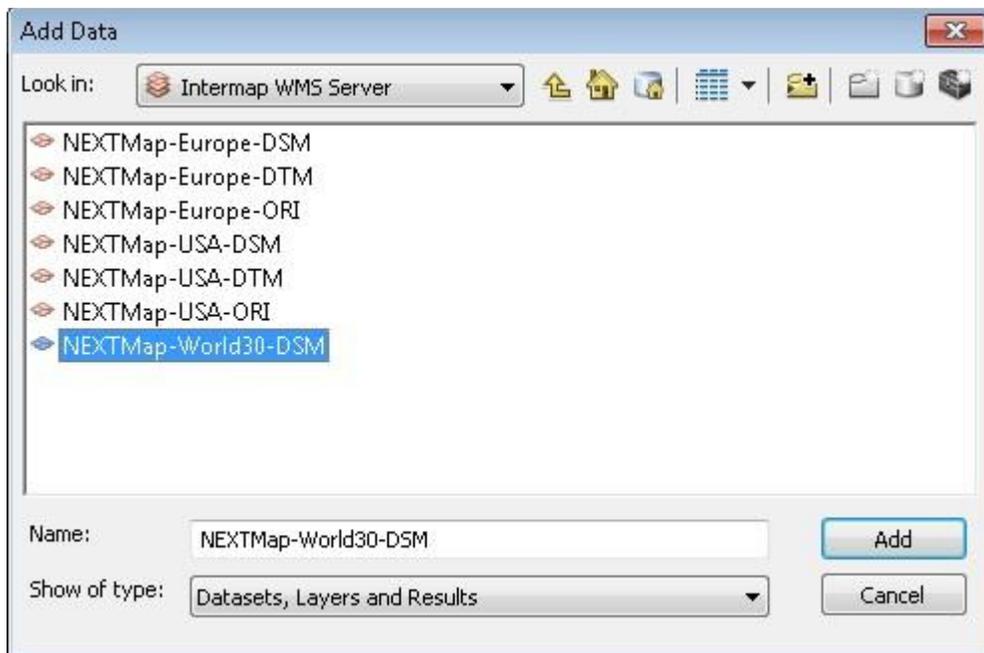


9) Select the *Intermap WMS Server on api.intermap.com*

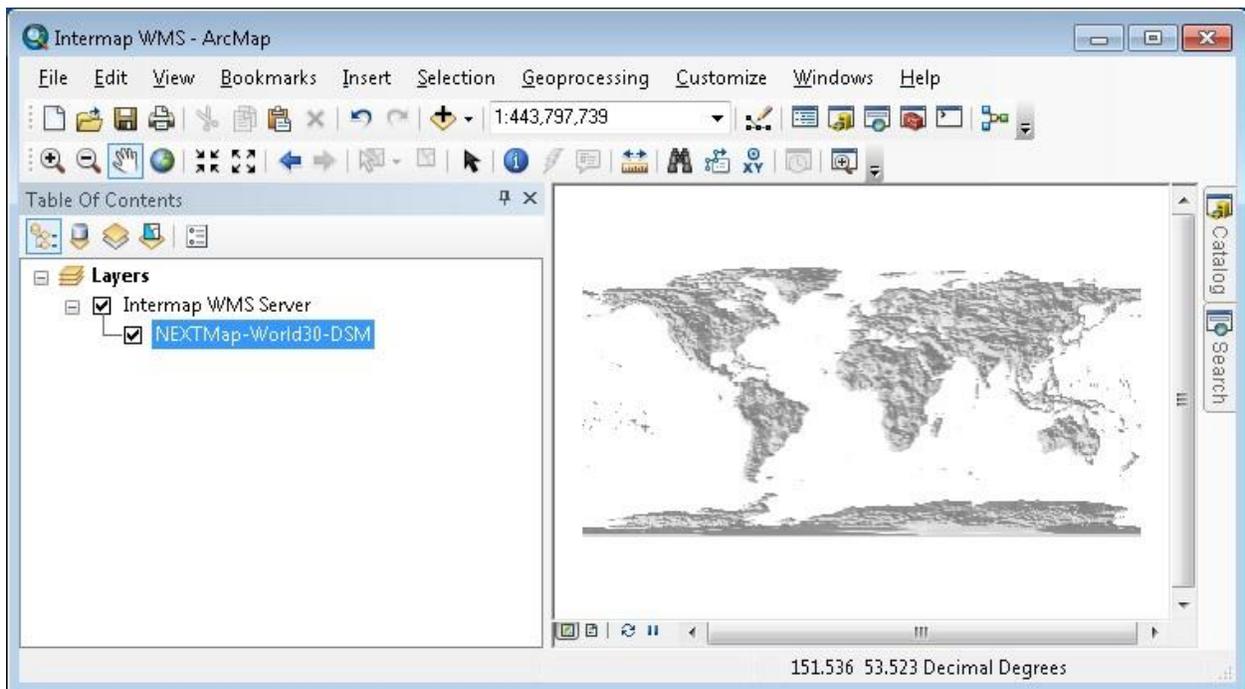
10) Click the Add button. The Intermap WMS Server is selected and another Add Data dialog is displayed



11) To select individual layers, double-click on Intermap WMS Server item and all available data sources are displayed

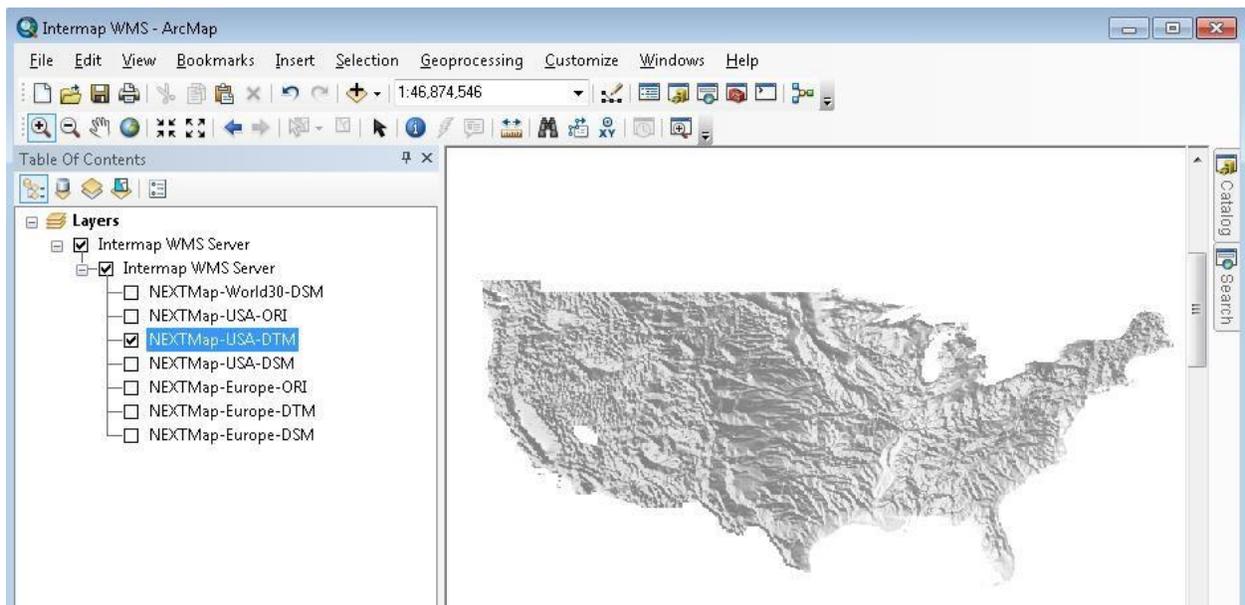


12) To bring a layer into the map, highlight the dataset that you would like to add as a new layer and click the "Add" button and data should be visible in the map



13) Select and switch on the new layer and zoom to any area

Only the selected layer is added to the map. To add all the layers to the map at once, highlight the **Intermap WMS Server** in the previous Add Data dialog box.

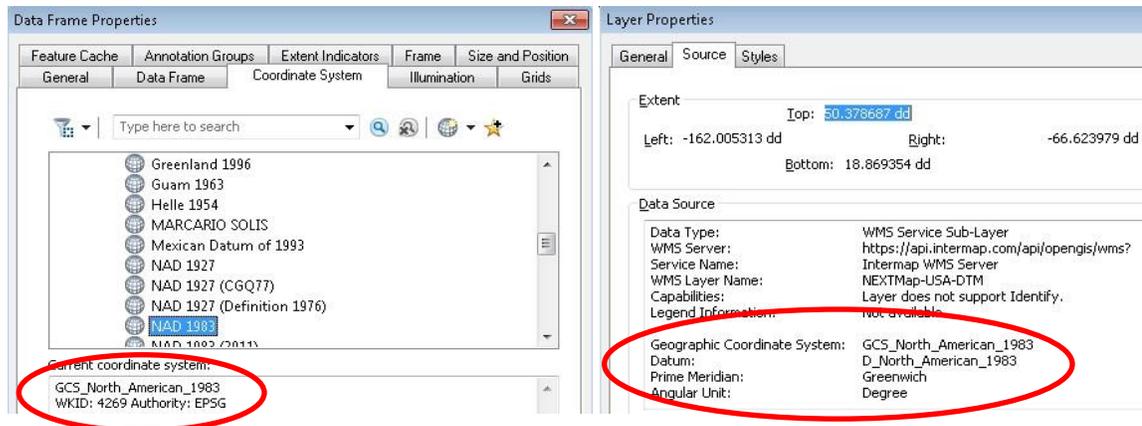


Important:

Be sure that spatial reference system set for Data frame (Layers) is identical with this one for the new WMS layer. In other cases, nothing is displayed without any warning.

For NEXTMap-Europe DSM/DTM has to be set GCS_ETRS_1989 (EPSG 4258)
For NEXTMap-USA DSM/DTM has to be set GCS_North_American_1983 (EPSG 4269)
For NEXTMap-World30-DSM has to be set GCS_WGS_1984 (EPSG 4326)

Data frame properties can be displayed by right mouse button click on Layers and GCS of the new layer can be displayed by the similar way in its properties.



7. Download Raw Data (WCS)

7.1. Notes about WCS

WCS is designed as an easy standard way for developers, applications, and GIS tools to access data from a third party. WCS does have limitations (**See the notes on WCS in Section 3 of this document**) and it is important to be accessed correctly. In particular:

- Intermap's WCS server is metered based on the square kilometers of data downloaded at native resolution
- Data must be accessed at native resolution (i.e. no downsampling is permitted)
- Bounding boxes must be constructed precisely or there may be a pixel shift in the data

For support in accessing data through WCS, or for an option of downloading the data by other means, please contact Intermap support.

7.2. Intermap WCS Downloader Tool

Intermap's WCS Downloader Tool allows users to quickly and accurately download cloud data for use in your applications. Intermap's WCS Downloader Tool allows you to:

- Specify a rectangular area of interest
- Generate the appropriate calls to download the data. All calls are at native resolution and aligned correctly to the requested area for retrieval of a 1:1 copy.
- Download the data as tiles (GeoTiffs) for use in almost any COTS software

To use the WCS Downloader Tool, please follow these procedures:

- 1) Go to <https://api.intermap.com/apps/wcs/>
- 2) Enter the credentials provided in your welcome email:



- 3) The application will load:

INTERMAP**WCS Download App**

GAlexiev+samplenmone@intermap.com Logout

Calculates the number of calls and creates links to download via WCS for a simple rectangular Area of Interest.

1 Enter Bounding Box

	Latitude	Longitude
Upper Left Corner	<input type="text"/>	<input type="text"/>
Lower Right Corner	<input type="text"/>	<input type="text"/>



Map data ©2018 500 km Terms of Use

- Sample Data (NEXTMap One)
- Sample Data (5, 10 and 30 meters)
- NEXTMap One
- NEXTMap 5
- NEXTMap World 10 DSM / DTM
- NEXTMap World 30

2 Select Data Layer

Server:

Data Layer:

Output Pixel Spacing:

Tile pixels: x pixels

3 Download Tiles

Number of WCS calls: 0

Tile	Name	Area	Url
1			
2			
3			
...			

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The world map will display by default and shows coverage of the first available data set. Select the desired color-coded data layer from the list below the map.

- 4) Enter your bounding box either directly by entering coordinates or visually on the map
 - a. Make sure your selection is within the selected data set boundaries
 - b. Enter your coordinates manually in the Latitude and Longitude boxes as decimal degrees
 - c. The tool optionally supports drawing an area of interest on the map; however, it is recommended to determine the coordinates you wish to download using a GIS application
 - d. To select the bounding box on the map, press the “Draw” button than select your bounding box on the map
 - e. The selected area of interest will be displayed on the map as a red box

1 Enter Bounding Box

	Latitude	Longitude
Upper Left Corner	<input type="text" value="37.5000"/>	<input type="text" value="-80.0000"/>
Lower Right Corner	<input type="text" value="37.375"/>	<input type="text" value="-79.875"/>

2 Select Data Layer

Server:

Data Layer:

Output Pixel Spacing:

Tile pixels: x pixels

3 Download Tiles

Number of WCS calls:

Tile	Name	Area	Url
1			
2			

The map shows a red bounding box over a geographic area. The legend below the map lists the following data layers:

- Sample Data (NEXTMap One)
- Sample Data (5, 10 and 30 meters)
- NEXTMap One
- NEXTMap 5
- NEXTMap World 10 DSM / DTM
- NEXTMap World 30

- 5) Select the Intermap server you wish to connect. For demo accounts, select “Intermap WCS Server (Sample Data).” For non-demo accounts, select “Intermap WCS Server:”

Select Data Layer

Server:

Data Layer:

- 6) Once the server is selected, the available data layers in the bounding box are listed. Select your layer of interest:

Select Data Layer

Server:

Data Layer:

Output Pixel Spacing:

- 7) Tiles for downloading the area of interest are automatically created and the tiles are overlaid in green on the map. Links to download the data are generated in the table at the bottom of the page:

1 Enter Bounding Box

Upper Left Corner: 37.5000, -80.0000
Lower Right Corner: 37.375, -79.875

2 Select Data Layer

Server: Intermap WCS Server (Sample Data)
Data Layer: NEXTMap5-USA-Elevation-DSM
Output Pixel Spacing: 5 m
Tile pixels: 1000 x 1000 pixels

3 Download Tiles

Number of WCS calls: 16

Tile	Name	Area	Url
1	N37.4166458_W80.0000625_5m	17.1 km ²	link
2	N37.4583125_W80.0000625_5m	17.1 km ²	link
3	N37.4999792_W80.0000625_5m	17.1 km ²	link

- Sample Data (NEXTMap One)
- Sample Data (5, 10 and 30 meters)
- NEXTMap One
- NEXTMap 5
- NEXTMap World 10 DSM / DTM
- NEXTMap World 30

Adjust the tile sizes to optimally cover the area of interest. For example, a value of 1501 x 1501 creates 4 tiles to cover the area of interest:

1 Enter Bounding Box

Upper Left Corner: 37.5000, -80.0000
Lower Right Corner: 37.375, -79.875

2 Select Data Layer

Server: Intermap WCS Server (Sample Data)
Data Layer: NEXTMap5-USA-Elevation-DSM
Output Pixel Spacing: 5 m
Tile pixels: 1501 x 1501 pixels

3 Download Tiles

Number of WCS calls: 4

Tile	Name	Area	Url
1	N37.4375208_W80.0000625_5m	38.5 km ²	link
2	N37.5000625_W80.0000625_5m	38.5 km ²	link
3	N37.4375208_W79.9375208_5m	38.5 km ²	link

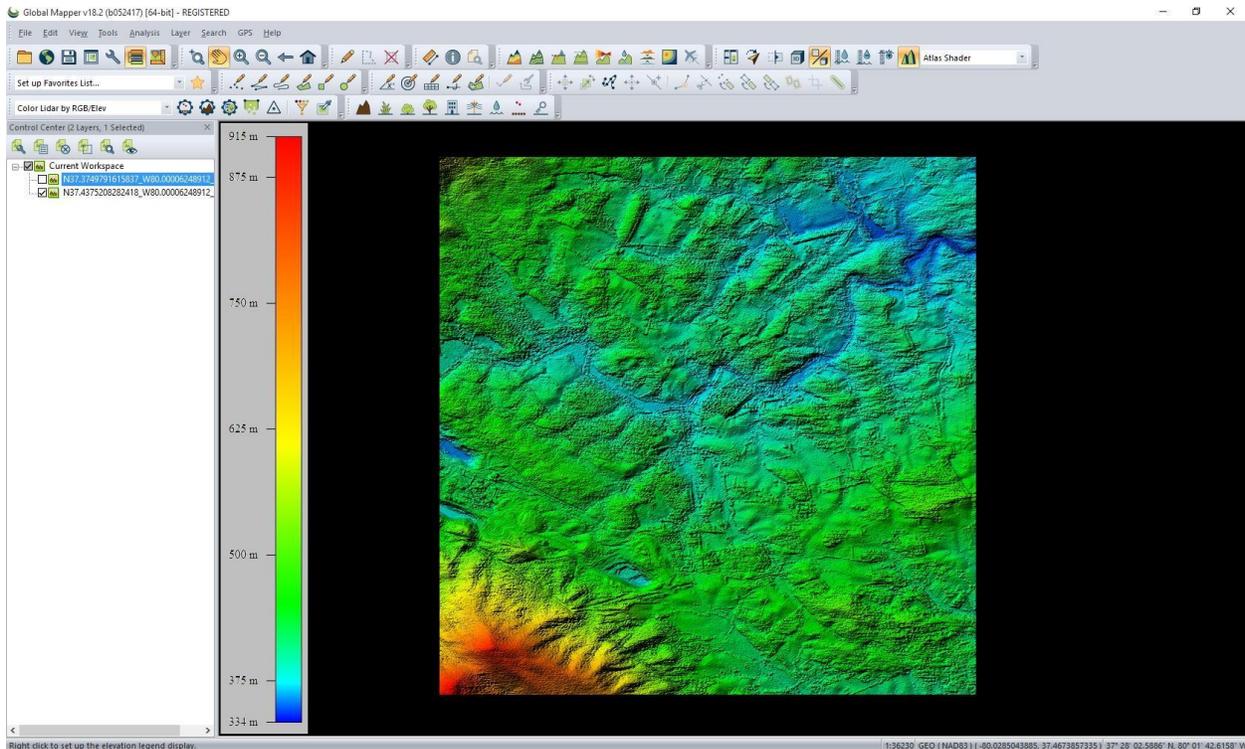
- Sample Data (NEXTMap One)
- Sample Data (5, 10 and 30 meters)
- NEXTMap One
- NEXTMap 5
- NEXTMap World 10 DSM / DTM
- NEXTMap World 30

8) The application automatically creates links to download the tiles. To download a tile, click the "Link" URLs next to the tile numbers to save the files locally.

The file name is default named based on the coordinate of the tile, for example: "N37.3749791615837_W80.00006248912_5m.tiff".

Once downloaded, you can load the tiles into a GIS tool or other software.

Note: For non-demo accounts, your account will be charged for any area downloaded.



- 9) The tool includes an Export Table option. This option downloads the entire table of tiles and links into Excel. Exporting the table is a convenient way to download data at a later time, for estimating the number of calls required to download, or for developers to verify how to construct WCS calls.

7.3. Global Mapper

To download WCS data in current versions of Global Mapper (v18), users are required to specify the correct tile bounding box and to manually limit the size of requests to under 4000 x 4000 pixels.

Because of these limitations, it is recommended to use Intermap's WCS Downloader Tool for downloading WCS data.

8. NEXTMap Global Analytics

8.1. Profile

Intermap's Profile service provides quick and easy access to terrain profiles anywhere in the world. Profile Application allows you to create detailed surface profile between the start point and the end point. The result could be exported in CSV format. Profile service is available through web application or programming interface (API).

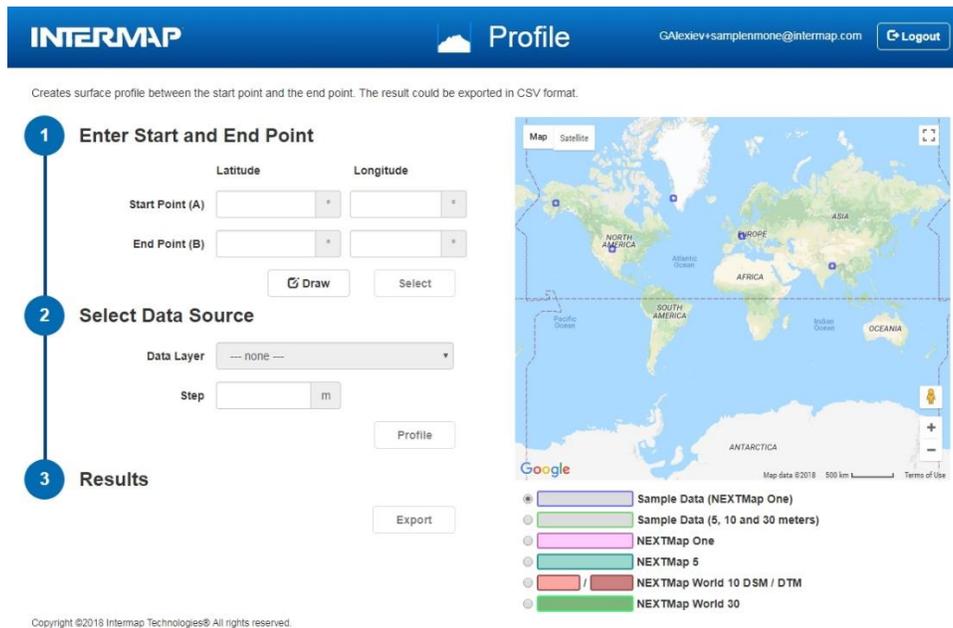
To use the Intermap's Profile Application, please follow these procedures:

- 1) Go to <https://api.intermap.com/apps/profile/>
- 2) Enter the credentials provided in your welcome email:



The screenshot shows the Intermap Web Services login interface. At the top, the Intermap logo is on the left and 'Solutions on Demand' is on the right. Below the logo is a banner with a globe and the text 'INTERMAP Web Services Providing high value answers into industry applications'. The main content area contains a login form for 'Existing Customers' with fields for 'User Name', 'Password', and a 'Remember my user name' checkbox. A 'Sign in' button and a 'Forgot password?' link are also visible. To the right of the form, a 'Login Required' message states: 'Please login to access Intermap's Applications and Web Services'.

- 3) The application will load:



The world map will display by default the coverage of the first available data set.

Select the desired color-coded data layer from the list below the map.

4) Enter Start and End Point

- a. The user can enter the start and end points of your profile either directly by entering coordinates or visually on the map. Make sure your profile is within the selected data set boundaries.
- b. Enter your coordinates manually in the Latitude and Longitude boxes as decimal degrees. Corresponding pushpins A and B will display on the map
- c. To select the profile on the map, press the “Draw” button than select Start and End Points on the map. They will be marked by pushpins A and B.
- d. Once the desired profile location is selected press the “Select” button
- e. The profile will be visualized on the map by blue line

1 Enter Start and End Point

Latitude Longitude

Start Point (A) ° °

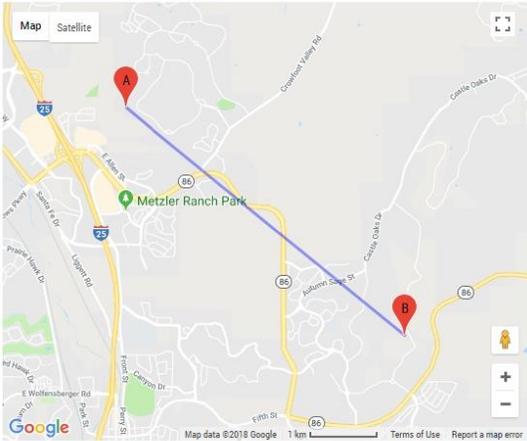
End Point (B) ° °

2 Select Data Source

Data Layer ▾

Step m

3 Results



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5) Select the Data Source

- a. Select the Data Set Layer available for your profile from the “Data Layer” Box pull-down menu.
- b. Enter the desired sample interval distance (min. 0.1m) in the “Step” Box.

2 Select Data Source

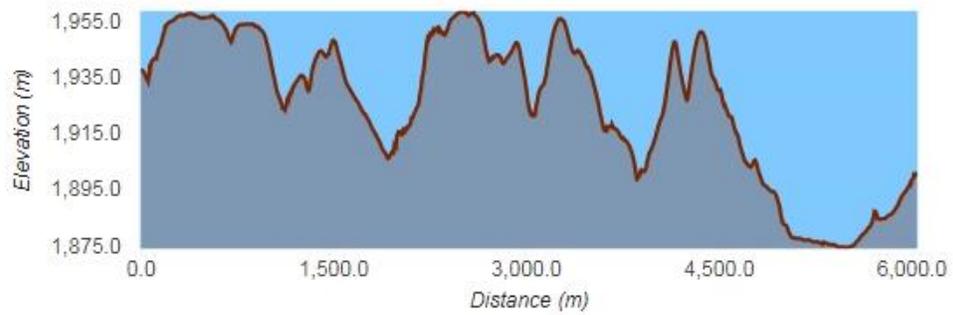
Data Layer ▾

Step m

6) Plot the Profile

- a. Press the “Profile” button
- b. Spinning wheel will indicate the progress
- c. The time it takes to generate the profile depends on its length, Data Layer and the Step value used. When complete the profile will display on your screen.

3 Results



Export

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- 7) Press the “Export” button if you wish to export and save the profile in CSV format for further analysis

8.2. Viewshed

The Intermap's Viewshed service generates detailed colorized viewshed analysis from a transmitter to receiver using our elevation database. The analysis generates a colorized KMZ file where red represents areas that are not visible due to obstructions and green represents an unobstructed (clear) line of sight.

Viewshed is available through web application or programming interface (API).

To use the Intermap's Profile Application, please follow these procedures:

- 1) Go to <https://api.intermap.com/apps/viewshed/>
- 2) Enter the credentials provided in your welcome email:

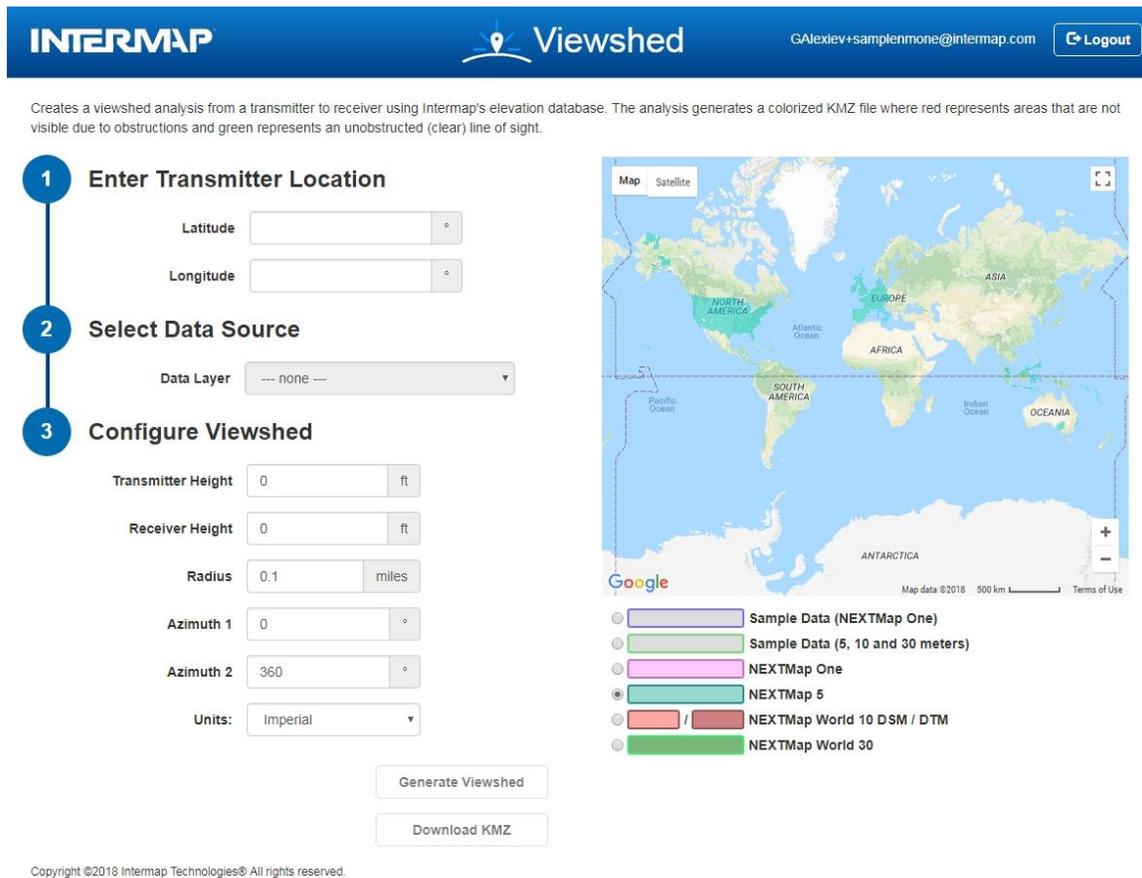
INTERMAP Solutions on Demand®
5.0.18107.1

INTERMAP
Web Services
Providing high value answers into industry applications

Existing Customers
User Name
Password
 Remember my user name
Sign in
Forgot password?

Login Required
Please login to access Intermap's Applications and Web Services

- 3) The application will load:



Creates a viewshed analysis from a transmitter to receiver using Intermap's elevation database. The analysis generates a colorized KMZ file where red represents areas that are not visible due to obstructions and green represents an unobstructed (clear) line of sight.

- 1 Enter Transmitter Location**
Latitude
Longitude
- 2 Select Data Source**
Data Layer
- 3 Configure Viewshed**
Transmitter Height ft
Receiver Height ft
Radius miles
Azimuth 1
Azimuth 2
Units:

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The world map will display by default the coverage of the first available data set.

Select the desired color-coded data layer from the list below the map.

4) Enter Transmitter Location

- The user can select the origin (Transmitter Location) of the viewshed either directly by entering coordinates or visually on the map. Make sure the location is within the selected data set boundaries.
- Enter coordinates manually in the Latitude and Longitude boxes as decimal degrees
- To select the Transmitter Location visually click on the desired map location
- The selection will be visualized on the map by a pushpin

1 Enter Transmitter Location

Latitude °

Longitude °

2 Select Data Source

Data Layer

3 Configure Viewshed

Transmitter Height ft

Receiver Height ft

Radius miles

The map shows the Castle Rock area with a red pushpin and a yellow viewshed circle. The map includes labels for Centennial, Dove Valley, Cottonwood, Highlands Ranch, Lone Tree, Stonegate, Parker, Castle Pines, Sedalia, Franktown, Castle Rock, and The Pinery. The map data is attributed to Google, 2018.

- 5) Select the Data Source
 - a. Select the Data Set Layer available for your profile from the “Data Layer” Box pull-down menu.

2 Select Data Source

Data Layer

- 6) Configure Viewshed
 - a. Enter the Transmitter and Receiver Heights in the corresponding boxes.
 - b. Enter the Radius (0.1 to 9.0 miles) in which a viewshed will be generated around the transmitter. The selected radius will be displayed on the map as a yellow circle around the pushpin.
 - c. Enter values in the “Azimuth 1” and Azimuth 2” boxes to limit the viewshed directional coverage. The selected coverage will be adjusted on the map.
 - d. Select the units (metric/imperial) from the pull-down menu of the entries above.

1 Enter Transmitter Location

Latitude: 39.45590239313

Longitude: -104.832916217

2 Select Data Source

Data Layer: Sample-NEXTMapOne-Elevation-DS

3 Configure Viewshed

Transmitter Height: 100 ft

Receiver Height: 20 ft

Radius: 5 miles

Azimuth 1: 45

Azimuth 2: 270

Units: Imperial

Generate Viewshed

Download KMZ

Map Legend:

- Sample Data (NEXTMap One)
- Sample Data (5, 10 and 30 meters)
- NEXTMap One
- NEXTMap 5
- NEXTMap World 10 DSM / DTM
- NEXTMap World 30

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7) Generate the Viewshed

- Press the “Generate Viewshed” button. “Processing” progress bar will be displayed.
- The processing time depends on the Data Source and configuration values used.
- Once complete the progress bar will disappear and the “Download KMZ” button will become active.

8) Display the generated viewshed

- At this stage the generated viewshed will not display on the screen.
- Press the “Download KMZ” button to download and save the viewshed in KMZ file format. You can use any GIS tool/viewer to visually display the viewshed.
- The example below the viewshed is displayed in Global Mapper. The green color represents clear and the red obstructed view.

