Progress report

Class project for *GIS in Water Resources*

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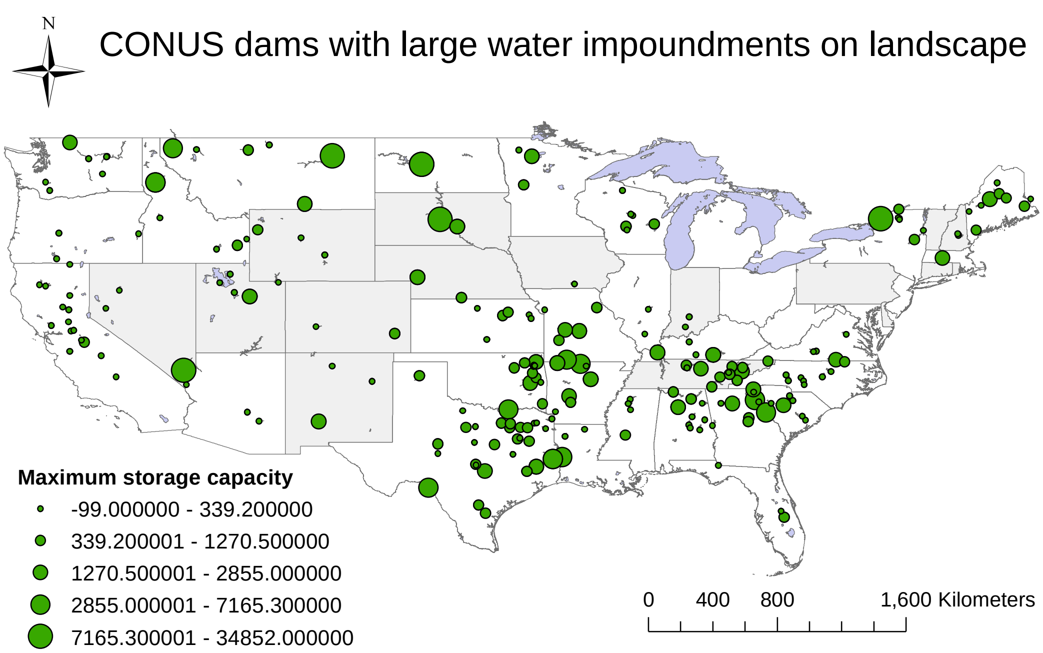
1. Impacts of dammed reservoirs on downstream hydrologic system

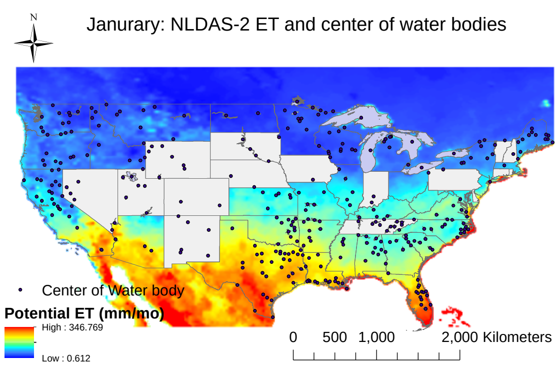
The Global Reservoir and Dam (GRanD) dataset is a global set with 6862 dams documented, so I firstly used the U.S. state boundary shapefile and selected the dams in the continental U.S. (CONUS) by using "select by location" function, and I got 1886 points of dams. For the lakes/reservoir data, I used Global Lakes and Wetlands Database L1 by *Lehner et al.* (2004), and there are 335 polygons indicating water bodies in CONUS. Since this project will focus only on the dams which formed large impoundments on the landscape, which are expected to have larger regional climate impacts, so I did some processing to filter out the "less-impactful" dams and tried to simply the dataset. I used "select by location" and chose "CONUS dams" and "CONUS lakes" as target/sources layer, and then used "are within a distance of the source layer". I tried several thresholds and finally found that a distance of 1km will better filter out those dams with smaller reservoirs. The point dataset of dams do not always located exactly on the outlet of the reservoirs, which is a polygon dataset created from different sources, so this threshold selection is important otherwise one wouldn't get each dam associated with one reservoir correctly. After I applied the 1km threshold, and I can get "impactful" dams over CONUS. Below is a map showing the 335 dams which impound larger water bodies on landscape, and their maximum storage capacity in million cubic meters:

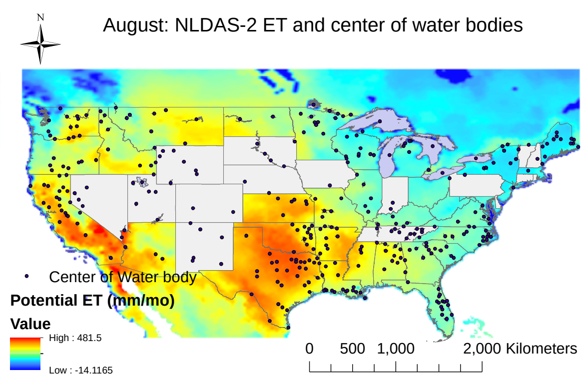


My final maps would look similar to the above figure, but rather than showing the storage capacity, it will show values about the releases. By doing this, we can get a better understanding on which reservoirs will have bigger impacts on downstream hydrologic system, and which ones are less impactful. Currently, I am still reading *Hanasaki et al*. (2006) to learn the equation to parameterize the releases based on maximum storage capacity, and some coefficients. I will apply the equation and add a column to the attribute table of “dams” point shape file, and symbolize them.

2. Impacts of dammed reservoir on regional climate

   Currently I got 1984-2009 monthly NLDAS-2 ET data, and I will try work on 2000 to 2009, and try to make animation. In order to get similar maps as in 1, I will have to find out the locations of those dammed reservoirs in the netCDF files of the NLDAS-2 ET dataset, in terms of rows and columns.





   The figures above show the ET in January and August in 2000, and the dots represent the centers of the dammed reservoirs. The dots are extracted using “Multi-dimentional tools”→ “Features” → “Feature to points” which are the centers of the polygon reservoirs. The ET fluxes of NLDAS-2 is netCDF files, which are imported as raster layers.

   Currently I am still working on extracting the ET fluxes for each dammed reservoirs on the map above, and try to make animations based on time series. It is the most difficult technical problem I am facing, and hopefully I would make progress soon on this.