

Interactive comment on “Attributing trends in extremely hot days to changes in atmospheric dynamics” by J. A. García-Valero et al.

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Hello, I read the manuscript with interest, because my work is also focused on temperature extremes and their attribution to various forcing. Since I have some geographical background, I am interested in regionalization studies.

However, I think it is quite difficult to attribute regional changes of EHD just over Spain. In my opinion, the area is too small to obtain "significantly" different circulation patterns. In Figure 3, the circulation patterns look very similar to me. Are you sure that the circulation types are really different?

Thanks for your interest in our work. Right, to attribute regional changes in extremes is a difficult task, specially if the method employed makes use of general CT classifica-
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tions (those obtained using all days from a long period). In this case, the extreme situations represent a small portion of days respect the total clustered days. This provokes that they could be assigned to groups very distant to the real atmospheric situation. The method proposed here firstly clusters the extreme days, characterizing specific CTs and ensuring that atmospheric situations linked to extreme events are included inside coherent clusters. Second, for the exercise of attribution, only days with similar characteristic to the obtained centroids are assigned to these CTs (if not similar are assigned to an "trash" group. In this way, we ensure that frequencies of CTs be more realistic for trend analysis. In addition, the use of regional information to obtain the CTs also facilitate the increase of the signal-to-noise ratio of the links between CTs and regional EHD occurrences.

Important EHD trends in summer maximum temperatures in Spain have been reported by numerous studies observing an important spatial variability (largest trends in inner regions). Despite of the size of the Iberian Peninsula, the interaction of the atmospheric dynamics with its complex orography (high-land plateaus, great depressions, mountain configurations, its position at midlatitudes, bounded by the Atlantic Ocean and Mediterranean Sea, etc) provokes a great climate variability. Therefore, regional studies like for our area have all sense.

The CTs presented for each classification (SLP-T850, Z500-T850, SLP-Z500) are different. Despite CTs are represented for a large-synoptic window, CTs are obtained using a small window centered over the Iberia Peninsula (see the discussion in relation to this in the response to the referee 1). Therefore the main differences should be found inside this window. In addition, CTs must be analyzed taken into account both variables employed, SLP and T850 of Figure 3. If you take into account these considerations, you will find significant differences among the CTs of Figure 3. On the other hand, a clear proof of that is the differences between the impacts of such CTs on EHD distribution that you can find in same figure.

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