

## SNOW AVALANCHE CLIMATOLOGY OF THE EASTERN SIERRA NEVADA, CALIFORNIA

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**ABSTRACT:** The Sierra Nevada mountain range of California lies between 35° and 40°N and is located within 320 km (200 miles) of the Pacific Ocean. Previous investigators have classified the snow avalanche climate of the Sierra Nevada as a coastal climate zone, with mild temperatures, high-density snowpacks and low temperature gradients. Most avalanches are storm induced. The much steeper and leeward east side of the Sierra Nevada has less exposure to moderating maritime influences and is drier due to the rain shadow effect. The topography is characterized by elevation and latitudinal precipitation gradients. Diverse topographic relief results in canyon-to-canyon microclimates that make regional avalanche forecasting problematic.

The winter of 2003-2004 was characterized by significant late December snowfall followed by mostly dry and unusually cold weather in January and February. Snowpit analyses revealed lower snowpack densities and high snow temperature gradients compared to more typical conditions. Extensive faceted crystal growth, persistent weak layers and depth hoar resulted in an unprecedented number of human triggered, full depth avalanches and numerous close calls including a remotely triggered avalanche.

To better understand the unusual snowpack and avalanche conditions of the 2003-2004 winter, four eastern Sierra stations with climatic and snowpack data records are used to quantify the snow avalanche climate from 1990 to 2004. The elevations of the stations range from 2613 to 2750 meters with almost a degree of latitude separate the northern from the southern station. Temporal and spatial variability within the Sierra Nevada's coastal designation is evaluated using a binary avalanche climate classification. Atmospheric circulation data consisting of December–March 500-mb height anomalies for the time period are used to identify longwave ridges and troughs and the location of the mean annual storm track for the West.

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