Geophysical Research Abstracts
Vol. 12, EGU2010-12200, 2010
EGU General Assembly 2010
© Author(s) 2010

Snow Surface Scaling and Roughness in Mountains

Michael Schirmer and Michael Lehning
WSL Institute for Snow and Avalanch Research, SLF Davos, Davos Dorf, Switzerland (lehning@slf.ch)

The recent development of suitable remote sensing techniques for area-wide measurements of snow distribution (Terrestrial and Airborne Laser Scanning) allows an in-depth analysis of the snow cover in varying terrain. We present multiple TLS measurements over very complex high Alpine terrain. For the first time, the snow surface development was studied for individual storms. It was observed that the characteristics of an inter-annual consistent snow distribution found at the time of maximum accumulation was mainly formed by one type of individual snow storm event, which repeatedly appeared during the accumulation season. This intra-annual consistency was less pronounced (maximum correlation coefficients between two events of 0.73) than the inter-annual consistency (correlation coefficient between the two years of 0.97). This suggests a convergent behavior of snow depth development formed by comparable storm events. The similarities between individual snow falls as well as the characteristics of the snow cover development were investigated with a fractal analysis. The scaling properties for snow depth and snow depth changes inferred from uni- and omni-directional variograms quantitatively showed that overall snow depth may become what conventionally has been termed “smoother” during an accumulation season. A general trend towards larger scale breaks was observed, which suggests a small but significant shift towards processes acting on a larger scale. This is consistent with the picture of small terrain depressions being successively filled in. In addition to the similarities between snow storms, this points to a modified but not completely altered summer terrain that strongly influences snow depth distribution. These terrain-induced roughness features are on top of the very small scale snow roughness caused by ballistic deposition of individual snow flakes.