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| 10/10/2020 |

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| Data Creation – CTM1 File |

# Summary

The Bureau of Land Management (BLM) Call-When-Needed (CWN) Unmanned Aircraft System (UAS) contracted vendor Bridger Aerospace utilizes the map engine CartoType within the Vexos ground control station. This map engine ingests CartoType Maps (.CTM1 files). The following instructions outline how to generate daily ground control station (GCS) maps from ArcGIS applications into CTM1 files without requiring an internet connection.

## Initial downloads

* Base maps:
	+ The vendor must download their initial base map, which includes elevation data, prior to going offline (current situation but alternate options exist, see below)
* Fire event features:
	+ Online creation: Use NIFC AGOL Event WFS in PNG creation
	+ Offline creation: [Make a local copy of the NIFC AGOL Event WFS](https://www.nwcg.gov/publications/pms936-1/data-preparation/create-local-copy)
* CartoType software:
	+ [makemap.exe](https://www.cartotype.com/developers/documentation/50-how-to-create-map-files-for-cartotype-ctm1-files) – the command line executable to create the CTM1
	+ [CartoType Map App](https://www.cartotype.com/the-maps-app) – the software for viewing CTM1 files

Generate Fire GCS Basemap

1. Populate desired fire event vector data within ArcPro through Map view as PNG with world file
	1. Recommended to leave off all points except Helibases, H, DP...
	2. Remove base maps, ensure transparency of any vector polygons
2. Export PNG
	1. Set aspect ratio
	2. Export width as 10725 pixels
3. Save As/Export .prj file (or copy PRJ file in Mullen example)
	1. GCS WGS84

## Generate CartoType CTM1 File

1. Create working folder (i.e. C:\users\{name}\desktop\carto)
	1. Extract makemap.exe to working folder
	2. Add files:
		1. PNG
			1. Include PGW and PRJ files
		2. Optional:
			1. *OSM – See Appendix A*
				1. *Currently, vendor will include this in initial download*
			2. *HGT*
				1. *Currently, vendor will include this in initial download*
			3. *SHP*
				1. *Could add fire line/points as shapefiles in lieu of PNG base map, but currently more work than a PNG*
2. Open cmd
	1. Point to current directory of working folder:



* 1. Insert following text and run:



1. CTM1 file will be added to working folder

## Viewing CTM1 File

Verify your CTM1 map looks correct

1. Open CartoType Map App
	1. Colors may not be true based on chosen style

# Appendix A

## Extract OSM Data

### Reference:

<https://www.cartotype.com/articles/103-tutorial-creating-a-map-from-openstreetmap-data>

* Bug Note for large files with polygons outside bounding box, Mullen example script

<osm-script timeout="10000" element-limit="1073741824">

 <union into="\_">

 <bbox-query into="\_" w="-106.7031" s="40.7747" e="-105.5511" n="41.6593"/>

 <recurse from="\_" into="\_" type="up"/>

 <recurse from="\_" into="\_" type="down"/>

 </union>

 <print from="\_" limit="" order="id"/>

</osm-script>

## Tutorials

<https://www.cartotype.com/developers/documentation/50-how-to-create-map-files-for-cartotype-ctm1-files>

<https://www.cartotype.com/developers/documentation/42-cartotype-tutorial>

## Terrain

<https://www.cartotype.com/articles/17-high-resolution-terrain>

## Shapefiles

<https://www.cartotype.com/developers/documentation/33-import-rules-used-by-makemap>