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GEOS 505
Final Project Problem Statement

Populations and ecosystems in much of the western US are dependent on winter snow as a major source of water. Particularly in the dry, summer months when there is often little or no precipitation, gradual snow melt from higher elevations sustains life down slope. Because of this crucial relationship, understanding snow melt behavior in mountainous watersheds is important for predicting the availability of water during the dry seasons. One way this can be accomplished is by using remote sensing to visually see patterns of snow cover and how they vary over large spatial and temporal scales.

This project will monitor snow melt in the East River Watershed in south-central Colorado by using two different remote sensing datasets to observe snow extent and how it changes throughout the spring melt season. The snow cover extent from each dataset will be compared to see if and how the two differ throughout the melt season. The two datasets are both a product of NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) satellite and are named MODSCAG and MCD43A4. MODSCAG stands for MODIS Snow Covered-Area and Grain Size retrieval algorithm, is available through the Snow Data Systems Portal, which is managed by NASA's Jet Propulsion Laboratory. It uses surface reflectance to calculate per pixel fractional snow cover and grain size. MCD43A4 is available through the Land Processes Distributed Active Archive Center (LP DAAC), which is managed by NASA and the USGS. It uses a bidirectional reflectance distribution function to estimate albedo. Both datasets are available at a daily temporal resolution and a 500m spatial resolution for most of the globe, but will be clipped to the identified study area.

The first step of this project will be to identify 3-5 dates in the same year througout the late snow season (March-June) that are relatively cloud free and can be used for analysis. Snow extent will need to be determined for the MCD43A4 data by calculating the normalized difference snow index (NDSI) and classifying areas as having snow or no snow. A binary snow classification scheme will be developed for the MODSCAG using the available snow fraction data. Once this is complete, I anticipate creating maps to display snow cover from each dataset at the predetermined dates. I will also calculate and display the differences in snow cover extent between the two datasets for each date.