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Physical properties of snow cover in Alps: insight from the Davos area (Switzerland) and Veneto-Friuli Venezia Giulia regions (Italy)

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he European Alps cover an area ranging between 6° and 15,5° E longitude and between 44° and 47,5° N latitude. Many authors described the climatic differences between the southern and the northern side of the Alps. There are, however, few studies on the snow cover characteristics (e.g. snow hardness, snow density, grain size) related to the different climatic areas.
Determining the local snow cover characteristics is important for many purposes like snow water equivalent (SWE) estimations; local calibration of snow cover models; determination of the correcting factors for the methods to derive the snow stability based on the snow cover characteristics (e.g. the threshold sum approach).
In this work we analysed about 8.000 manually inspected snow layers both on slopes and flat terrain. The snow profiles were performed in different micro-climatic areas including Veneto and Friuli Venezia Giulia regions in the Southern side of the Italian alps and regions around Davos, Switzerland in the Northen part of the Alps. In this study we analysed snow hardness, snow density, grain type and grain size.
First results show that the relative differences in snow hardness and snow density related to the different grain types are similar in the studied datasets. On the other hand, absolute differences in snow density are consistent with the climatic differences between the two investigated regions. The snow hardness and snow density of the kinetic growth layers seem to be influenced by the total snow height much more than the layers composed by rounded grains.
The grain size estimation shows a large variability between the datasets related to the different measuring methods used in the avalanche centres. In this way the observed differences can not be related to the climatic differences. This problem may have affect the reliability of methods (as the "threshold sum approach" based on snow structural characteristic analysis, including grain size) to derive snow stability at regional scale. A discussion between the avalanche forecaster commissions would be recommended in order to improve as much as possible the uniformity of the grain size estimation methods.