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Study on frozen nuclei in the winter season in the northern mountains of Madrid (Spain)

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In the Framework of Studies that the Group for Atmospheric Physics from the University of León has been developing about winter precipitation in the mountains of Madrid, one of the experimental objectives consists of the measurement of concentration (L-1) of frozen nuclei (IN) at the ground level, using an isothermal cloud chamber. The Experimental Center is found in the reservoir in Sierra Guadarrama, located about 50 km north of Madrid, at a height of 1294 meters above sea level. The sample is of 234 days, of which 119 showed precipitation, corresponding to three winter seasons (2008/2009, 2009/2010 and 2010/2011). The chamber is capable of operating at different temperatures. Making use of past experiences, we set the working temperature at -23ºC. The principle objectives of the study were, on one hand, to determine the distribution of nuclei concentrations, and on the other, to analyze if this distribution presented similar behaviour, extracting days with precipitation from the sample. The results show that the concentration of nuclei is low. To be exact, on 75% of the days analyzed, this statistic did not exceed 25 L-1. With respect to the second objective described, we saw that the distribution of the concentration stayed very similar in those days in which ground precipitation was registered. In other words, precipitation was not associated with an increase in the number of nuclei. Finally, given the relative proximity of the Experimental Center to the city of Madrid, we took measurements of aerosols to analyze their possible influence on the presence of the nuclei. The results did not allow us to infer a statistically significant relationship between both concentrations.

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