Create OmniSuite story from a video

Software: ffmpeg, QGIS, PhotoShop, OmniSuite

Example: OLLIE BYE: History Of The World: Every Year

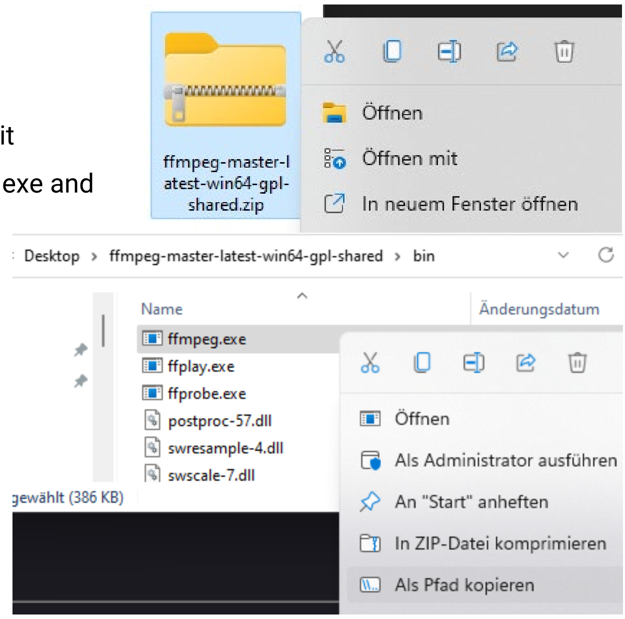
- **Download Youtube video in highest resolution**

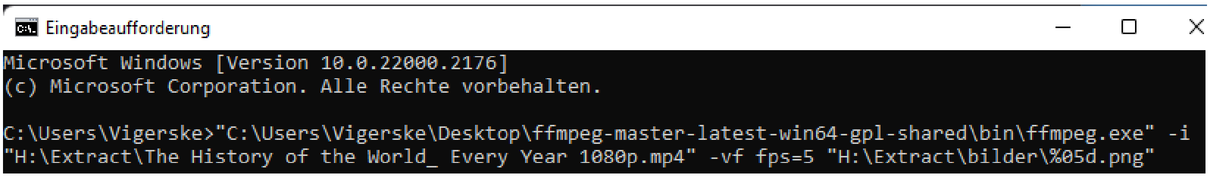
> Qualitatively, conversions to MP4 are obviously of higher quality

> MP4 videos cannot be opened with PhotoShop

> https://y2down.cc/de/ currently works (such services change from time to time or try to offer premium offers): Enter URL and download video in 1080p (FullHD), if the video is offered in this resolution

- **Convert video to PNG frames with ffmpeg**
  - Load the current zip "ffmpeg-....-win64-gpl-shared.zip" from https://github.com/BtbN/FFmpeg-Builds/releases and extract it
  - In the unzipped folder under "bin", right-click on the file ffmpeg.exe and copy the path
  - Start the "Command Prompt" in the Windows Start menu and construct a command from copied paths (Ctrl+V to paste), according to the following pattern:
    - "ffmpeg.exe -i videofile.mp4 -vf fps=# outputfile.png"
  - the exe must be specified with full path, the video file as well and also the output file
  - for fps= a number is specified such as 5, i.e. fps=5, in order to extract only 5 images per second (YouTube videos usually have 30 frames per second)
    - if too many frames are skipped or too many are generated, the number must be set lower (fewer frames) or higher (more frames)
  - a complete command line may look like the following if the programme is on the desktop (do not delete the inverted commas):
    - "C:\Users\Vigerske\Desktop\ffmpeg-master-latest-win64-gpl-shared\bin\ffmpeg.exe" -i "H:\Extract\The History of the World Every Year 1080p.mp4" -vf fps=5 "H:\Extract\bilder\%05d.png"
    - The video is in the folder Extract on the hard disk H and the pictures should be in a corresponding sub-folder (this must be created beforehand!).
    - The %05d stands for a numbering with 5 digits, the .png specifies the file format.





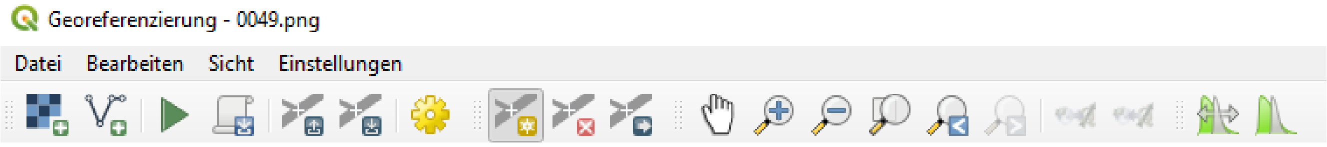
```
Microsoft Windows [Version 10.0.22000.2176]
(c) Microsoft Corporation. Alle Rechte vorbehalten.

C:\Users\Vigerske>"C:\Users\Vigerske\Desktop\ffmpeg-master-latest-win64-gpl-shared\bin\ffmpeg.exe" -i
"H:\Extract\The History of the World_ Every Year 1080p.mp4" -vf fps=5 "H:\Extract\bilder\%05d.png"
```

- **Georeferencing with QGIS**

- set the projection of the video in QGIS (or a similar one if not known), in our example "Robinson Projection"

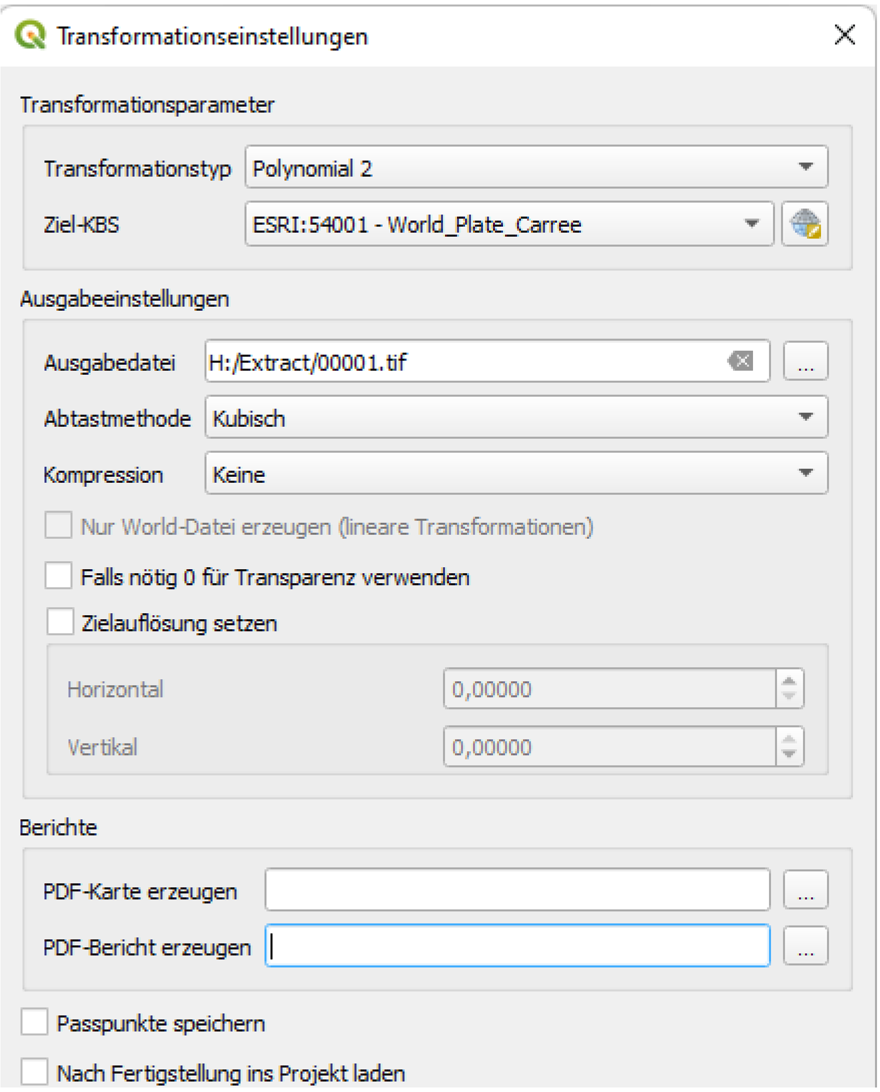
- in QGIS, set a weblayer or another map as reference if the map does not show coordinates



- Layer > Georeference

- File > open one of the images > set points (enter coordinates or use map reference).

- Settings > transformation settings (type mostly polynominal order 2 (or 1 if few points are sufficient), output location will be adjusted later, sampling method at least cubic)


Transformationseinstellungen

Transformationsparameter

Transformationstyp: Polynomial 2

Ziel-KBS: ESRI:54001 - World_Plate_Carree

Ausgabeeinstellungen

Ausgabedatei: H:/Extract/00001.tif

Abtastmethode: Kubisch

Kompression: Keine

□ Nur World-Datei erzeugen (lineare Transformationen)

□ Falls nötig 0 für Transparenz verwenden

□ Zielauflösung setzen

Horizontal: 0,00000

Vertikal: 0,00000

Berichte

PDF-Karte erzeugen:

PDF-Bericht erzeugen:

□ Passpunkte speichern

□ Nach Fertigstellung ins Projekt laden

- File: Create GDAL script

- the script would georeference ONE image, but we want to process all images one after the other and reproject and crop them simultaneously

- **Customise script to georeference and reproject**

  - paste the script from QGIS e.g. into the editor and save it as georeference.bat (not txt) in the folder containing the subfolder with the individual images, in our case H:/Extract/.
  - it contains two commands: gdal_translate sets the reference points for georeferencing and saves the result in a temp folder
  - gdalwarp contains the transformation parameters, calls the image from the temp folder and projects it into the specified projection
  - we now add a loop to the script that processes all images in the folder and saves them into a new one
  - we change the target coordinate system and crop the result
  - our code initially looks like this

```
gdal_translate -of GTiff -gcp 148.811 201.396 -1.06076e+07 6.36598e+06 -gcp 1651.98 191.887
    1.16695e+07 6.52119e+06 -gcp 512.377 1022.43 -5.15571e+06 -5.80444e+06 -gcp 1701.91 924.623
    1.25322e+07 -4.38174e+06 -gcp 817.443 328.415 -563699 4.48154e+06 -gcp 957.623 833.604 1.55736e+06 -
    2.99845e+06 -gcp 828.651 76.5 -670517 8.2053e+06 -gcp 286.953 527.009 -8.36775e+06 1.54477e+06 -gcp
    1749.54 649.783 1.33145e+07 -279695 "H:/Extract/bilder/3329.png"
    "C:/Users/Vigerske/AppData/Local/Temp/3329.png"
gdalwarp -r cubic -order 2 -co COMPRESS=None -t_srs "+proj=eqc +lat_ts=0 +lat_0=0
    +lon_0=0 +x_0=0 +y_0=0 +datum=WGS84 +units=m +no_defs"
    "C:/Users/Vigerske/AppData/Local/Temp/3329.png" "H:/Extract/3329.png"
```

and contains the georeferencing points, one of the input images, the temporary output, the transformation parameters, the projection and the output

First, we insert the loop that ensures that all images are processed.

One line before gdal_translate comes the following code:

```
@echo off
for %%f in (bilder\*.png) do (
```

and after the gdalwarp line we close the bracket:

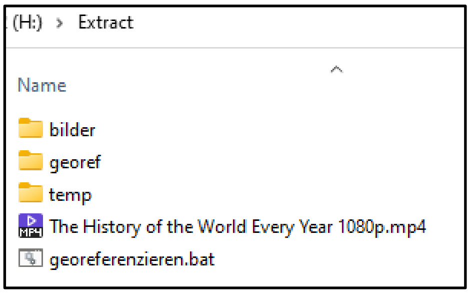
```
)
```

Now all png files in the subfolder images are processed (starting from the location of the bat file).

And the variable %%f serves as the file name. We now insert this, slightly modified (%%~nf), in several places (we cut out the point coordinates here for the view):

```
@echo off
for %%f in (bilder\*.png) do (
        gdal_translate -of GTiff -gcp [...] "bilder\%%~nf.png" "temp\%%~nf.tif"
        gdalwarp -r cubic -order 2 -co COMPRESS=None -t_srs "+proj=eqc +lat_ts=0
                +lat_0=0 +lon_0=0 +x_0=0 +y_0=0 +datum=WGS84 +units=m +no_defs"
                "temp\%%~nf.tif" "georef\%%~nf.png"
)
```

First the path for the input images is reset, then the temp folder and then the output. All three folders must be in the same folder as the bat file.


(H:) › Extract

Name

bilder
georef
temp
The History of the World Every Year 1080p.mp4
georeferenzieren.bat

Next we change the **projection**. *This step is only needed if the source material is not already projected in Plate Carree, the projection used by the Globus software.*

In our example, the complete definition of the Robinson projection is still in gdalwarp, before the temp folder. The -t_srs stands for target spatial reference system. In fact, in our example only the source is Robinson, we need Plate Carree as the target for the globe. For this purpose, we also use the specification -s_srs (source). In addition, projection information can also be specified much shorter via the EPSG or ESRI code, as it can be found everywhere in QGIS, we therefore replace the long definition:

```
        gdalwarp -r cubic -order 2 -co COMPRESS=None -s_srs ESRI:54030 -t_srs ESRI:54001
                "temp\%%~nf.tif" "georef\%%~nf.png"
```

We have specified ESRI:54030 (Robinson) as the source reference system and 54001 (Plate Carree) as the target.

Now the cropping to the **dimensions of the earth** and the **pixel dimensions** of the final image are still missing:

```
        gdalwarp -r cubic -order 2 -co COMPRESS=None -s_srs ESRI:54030 -t_srs ESRI:54001
                -te_srs EPSG:4326 -te -180 -90 180 90 -ts 4096 2048
                "temp\%%~nf.tif" "georef\%%~nf.png"
```

Another projection specification becomes necessary. With -te_srs we set the projection of the function -te to WGS84 (4326). As target extent (te) we specify the maximum of the earth, thanks to WGS84 in degrees. Target size (ts) sets the pixel dimensions of the final image to those typically used by the globe.

Our complete code looks like this:

```
@echo off
for %%f in (bilder\*.png) do (
        gdal_translate -of GTiff -gcp 148.811 201.396 -1.06076e+07 6.36598e+06 -gcp 1651.98 191.887 1.16695e+07
6.52119e+06 -gcp 512.377 1022.43 -5.15571e+06 -5.80444e+06 -gcp 1701.91 924.623 1.25322e+07 -4.38174e+06 -gcp
817.443 328.415 -563699 4.48154e+06 -gcp 957.623 833.604 1.55736e+06 -2.99845e+06 -gcp 828.651 76.5 -670517
8.2053e+06 -gcp 286.953 527.009 -8.36775e+06 1.54477e+06 -gcp 1749.54 649.783 1.33145e+07 -279695
"bilder\%%~nf.png" "temp\%%~nf.tif"
        gdalwarp -r cubic -order 2 -co COMPRESS=None -s_srs ESRI:54030 -t_srs ESRI:54001 -te_srs EPSG:4326 -te -
180 -90 180 90 -ts 4096 2048 "temp\%%~nf.tif" "georef\%%~nf.png"
)
```

- **Run script**

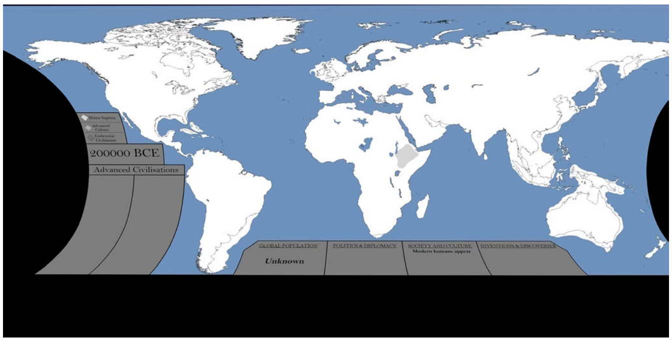
- the OSGeo4W Shell programme was installed with QGIS

- in it on the drive, navigate to the folder with the bat file and execute, in our case:

```
        > h:
        > cd Extract
        > georeferenzieren.bat
```

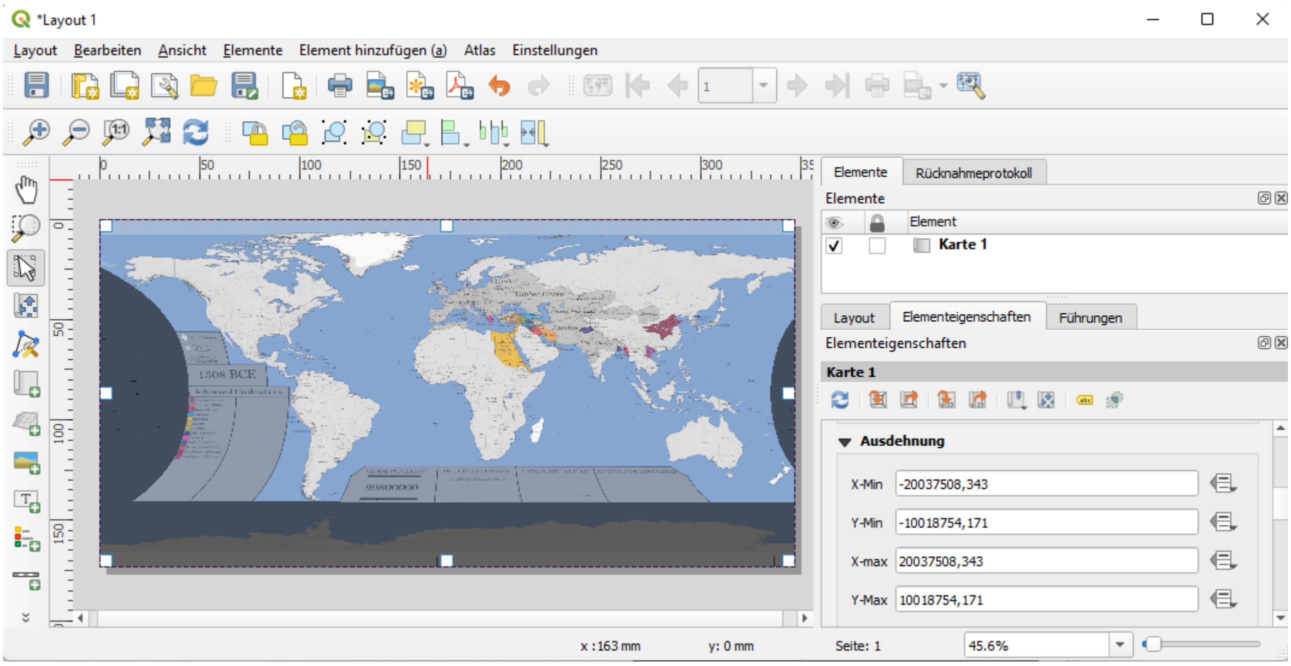
All png files in the folder "images" should be georeferenced, briefly stored under "temp", then reprojected and cropped. The result ends up under georef. It is best to test with only a few images first. If the map looks very distorted, you should simply set more points or check whether the source and target coordinate systems are correct.

- **Preparation of the images**

> Initial image: 

> Create layout in QGIS with basemap to add the missing elements (North Pole, South Pole).

- Define map extent fix and save in suitable format (4096 x 2048)



*Layout 1
Layout Bearbeiten Ansicht Elemente Element hinzufügen (a) Atlas Einstellungen
Elemente Rücknahmeprotokoll
Elemente
Element
Layout Elementeigenschaften Führungen
Elementeigenschaften
1508 BCE
Advanced Civilisations
x :163 mm y: 0 mm Seite: 1 45.6%

Karte 1

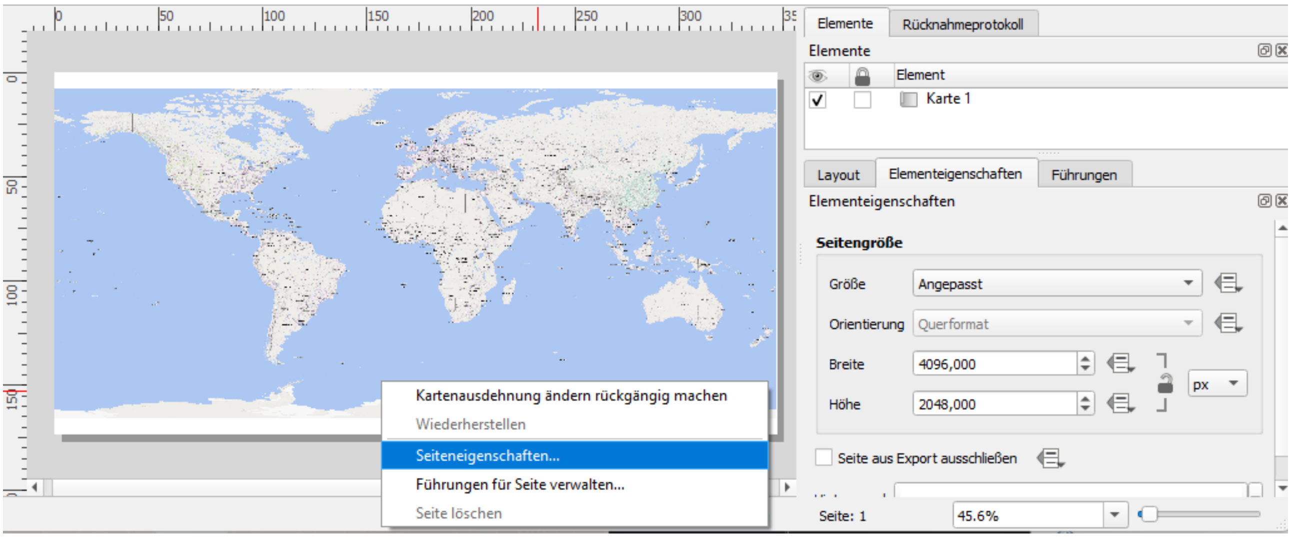
Ausdehnung

X-Min -20037508,343

Y-Min -10018754,171

X-max 20037508,343

Y-Max 10018754,171



Elemente Rücknahmeprotokoll
Elemente
Element
Karte 1
Layout Elementeigenschaften Führungen
Elementeigenschaften
Kartenausdehnung ändern rückgängig machen
Wiederherstellen
Seiteneigenschaften...
Führungen für Seite verwalten...
Seite löschen
Seite: 1 45.6%

Seitengröße

Größe Angepasst

Orientierung Querformat

Breite 4096,000

Höhe 2048,000

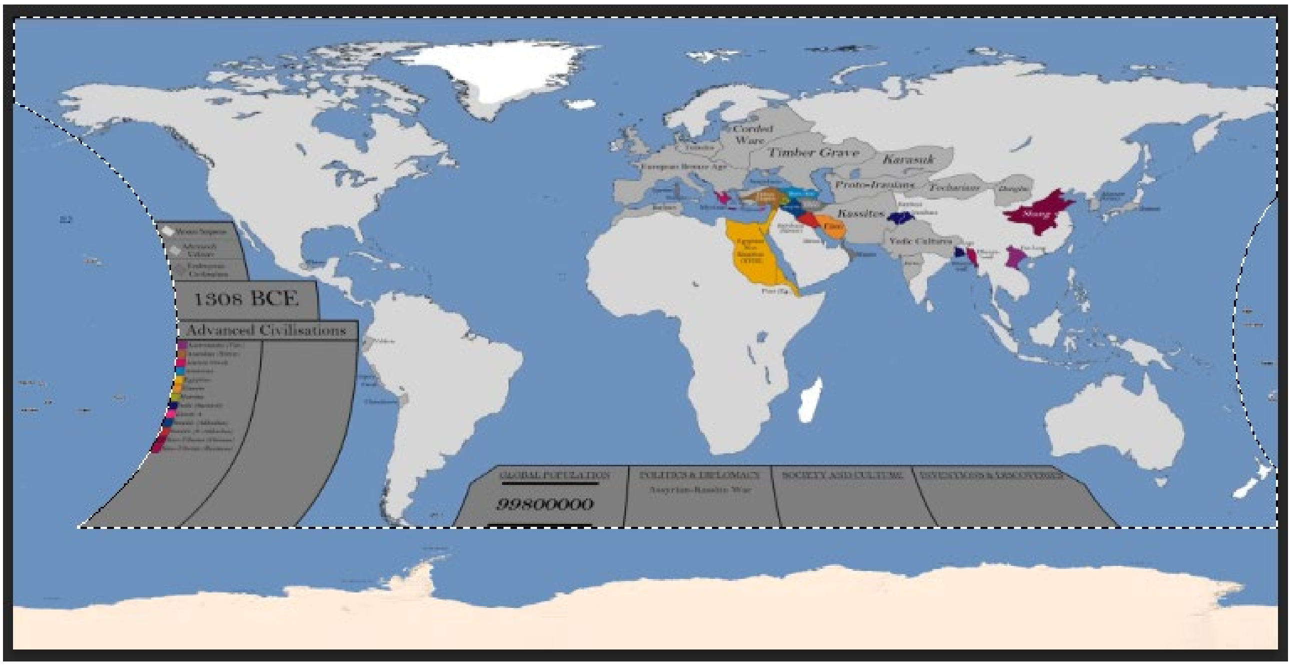
px

□ Seite aus Export ausschließen

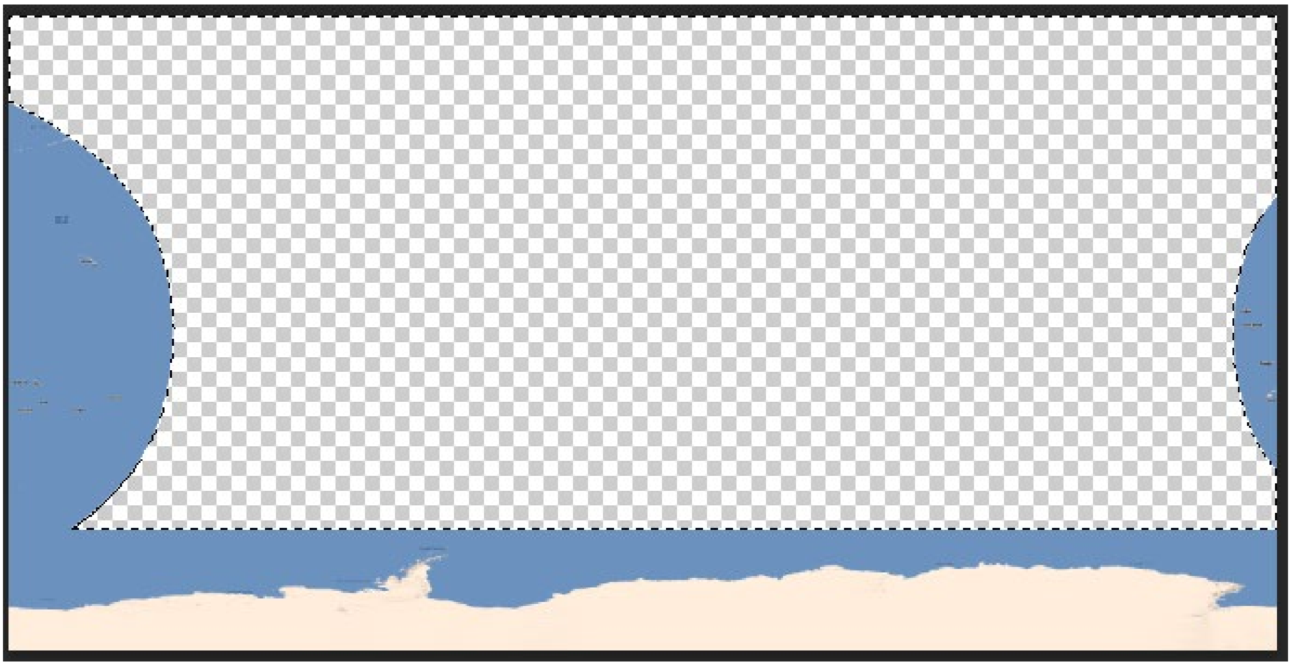
The exported map is used as a mask in the globe material to complement the video map.

> Load the georeferenced map from the video into Photoshop and place the basemap from QGIS in a layer below it

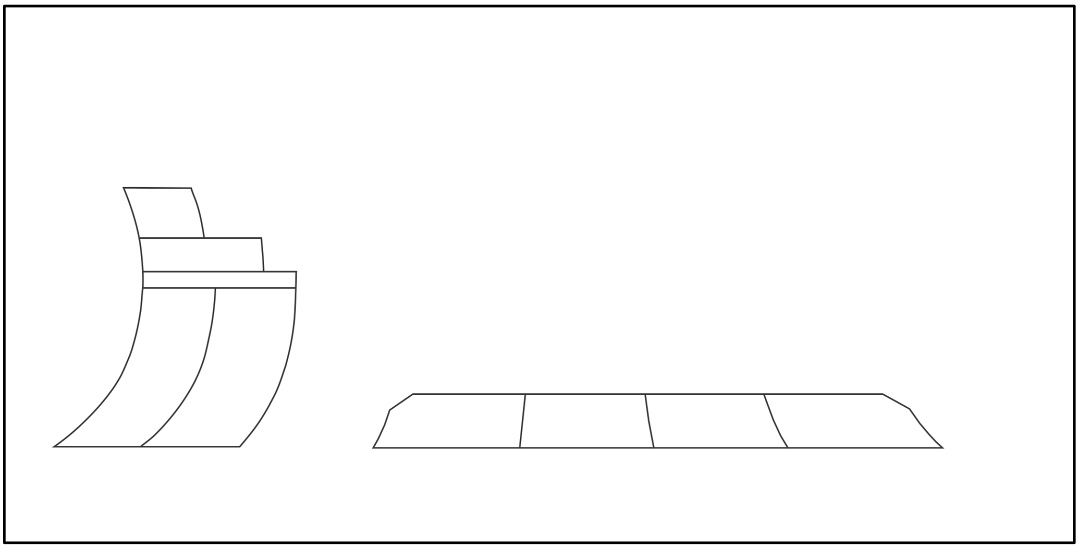
- remove borders in the video map until the QGIS basemap is seamlessly visible below it
- change the colour of the QGIS basemap to match the one from the video
- select the remaining area of the video map



and delete this area in the basemap, hide the video map again and save the result as a PNG with transparency - we have a mask that we can place as a second texture over the video map



> Other masks can also be created at this point, e.g. a new contour around the legend.:



> **Loading into the OmniSuite Material Editor**

- first the folder with the georeferenced images as animation

- then the mask with the QGIS basemap

- further masks if required

Video source: OLLIE BYE (2015): History Of The World: Every Year. – Online In Internet: https://www.youtube.com/watch?v=ymI5Uv5cGU4 [Last accessed on 2023-07-13].