

Temperature inversions and cold-air pools study in Picos de Europa surroundings

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Using surface temperature data from dataloggers located at the bottom of four different high-altitude (2000 m MSL) glaciokarstic depressions in Picos de Europa (Cantabrian Cordillera, Spain) from January 2012 to September 2016, we have analyzed the evolution of more than 200 different cold-air pools events according to different geomorphologic parameters. The ski-view determinates the cold-air pool occurrence and the temperature range, and the depression's depth is a very important factor in the permanent cold-air pools (PCAP) formation. Depending on the structure of the thermal curve, we classified all cold-air pools in each depression by using a conceptual model with eight different modes. With wind and relative humidity data, supplied by a weather station situated near the depressions, and NCAR-NCEP reanalysis data, we have characterized them at mesoscale and synoptic scale. If the ski-view is small enough, we can have undisturbed cold-air pools even though disturbed wind conditions. Snow-covered and non-snow-covered events were measured during the campaign, which allow us to recognize its influence on the temperature inversions. We also identified and analyze several permanent cold-air pools events where December minimum temperature record of $-30,6^{\circ}\text{C}$ in the Iberian Peninsula was measured. We also make a deep analyze of the Iberian Peninsula historical minimal temperature record of $-32,7^{\circ}\text{C}$, which was measured on February 2016. Finally we use and test a simplified three-layer radiative model to describe and verify the influence of different geomorphologic factors in the cooling process of all the cold-air pools.