Geophysical Research Abstracts
Vol. 20, EGU2018-13893, 2018
EGU General Assembly 2018

Monitoring Snowbank Processes and Cornice Avalanching with Long-term Environmental Time-Lapse Photography

Jeffrey Munroe
Middlebury College, Geology, Middlebury, United States (jmunroe@middlebury.edu)

Long-term environmental time-lapse photography was employed to monitor the evolution of a snowbank in the Uinta Mountains, Utah, USA. The snowbank forms against a 35-m high, east-facing escarpment and is nourished by wind redistribution of snow from an extensive alpine plateau located upwind to the west. The snowbank is capped by a large cornice extending from the lip of the plateau, and the central core of the snowbank persists through the summer in most years. An automated, solar-powered digital camera was deployed between October, 2016 and June, 2017, and programmed to capture 5 photographs of the snowbank each day between 8:00 and 16:00, local time. Cold temperatures negatively affected the batteries during the winter, reducing the number of photographs collected some days. Nonetheless, a total of 812 photographs were collected, for an overall average of 3.4 per day. These images were combined in an animation displaying the growth of the snowbank and associated cornice over the course of the winter. The debris fields resulting from nineteen cornice fall avalanches were noted in the sequence of photographs. In some events, only a part of the cornice broke free and fell, whereas in other events wide sections of the cornice collapsed. The first recorded avalanche occurred one month after the start of snow accumulation. Consideration of data collected at a nearby automated weather station reveals that 12 of the avalanches (between early December and early April) were preceded by intervals with significant increases in snow depth, snow water equivalant, and precipitation, with sustained windspeeds above the winter average. In contrast, six of the last seven events (between late April and early June) occurred in the absence of new snowfall, but were associated with rapid rises in temperature, with an average increase of +12.0 °C and a mean rate of 0.3°C/hour. These events were also associated with notable decreases in snow water equivalant, implying rapid snowpack melting. The average interval between recorded avalanches is 10 days, with a longest interval of 29 days and a shortest of 2 hours. Recurrence intervals were shorter in December/January, in late March/early April, and in late April/early May. Only one avalanche occurred in the 56 days between 27 January and 24 March. The results of this project underscore the strong potential of long-term environmental time-lapse photography as a tool for monitoring nival processes.