VICGlobal Subsetting Codes and Example

October 6, 2019

1 The Subsetting Codes

VICGlobal comes with Matlab functions for subsetting the VICGlobal parameters to a particular domain of interest (Table 1). The *wrapper* script is used to perform the subsetting. The subsetting codes require the image processing and mapping Matlab toolboxes.

Function Name	Description
wrapper	Executive script for the subsetting
subset_soils	Subsets the soil parameter file (classic mode)
subset_domain	Subsets the domain file (image mode)
subset_parameter	Subsets the parameter file (image mode)
write_soils	Writes the (subsetted) soil parameter file
crop_dem	Crops a DEM to a specified extent
make_cropping_rectangle	Helper function for crop_dem
georefobj2mat	Converts Matlab spatial referencing object type

Table 1: List of VICGlobal subsetting functions.

1.1 Classic Mode

Follow these steps if you intend to run VIC using the classic driver:

1. Open the *wrapper.m* script in Matlab.
2. Load the VICGlobal soil parameter file.
3. Input the extent of your study area, either as a Shapefile or as an array of numbers [lon1 lon2 lat1 lat2].
4. Leave the parameters *grid_decimal* and $outformat$ set to their default values of 5 and $3l$. *grid_decimal* is the number of decimals used in the VIC forcing filenames (should correspond to the parameter with the same name from the global parameter file). $outformat$ tells the function *write_soils* what columns are in the soil parameter file.
5. Set *outname*. This is the name for the subsetted soil parameter file.
6. Run *soils_subset* to subset the soil parameter file.

1.2 Image Mode

Follow these steps if you intend to run VIC using the image driver:

1. Open the *wrapper.m* script in Matlab.
2. Input the extent of your study area, either as a Shapefile or as an array of latitude and longitude values [lons lats]
3. Subset the domain file using *subset_domain*
4. Subset the parameter file using *subset_parameter*

2 Example: Tuolumne River Basin

The Tuolumne River basin is a 4850 km^2 river basin in the Sierra Nevada range in California, U.S.A. (Figure 1). Here are several screenshots showing how to set up the VIC model for the Tuolumne basin by subsetting the VICGlobal dataset.

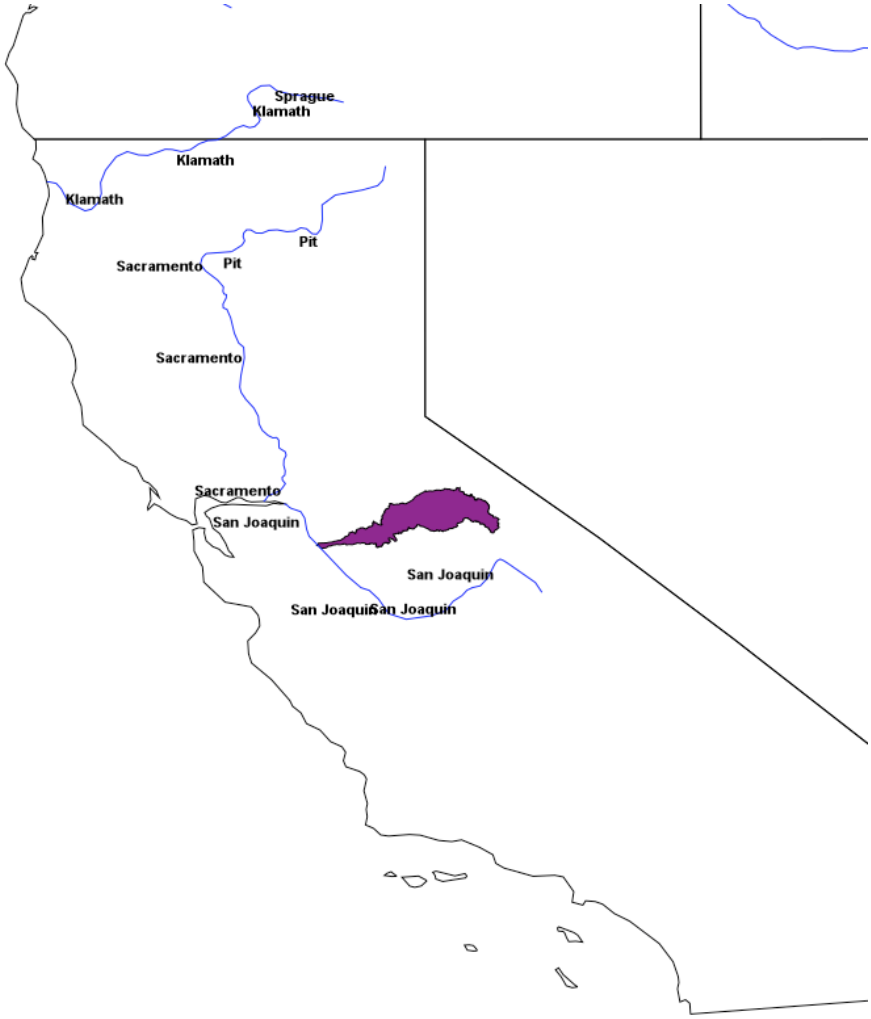

Figure 1: Tuolumne River Basin (purple shaded region) in California. Major rivers are shown in blue.

```
%% Classic mode: Subsets the soil parameter file.

% Load soil parameter file
soilfile = '/Volumes/HD3/VICParametersGlobal/Global_1_16/v1_3/soils_3L_MERIT.txt';
disp('Loading soil parameter file')
soils = load(soilfile);
disp('Soil parameter file has been loaded')

% Define extent
% extent = [75, 76, 34, 35];
extent = '/Users/jschap/Documents/Research/SWOTDA_temp/Tuolumne/Tuolumne2/Shapefiles/upper_tuolumne.shp';
% use full name; do not use . in file name
% extent = './Data/IRB/VIC/34N_75E/dem.tif';

grid_decimal = 5; % number of decimals used in forcing filenames
outformat = '3l'; % format of input soil parameter file (number of soil layers)
outname = 'soils_tuolumne.txt';

soils_subset = subset_soils(soils, extent, outname, outformat, grid_decimal);
```

Figure 2: *wrapper* script set up to subset the VICGlobal soil parameter file to the extent of the Tuolumne River Basin.

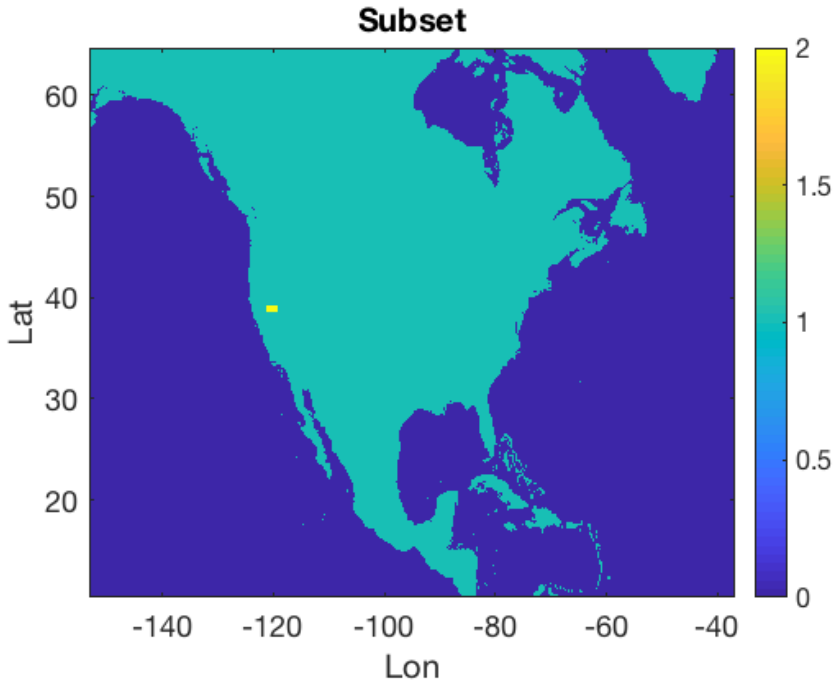

Figure 3: Extent of the Tuolumne River Basin (yellow), shown over background VICGlobal landmask.

```
%% Image mode

% Subset Image
%
% Wrapper for subsetting the global VIC parameter file
% to a user-specified domain

% Define extent
% extent = horzcat([75; 76], [34; 35]);
extent = '/Users/jschap/Documents/Research/SWOTDA_temp/Tuolumne/Tuolumne2/Shapefiles/upper_tuolumne.shp';

% Subset domain
global_domain = '/Volumes/HD_ExFAT/output/VICGlobal_domain.nc';
outname_domain = '/Volumes/HD4/SWOTDA/Data/Tuolumne/Image_VICGlobal/domain_sub.nc';
subset_domain(extent, global_domain, outname_domain)

% Subset parameters
global_params = '/Volumes/HD_ExFAT/output/VICGlobal_params.nc';
outname_params = '/Volumes/HD4/SWOTDA/Data/Tuolumne/Image_VICGlobal/params_sub.nc';
subset_parameter(extent, global_params, outname_params)
```

Figure 4: *wrapper* script set up to subset the VICGlobal domain and parameter files to the extent of the Tuolumne River Basin.