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Snow cover distribution over elevation zones in a mountainous catchment

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A good understanding of the elevetional distribution of snow cover is necessary to predict the timing and volume of runoff. In a complex mountainous terrain the snow cover distribution within a watershed is highly variable in time and space and is dependent on elevation, slope, aspect, vegetation type, surface roughness, radiation load, and energy exchange at the snow-air interface. Decreases in snowpack due to climate change could disrupt the downstream urban and agricultural water supplies, while increases could lead to seasonal flooding. Solar and longwave radiation are dominant energy inputs driving the ablation process. Turbulent energy exchange at the snow cover surface is important during the snow season. The evaporation of blowing and drifting snow is strongly dependent upon wind speed. Much of the spatial heterogeneity of snow cover is the result of snow redistribution by wind. Elevation is important in determining temperature and precipitation gradients along hillslopes, while the temperature gradients determine where precipitation falls as rain and snow and contribute to variable melt rates within the hillslope. Under these premises, the snow accumulation and ablation (SAA) model of the US National Weather Service (US NWS) was applied to implement the snow cover extent over elevation zones of a mountainous catchment (the Mesochora catchment in Western-Central Greece), taking also into account the indirectly included processes of sublimation, interception, and snow redistribution. The catchment hydrology is controlled by snowfall and snowmelt and the simulated discharge was computed from the soil moisture accounting (SMA) model of the US NWS and compared to the measured discharge. The elevationally distributed snow cover extent presented different patterns with different time of maximization, extinction and return during the year, producing different timing of discharge that is a crucial factor for the control and management of water resources systems.