We apply a very simple point-scale seasonal description of snow processes, expressed using dimensionless variables, to predict the snowpack climatology at several hundred locations in the western USA. The model is climatological in nature, and is not intended for detailed temporal or spatial simulation of snow conditions. It is, however, potentially suitable as a screening tool for identifying dominant processes, and for investigation of broader-scale questions such as the effect of climate change and climate variability on snow and water resources. Previous studies have shown that the model is useful at some locations in the western USA with a continuous snowpack, and also at a range of sites in Austria. This research significantly expands the range of test sites, to provide more challenging tests of the model.

The model uses four dimensionless variables as inputs which describe the hydro-climatology of snow/ice-dominated regions. The variables are: a scaled mean temperature; a measure of the seasonality of precipitation; a measure of the magnitude of snowfall relative to snowmelt; and a measure of within-season temperature fluctuations. These input variables are used to make uncalibrated predictions of snowpack climatology at all Snotel stations in the western USA for which suitable data are available. The predictions of peak snow accumulation and of dates for the start, peak and end of the snowpack are compared against observed data, and shortcomings of the model are explored.