Quick Start Guide for FB Disease Prevention Maps

based on release amid COVID-19 response available since March 2020

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Not a Facebook Official Guide

What's Included in FB Disease Prevention Map?

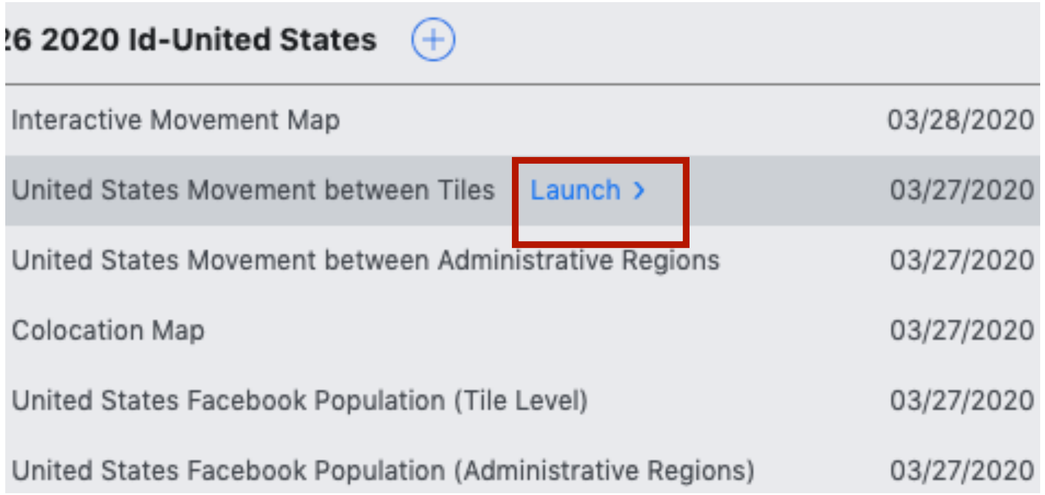
Product Name	Data Format
Interactive Movement Map	CSV files with start/end latitude/longitude for movement
Movement between Tiles	CSV files with Well-Known Text (WKT) Geometry field
Movement between Administrative Regions	CSV files with Well-Known Text (WKT) Geometry field
Colocation Map*	CSV files with start/end latitude/longitude for movement
Facebook Population (Tile Level)	GeoTIFF images, resolution around 1 km (varies by latitude)
Facebook Population (Administrative Regions)	CSV files with Well-Known Text (WKT) Geometry field

Each product can be launched separately or all together in GeoInsights for browsing and downloading.

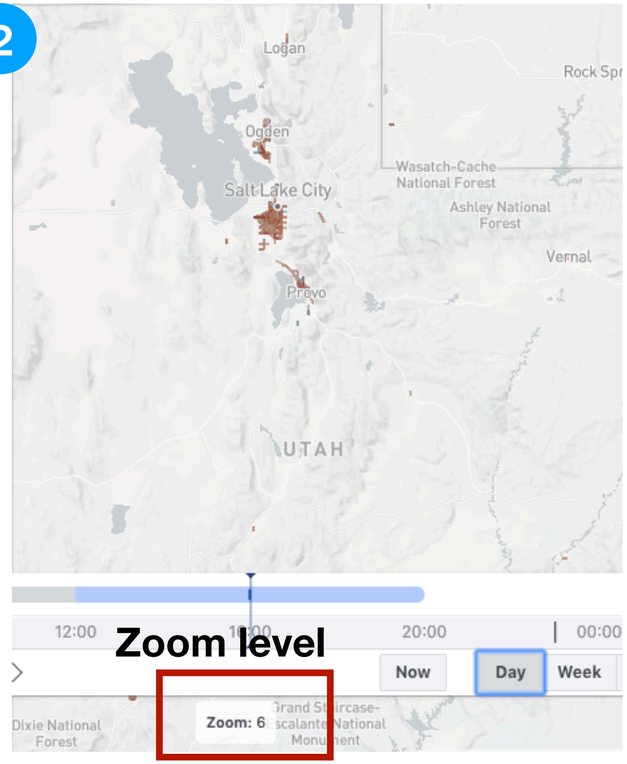
*** A Quick Start Guide for Colocation Map is provided separately from this guide.**

Data Download from GeoInsights

1

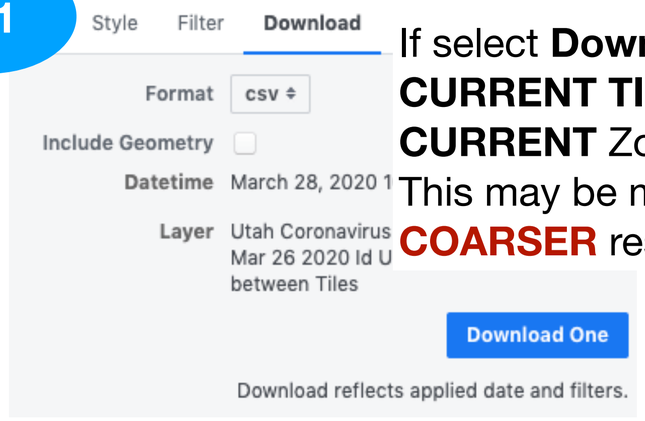


2



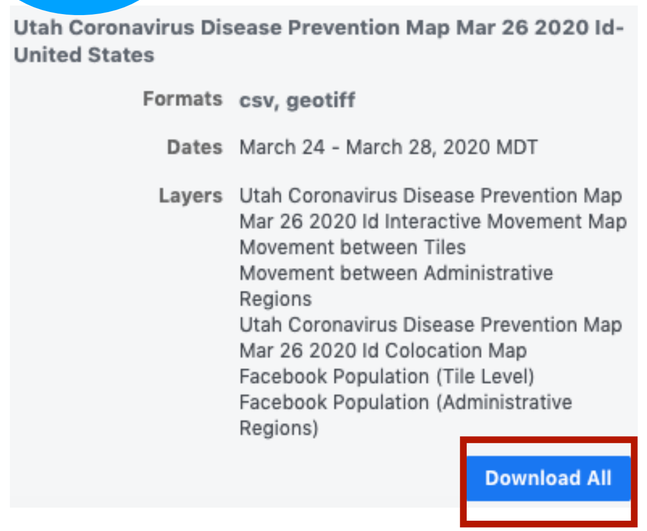
If select **Download All**, you will get the **FULL** collection (**ALL** time stamps, **FULL** geospatial extent) of the data (variable) you **currently launched** in GeoInsights, at the **HIGHEST** spatial resolution consistent with the original data

3.1



If select **Download One** (one time stamp), you will get the file of **CURRENT TIME STAMP**, **WITHIN** your current map extent, at the **CURRENT** Zoom level.
This may be much **SMALLER** than the entire data collection and have a **COARSER** resolution than the highest resolution of the original data.

3.2



Geospatial Specs of Data

- **GeoTIFF images**
  - For **Tile-level Population** only
  - GeoTIFF images are posted to a gridded project referencing system
    - **WGS 84 / Pseudo-Mercator -- Spherical Mercator (EPSG: 3857)**
    - **It is a project referencing system (data posted to meter, mile, etc.), NOT a geographical referencing system (data posted to latitudes/longitudes)**
    - **Grid size varies by latitude**, around 600 m near the Equator and increasing as latitude grows
      - For example, in the data of Utah, USA, the grid size is 1,600 m
- **CSV files with WKT Geometry Field**
  - **Movement between Administrative Region, Movement between Tile, Administrative Region Population**
  - Use a **DIFFERENT** referencing system than tile level data
    - **WGS 84 (World Geodetic System 1984, EPSG: 4326), data shown in latitudes/longitudes**
  - Administrative Region data represent the average or total of the administrative region
    - Vary by country, level 3 or level 4
- **CSV file with latitude/longitude for start/end point of movement vectors**
  - **Interactive Movement Map**

Read GeoTIFF Data

Option 1

- If you use a programming language (python, R, Matlab, etc.) to read in GeoTIFF data, refer to this link.
- One GeoTIFF image may contain **multiple bands**, each containing one variable
- Make sure you assign the correct **Coordinate Reference System** in your data I/O function
    - **WGS 84 / Pseudo-Mercator -- Spherical Mercator (EPSG: 3857)**

Option 2

- If you read in GeoTIFF data using a software (QGIS, ArcGIS), the reference system information will be automatically recognized by your software
    - You will also find the information of **grid size** after you read in the GeoTIFF file
    - You can project the original file to a desired reference system if necessary

Example: GeoTIFF for Tile Level Facebook Population

Band Name	Content*
Baseline: People	Pre-crisis population, averaged based on 5-13 weeks data
Crisis: People	Crisis population
Difference	Difference between Crisis Population and average Baseline Population
Percent Change	Percentage difference between Crisis Population and average Baseline Population
Standard (Z) Score	Difference between Crisis Population and average Baseline Population divided by variance of Baseline population

*** Details available from this paper by FB Data for Good**

CRS	EPSG:3857 – WGS 84 / Pseudo-Mercator – Projected
Extent	-12725236.468915585428476 3,4384427.8725176118314266 : -12113740.2426341753453016,5191602.8823617668822408
Unit	meters
Width	251
Height	331
Data type	Float32 – Thirty two bit floating point
GDAL Driver Description	GTiff
GDAL	GeoTIFF

Coordinate reference information available from Layer Properties after read in QGIS

Dimensions	X: 251 Y: 331 Bands: 5
Origin	-1.27252e+07,5.1916e+06
Pixel Size	2436.239945344263106,-2438.595195903791591

Grid size information (meter) available from Layer Properties after read in QGIS

Pay attention to the difference between X and Y

Read CSV Data with Geometry Field: I

Available for

- Movement data (**Movement between Tiles**, **Movement between Administrative Regions**), as LINESTRING
- **Facebook Population Administrative Region** level data, as POLYGON or MULTIPOLYGON

- **Geometry** field contains geospatial information, e.g. type, coordinates of nodes
  - This field is a **Well Known Text (WKT)** representation of geometry.
  - **DO NOT** delete this field

Example: Administrative Region population (Geometry contains polygon nodes)

Standar	Baselir	Crisis	Differenc	Percent Chang	Country	Region Name	Spaco Id	Geometry
-0.8889	1.6666	0	-1.66666	-62.5	US	Montpelier	819496	POLYGON ((-111.311027 42.001224,-111.298791 42.001247
0.78278	30.833	35	4.166666	13.0890052356	US	Paris	819497	MULTIPOLYGON (((-111.500767 41.999522,-111.491203 41.

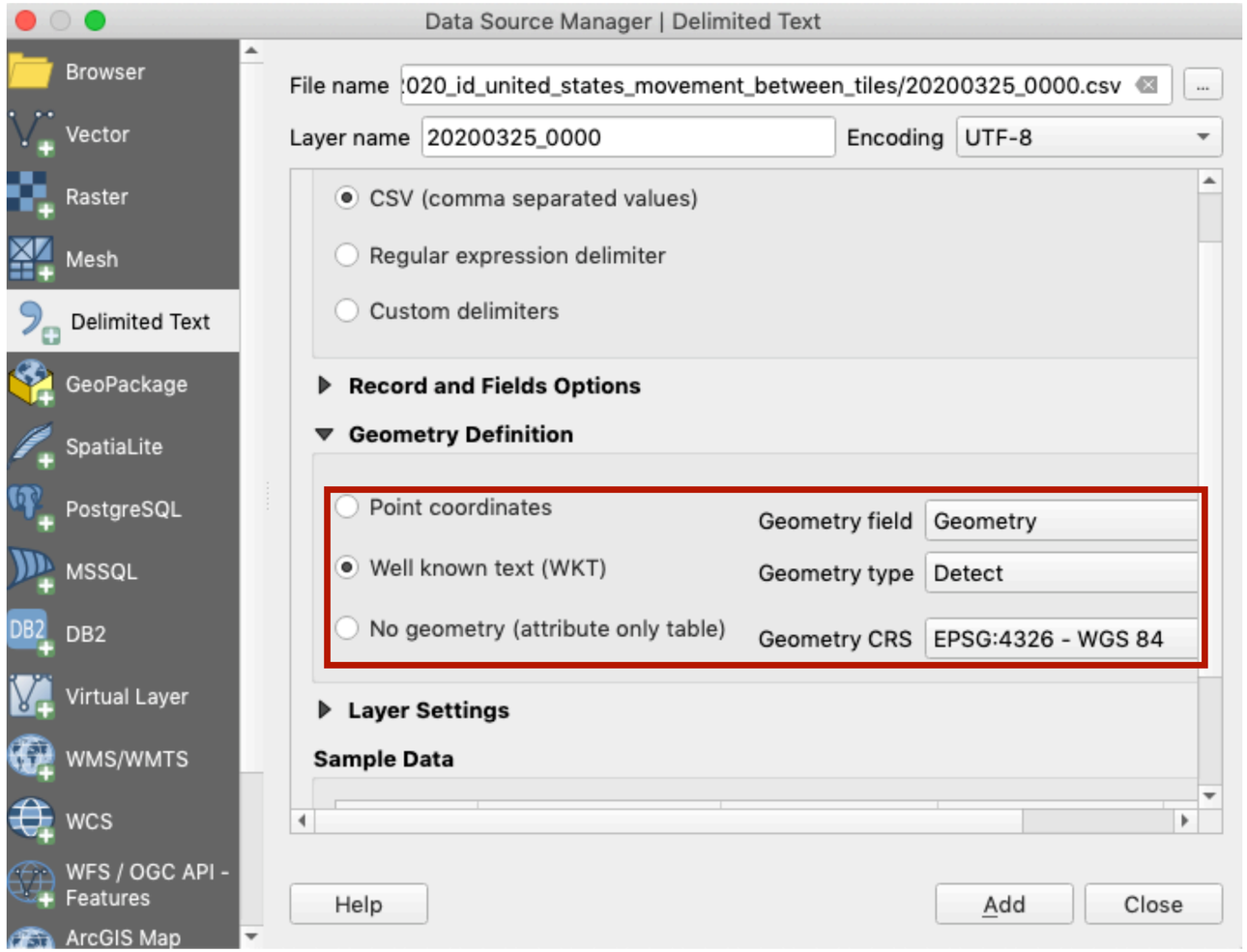
Example: Administrative Region level movement (Geometry contains line nodes)

Differen	Baselin	Crisis	Percent	Standa	Country	Starting	Ending Regio	Startir	Endin	Leng	Geometry
-3.8	40.8	37	-9.09090	-1.0084	US	Rangely	Rangely	14369	14369	0.40	LINESTRING (-108.83531725084461 40.0948800465
-188	518	330	-36.2235	-2.5207	US	Provo-Or	Springville-Ma	14218	14218	12.5	LINESTRING (-111.66834819747741 40.2495145415

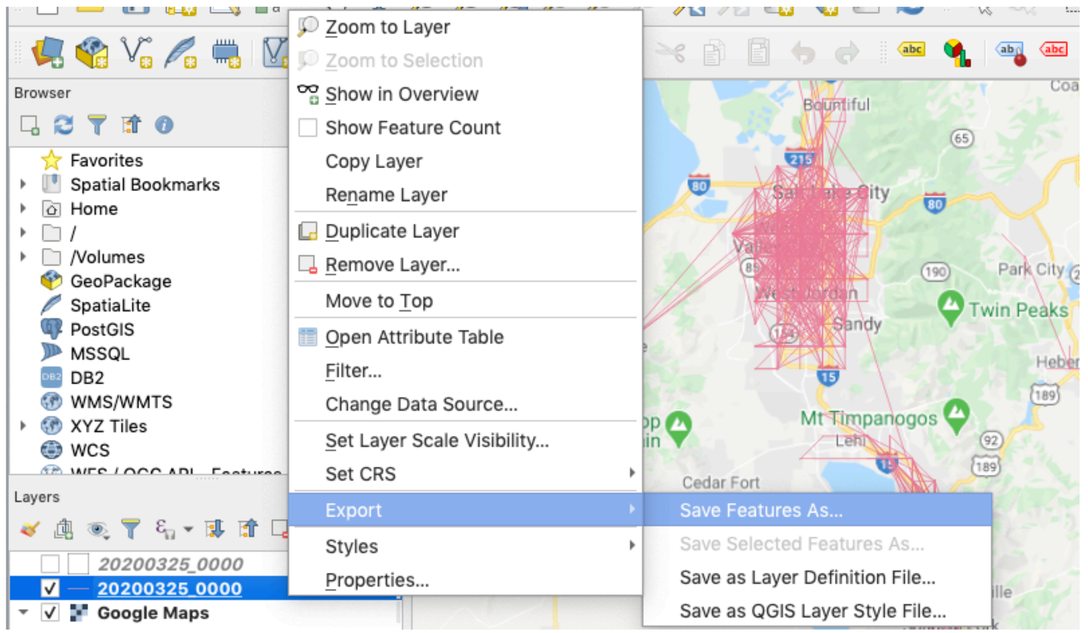
- **WKT Geometry field can be directly read by a large number of APIs and geospatial engines, such as GDAL, sf package of R, and FromWKT** function of arcpy
  - Unlike GeoTIFF images, CSV file with WKT Geometry field uses **WGS 84 (EPSG:4326)**. Use the correct information when importing using GDAL or sf

Read CSV Data with Geometry Field: II

1 **Importing with QGIS as Delimited Text file (screenshot taken for QGIS 3.12.1, macOS)**



2 **Save the temporary file created by QGIS to an ESRI Shapefile or a desired format**



There is currently no direct import tools available from ArcGIS desktop software. Use QGIS for this step if you do not want to use a programming language.

Read CSV Data with Lat/Lon of Movement Vectors (Interactive Movement Map)

Sample data of Interactive Movement Map CSV

utc_date	2020-03-25	2020-03-25	2020-03-25	2020-03-25	2020-03-25
time	00:00	00:00	00:00	00:00	00:00
crisis_name	utah_coronaviru	utah_coronavi	utah_coronavir	utah_coronaviru	utah_coronavirus
start_polygon_id	1421806	1421806	1421806	1421806	1421806
start_polygon_names	North Davis	North Davis	North Davis	North Davis	North Davis
start_x	-112.172343105	-112.1723431(	-112.17234310	-112.172343105	-112.1723431051
start_y	41.00840877713	41.008408777	41.008408777	41.00840877713	41.008408777136
end_polygon_id	1421789	1421789	1421789	1421789	1421789
end_polygon_names	Tremonton	Tremonton	Tremonton	Tremonton	Tremonton
end_x	-112.228332593	-112.2283325	-112.22833259	-112.228332593	-112.2283325933
end_y	41.6055072319	41.605507231	41.6055072319	41.6055072319	41.605507231972
length_km	71.1587915754	71.158791575	71.1587915754	71.1587915754	71.15879157541
metric_name	z_score	percent_chang	n_difference	n_crisis	n_baseline
metric_value	0.298142396999	25			
level	LEVEL4	LEVEL4	LEVEL4	LEVEL4	LEVEL4
tile_size	13	13	13	13	13
country	US	US	US	US	US

Same across metrics

Multiple metrics for each link

1. **Filter CSV by metric and separate into multiple files, representing One Metric Each File**
2. **Create line features/objects (start and end point coordinates) by**
   - **XY To Line (ArcGIS Pro/ ArcMap)**
   - **Function developed using sp and maptools library (R Language)**
   - **Python GDAL/OGR**