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EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS

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ABSTRACT

The percentage of snowcover area on specific drainage basins was measured from ERTS imagery with the Stanford Research Institute console. Basin outlines were electronically superimposed on imagery, and video density slicing used to measure areas. For a basin with 22.6 percent snowcover, results were repeatable to within 4 percent of the snow-covered area. Data from five ERTS and U-2 images of the melt season snowcover in the Thunder Creek drainage basin in the North Cascade Range were combined with existing hydrologic and meteorologic observations to enable calculation of the space and time distribution of the water stored in this mountain snowpack. Knowledge gained from this model can then be used in subsequent years to forecast meltwater runoff during the critical late summer period. Similar data could be used for frequent updating of expected inflow to reservoirs if similar satellite data were available in the future.

Snow-covered area and snowline altitudes were also determined by enlarging ERTS imagery to 1:250,000 and using a transparent map overlay. Under favorable conditions, showline altitude was determined to an accuracy of about 60μm. Ability to map snowcover or to detemrine snowline altitude depends primarily on cloud cover and vegetation and secondarily on slope, terrain roughness, sun angle, radiometric fidelity, and amount of spectral information available.

Clacier accumulation area ratios were determined from ERTS imagery. Also, subtle flow structures, undetected on aerial photographs, were visible. Surging glaciers were identified, and the changes resulting from the surge of a large glacier were measured. Marked changes in tidal glacier termini were discovered between successive ERTS passes.