Yutaka Yamada
Nagaoka Institute of
Snow and Ice Studies
Suyoshi, Nagaoka 940,
Japan
Tel : 0258-35-7522
Fax : 0258-35-0020

Rain on Snow Disaster Prediction

by

S. Ferguson and P. Hayes
Forest Service
United States Department of Agriculture

T. Nakamura, Y. Yamada, H. Nakamura and Y. Nohguchi
Nagaoka Institute of Snow and Ice Studies,
National Research Institute for Earth Science
and Disaster Prevention
Science and Technology Agency

ABSTRACT

Heavy rain that falls onto an existing snow cover can cause major snow avalanches, slushflows, and contribute to disastrous flooding. These rain on snow (ROS) events occur frequently in the Pacific coastal ranges of the United States and in Japan's many coastal regions. ROS avalanches have killed many people, destroyed structures, and often block major transportation routes for several days at a time. In addition, ROS contributions to floods have swept entire communities away. In other parts of the world ROS events can be equally disastrous. For example, warm monsoon rains, which quickly penetrate through high elevation snow cover in the Himalaya, cause very rapid snow melt that contributes to intense and long lasting floods in the rivers of India and Bangladesh. Loss of lives and livelihoods in this region can be tremendous.

Often there is little or no warning for the onset of these events. Also, the magnitude and duration of related flood, slushflow, and avalanche disasters usually is underestimated. There are few, if any tools available to help anticipate and prepare for ROS disasters.

The physical conditions that cause snow to be washed away and melted by impending rainfall have been studied by hydrologists and avalanche scientists throughout the world. Much is already known and continuing studies are improving our knowledge. In addition, there are some efforts to subjectively predict ROS events 1-6 days in advance. Also, there have been a few qualitative descriptions of the seasonality of ROS events.

This poster identifies disasters that have been initiated or enhanced by heavy rain falling on existing snowcover in Japan and the United States. Scenarios that describe the climate during high frequency and/or large magnitude ROS events are defined then compared to predictable weather parameters (e.g., 24-hour rainfall and accumulated snow on the ground). These comparisons can be used by forecasters and hazard planners to help anticipate the timing and magnitude of individual ROS events 1 to 6 days in advance.