

# The vulnerability of Pyrenean ski resorts to climate change

October 9th, 2015



The vulnerability of the Pyrenean ski resorts to projected changes in the snowpack under various future climate scenarios has been analyzed. A shorter ski-season length is projected especially in low-altitude ski resorts in a moderate climate change scenario (2°C increase at the end of the 21<sup>st</sup> century) and for all ski resorts in a more intensive climate change scenario (4°C increase).

Average minimum snow depth to operate a ski resort is assumed to be 30 cm. Ski resorts reaching the 30-cm threshold during at least 100 days per winter season (natural and artificial snow combined) are considered as being reliable. At present, 83% of the ski resorts are considered naturally reliable in an average winter season, and 98% when snowmaking capacity is taken into account. Assuming a future increase of 2°C in winter mean temperature, this share would be reduced to 44 % (85% including snowmaking). Under 4°C winter temperature increase the total share of reliable ski resorts in the Pyrenees would be dramatically reduced to only 7% (and no improvement with snowmaking).

Snowpack is most affected by climate change in the eastern part of the Spanish Pyrenees; south-oriented slopes are most vulnerable. Pyrenean ski resorts closer to the Atlantic Ocean, located at higher elevations, and/or with northerly orientation are most resilient. Spatial distribution of snow in mountain areas is characterized by high variability within very short distances due to complex interaction between meso-scale meteorology, local topography, and weather factors.

Snowmaking cannot completely solve the problem for all ski resorts in the Pyrenees, as the measure can only act as a robust adaptation strategy in the region provided climate change is limited to +2 °C snowmaking.

Source: Pons et al., 2015. *Climatic Change* 131: 591-605.

Photo: Aitor Salaberria ([www.flickr.com](http://www.flickr.com))