

Review:

The European 2015 drought from a climatological perspective

Ionita et al.

This article reviews the European Summer drought of 2015, describing in detail the larger scale climatological characteristics of the drought event, and trying to identify the key drivers that led to the establishing of drought conditions, particularly over the Southern and Eastern Europe. The article is well written and provides a very comprehensive review of the drought event. Additionally a comparison is provided with the 2003 drought event, which showed some distinct differences in spatial extent and initiation, but also similarities with respect to larger scale circulation patterns and the occurrence of anomalously high SST's in the Mediterranean. I think this article, together with its companion paper that studies the 2015 drought event from the hydrological perspective, provide an important insight into the links between the climatological circumstances that lead to drought, the impacts these have on meteorological and hydrological conditions, and the impacts these have on society. I am sure these articles will provide a good reference both to studies that for example explore how climate change may affect the occurrence of drought over Europe, as well as more detailed studies of the 2015 drought and its impacts.

General Comments

While reading the article I was intrigued by the pivotal role of the Mediterranean SST's. One of the objectives of the article is to identify the drivers that lead to the establishing of drought conditions, with the Mediterranean SST's being noted as an important driver. However, the causal relationship is not very clear. I am not a climatologist, so this may be a trivial question, but could the causal relationship be exactly the other way round – i.e. could it be that the warmer SST's in the Mediterranean are the result of the anomalously warm air temperatures. In particular the authors note that in the 2003 event, which started in Spring, the warmer SST's only established themselves in Summer. Also in the discussion, the authors note that the causal effect of the Mediterranean SST's are identified in some studies, but contradicted in others. My question is then if there is more information available from other studies on the causal effect of these warm SST's, or if the reverse causal relationship is possible. I think this is of particular interest to possible anticipation of drought conditions over Southern and Eastern Europe.

Related to this question, the authors have compared the 2015 and 2003 drought events, noting differences in spatial extent but also similarities. While a detailed analysis of other historical drought events would be beyond the scope of this paper, it may be of value if the authors provide any additional information on coincidence of those events with the anomalies in the climatological indicators (e.g. NAO, EA, SCA, Mediterranean SST's) found in 2003 & 2015.

Detailed Comments:

Page 2, Line5: Mention is made of drought impacts of 5000 Billion. I find this number somewhat large. A quick check of the table in the EEA publication reveals this should be about 5 Billion (4.94), or 5000 Million. Please correct (this number is also repeated later in the paper on page 3).

Page 2, Line 15: "*was the warmest on record*" from the context it is implicit that this is globally. To clarify I would add the word "*globally*".

Page 2, line 17: "*air temperature record, which were broken*"

Page 2, line 19: "*50 years, where only 2003 had lower rainfall*"

Page 3, Line 13: "*precursor to dry*"

Page 3, Line 18: "*was managed are described*"

Page 4, Line 24: I would rather use "*values lower*", as larger could be confusing.

Page 6, section 3.2: The authors choose to analyse SPI3 and SPEI3. Whilst I agree that this is a good choice given the duration of the events studied, it may be worth commenting on the reason for choosing 3 monthly accumulations, and not 6 or 12 monthly. I would expect this may be relevant for some drought impacts, or even occurrence of hydrological drought (described in the companion paper). Perhaps the authors can add a short note motivation their choice.

Page 7, line 25: It is noted that the SST's were the warmest in 160 years, shown also in Fig 5. What is the reference/source of this time series. This should also be added in section 2.3.

Page 8, line 15: should this not be descending motions?

Page 8: line 19: "*throughout the summer*"

Page 10, line 6: either in "*the western and central part of Europe*" or "*Western and Central Europe*"

Page 10, line 17: I would rephrase the sentence starting "*In summer 2015*". It is confusing. I would suggest to change to "*In 2015, the drought conditions became more evident and accentuated in summer, especially..*". It is then clearer that the emphasis is on the timing.

Page 10, line 34: "*Mediterranean Sea alone could not produce the heat wave*"

Page 12, line 11: "*of the blocking patterns over Europe*"

Page 12, line 20: "*the summer 2015 event, was*"

Page 13, line 1: "*The summer*"

Page 13, line 28: "*caution should be taken*"

Figures:

Figure 1: This figure seems somewhat redundant, and also the figure itself is not very informative. I would expect that the figure would be more relevant to the accompanying paper. Also the discharges of 2015 are compared against the Q80 discharge. It may be more informative to compare against the mean monthly discharges. I would suggest dropping this figure. The reference in the discussion to the accompanying paper should suffice.

Figure 8: While this is included in the Supplementary material, it may be worth extending these figures to 2003 (or 2002) for reference purposes.

Figure 11, caption: "*The anomalies were computed*"