



## Characterizing snow seasons through the application of a new Multivariate Snow Index

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The European mountain bioregion are potentially vulnerable to the effects of climate change, both from an ecological and a socio-economic perspective. At the end of the 21st century, the level of greenhouse gases will play a fundamental role in emission scenarios and temperature increases. In recent decades, the snow depth in the European mountain regions like the Pyrenees has tended to decrease due to a rise in average temperature and precipitation variability. Several sectors, such as snow tourism and hydroelectric power generation, have been affected by this changing snow trends. In order to follow the winter snow seasons, a multivariate snow index (MSI) has been proposed to characterize the climatic variability of the snowpack in time and space, with the aim of detecting extreme changes. This new index consists in the objective characterization of the snowdepth anomaly and is based on high/low quantiles of daily maximum snow height distributions to characterise the seasons in terms of surplus or scarcity. This approximation is more suitable for making comparisons between regions and detecting variations in climatic extremes and could be applied to snow data sets from any region, at different spatial scales and for both the present and future climate. The analysis of extreme trends in duration and intensity helps to identify areas where the decrease in these parameters are more relevant and statistically significant. In this sense the proposed indicators will complement the classical snow indicators that are currently monitored, helping to provide a better regional characterization of the temporal evolution of the snowdepth.