

sALR Model & Pipeline Notes

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ArcGIS Pro: Creating the VIIRS TIFF File

The first step is creating the input data that is needed to run the sALR model. The input data is the VIIRS upward radiance data provided by the Earth Observation Group (EOG), cropped to cover just the contiguous United States (CONUS). We typically use only the annual, median filtered, composite data, an example file from EOG looking like VNL_npp_2023_global_vcmslcfg_v2_c202402081600.median.dat.tif. This file covers a huge portion of the world, however, which is why we need to first crop it to the area of interest, and also do some simple data manipulation like setting low-valued pixels to zero.

If Starting From Scratch:

1. Create a new Map project in ArcPro
 - By default, this project will contain the “World Topographic Map” and “World Hillshade” map layers.
2. Load a CONUS (continental US) state boundary feature layer. Can find one used in a previous project (e.g. CONUS_states from Sharolyn’s sALRpipeline project), or can just download a reliable layer from the web. Just google search CONUS ArcGIS layer and several options should show up.
3. Create a **500 km** buffer layer around the CONUS state boundaries.
 - Go to **analysis** tab, click **Tools**, and type “buffer” in the search bar in right panel to find the **Buffer (Analysis Tools)** tool.
 - Select the CONUS state boundary layer as the input, set distance/unit to desired values, and select “Dissolve all output features into a single feature”. Side type can stay full, and method can stay planar.
 - Click “Run” to create buffer feature.
4. Create a bounding box for the buffer layer.
 - Go to **analysis** tab, click **Tools**, and type “minimum bounding geometry” in the search bar in right panel to find the **Minimum Bounding Geometry (Data Management Tools)** tool.
 - Select the buffer feature as the input, and set geometry type to **Envelope**. Leave group option as none.
 - Click “Run” to create the bounding box.
5. Load in the VIIRS data layer from EOG.
6. Clip VIIRS data to bounding box and replace values <0.5 with 0.
 - Go to **analysis** tab, click **Tools**, and type “con” in the search bar in right panel to find the **Con (Spatial Analyst)** tool. If this tool shows up as unlicensed, you’ll need to enable it by going to **Project -> Licensing -> Configure your licensing options**. Wait a bit for options to load, then scroll down and check the box next to **Spatial Analyst**.
 - In the **Parameters** window:

- i. Set input raster to EOG VIIRS TIFF layer.
 - ii. Add a condition where **VALUE is less than 0.5**
 - iii. Set input true value to 0 and input false value the the EOG VIIRS layer.
 - iv. Set output raster to CONUS_YYYY_viirs
- In the **Environments** window:
 - i. Set output coordinate system to **USA Contiguous Albers Equal Area Conic USGS**, which can be found by clicking on the Globe icon and then looking under **Projected Coordinate System -> Continental -> North America**
 - ii. Set the XY Extent by clicking the layer dropdown menu and selecting the bounding box layer.
 - iii. Set cell size to 500m (meters should already be default unit).
- Click “Run” to process the VIIRS layer
- 7. Save CONUS_YYYY_viirs layer to a TIFF file
 - Right click on layer and go to **Data -> Export Raster**
 - No settings should have to be changed, make sure pixel type is 32 bit float.
 - Click “Export” to save layer to TIFF file.

If Only Updating the VIIRS Layer

If the bounding box has already been created and the only goal is to update the VIIRS TIFF file for a new year, then one could open a saved project containing the bounding box layer and replace/remove all EOG VIIRS layers with updated versions, basically starting from step 5 above.

Creating an arcpy conda Environment

To run the script that generates the sALR model (annulus40_np_CONUS.py), you’ll first need to create an python environment that can run arcpy commands. Below are steps to create such an environment using conda:

1. Add path to arcgispro-py3 to .condarc configuration file
 - a. `conda config --add envs_dirs "C:\Program Files\ArcGIS\Pro\bin\Python\envs"`
2. Clone arcgispro-py3 to create a new environment
 - a. `conda create --clone arcgispro-py3 --name salr`
3. Copy the “pinned” file from arcgispro-py3 conda-meta folder to new environment
4. Install other necessary packages
 - a. `conda activate salr`
 - b. `pip install pip-system-certs`
 - c. `conda install jupyterlab`