

Rocky Mountain Geographic Science Center

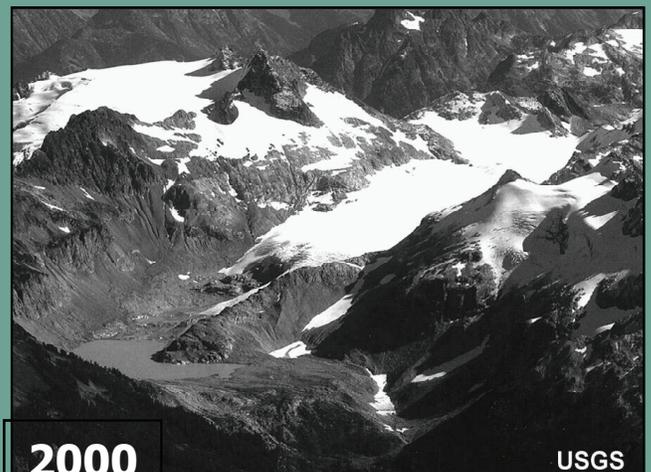
Glacier Monitoring Studies

Glacier Measuring

The U.S. Geological Survey (USGS) Rocky Mountain Geographic Science Center (RMGSC) has assisted the USGS Water Resources Discipline in the generation and analysis of derived products for use in volumetric measurements, glacial recession, and monitoring. Support is provided through image processing, analysis, and technique development. Products have included orthoimagery and derived elevation models. Additional research is being conducted to explore techniques to derive snow and ice coverage statistics using advanced image processing algorithms. The intent of this research is to augment the understanding of glacier conditions and ice extent.



The view (above) depicts the locations of glaciers in the state of Washington that are being investigated. Other areas include glaciers in Alaska and Montana. Data is acquired on an annual basis that represents the extremes for snow pack.



The (above) oblique aircraft photographs of the South Cascade Glacier in Washington, denote changes in glacial extent from 1928 to 2000. (Photographs courtesy of Edward Josberger)

FY06 Highlights

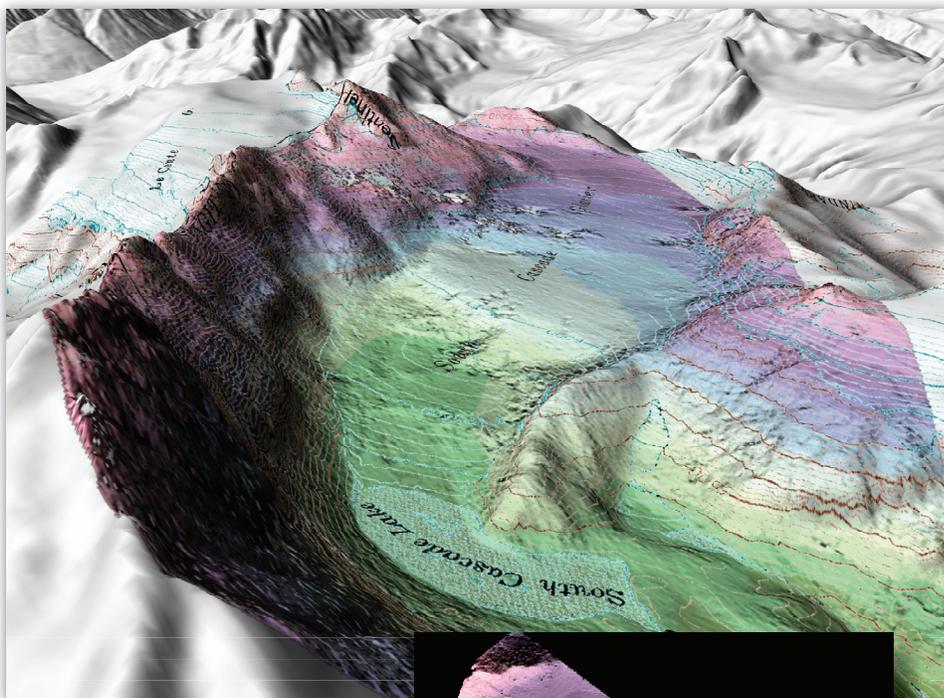
Multiple datasets for 2005 and 2006 were queried, organized, and cataloged in FY06. Enhancements to the current methodology to generate auto-correlated elevation models were investigated. Enhanced methods to generate orthoimagery were also researched to improve the spatial accuracy of the datasets.

FY07 Activities

In FY07, the collection of data over specific glaciers to calculate mass balance differences will be continued. Research efforts will also be continued to investigate process enhancements to generate orthoimagery, auto-correlation enhancements of elevation models, and volumetric analysis techniques. Additional orthoimagery and elevation models will be generated over selected areas from datasets collected in 2006 and 2007. Moreover, analysis of volumetric measurements, equilibrium line altitude (ELA), mass balance, glacial recession, climate relationships, and change dynamics will be examined during the fiscal year.

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The (above) computer generated image is a 3-D representation derived from the Digital Elevation Model (DEM) data of the image on the (right). The techniques are used to determine the annual volume change determinations, the terminus position and equilibrium line altitude (ELA) that is a line for a particular glacier showing net water gain or loss over time. The graph (below) illustrates the accumulation (gain), net, and ablation (loss) for three glaciers in the states of Alaska and Washington.

