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Glacial-Fed River Basins and the Relationship Between Incoming Solar Radiation and Stream Flow

Since my original proposal, I’ve changed the focus of my project a bit. My project will now be a comparative analysis on the Santa River basin of Ancash, Peru and the Taku River basin of British Columbia, Canada and Alaska. The project will analyze stream flow patterns among both basins along with patterns in incoming solar radiations in the basins. The reason both of the basins are being compared is due to their reliance on glacial melt for providing a significant supply of their incoming water supply. In recent decades, both basins have seen drastic glacier flood surges as a result of glacial recession due to climate change. The goal of my project is to see if there is a relationship between stream flow patterns and incoming solar radiation patterns, and to possibly find patterns related to glacier flood surges.

I’ve begun my project by gathering the boundary data for the Taku and Santa River basins. I created separate geodatabases for each basin with the appropriate projection systems for the local areas of each basin. Next, I gathered DEM data from USGS’ EarthExplorer page using data collected by the ASTER GLOBAL DEM product, which is developed in 30m resolution. I chose ASTER because I wanted to use the same satellite imagery for both basins, and many products only provide data on North America.

Because I had to download multiple datasets for each basin, the next step was mosaicking and clipping the DEMs together and projecting them. The DEMs are essential for my project because the Area Solar Radiation tool relies on a DEM as its only input. I haven’t tested the tool yet, but I plan to soon. I’ve read that the geoprocessing time can be extensive, so I plan to do test runs on individual DEMs before running the tool on my mosaicked images.

The next steps of my project will be focused on selecting the time period I want to focus on for my stream flow data. The stream flow data I have for the Santa Basin goes back much further than the Taku Basin, so I’ll likely begin my analysis in the 90s when data began being collected on the Taku River. I’ll need to find what other stream gauges have been placed in the Taku Basin besides the Taku River gauge and download that data. I have data on 9 gages in the Santa Basin, so I hope to get a similar amount for the Taku Basin. This weekend will be focused on finding the remainder of the stream flow data I need and beginning the mapping of the data.



