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The Climate of Major Avalanche Cycles

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ABSTRACT

Every winter, mountainous areas throughout the world experience numerous snow avalanches. Most are small, killing only one or two people at a time or damaging small amounts of vegetation, buildings or other structures. Some are large, isolated incidents that can kill many people at once or destroy whole sections of towns and villages.

In addition to winters with numerous small or large isolated avalanches, once in a while there is a unique combination of climatic parameters that can develop a major avalanche cycle. Large areas of unstable stratigraphy develop in the mountainous snow cover. This causes the snow to be susceptible to avalanches that can occur over wide areas and/or over long periods of time. When this condition develops, the number of deaths and property damage caused by avalanches increases significantly. For example, a major avalanche cycle in Turkey killed nearly 300 people in 1992. Prior warning of the situation could have saved hundreds of lives.

The likelihood of massive destruction by a major avalanche cycle in places like Europe and North America has been reduced since the mid 1990's because of rigorous avalanche prediction, warning, and control programs that are in place. However, even these modern methods of hazard mitigation are no match for a major avalanche cycle. Without prior planning, stockrooms run out of explosives that are used to control avalanches. There usually are not enough personnel to issue warnings and ensure overworked with many sleepless nights.

Some qualitative efforts have been made to describe the climatic conditions that lead to major avalanche cycles in Canada along the Route 1 highway through Rogers Pass and for backcountry areas of Colorado. Also, some computer models have been developed that use weather data to determine daily avalanche potential in Switzerland, Canada, U.S., Japan, France, and Norway.

This poster describes climate patterns that have caused major avalanche cycles in the United States and Japan. These climate patterns are related to large-scale climate fluctuations (e.g., the El Nino Southern Oscillation). An estimate of the expected change in frequency of major avalanche cycles under future climate patterns is discussed.