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Spatial Analysis

Project Proposal

**Topic overview:** The dataset that I intend to work with is the SNOTEL dataset. This is an automated system of snowpack and climate sensors which collect data on snow water equivalent (SWE), precipitation, and air temperature. Some sensors within the SNOTEL network also collect other variables such as snow depth, soil moisture, and wind speed. This dataset is important because it provides consistent data on snowpack, especially in areas that are difficult or costly to access for field surveys. SNOTEL is also important because it can be used to project annual water supply, predict floods, and it also has been used in climate studies. I intend to use this dataset to investigate variance in SWE, precipitation, and temperature at SNOTEL sites across different EPA Level III Ecoregions. I am also interested variance in those variables between SNOTEL sites at similar elevations.

**Types and Sources of Data**: The main data that I will be using will obviously be the SNOTEL dataset. This can be accessed by downloading it as a CSV from the USDA NRCS website, but I will access it through the {snotelr} package in RStudio. The EPA Ecoregions can be downloaded as a shapefile from the EPA website very easily, and this will make it a fairly straightforward process to bring them into RStudio as well. Elevation data is associated with the individual sites when I download it through the {snotelr} package but I will still want to download it elsewhere if I want to investigate variance within whole Ecoregions. Elevation data can be accessed in a few different places, including USGS’s EarthExplorer website and USGS’s National Map website. However, these sources differ in resolution so I may opt for SRTM data from EarthExplorer if there is not enough LiDAR data from the USGS National Map or other sources such as state GIS portals. The elevation data will need to be mosaiced which will also be something I consider when downloading elevation data for my analysis.

**Possible Methods**: There are multiple potential ways to analyze the SNOTEL dataset. In order to evaluate differences between Ecoregions, I might want to evaluate mean and peak SWE, precipitation, and temperature for each year across each Ecoregion, and use the distributions of those variables to evaluate whether there is a relationship between them and which Ecoregion they are in. Additionally, since I am interested not just in variance between individual sites but variance across EPA Ecoregions, I will likely be interested in using spatial interpolation methods such as kriging and Inverse Distance Weighting (IDW) to estimate variables such as SWE in order to properly compare different Ecoregions.