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Customer Support Document

BlomURBEX™ WMTS Service - User Guide

REVISION HISTORY

Document Number	Issue Date	Reason for Change
BU_WMTS_1000	November 2013	Initial release
BU_WMTS_1010	February 2015	ExtraZoom feature added
BU_WMTS_1020	February 2016	Added new Finnish projections
BU_WMTS_1030	December 2016	Added mixed format support Added default “extraZoom” value
BU_WMTS_1040	February 2018	Added GetFeatureInfo and HTTPS support
BU_WMTS_1050	June 2019	Fixed documentation error

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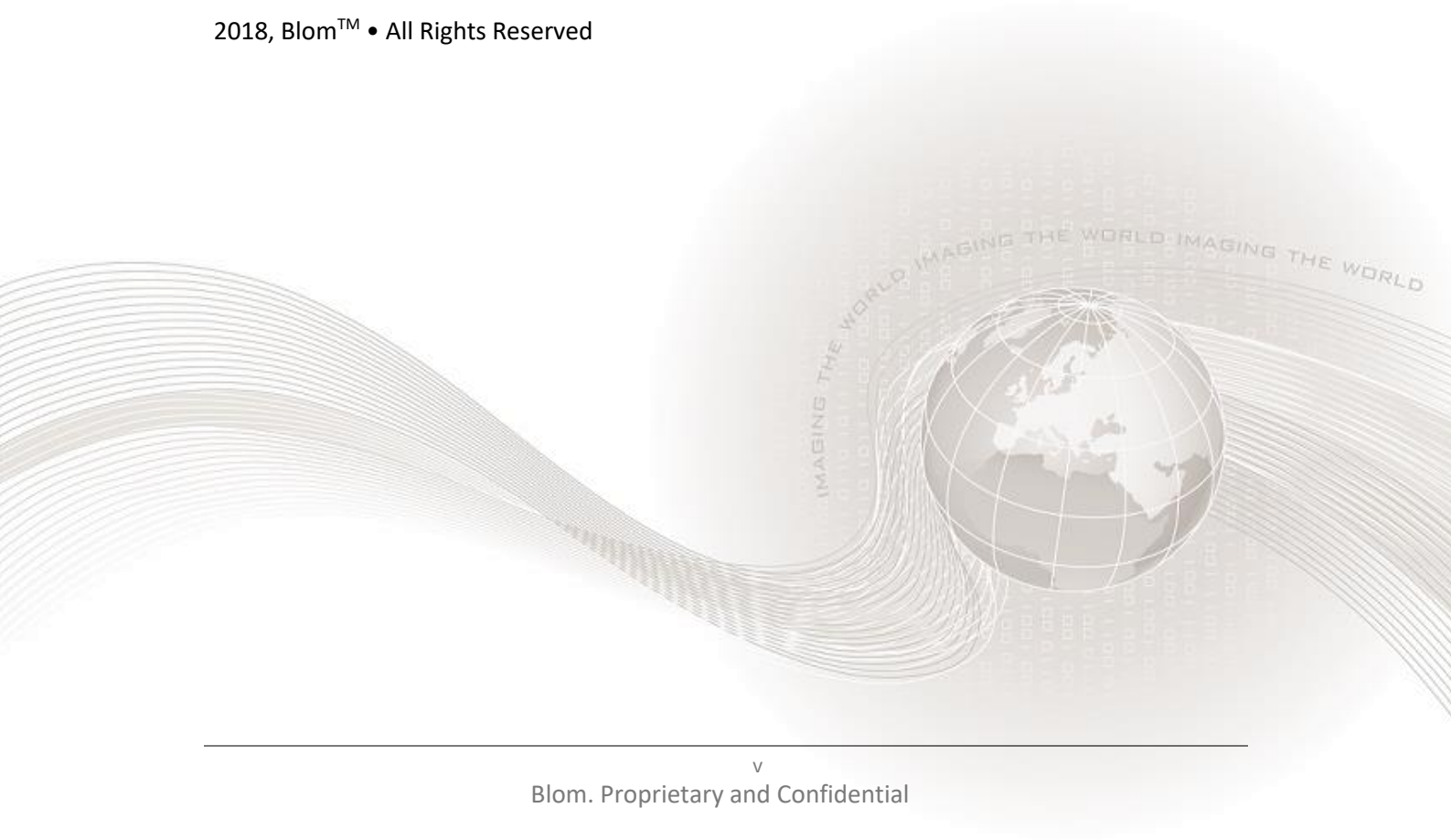


1. SCOPE

BlomURBEX™ offers a WMTS (Web Map Tile Service) as an ortho and ortho-rectified tiled image provider complying with the directives and OGC's regulation.

The service has been developed to provide 256x256 pixel tile image inside the matrix described in the 'GetCapabilities' metadata response. At this moment all ortho and ortho-rectified layers available in BlomURBEX can be requested using this mechanism.

The service requires an http request with the parameters normalized by OGC. These parameters are service, version, type of request, layer name, name of the matrix, matrix set referred, the ordinal number (x and y) of the tile inside the layer's matrix and the expected image format.

2. WMTS INTRODUCTION

Our Web Map Tile Service (WMTS) Implementation provides a web solution to access to digital maps using predefined image tiles. The service gives information regarding the available tiles through a standardized declaration in the ServiceMetadata document common to all OGC web services. This declaration defines the tiles available in each layer (i.e. each type of content), in each graphical representation style, in each format, in each coordinate reference system, at each scale, and over each geographic fragment of the total area covered. The ServiceMetadata document also gives the communication protocols and encodings through which clients can interact with the server. Clients can interpret the ServiceMetadata document to request specific tiles.

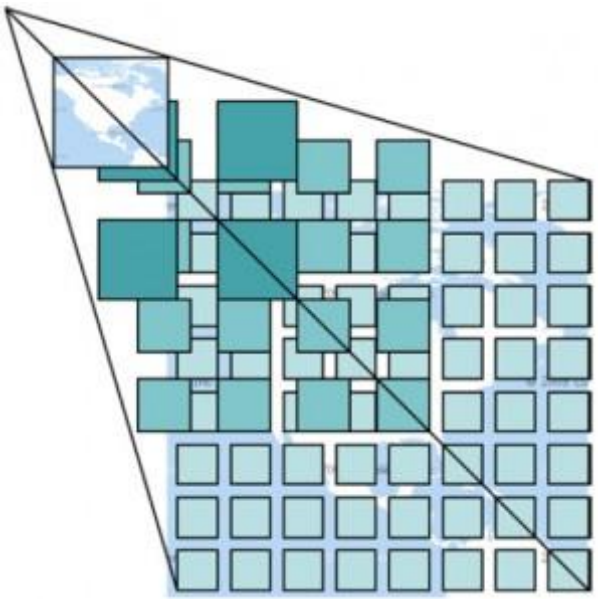


Illustration 1 – WMTS Concept image

3. BLOMURBEX™ WMTS SERVICE

3.1. SUPPORTED VERSIONS

Current supported WMTS version is 1.0.0. Refer to the OGC WMTS to obtain more information about mandatory and optional parameters for this: http://www.opengeospatial.org/standards/wmts

3.2. SUPPORTED MATRIX SYSTEMS

BlomURBEX™ WMTS service supports several matrix systems. Default is EPSG:4326, but optimal is EPSG:3785. A complete list is available online in next URL:

```
http://www.blomurbex.com/v02/WMTSService?usertoken=XXXXX&service=WMTS&request=GetCapabilities
```

Note: Different coordinate reference systems can be supported. Contact your local Blom Sales if necessary.

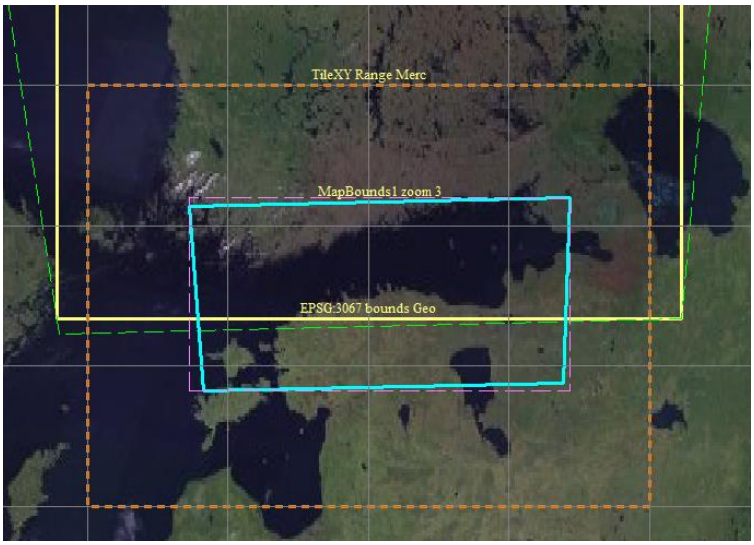


Illustration 2 – WMTS Tile matrix set example

3.3. USING BLOMURBEX™ WMTS SERVICE

To connect to the BlomURBEX™ WMTS service from a GIS client, it is necessary to setup the following URL:

```
http://www.blomurbex.com/v02/WMTSService?usertoken=usertokenstring
```

In this request, `usertokenstring` must be replaced by the unique platform access token provided by Blom. Then GetCapabilities will return information about *TileMatrix* and layers available.

At this moment, we have five different ones. They are the vertical ortho and the four ortho-rectified views (north, south, east and west). Standard Ortho requests are available from zoom level 1 to 20 but on rectified views, zoom level value should be set between 15 and 20.

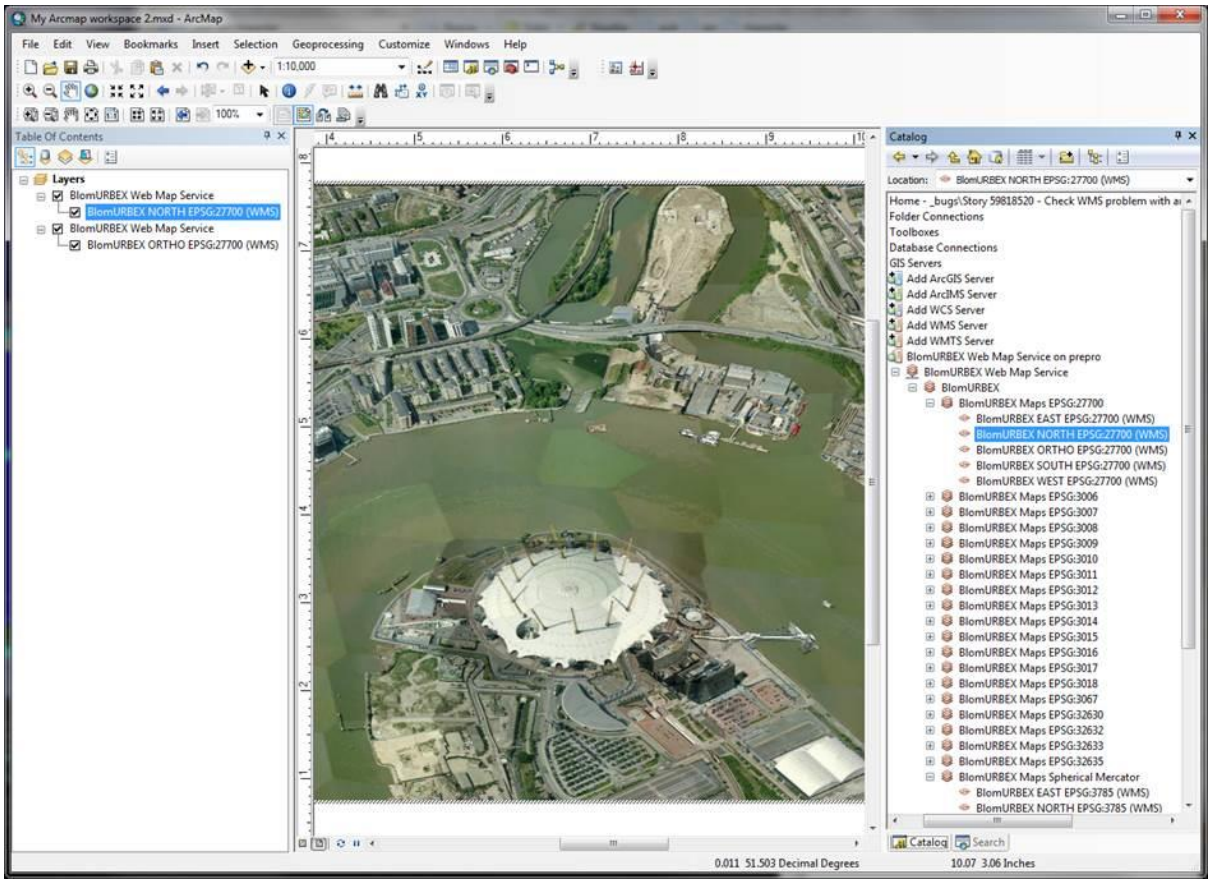


Illustration 3 – BlomURBEX WMTS in ArGIS

Example:

```
http://www.blomurbex.com/v02/WMTSService?usertoken=XXXXXX&SERVICE=WMTS&REQUEST=GetTile&VERSION=1.0.0&LAYER=BlomURBEX:ORTHO:3067&TILEMATRIXSET=EPSG:3067&TILEMATRIX=EPSG:3067:3&TILECOL=1&TILEROW=3&FORMAT=image/jpeg&STYLE=_null
```

Illustration 5 – BlomURBEX WMTS response example

3.3.1. SSL service (WMTSServiceSSL)

In order to support SSL web protocol (HTTPS) it has been added a new clone service on this URL:

```
https://www.blomurbex.com/v02/WMTSServiceSSL?usertoken=usertokenstring
```

The response of this service will be equal to standard HTTP service, but with HTTPS links support

3.4. WMTS SERVICE PARAMETERS

- **Version [mandatory]**: This parameter is the WMTS version that is used in the request. Only one value is accepted in the current implementation:

    1. 1.0.0

- **Request [mandatory]:** The type of service GetTile. Possible values are:

    1. GetTile. Used for retrieving a tile.
    2. GetCapabilities used to obtain the web services descriptor metadata xml file.
    3. GetFeatureInfo used to retrieving the available information (date & copyright) in pixel location inside the requested image.

- **Layers [mandatory]:** Identifies which view is being requested. Possible values are:

    1. BlomURBEX:ORTHO: For the vertical images.
    2. BlomURBEX:NORTH: For the orthorectified North view images.
    3. BlomURBEX:SOUTH: For the orthorectified South view images.
    4. BlomURBEX:EAST: For the orthorectified East view images.
    5. BlomURBEX:WEST: For the orthorectified West view images.

- **Style [mandatory]:** Parameter mandatory for WMTS Standard. The only supported value is **default**.

- **Tilematrixset [mandatory]:** WMTS requires the ability to define Tile Matrix Sets. A tile matrix set controls what tiles are available for a layer.

- **Tilematrix [mandatory]:** Name of the tile matrix the tile requested is being referred to. Every tile matrix inside BlomURBEX is referred to a different zoom level, thus divides the world into a different number of tiles, starting on zoom level one (dividing the world into a 2x2 tiles matrix) to zoom level 20 (dividing the world into a 1048576x 1048576 tile matrix). Nomenclature for tile matrices is: NameOfTileMatrix:NumberOfZoom. That is, level 5 in our only tile matrix set would be: EPSG:3785:5

- **Tilerow [mandatory]:** Number of the row the tile requested belongs to, inside the requested matrix.

- **Tilecol [mandatory]:** Number of the column the tile belongs to, inside the requested matrix.

- **Format [mandatory]:** Image format. Supported formats are **image/jpeg/mixed.** Mixed mode change the service behaviour allowing us to receive a jpeg or png image. We will

receive a jpeg image if requested area has full coverage by Urbex data (allowed layers for user). If not, we will receive a png image with a transparent data for missing coverage area.

- **Usertoken [mandatory]**: User's Token for authentication purposes. This token is unique for each client and must be requested from Blom.

- **Nodata [optional]**: This specifies the output format for the non-available data request (no image coverage). Allowed parameters are:
  - empty: Response will be empty (not file provided)
  - transparent: Response will be a transparent png tile.

- **ExtraZoom [optional]:** Allows get one extra zoom level resampling previous zoom level tiles. Possible values are **true/false.** If required, it is possible to set a default value when parameter is missing. This functionality must be added in the BlomURBEXUserManagement (Users Profiles & Extensions) page. There is a new Profile (WMS/WMTS enhanced) that must be enabled for required user.

- **Time [optional]**: A date following the structure YYYYMMDD or YYYYMM or YYYY. The service will return the most recent image available starting from the year provided.

  It is also possible to use a range of dates with the structure YYYYMMDD-YYYYMMDD. In this case the returned image will be the most recent one available in the specified range.

  If the parameter is omitted the system will submit the most recent version of the imagery.

- **Service**: This parameter is mandatory with a fixed value set to **WMTS.**

- **Query_layers [Mandatory GetFeatureInfo]:** The layer name to be used as source.

- **Info_format [Optional GetFeatureInfo]:** The output format for GetFeatureInfo. Available formats are 'text/plain', 'text/xml', 'application/json' & 'application/gml+xml; version=3.1' (last one is default format).

- **I (or X) [Mandatory GetFeatureInfo]:** X Pixel (Tile) location of GetFeatureInfo request

- **J (or Y) [Mandatory GetFeatureInfo]:** Y Pixel (Tile) location of GetFeatureInfo request

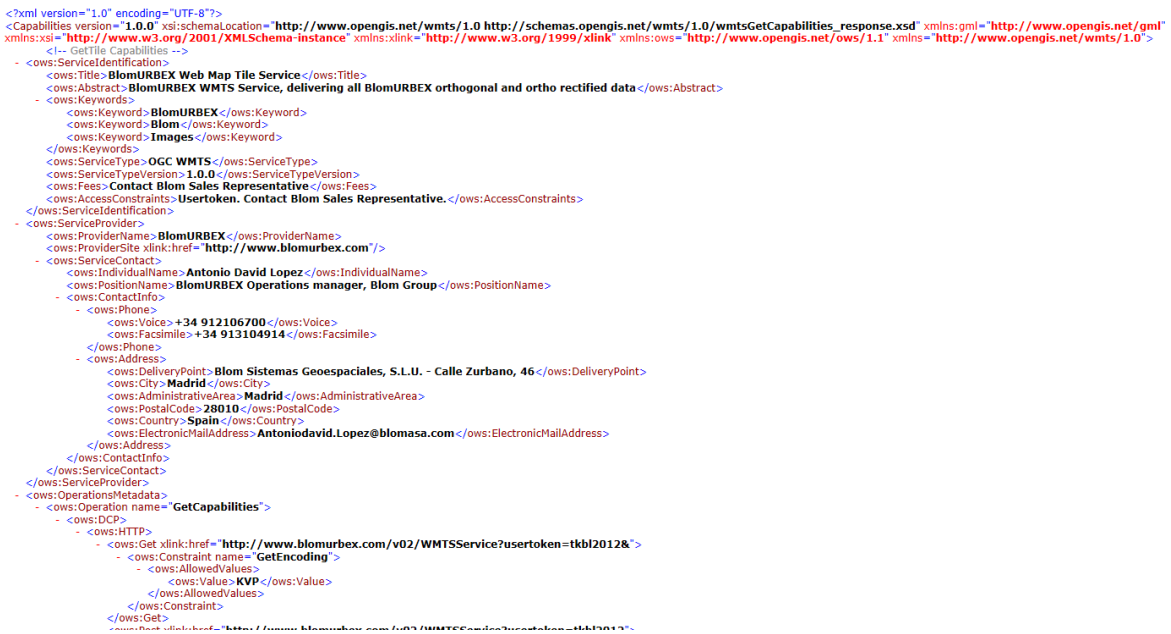
3.5. WMTS SERVICE GETCAPABILITIES

To obtain the metadata xml file with the description of the WMTS service call, the **request** parameter must be set to "GetCapabilities". It must be also necessary to fill out the **service** and **usertoken** parameters.

Example:

```
http://www.blomurbex.com/v02/WMTSService?usertoken=XXXXX&service=WMTS&request=GetCapabilities
```

The result would be an xml file with the capabilities of the WMTS like the one shown below.



```
<?xml version="1.0" encoding="UTF-8"?>
<Capabilities version="1.0.0" xsi:schemaLocation="http://www.opengis.net/wmts/1.0 http://schemas.opengis.net/wmts/1.0/wmtsGetCapabilities_response.xsd" xmlns:gml="http://www.opengis.net/gml"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:ows="http://www.opengis.net/ows/1.1" xmlns="http://www.opengis.net/wmts/1.0">
    <!-- GetTile Capabilities -->
  - <ows:ServiceIdentification>
        <ows:Title>BlomURBEX Web Map Tile Service</ows:Title>
        <ows:Abstract>BlomURBEX WMTS Service, delivering all BlomURBEX orthogonal and ortho rectified data</ows:Abstract>
      - <ows:Keywords>
            <ows:Keyword>BlomURBEX</ows:Keyword>
            <ows:Keyword>Blom</ows:Keyword>
            <ows:Keyword>Images</ows:Keyword>
        </ows:Keywords>
        <ows:ServiceType>OGC WMTS</ows:ServiceType>
        <ows:ServiceTypeVersion>1.0.0</ows:ServiceTypeVersion>
        <ows:Fees>Contact Blom Sales Representative</ows:Fees>
        <ows:AccessConstraints>Usertoken. Contact Blom Sales Representative.</ows:AccessConstraints>
    </ows:ServiceIdentification>
  - <ows:ServiceProvider>
        <ows:ProviderName>BlomURBEX</ows:ProviderName>
        <ows:ProviderSite xlink:href="http://www.blomurbex.com"/>
      - <ows:ServiceContact>
            <ows:IndividualName>Antonio David Lopez</ows:IndividualName>
            <ows:PositionName>BlomURBEX Operations manager, Blom Group</ows:PositionName>
          - <ows:ContactInfo>
              - <ows:Phone>
                    <ows:Voice>+34 912106700</ows:Voice>
                    <ows:Facsimile>+34 913104914</ows:Facsimile>
                </ows:Phone>
              - <ows:Address>
                    <ows:DeliveryPoint>Blom Sistemas Geoespaciales, S.L.U. - Calle Zurbano, 46</ows:DeliveryPoint>
                    <ows:City>Madrid</ows:City>
                    <ows:AdministrativeArea>Madrid</ows:AdministrativeArea>
                    <ows:PostalCode>28010</ows:PostalCode>
                    <ows:Country>Spain</ows:Country>
                    <ows:ElectronicMailAddress>Antoniodavid.Lopez@blomasa.com</ows:ElectronicMailAddress>
                </ows:Address>
            </ows:ContactInfo>
        </ows:ServiceContact>
    </ows:ServiceProvider>
  - <ows:OperationsMetadata>
      - <ows:Operation name="GetCapabilities">
          - <ows:DCP>
              - <ows:HTTP>
                  - <ows:Get xlink:href="http://www.blomurbex.com/v02/WMTSService?usertoken=tkbl2012&">
                      - <ows:Constraint name="GetEncoding">
                          - <ows:AllowedValues>
                                <ows:Value>KVP</ows:Value>
                            </ows:AllowedValues>
                        </ows:Constraint>
                    </ows:Get>
```


Illustration 6 – BlomURBEX WMTS GetCapabilities response

3.6. WMTS SERVICE GETFEATUREINFO

To obtain the metadata information: Copyright & Date Interval, the **request** parameter must be set to "GetFeatureInfo". The request parameter list must be equal to 'GetTile' request with the mandatory parameters of GetFeatureInfo service.

Example:

```
http://www.blomurbex.com/v02/WMTSService?usertoken=********************&SERVICE=WMTS&VERSION=1.0.0&REQUEST=GetCapabilities&BASELAYER=&layer=BlomURBEX%3AORTHO&style=default&tilematrixset=EPSG%3A3857&Service=WMTS&Request=GetFeatureInfo&Version=1.0.0&Format=image%2Fjpeg&TileMatrix=EPSG%3A3857%3A19&TileCol=256776&TileRow=197622&I=128&J=150&QUERY_LAYERS=ortho&INFO_FORMAT=text/xml
```

The result would be an xml file with the Copyright and Date interval like the one shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
      <result>
            <copyright>Blom</copyright>
            <dateMin>2009-10-15</dateMin>
            <dateMax>2009-10-15</dateMax>
      </result>
```

ANNEX 1: CONNECT GLOBAL MAPPER TO BLOMURBEX™ WMTS SERVICE

Here you can see a quick guide to user BlomURBEX WMTS in a common GIS tool such as Global Mapper. In order to carry this out, follow these steps:

1. Add new online source type: WMTS

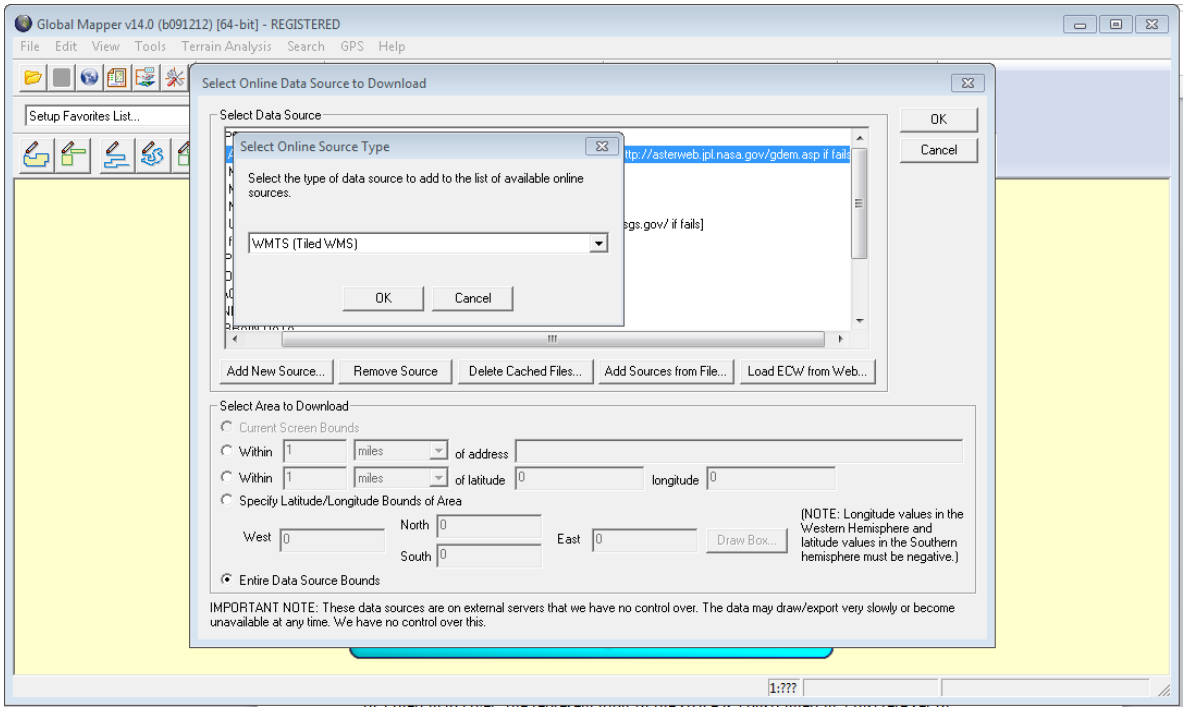


Illustration 7 – BlomURBEX WMTS Global Mapper connection

2. Enter the Server URL and the service Name as shown in the screenshot.

   Server URL: http://www.blomurbex.com/v02/WMTSService

   Service Name: WMTS&usertoken=XXXXXX&style=default

   - Note that style parameter is mandatory

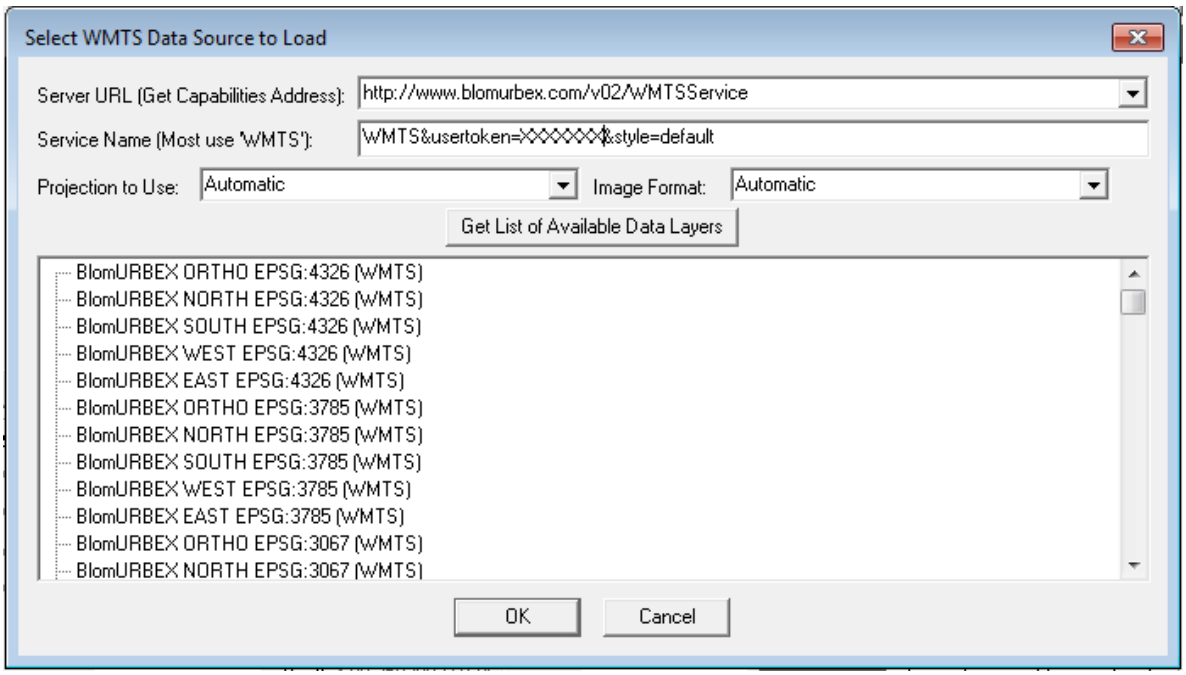


Illustration 8 – BlomURBEX WMTS Global Mapper connection

3. Make sure that the radio button “Entire Data Source Bounds” is selected, and press OK.

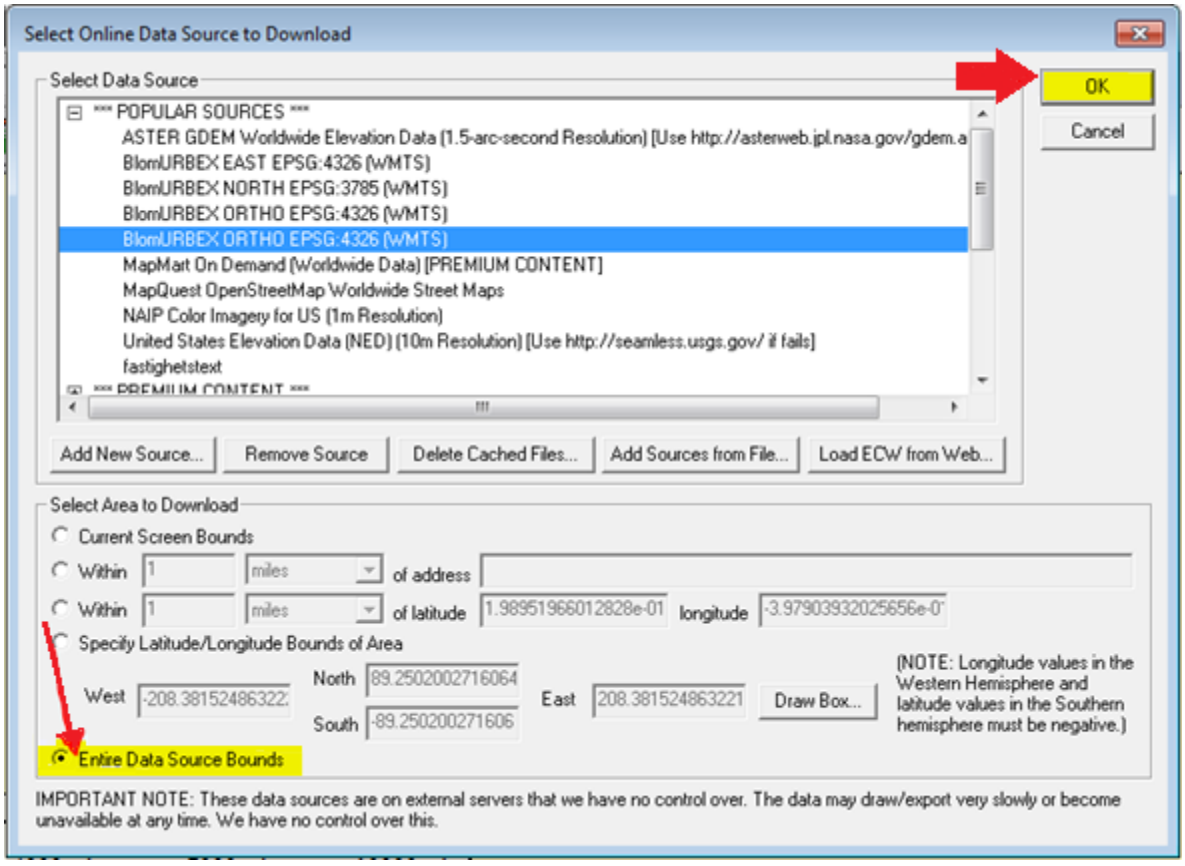


Illustration 9 – BlomURBEX WMTS Global Mapper connection

ANNEX 2: TILE MATRIX SET – THE GEOMETRY OF THE TILED SPACE

In a tiled map layer, the representation of the space is constrained in a discrete set of parameters. A tile matrix set defines these parameters. Each tile matrix set contains one or more "tile matrices" defining the tiles that are available for that coordinate reference system. Each tile matrix specifies:

a) The scale of the tiles as a scale denominator: The scale denominator is defined with respect to a "standardized rendering pixel size" of 0.28 mm × 0.28 mm (millimeters). The definition is the same used in WMS 1.3.0 [OGC06-042] and in Symbology Encoding Implementation Specification 1.1.0 [05-077r4].

Frequently, the true pixel size is unknown and 0.28 mm is a common actual size for current displays.

b) The width and height of each tile in pixels.

c) The top left (minimum x, maximum y) corner of the bounding box of the tile matrix (i.e., the CRS coordinates of the top left corner of the top left pixel of the top left tile).

d) The width and height of the tile matrix in tile units (i.e., number of tiles).

The number of tile matrix sets that a WMTS server serves for a particular layer is:

nTileMatrices × nTiledStyles × nTiledFormats

If no dimensions are defined or:

nTileMatrices × nTiledStyles × nTiledFormats × nTiledDimensions

If dimensions are defined, the number of distinct tiles within each tile matrix of a tile matrix set (i.e., for a particular scale within a tile-matrix set) is a product of:

matrixWidth × matrixHeight

Each tile matrix set defines its own set of scale levels corresponding with the contained tile matrices. Each layer references one or more tile matrix sets. Although each layer could reference a different tile matrix set, it is likely that a server will offer many layers with the same tile matrix set reference.

A tile matrix set is composed of a collection of tile matrices, each one with a resolution optimized for a particular scale and identified by a tile matrix identifier

Each tile matrix set has an optional approximated bounding box but each tile matrix has an exact bounding box that is deduced indirectly from other parameters. Tile matrix bounding boxes at each scale will usually vary slightly due to pixel alignment, and it is important for the client and server to take this variation into account. Given the top left point of the tile matrix in CRS coordinates (tileMatrixMinX, tileMatrixMaxY), the width and height of the tile matrix in tile units (matrixWidth, matrixHeight), the width and height of a tile in pixels (tileWidth, tileHeight), the coefficient to convert the coordinate reference system (CRS) units into meters (metersPerUnit) and the scale (1:scaleDenominator), the bottom right corner of the bounding box of a tile matrix (tileMatrixMaxX, tileMatrixMinY) can be calculated as follows:

```
pixelSpan = scaleDenominator × 0.28 10-3 / metersPerUnit (crs);
tileSpanX = tileWidth × pixelSpan;
tileSpanY = tileHeight × pixelSpan;
tileMatrixMaxX = tileMatrixMinX + tileSpanX × matrixWidth;
tileMatrixMinY = tileMatrixMaxY - tileSpanY × matrixHeight;
```

The tile space therefore looks like this:

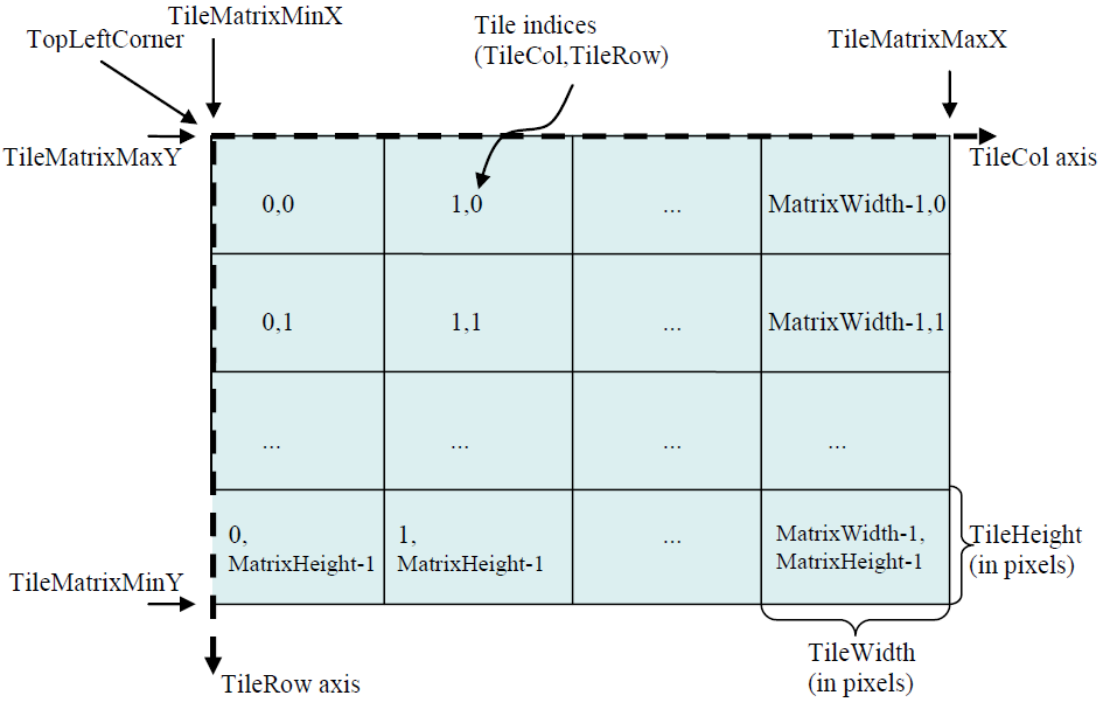


Illustration 10 – BlomURBEX WMTS Tile Space

Each tile in a tile matrix is identified by its *TileCol* and *TileRow* indices that have their 0,0 origin in the tile next to the top left corner of the tile matrix and that increases towards the right and towards the bottom respectively, as shown in figure 2. Annex H in this document includes pseudo code that illustrates the process for obtaining the tile indices that cover a bounding box rectangle and also the computation to get the CRS coordinates that bound a tile.

NOTE 1 Non-square pixels are not supported. This is different from WMS, which does allow nonsquare pixels (although many implementations fail to support this properly).

A tiled layer links to its tile matrix set through a *TileMatrixSet* URI that points to a *TileMatrixSet* section that completely defines it as previously explained. A layer can use a specific *TileMatrixSet* that describes a region adjusted to the actual content of this layer. In this case, the optional *TileMatrixSetLimits* section will not be used and changes in spatial extension of the layer can affect the minimum bounding box of the layer forcing to redefine the *TopLeftCorner* of each *TileMatrix* and that will end up changing the *TileCol, TileRow* indexes thereby invalidating any previously cached tile.