Goodbye to cold nights

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Given the impact of climatic extremes on agriculture and health in Spain, researchers at the University of Salamanca (USAL) have analysed the two factors most representative of these thermal extremes between 1950 and 2006 - warm days and cold nights. The results for mainland Spain show an increase in the number of warm days greater than that for the rest of the planet and a reduction in the number of cold nights.

Few studies to date have focused on climatic extremes and the changes occurring in maximum and minimum temperatures and in warm day and cold night variables. Until now, most research studies had analysed average temperature changes on a global scale. These results indicated an increase "most probably" caused by human factors.

The new study, published in the journal *Climatic Change*, has made it possible to analyse the causes of the variations in climatic extremes from a physical point of view, in other words "which changes are taking place in the air masses reaching the Iberian Peninsula, as well as sea temperature", as Concepción Rodríguez, lead author of the study and a researcher at the General and Atmospheric Physics Department at the USAL, tells SINC.

"The results indicate an increasing trend in the frequency of warm days and a reduction in the frequency of cold nights. The trend towards the reduction of cold nights correlates with that obtained at global level, according to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). However, the increase in warm days in mainland Spain is higher than the number obtained globally for the

planet as a whole", the scientist explains.

The atmosphere and oceans are thermometers

In order to explain these differences, the scientific team linked the increase in warm days with climate teleconnection indices, which show the variability of atmospheric and oceanic characteristics. "Warm days are related to atmospheric teleconnection patterns, while cold nights are caused, principally, by the temperature of the sea (in the North Atlantic)", the researcher adds.

Weather that draws air masses up from the north of Africa is the leading cause of warm days. "The type of weather that causes more cold nights is the depression over the Gulf of Genoa, which brings cold and dry air from central Europe to Spain", explains Rodríguez, who says that the change in the number of warm days and cold nights is much more pronounced in the south west and north east of the Iberian Peninsula. "One of the most probable causes of these changes is the variation in the surface temperature of the sea in the eastern Atlantic", she points out.

Last July, the researchers presented their study for the whole of Europe at the Congress on Statistics and Climatology in Edinburgh (Scotland). This study showed a "fairly significant" increase in warm days and nights in summertime.

More information: Rodríguez-Puebla, Concepción; Encinas, Ascensión H.; García-Casado, Luis Alberto; Nieto, Susana. "Trends in warm days and cold nights over the Iberian Peninsula: relationships to large-scale variables" *Climatic Change* 100(3-4): 667-684, June 2010. DOI:10.1007/s10584-009-9721-0

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