

Interactive comment on “Simulating past droughts and associated building damages in France” by T. Corti et al.

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Received and published: 29 March 2009

General comments

The article presents a modelling of the building damages cost based on the combined use of a soil moisture modelling and of a vulnerability curve. The article briefly presents a comprehensive work, based on an analysis of the insurance data base and on a LSM modelling. However, few assessment of the modelling is presented. Sometimes, the presentation of the results is not very clear, and I am not sure if the results are based on an analysis of the observed data base, or from the model. Some hypothesis or statements don't seem correct, or at least, in contradiction with other sources of information. Thus I am doubtful concerning the conclusion of the article. Especially, it is concluded that there

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was an increased of the cost by damage in 2003. Such statement is on contradiction with several sources of data that present a quite constant cost by damage since at least 1989 in France. It seems to me that if the conclusion is wrong, it may be because the methodology is too simple. The building damages linked to drought are localized in restricted and well known areas (constructed areas with clay soil). But in the modelling, every grid points are used. That means that for instance, the soil moisture deficits of forested grid cells are as significant as the ones representing urban areas. This certainly introduced some bias in the vulnerability curve, which lead to unrealistic results for the 2003 drought that had a very large extension.

Specific comments

Section 1: In order to assess the risk of the building damage in France, an important effort was conducted to map the sensitive areas and to provide construction advice. The web site www.argiles.fr is dedicated to such topic. I think that such effort should be cited in this section.

Section 3.2: it would be nice to have a map of the damages disaggregated based on the population distribution average over the time period. **Section 4:** It is said that the results of the PDSI model compare well with the GSWP and BSWB results. But, these two analyses do not focus on urban area, while the building damages occur on constructed area. So, I don't think that such comparison provides a real assessment for the model in the context of this article.

Section 4.2 According to the fine spatial resolution of the model, I wonder why you did not select only the urbanised area to build the vulnerability curve? By integrating all the grid points, you mix pixels covered by forest, cultivated area, and other natural surfaces with the urban pixels. But the damages correspond only to constructed areas. I wonder if such spatial average introduces a bias in the vulnerability curve. By selected only the urban area, the only risk is to miss

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damages on isolated building.

Section 5: The assessment of the model is quite limited compare to what is possible. It would be nice to see a map of the estimated building cost compared to the data available. For instance, the figure below presents an estimation of the cost for the period 1989-1998 based on the observed data

Line 20: “It is thus the non-linearity of the vulnerability curve that has caused the distinct increase in building damages since 1989, even though the changes in soil moisture conditions are moderate”. Such assessment may be true, but I wonder how averaged soil moisture over France can be sufficient to explain the occurrence of drought at local scale, especially since those damages affect mainly clay soil? I think that an average over urbanised clay soils would be more pertinent.

Section 5.3 It is not very clear how the Figure 7 was obtained, and I think it should be better explained.

It is said that the model does not perform well in 2003, and that this is link to the spatial repartition of the drought. The analysis of such failure is based on the Figure 7. The problem is that this map doesn't correspond to the data that I have seen. For instance, the “regions that have regularly experienced high soil water deficits during the reference period (1989–2002), as well as in 2003” plotted in blue are quite different from the map presented in Figure 1. In the opposite, “regions also affected in 2003, but not regularly during the reference period” are too large compared to the map of the towns recognized as CAT-NAT for the drought damages presented in Figure 2. Although there might be a problem in interpreting the Figure 7, I think that this map is quite different from the observations (at least, from the above mentioned sources of data). Therefore, this means that not only the model is wrong in 2003, but it was also wrong for the previous period. The fact that the cost is well reproduced by the model for

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the period before 2003 would then be due to the bias in the vulnerability curve.

“The analysis of damage data with departmental resolution shows that these regions were more sensitive to soil subsidence, exhibiting higher damage per capita by about a factor of three in case of high soil moisture deficit compared to the other regions.” I found such statement surprising. Moreover, it is not clear if such statement is based on the observed data base analysis or from the model analysis? Other sources, for instance http://www.ecologie.gouv.fr/IMG/pdf/Rapport5CATNATRisques_scherche.pdf,

give an estimation of the damage cost, and it appears that such cost is quite stable for each year, and around 10000 € by damage on average. Therefore, I wonder if the above statement is due to the failure of the model to estimate the spatial extent of the damage.

Conclusion: There are not enough assessments of the results in the article to be confident with the conclusion presented.

captions:

Figure 1: Cost estimation of the building damages link to drought for the period 1989 to 1998. Source:

www.prim.net/citoyen/definition_risque_majeur/dossier_risque_mouvement/retraitgonflement.htm

Figure 2: Maps of the towns that have been recognized as CAT-NAT for the drought damages from <http://www.argiles.fr/presentation.asp> (the details of the CATNAT declarations can be found for each department and each year on the website <http://www.argiles.fr/presentation.asp> - select a department and ask to download the report).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1463, 2009.

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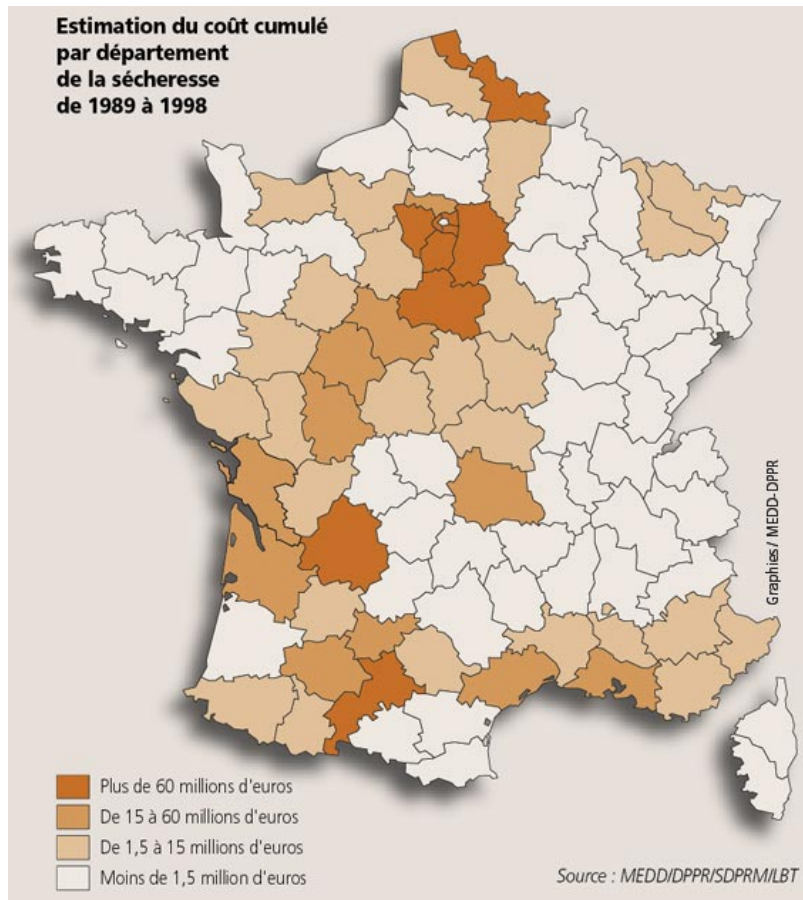


Fig. 1.

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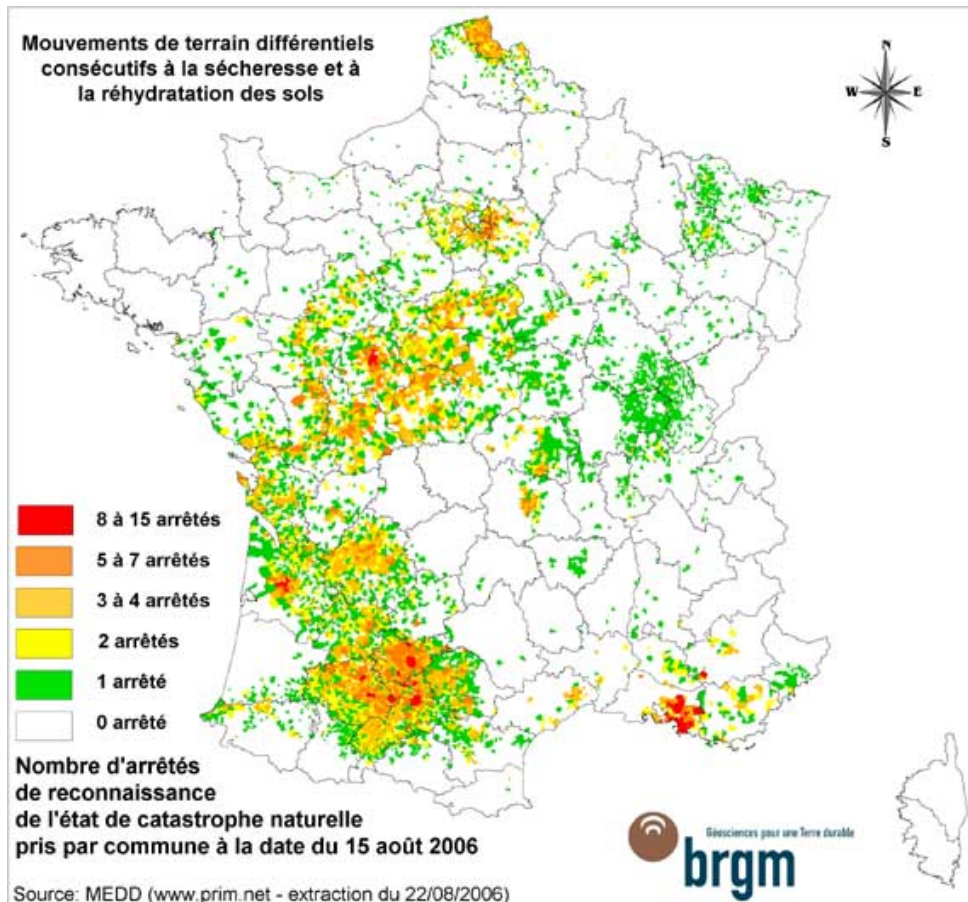


Fig. 2.