How to convert freely available satellite images from Google and Bing into an image which is georeferenced to the British National Grid.

 These instructions show how to obtain aerial photos from online sources such as Google and Bing, and convert them to a single image georeferenced to British National Grid (Ordnance Survey) suitable for use as a background map in OCAD. This version (6) of this document includes an update for OCAD 2018 users. The procedure uses two programs, the first called SASPlanet can do the downloading step, but will not output in OS coordinates. The second program gdalwarp.exe performs the necessary coordinate transformation. These instructions first show how do to download and configure the necessary programs, and then how to use them.

 It should be noted however that OCAD 2018 users do not need one of these two program, and since May 2020 may not need either of them. In the latest version of OCAD 2018 one can grab small sections of Google satellite image directly as a background map. This is done via Background Map >Online Map Service >Load as background map. In order to get good resolution photos one needs to be zoomed in on the area of interest, so for a complete map one would have to repeat this process many times however it can be useful for a quick check of a smaller area. Also only google images can currently be chosen. Sometimes Bing has better ones. When obtaining a full size photo to cover the whole of your map, as described below, the second of the two programs is not required when using OCAD 2018.

Installation and Configuration

Step 1 Download and Install SASPlanet.

1. SASPlanet can be downloaded from: http://www.sasgis.org/programs/sasplanet/nightly.php

2. Extract the contents of the zip archive to somewhere suitable on your computer.

If using OCAD 2018 you can skip the next step.

Step 2 Download and Install gdalwarp.exe.

1. You need to download the GDAL collection of programs. This can be obtained from http://www.gisinternals.com/release.php

2. Extract the contents of the zip archive to somewhere suitable on your computer.

3. Edit the file <home folder>\Documents\WindowsPowerShell\Microsoft.PowerShell_profile.ps1 and add the following lines:
   $env:GDAL_DATA= ";<GDAL folder>\bin\gdal-data"
   $env:Path += ";<GDAL folder>\bin\gdal\apps"
   $env:Path += ";<GDAL folder>\bin"

    You need to replace <home folder> with the location of your home folder and <GDAL folder> with the folder where you stored the gdal package
4. Right click on the Window start button and choose Windows Power Shell.
5. Type in
   Set-ExecutionPolicy -Scope CurrentUser Unrestricted
   in powershell, then close the window.

The instructions above need only to be executed once, on the next page is the procedure to follow every time you want to produce a new aerial photo background image.
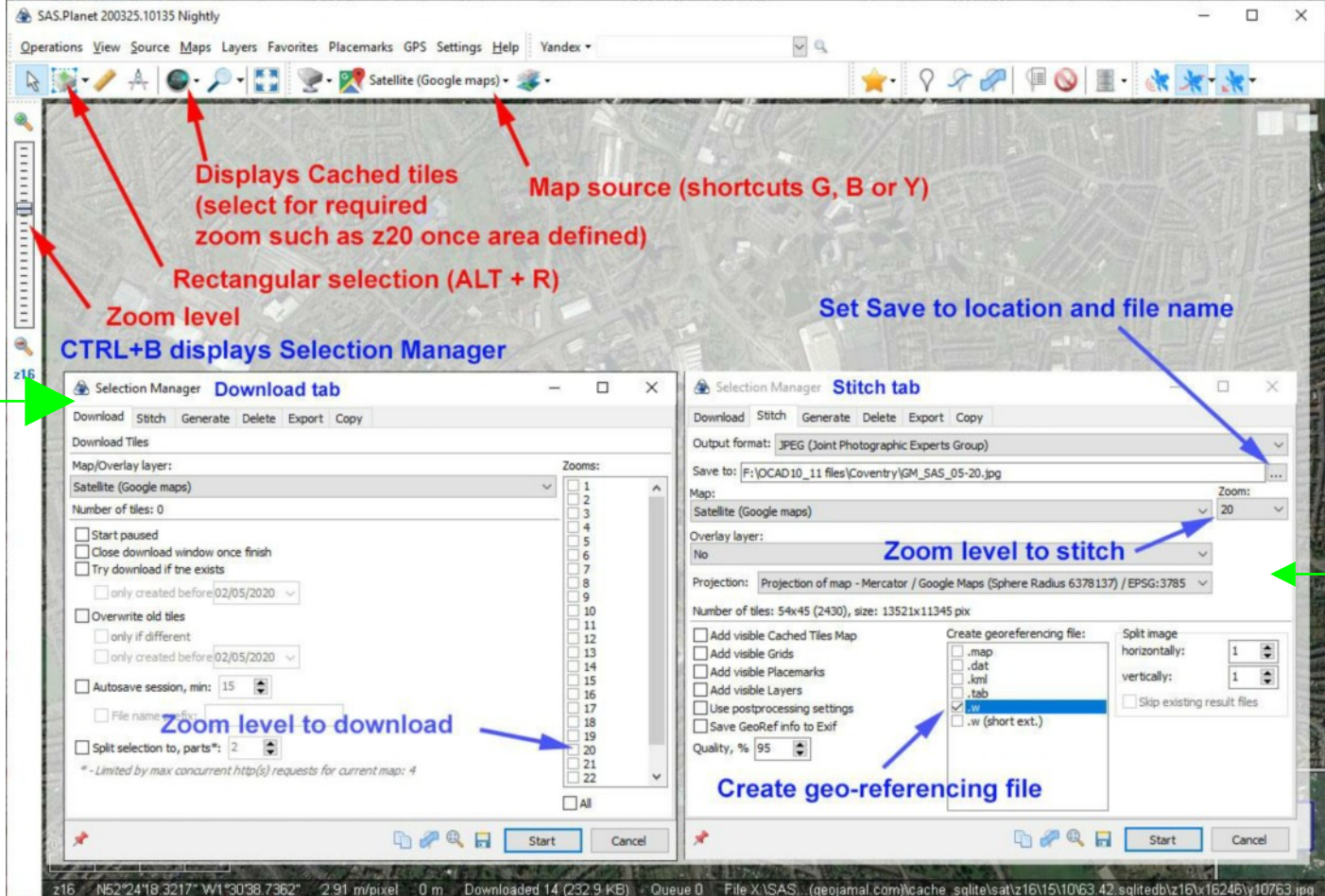
Creating an Image

Note, there is now a description of this process on the OCAD blog page as well. Search for "ocad blog sasplanet". Start the program SASplanet from the folder you stored it in earlier. Refer to the image above for further clarification.

1. Choose either Google (Shortcut: *G*), or Bing (V*)* or Yandex (*Y)* as the source from the top toolbar.
2. Zoom into until the area you require is on the screen. You can use the bar on the left hand side or mouse wheel; click and drag in the window to move
3. Type Alt-R to start creating a rectangular selection of the area you need.
4. Click at the top left of the area you require.
5. Click at the bottom right of the area you require.
6. Selection Manager will now appear, Select Download tab if not already open. Check it shows required map type as chosen in (1). In the right hand zoom column select required zoom level (z20 or possibly z21 for a small area). It then shows the number of tiles it will download and the size of the final image. At z20 this may be between 10000 and 20000 pixels for a large area (Don't go much bigger than 20000 x 20000!).
7. Click Start, the necessary images will be downloaded, to a "Cache" folder. Note that if the Cache button is switched to the required zoom - z20 you can see the download progress visually. When task is complete click on the small box - in the bottom left window of the download dialog to reopen the SelectionManager
8. Select "Stitch" tab and choose
    8.1 Output Format , either JPEG or GeoTIFF are recommended
    8.2 Click on the … next to "Save to" and navigate to the folder where you want the file to end up, and give it a suitable name.
    8.3 **Most important...** Zoom: Change to match the size downloaded , e.g. z20
    8.4 If using JPEG output , for "Create georeferencing file:" choose .w
    8.5 Geographic (Latitude/Longitude) /WGS84 /EPSG:4326 If using OCAD 2018, choose Mercator / Google EPSG 3785
    8.6 Compression: None
9. Click on Start

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Output from SASPlanet is in format WGS 84. We need to first convert it to OSGB 36, and then convert to British National Grid (see: https://communityhub.esriuk.com/geoxchange/2012/3/26/coordinate-systems-and-projections-for-beginners.html for an explanation). We use the program gdalwarp to modify this file. Start File explorer and navigate to the folder where you just created the aerial photo, then click on File>Open Windows PowerShell and execute the following commands

1. Convert to OSGB 1936 ..
   gdalwarp.exe -t_srs 'EPSG:4277' <FilenameFromSAS> <FilenameforOSGB36formatfile>
   where you   need to substitute in the correct names for the items between <> brackets.
2. Project to National Grid
   gdalwarp.exe -t_srs   EPSG:27700 <FilenameforOSGB36formatfile> <FilenameforBNGformatfile>

You can now open the file <FilenameforBNGformatfile> as a background image in OCAD. It will be correctly georeferenced for the British National Grid.

Opening an aerial photo directly in OCAD 2018.

In OCAD 2018 it is now possible to open a background file directly in a different coordinate system to the map. First ensure that the map is defined to be using British National Grid by looking in Map>Set Scale And Coordinate System. Now go to Background Map>Manage>Open, Select the aerial photo you produced above, select "Transform from Other Coordinate System", Choose "Google Mercator" and click OK I recommend you do this before applying any magnetic declination correction to the map.

Troubleshooting

If you are using OCAD12 and the image doesn't appear when you open it you need to delete the .jpgw file that was created in the SASPlanet Stitch tab (or don't "create georeferencing file" when you stitch the file).

If the newly created aerial photograph does not align with the existing map you must decide which source you trust. You can either use a trusted third source such as an Ordnance Survey map, or attempt to obtain accurate locations using GPS in the field. If you believe the existing map to be correct then you can adjust the aerial photograph to match the map using the F9 shortcut. Alternatively you can adjust the map to fit the aerial photograph using one of the options under map>transform. The most powerful of these is rubbersheeting, but it needs to be used with care because it can cause considerable distortion.This can be particularly noticeable when there are many buildings or other man made objects on the map so it is not suitable for an urban map. It is recommended to save multiple copies of the map when using this tool to make it easier to undo changes.

If you want to know what EPSG codes are about you can look here: https://www.epsg-registry.org/. I hope you find these instructions useful. Please get in touch if you spot a problem or can suggest an improvement.

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