

The probability of precipitation as snow derived from daily air temperature for high elevation areas of Colorado, United States

S. R. FASSNACHT¹, N. B. H. VENABLE², J. KHISHIGBAYAR³ & M. L. CHERRY¹

1 ESS-Watershed Science, Colorado State University, Fort Collins, Colorado 80523-1476, USA
steven.fassnacht@colostate.edu

2 EASC-Watershed Science, Colorado State University, Fort Collins, Colorado 80523-1482, USA

3 Rangeland Ecosystem Science, Colorado State University, Fort Collins, Colorado 80523-1472, USA

Abstract Precipitation phase affects the energy balance of the Earth's surface. Snow formation depends upon atmospheric conditions and is driven mainly by temperature. Dewpoint and air temperature thresholds at or near freezing temperatures have been used to determine precipitation phase in some climates, but may not adequately represent the same phase of precipitation in snowy and semi-arid regions, nor are relative humidity data available at many stations. The objective of this study is to describe relations between average air temperature and probability of snow for nine high elevation (>2000 m) meteorological stations across central Colorado, USA. Fifty years of data were analysed, generating snow probabilities from ratios of the number of days with snow and days with precipitation. These were compared to the average daily temperature during precipitation using 0.2°C intervals. Best-fit linear relations reveal higher probabilities of snowfall in the study areas at temperatures several degrees warmer than previously published curves.

Key words snowfall; precipitation; semi-arid climate