pack development models, as well as identifying snow layered structures that will impact snow melt dynamics.

P4.5

USING TIME LAPSE PHOTOGRAPHY TO DOCUMENT TERRAIN PREFERENCES OF BACKCOUNTRY SKIERS

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This paper develops a method to capture the terrain metrics of all visible skiers on an avalanche-prone backcountry slope adjacent to an operating ski area. A remote time-lapse camera focused on Saddle Peak, a high skier-use backcountry slope in the Bridger Mountain Range of southwest Montana, USA, captured 31960 photos of 525 skiers (N = 7499) descending in ten-second increments over 13 days. Skier locations were digitized from the photos, then transformed onto a geo-referenced digital elevation model (DEM) such that terrain metrics could be applied to each of the 7499 skier locations.

Analysis of terrain metrics for each skier point compared slope, profile curvature (downslope), and plan curvature (cross slope) over days with different forecasted avalanche hazard. Terrain metrics on Considerable avalanche hazard days differed significantly from Moderate or Low avalanche hazard days (p-value < 0.001). Data transformed from the oblique photos to the geographic coordinate system for all skier point locations had an observed horizontal spatial accuracy of 49-m with a 95% confidence interval. By capturing all visible skiers on a slope anonymously, the data collected provides a large and diverse data set of the terrain preferences of backcountry skiers under varying conditions.

Time lapse photography presents a simple and inexpensive tool for effectively monitoring ski areas in avalanche terrain. Skier images can be useful in determining high-use areas of skier traffic, crowding or congestion issues, documenting avalanches, and recording avalanche control operations. It has also proven to be useful with assisting avalanche emergencies by providing visual survey of the avalanche path including determining number of people (if any) involved, identifying triggers and last seen points, and assessing residual risk to responders.

P4.6

SIMULTANEOUS USE OF DIFFERENT TECHNIQUES IN ASSESSMENT OF SPATIAL-TEMPORAL VARIABILITY OF THE CHARACTERISTICS OF SNOW COVER

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The spatial and temporal variability in the characteristics of snow cover and identification of the corresponding snow structure and snow cover properties changes can be assessed by different techniques. However, each of them has certain limitation and the results are rarely accurately compared due to rare possibility of simultaneous use of different devices. The aim of the study was to understand the “background” variability in various snow cover characteristics as represented by different methods. The selected area was the flat and uniform in vegetation area at the Meteorological observatory of the Lomonosov Moscow State University (Moscow). The involved methods included provided by Leica Viva (GS08, GS10) cm-accuracy measurements of the positions of the basic points at the soil and snow cover surface with mathematical analysis of the results by Leica Geo Office-8 and Leica Infinity, results of measurements by Scanning tacheometer Leica Nova MS60, results of drone surface scanning with standard optical camera attached to the drone, 20-m-length snowpits with snow depth and snow structure description and the SnowMicropen profiles each 50 cm along these snowpit. Additionally snow depth by ultrasonic sensor and the standard meteorological data were recorded. The data analysis showed high variability in snow depth and snow structure despite the uniform morphological conditions and assuming the same meteorological conditions over the area. The differences in the variability as presented by different techniques would be discussed.

P4.7

USING A WEBCAM NETWORK FOR STUDYING SNOWCOVER SEASONAL SPATIAL DYNAMICS: AN APPLICATION IN MEDIUM MOUNTAINS (JURA, FRANCE)

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Snowcover dynamics, specifically through climate change influence, is a key factor in medium mountains, influencing several human activities such as tourism, agriculture, drinking water resources... The water stock is however challenging to monitor in such environment, due to a spatial inhomogeneity. In medium mountains, the rain/snow limit may not be as obvious as a simple altitudinal gradient. Indeed, the Jura mountain range exhibits lots of areas with specific microclimate, whether due to the specific topography/micro-topography, geomorphological features or