Product access guide for the Medium Resolution Digital Elevation Model (MRDEM)

Version : 1.0

Decembre 18th 2024

ATTENTION!

The files in this dataset are designed for streaming, not downloading. For the best experience, please follow the instructions below.

Context

Files forming the Medium Resolution Digital Elevation Model (MRDEM) product are distributed in Cloud-Optimized GeoTiff (COG) format. Files in GDAL virtual format (VRT) pointing to the COG files are also available. As the optimal use of COG differs from that of the traditional GeoTiff format, this document explains how they can be added to QGIS and ESRI ArcGIS Pro programs. For the latter platform, use of the VRT format is recommended.

These resources can be accessed using a catalog in SpatioTemporal Asset Catalogs (STAC) format. An example of how to use the STAC catalog is presented using the QGIS tool.

For developers, we also present an example of python code extracting elevation data for an area of interest.

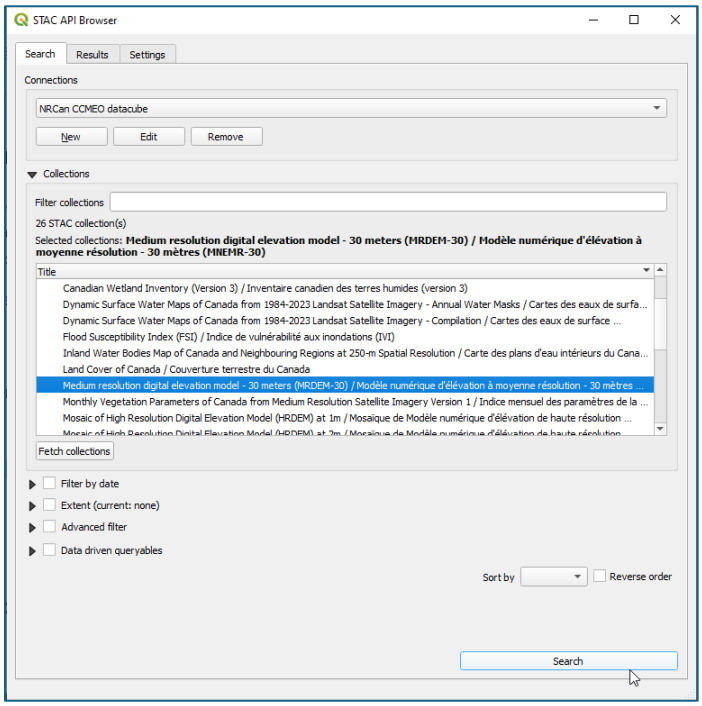
QGIS, use via the STAC catalogue

Product loading via the STAC catalog is possible in QGIS using the QGIS STAC API Browser extension. Please see the extension page for details on how it works.

STAC catalog URL: https://datacube.services.geo.ca/stac/api/

1. Select MRDEM collection

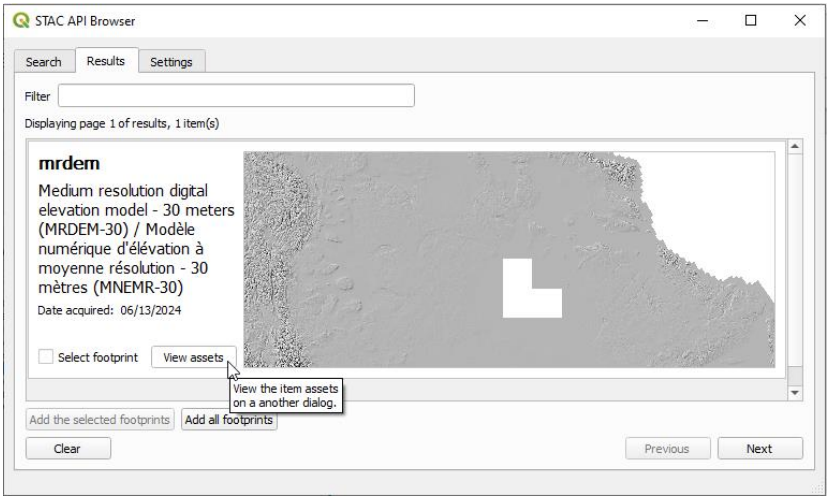
Select the MRDEM collection from the list of catalog collections. Click on ***Search*** to search for records.



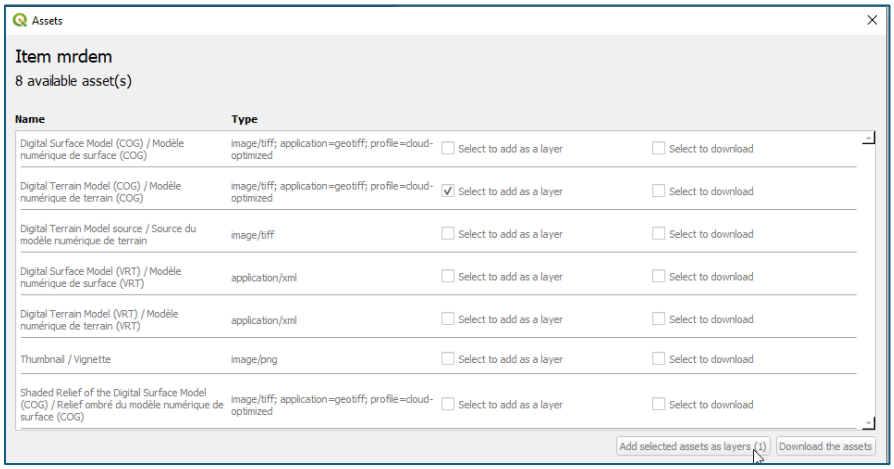
2. Load data

Since there is only one item in the collection, there should be only one result in the ***Results*** tab.

Click on the ***View assets*** button.



Then select one of the resources associated with the element. Check the ***Select to add as a layer*** to add it directly to the map.



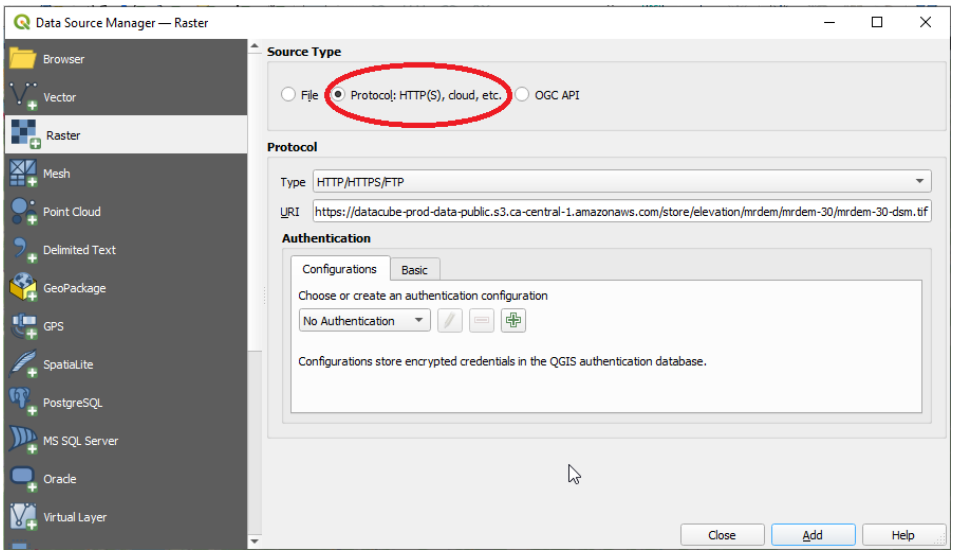
QGIS, direct use

1. Select a MRDEM model

Available files are listed in Appendix 1. Copy the URL to clipboard.

2. Add raster source

From the ***Data source manager***, select the ***Raster*** type. The ***HTTP Protocol(s)*** option must be selected. Paste the URL into the URI field.

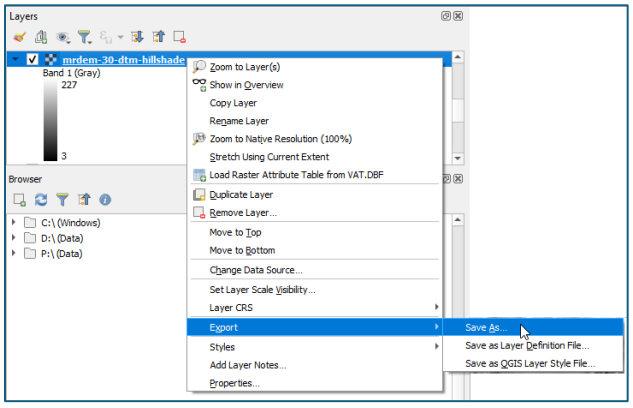


The file should then open.

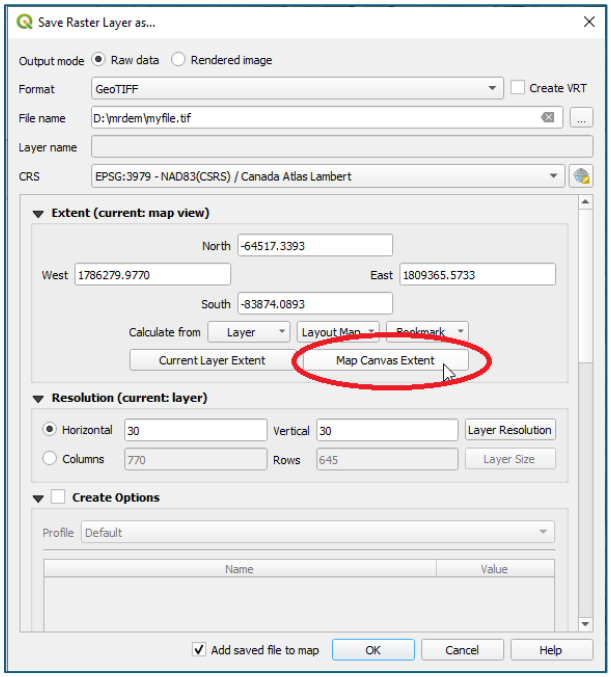
3. Extracting an area of interest to a local file

By first zooming to an area of interest, it is possible to extract a portion of the data into a local file for latter uses. First, frame the map over the area of interest, using the tool  .

In the layer panel, go to the context menu of the MRDEM layer and select ***Export***, then ***Save as***.



In the next window, click on the ***Map Canvas Extent*** button to extract the area covered by the map only. You must also enter a file path in the ***File name*** field. Then confirm the export operation by clicking on ***Ok***.



ESRI ArcGIS Pro (3.4)

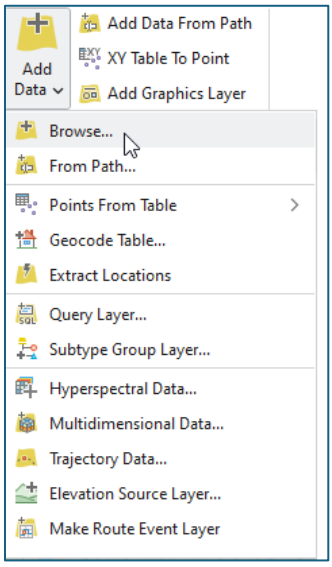
Our tests have shown that the use of the COG format does not work in all versions of ArcGIS Pro. A good alternative is to use the GDAL virtual format (VRT). The table in Appendix 1 contains the URLs to be used for this format.

1. Downloading a MRDEM model locally in VRT format

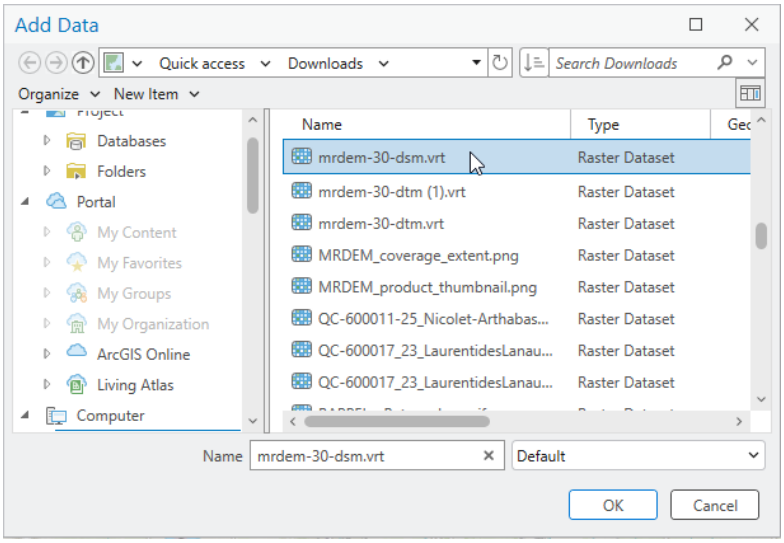
The VRT files available are shown in Appendix 1. Click on the link to save it locally.

2. Add raster source

In the toolbar, click on ***Add Data*** and then ***Browse***.

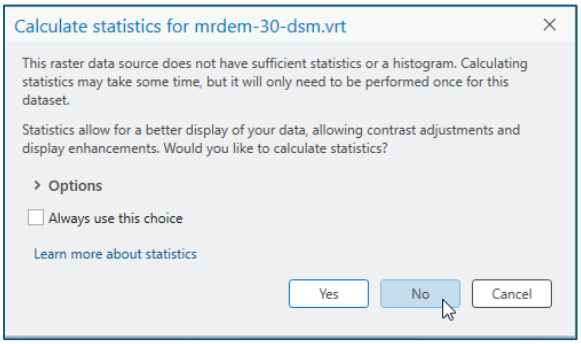


Select the downloaded VRT file and add it to the map.

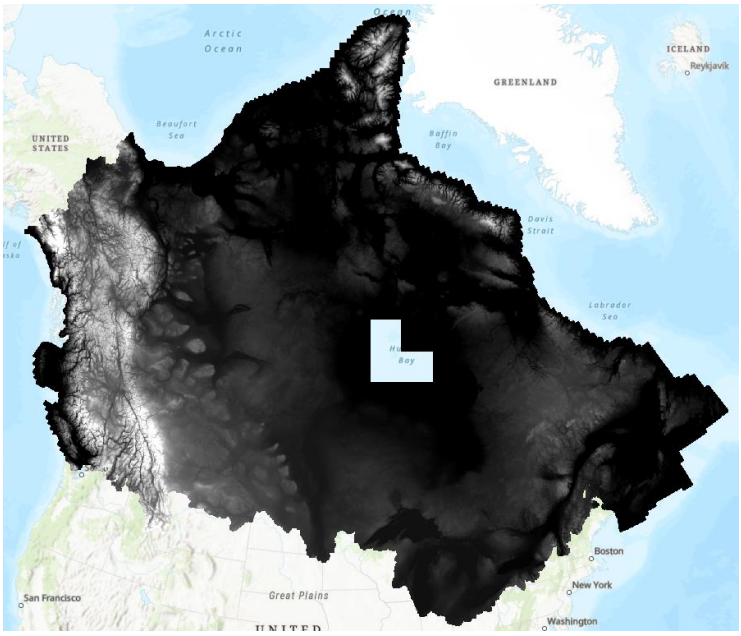


ATTENTION!

By default, ArcGIS Pro asks whether the user wishes to calculate the file's statistics before loading it into the map. As the file is very large and that this operation requires a complete reading of the values, it is very time and resource consuming. We therefore advise you not to calculate them.



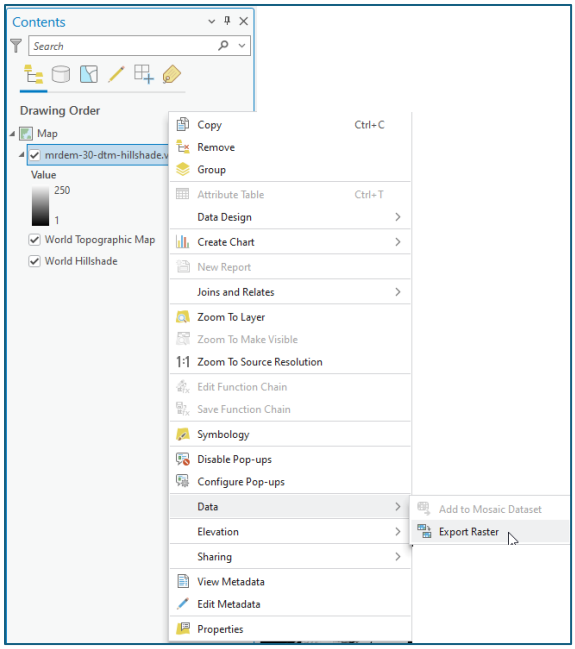
The file should now open.



3. Extracting an area of interest to a local file

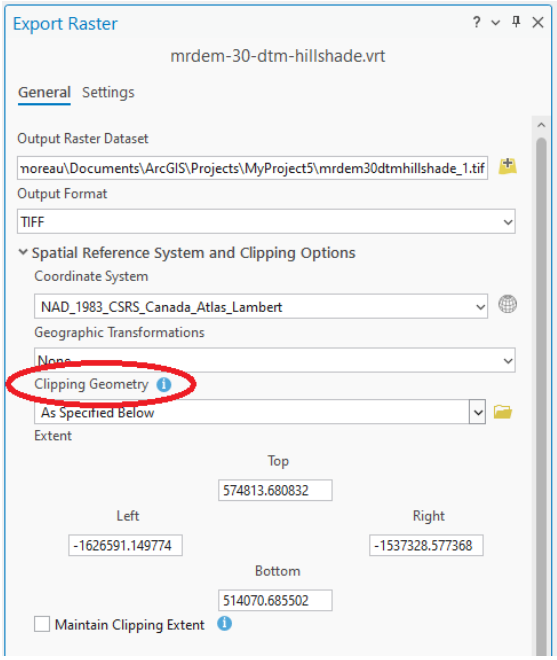
By first zooming to an area of interest, it is possible to extract a portion of the data into a local file for latter uses. First, frame the map over the area of interest.

In the map contents panel (Contents), go to the MRDEM layer context menu and select ***Data***, then ***Export Raster***.



A panel then opens.

In this panel, select the ***Current Display Extent*** option for the ***Clipping Geometry*** field, to extract only the area covered by the map. You must also enter a file path in the ***Output Raster Dataset*** field. Confirm the export operation by clicking on ***Export***.



By python programming

Here's an example of code using the rasterio library. The code extracts pixels from a region of interest and writes the result to another file. The ***output_path*** variable must be adjusted to suit your needs.

```
import os, rasterio

#Path to the COG
#Chemin vers le fichier COG
cog_path = 'https://datacube-prod-data-public.s3.ca-central-
1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm.tif'

# Zone d'intérêt pour l'extraction en EPSG:3979
# AOI extraction bounds
#(min_x, min_y, max_x, max_y)
aoi_bounds = (1774874, -89162, 1818832, -52305)

# Chemin d'accès pour l'extraction de la zone
# Output path for the extracted AOI
output_path = r'D:\extract_aoi.tif'
os.makedirs(os.path.dirname(output_path), exist_ok=True)

with rasterio.open(cog_path) as src:
    min_x, min_y, max_x, max_y = aoi_bounds

    # Lecture des pixels la zone d'intérêt
    # Reading of the aoi pixels
    window = src.window(min_x, min_y, max_x, max_y)
    raster_data = src.read(window=window)

    # Prepare metadata for writing
    # transform object of the source is needed to write output
    # Préparation des informations de méta pour l'écriture
    # L'objet transform de la source est nécessaire pour l'écriture
    metadata = src.meta.copy()
    metadata.update({
        'height': raster_data.shape[1],
        'width': raster_data.shape[2],
        'count': raster_data.shape[0],
        'transform': rasterio.windows.transform(window, src.transform)
    })
# Write the raster data to a new file
# Écriture du raster dans le nouveau fichier
with rasterio.open(output_path, 'w', **metadata) as dst:
    dst.write(raster_data)
```

Appendix 1: Links to MRDEM resources

	COG GeoTiff	GDAL Virtual format (VRT)
Digital surface model	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dsm.tif	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dsm.vrt
Hillshade of digital surface model	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dsm-hillshade.tif	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dsm-hillshade.vrt
Digital terrain model	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm.tif	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm.vrt
Hillshade of digital terrain model	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm-hillshade.tif	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm-hillshade.vrt
Source layer of MRDEM-30-DTM	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm-source.tif	https://datacube-prod-data-public.s3.ca-central-1.amazonaws.com/store/elevation/mrdem/mrdem-30/mrdem-30-dtm-source.vrt