SEASONAL SNOW AND ICE IN ALASKA'S SUBARCTIC TAIGA

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The subarctic taiga of interior Alaska (between the Brooks Range and the Alaska Range) is occupied by seasonal snow for six to eight months of the year. Snow is a dominant environmental factor, affecting hydrologic regime, aquatic and terrestrial ecosystems, and man's use of high-latitude lands and resources. Two snow "types" are common in the taiga. "Taiga" snow, occupying interior valleys and lower slopes (generally below treeline), is generally less than 100 cm in depth, and is distinguished by extensive depth hoar development and very low snowpack densities-commonly 0.20 ± 0.04 g cm-3, resulting from long residence times (up to 200+ days) and very steep air-to-ground temperature gradients (l°C cm-1). "Tundra" snow, resulting from extensive reworking by wind, is quite variable in depth, depth hoar development, and density (up to 0.45 g cm-3). Tundra snow is common at higher elevations which are exposed to wind action, and on the "north slope" and Arctic coastal plain north of the Brooks Range. Transitional snow types can also be defined, but these type generalizations are valid for interior Alaska.

Aufeis accumulation adjacent to stream channels, and often occupying entire floodplains, is a seasonal phemonenon. Aufeis is common in the valleys of interior Alaska, particularly in permafrost-underlain settings. The development of aufeis in contact with the low density taiga snowpack gives rise to ice/snow/water matrices wherein, even at very low (-400 C) air temperatures, free water is released at ice surfaces and margins and penetrates laterally into the adjacent snowpack. Such conditions pose problems for cross-country trafficability, and can present hazards to structures or facilities in valley settings which are subject to aufeis accumulation.

The shallow, low-density taiga snowpack, in concert with discontinuous-permafrost landscapes, provides snow hydrology conditions markedly different from most temperate settings. The snowpack ablation period is short, as little as ten days from pack "ripening" to disappearance. Vertical redistribution of water in response to steep temperature and vapor pressure gradients results in both exaggerated depth hoar development and in dessication of forest floor and upper soi11ayers. Such drying of the soil mantle provides for meltwater in spring, affecting streamflow responses to snowmelt.