Annals of Glaciology 16 1992

Avalanches in the Tien Shan mountains, China

WEI WENSHOU
Xinjiang Institute of Geography, Academia Sinica, Ürümqi 830011, China

INTRODUCTION

Climate, snowpack and avalanche observations have been made at the Tien Shan Snow and Avalanche Research Station, Chinese Academy of Sciences (84°24′ E, 43°16′ N, 1776 m a.s.l.) over a 20-year period. This area has a dry continental-type climate. Snow accumulates from the beginning of October to the end of April and the mean maximum snow depth is 0.84 m.

Temperature gradients of 0.21 to 0.34°C cm^{-1} have been measured in snowpacks (Ma and Hu, 1990). Depth hoar usually begins to develop in mid-December and up to 75% of the snowpack may be depth hoar by spring. Some measurements of snow texture, density, hardness, shear strength, and settlement rates have been made. New snow density ranged from 50 to 120 kg m^{-3}, the Kinosita hardness varied from 6.7 to 15.4 g cm^{-2}, and the shear strength ranged from 34 to 267 Pa (measurements made at −10°C and shear speed of 1.2×10^{-4} m s^{-1}). Density, hardness and shear strength increased with age of the snow. The density of depth hoar ranged from 300 to 360 kg m^{-3}, the hardness was 44.1 to 138.3 g cm^{-2}, and the shear strength ranged from 591 to 793 Pa (measurements made at −10°C and shear speed of 1.2×10^{-4} m s^{-1}).

CONCLUSION

Mid-winter avalanches of dry new snow are common on slopes steeper than 40° when the depth of snow cover exceeds 0.30 m. For example, avalanche path No. 1 near the research station has a slope of 42°. Avalanches occur on this path when the thickness of snow cover reaches 0.30 m. During spring, the liquid-water content of the snowpack increases (up to 17%) and avalanches are common on slopes greater than 30°. For example, a full-depth avalanche occurred on avalanche path No. 4 (slope angle: 33 to 38°) at 1800 h, 20 March 1991. Measurements made soon after the release showed that the fracture was 0.53 m deep and 62% of the snow was depth hoar. During times of rapid warming, full-depth wet snow avalanches were released on much shallower slopes. For instance a full-depth avalanche occurred on avalanche path No. 5 (slope angle: 17°) after the average air temperature had increased by 6°C over the previous two days.

REFERENCE

Ma Weilin and Hu Ruji. 1990. Relationship between the development of depth hoar and avalanche release in the Tian Shan mountains, China. *J. Glaciol.*, **36**(122), 37–40.

The accuracy of references in the text and in this list is the responsibility of the author/s, to whom queries should be addressed.