Notes 2024-11-04

SMAP-HB / WRF-Hydro Project

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HEC-RAS model

- Used soil_texture.py to convert POLARIS soil properties to soil texture
- Added soil texture raster to RAS model
- Created G&A infiltration parameter layer based on soils
  - Parameters from from Gowdish and Muñoz-Carpena 2009; Rawls and Brakensiek 1982 and Rawls et al. 1982
  - https://www.hec.usace.army.mil/confluence/rasdocs/r2dum/latest/developing-a-terrain-model-and-geospatial-layers/infiltration-methods
  - Field capacity used as initial water content (could use wilting point or something els; one tutorial recommended using field capacity for western US and wilting point for eastern US, so maybe wilting point is more appropriate)
- Imported MRMS data
  - Longitudes are in 0, 360 - converted to -180 to 180
  - Clipped to a 2 degree box around the study area
  - Need to check if I need to keep in 0, 360 longitude to import into RAS
  - Defined coordinate system - HEC-RAS should be able to understand

ML Model

- Using the modified post-processing script yields upscaled 2x2 netcdfs without missing values
- Adnan has tested the GANmapper prediction and extraction scripts using Google Colab with a GPU; I ran into issues getting it to access Drive files, but I think it's a minor problem
- **Should I email Dr. Jiang to ask whether he can help me access Rice computing resources?**

To do

- Import the clipped MRMS data into HEC-RAS and make a plan for the storm of interest in 10/2019 using the infiltration layer based on Polaris data
- Load precipitation in RAS mapper and see if the projection looks OK
- Assign WGS 84 with
- Adnan will look into training model locally with a GPU, and maybe getting a desktop is the best option
- Code is pytorch, not tensorflow, so should be runnable on Mac - but coding architecture is designed for CUDA
- Clean up and update the github

Questions

- If the initial soil moisture is assigned based on soil or land cover type, this might be an issue if we want to input modeled soil moisture
  - Possible workaround is having a different ID for every cell so every cell can have its own infiltration parameter values
- Benefit of using upscaled SMAP-HydroBlocks data vs some other coarse resolution input, like original SMAP data?
- If we used different remote sensing data, we'd have another value
- If using for climate models, we just have a climate model estimate
- Want an input with the same distribution as the output
- Need to have modeled input, so can't use observed data
- Need to ensure that the average of the grid matches the input data – must be consistent
- Need to have predictors that don't change over time; even NLCD may be problematic
- Data must either be static or variable and available for the future
- Keep it simple for now, avoid correlation in predictors
- ICLUS - predicted land use
  - Also have a 2020 dataset
  - Slightly different classes
  - https://catalog.data.gov/dataset/iclus-v2-1-1-land-use-projections-for-ssp2-and-rcp4-5-pathways12
- Might have to use a different model
  - Not a big problem since we haven't done any calibration
  - Talk to True and see if he's done it
  - Ideally, would be able to use boundary conditions every 2-3 days
  - But for now just look into initial conditions

Question about loading data - I've mostly been using xarray.open_dataarray or open_dataset - When I organized the data, I filtered them based on how many NaNs there were, so I would have imagined that None values were already assigned None, not -9999, which I think is a consequence of opening with open_rasterio - xarray doesn't load coordinate reference systems but rioxarray does