



Shrinkage of selected southcentral Alaskan glaciers AD 1900-2010 - a spatio-temporal analysis using photogrammetric, GIS-based and historical techniques

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The knowledge about the recent glacier change in the Chugach Mountains of southcentral Alaska is still scarce. In an effort to fill this gap we took an interdisciplinary approach and reconstructed the history of ten selected glaciers in the vicinity of Valdez (e.g., Valdez Glacier) and Cordova (e.g., Sheridan, Childs and Allen Glacier): Historical data such as early maps and photographs allowed for refining the glacier outlines of the early 20th century. Based upon photogrammetric methods, we further derived elevation models and orthomosaics from various airborne images. The Alaska High Altitude Program (AHAP) imagery, taken during the late 1970s, were the primary data of interest and provided a valuable source of information, primarily because they had not been quantitatively evaluated before. Together with the first USGS maps from the 1950s and most recent data (airborne LiDAR; as well as air- and space-borne optical data), they allowed for determining the volume and area changes that have occurred within the last 60 years.

A GIS analysis revealed that the recent decades have been characterized by rising equilibrium lines and thus retreating and thinning glaciers. The glaciers did not show a consistent recession pattern, which might partly be attributed to the varying area-altitude distributions. Simple hypsographic modeling indicated that the glaciers generally are far away from a state of equilibrium. Given the current climate scenarios and the unfavorable hypsography of most glaciers, the hitherto prevailing trend of glacier melt and recession is likely to continue or accelerate in the upcoming years. Reliably predicting the extents and characteristics of these glaciers at the end of the century remains an important yet poorly answered research question.