

## ***Interactive comment on “Evolution of spatio-temporal drought characteristics: validation, projections and effect of adaptation scenarios” by J.-P. Vidal et al.***

**Anonymous Referee #2**

Received and published: 2 April 2012

### General points

This paper uses a downscaled climate model to calculate precipitation and soil moisture drought indices over France. It compares these drought events with a high resolution reanalysis and shows that the model does a reasonable job compared with the reanalysis. One concern about this comparison is that the simulation is only for a 50 year period with a limited number of drought events. This limits the statistical analysis and needs to be explicitly discussed in the paper.

Future projections are made with the climate model and a couple of theoretical adaptation scenarios. I like the idea of considering adaptation scenarios. However, the

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adaptation studies are purely theoretical and not necessarily realistic. It concerns me that Figure 1 shows the threshold for drought changing so that it appears that it is defined so that it remains at the 20% level throughout. Therefore this, almost by definition, negates any climate changes and the results in Figures 7-10 for the adaptation scenarios show little change. Are the differences between the adapted future and present statistically significant in Figure 7-10? I suspect that the sampling size is a constraint in such an analysis? I would suggest that more thought would be put into the adaptation scenarios and they are made more realistic.

### Specific comments

-It might be good to discuss how the RCM/GCM/land surface combine together to make the paper more understandable to hydrologists.

-What do we gain from the high resolution information?

-What are the limitations of using the reanalysis data?

-Why do you not use the soil moisture directly out of the land surface scheme in the GCM?

-What soil depth is used in Isba?

-The spin up is short – have you tested whether it is long enough?

-I would be interested in finding a little more about the clustering algorithm and definition of drought.

-The paper is well written, but would benefit from further read through as some of the words are not used in the correct context.

-I get a bit confused with all of the different acronyms and projects. Is it possible to make them clearer?

-What is the baseline defined as?

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-The top figure of Figure 3 is probably unnecessary.

-Is the drought definition based on monthly data?

-Page 1635 line 20 on – I don't think that the conclusion that the events at the end of the simulations are related to climate change can be drawn. Natural variability has a huge impact and it is equally likely that these events are part of natural variability, particularly with such a small sampling size.

In some places there is too much detail which detract from the main message. For example. -Page 1641 line 25 on is probably too much detail.

-Using the theoretical adaptation scenarios the adaptation has a greater impact at the higher emission scenarios. Is this realistic? Surely the adaptation will find it harder to cope for the higher emission scenarios.

-How do the adaptation and mitigation combine?

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 1619, 2012.