NHESS-2017-181

Towards a monitoring system of temperature extremes in Europe

Christophe Lavaysse, Carmelo Cammalleri, Alessandro Dosio, Gerard van der Schrier, Andrea Toreti and Jürgen Vogt

General comments:
This is an interesting work, with an interdisciplinary (climate vs health sciences) view, including a reach bibliography in this sense, that fits very well in NHESS and can serve as a reference in discussing concepts like the definition of a heat and cold wave. Nevertheless, I would ask for some clarifications regarding concepts and also for several corrections before final publications. The authors recognise the need of including a reference to human health effects in the definition and intensity determination of heat and cold waves, following WMO recommendations and previous authors statements. In this sense they indicate that the effects on human health can be more related with absolute thermal extremes than to climatological anomalies, but all the work they have done is regarding climatological anomalies, not absolute extremes. The authors are mentioning that the third index of intensity they propose (I3) is oriented to absolute extremes, but I think this is not totally true: the seasonal component of the anomaly (that is clearly influencing both the detection and the I2 intensity) is removed with I3, but no the effect of the geographical, climatic or latitudinal conditioning is not. The reference to calculate differences is always place depending; it depends of the grid point climate, even when the seasonal average is considered to define the reference. I3, for instance, is more measuring the climatological rarity than a risk for the human health, unless the risk for human health is as much depending of the climatological rarity than of the absolute extreme values. In other words, is a summer temperature of 30 degrees in Lapland as much dangerous for human health as 45 degrees in southern Iberia? More clarity about this question would be appropriate in this work, which area of study is geographically/climatologically quite large.

Specific comments/corrections:

- (Lines 110-113) Are six month periods short enough to be considered as summer/winter events?
- (Lines 117-118) Is the 11 days' window only used in constructing the calendar of maximum and minimum temperatures?
- (Lines 135-136) It seems that the only pool accepted within a heat/cold wave is a one-day pool, then the word "less" is not appropriate
- (Lines 145-150 and tables 1 and 2) The numbers in the tables seem to be space mean/average values. Are they total or time mean/average values (per year?), referred to the 21 years' period? 17 heat waves and 25 cold waves per year, in every grid point, on spatial and time average, seem to be many waves. Around one per year, only, seems to be a small number. The number of hot and cold days' forces to think in the second interpretation. In addition, regarding hot and cold days we can hope equal number of

days within the extremes percentiles (0.9 and 0.1, respectively) for Tmin and Tmax. This is the case for cold days, but not for hot days: why not?

- (Line 156) Are 0.9 and 0.1 the only possible values for Thres?
- (Lines 156, 164, 172) Des N include the pool day, if any?
- (Line 235) I don't understand the first sentence
- (Lines 241-243) There is here a coherent explanation for an experimental result, but it is a quite surprising assessment for me: it is supposed that the oceans are stabilising factors for the temperature, reducing the variability (?)
- (Lines 271-286 and figures 9 and 10) The problem with the 2003 summer in south-western Europe was the repetition of hoy events in the same summer, perhaps not all of them strictly fitting the heat wave definition, but with a dangerous accumulative effect. When taking only one of the events (the strongest heat wave) appears France with a role that perhaps is not very realistic. Perhaps the sum of intensities in the year of larger sum could be a complement or a substitution for the results shown … (?)
- (Table 3) I don't understand this table well. Would you like to be more clear?
- (Figure 7) It seems to me that the squares c) and d) are exchanged