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Atmospheric circulation patterns associated with heavy snowfall events,
Bridger Bowl, Montana, U.S.A.

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ABSTRACT. Predicting heavy mountain snowfall, which is critical for avalanche hazard forecasting, is difficult due to complex interactions between rugged topography and atmospheric circulation. In this study the relationship between atmospheric circulation patterns and extreme snowfall events is examined at Bridger Bowl, Montana, U.S.A. which has a 26-year winter record of daily snowfall. Five hundred mb composite and anomaly maps were constructed for days of heavy snowfall (greater than 32.8 cm). These maps show that during and prior to heavy snowfall, Bridger Bowl is located beneath the back side of a upper-level trough, with predominant winds and storms coming from the northwest. This atmospheric circulation pattern differs from those for other high-elevation sites in the North American interior due to the surrounding regional topography. High mountain ranges to the southwest and west often block incoming moisture, while relatively lower topography to the northwest allows Pacific moisture to reach Bridger Bowl. The results of this study can be used to complement operational forecasting models for predicting heavy snowfall at Bridger Bowl, thereby facilitating snow avalanche forecasting in the region.