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A conceptual model of avalanche hazard

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Conventional avalanche forecasting is practiced as a mix of deterministic treatment for snow and weather parameters and inductive logic to reach actual forecast decisions (LaChapelle, 1980). Avalanche forecasters subjectively integrate a complex array of data and evidence to reach their decisions, often operating under a high degree of uncertainty. Spatial scales in avalanche forecasting are widely variable, ranging from slope specific predictions to large, regional areas characterized by significant variation across space, and over time. Thus, forecasters must synthesize the available evidence, and extrapolate this across the landscape by relying on their knowledge of the terrain.

In this poster, we provide a new approach to avalanche hazard assessment based on a comprehensive, risk-based examination of the process. We decompose avalanche hazard into its base components, and reassemble them into a probability-consequence framework. The resulting conceptual model of avalanche hazard mimics the expert reasoning process, and offers a meaningful pathway from individual field observations to the final hazard assessment. The framework applies to all operational forecasting situations (e.g. public bulletins, ski areas, backcountry operations and highways), and clearly highlights the similarities in their assessment methods. Furthermore, this model allows a more explicit integration of scale and uncertainty, has a high educational value because of its transparency, and offers a unifying platform for avalanche hazard assessments and danger ratings by promoting consistency.

The complete manuscript describing this work is currently in the final stages for submission to a peer-reviewed journal. Please contact the corresponding author to receive a copy of the accepted manuscript.