

Reply to Review of “Simulating record-shattering cold winters of the beginning of the 21st century in France” (Reviewer #1)

We thank the reviewer for their careful reading of our manuscript and their constructive remarks. Our replies are in red.

In the paper the authors use rare-event algorithm for sampling and simulating cold spell events in France in order to evaluate their dynamics. They use winter DJF 1963 as a reference and then used a weather generator method to simulate the coldest winter that occur in two periods with less and more effect of climate change. Their results show that the frequency of cold spells is decreasing but their intensity remains stationary and that few simulated cold spells reach the intensity of the winter 1963. They also analysed the atmospheric circulation of the observed and simulated events.

The paper is highly technical and often hard to follow, with many grammatical errors so that I suggest to have it checked by an English native speaker. Said so, the topic is very interesting and I believe that this can be published in WCD after addressing some comments below.

Major comments

Abstract: the conclusion of the study is missing in the abstract. I suggest to add 1-2 sentences at the end, that resume the importance of the work.

The abstract has been modified to better highlight the conclusions of the study.

L63 not clear what the bullet point states. “Reached without information...”? reached by who or what? Which information? Please clarify.

The sentence has been clarified. Reviewer 2 made a similar comment. We gave a detailed answer (to Reviewer 2) below.

L102-109 it would be helpful if you could highlight in the figure the strongest cold spells mentioned.

OK. The coldest spells mentioned in the text are now highlighted in the figure.

If you focus on 90-day running means then why in Fig. 1b you show only 7-day running means?

With Fig. 1b, we want to show the daily temporal series of DJF for each year. This daily series is smoothed over a 7-day window to improve readability. This is clarified in the text.

Minor comments

L4-5 “significant computational resources”

OK. The correction has been made

L9 repetition of “France”, I suggest remove it

OK.

L8 “We focus first...”. OK, but I don’t see the continuation of this in the remaining text. For example, “Secondly, we apply...” or “Then, we use...”. I suggest remove “first” or adapt the following text accordingly.

OK. This is clarified now.

L11 “We applied..”, before you said “We find..”. Please check the tenses in all the Abstract and make sure to be consistent with the chosen one.

We unified the tenses in the abstract.

L31 “Arctic Amplification”, please remove “The”.

OK. Removed

L33 “But...” change to “, but...”

OK.

L62 “the observational periods.”

OK.

L67 “200 years for simulations from the..” ???

This refers to historical and scenarios simulations of the Coupled Model Intercomparison Project Phase 6 (CMIP6), which usually run from 1850 to 2100.

L69 “2000-2050 decade” ?

We replaced by “2000-2050 period”.

L74 reference missing

The missing reference has been added.

L98 “have been”

OK, we made the correction.

L120 no need to repeat “Methods:”

OK. The repetition has been removed.

Figures 2: not clear the meaning of blue and red histograms. Please add it in the caption.

The caption has been modified to clarify the meaning.