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Hydrology and Earth System Sciences Discussions

Interactive comment on "Hydrological responses of a watershed to historical land use evolution and future land use scenarios under climate change conditions" *by* R. Quilbé et al.

R. Quilbé et al.

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All reviewers comments have been answered (see author comments S1025 and S1029) and the manuscript revised in consequence.

Regarding your personal comments, here are our answers :

- Land use is not interpolated between the Landsat scenes, it was just a graphical representation. As requested by reviewer #1, Fig. 4 and 5 have been changed. On Fig.5 land use evolution is now represented by histograms instead of curves.

- The 30 annual values of water discharge are already shown on Fig.5 and Fig.6

- Regarding observed discharge data, it is true that it would have been interesting. However, we have chosen not to present them in this paper because this is more a model calibration issue. This is presented in details in other articles (Fortin et al., 2001a). Considering the good calibration results, we consider here that the model can be use with confidence to simulate water discharge, even with the other land use configurations (which are, in absolute, very close to the 1995 one). Moreover, if we want to compare the results obtained from the model with each land use configuration to the measured water discharge, then we would have to consider only the meteorological sequence of this specific year (for example, for year 1981, only the annual water discharge simulated for this year could be compared to the 1981 measured water discharge). This is not exactly the aim of the approach which is more to assess the effect of the different land use configurations under various and representative meteorological conditions (here the thirty years of simulation). Finally, this would make the paper much heavier in its first part. It is already quite heavy and we would like to maintain it like this, as its aim is to present the two approaches (past and future). Actually, this issue will probably be developed in the revised version of the companion paper Savary et al (2007) which focuses on the retrospective approach.

- Regarding the effect of the time of the year in which the satellite images are taken, this a very good point. Indeed, the hydrological history of the growing season may influence LAI. However, the satellite images are only used to identify the land use and determine the areas of the most important land use classes on the watershed (pasture, cereals, forest, etc). It is not used to determine LAI. We consider that the time of the year in which satellite images are taken (and thus hydrological history if it is in September) has a negligible influence on calculated forest or corn areas based on these satellite images. LAI is determined in Hydrotel in an empirical way, depending on vegetation type and the time of the year. Therefore, we can conclude that, in our simulations, it is land use which influences water discharge and not the opposite.

- The effect of land use scenarios must be considered during the growing season and

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not the rest of the year. If you look closely at Fig. 7 and 8 for summer period, you see that climate change has a slight effect while land use scenarios induce a significant change in water discharge (especially Scenario A). However, we agree that the last sentence of the conclusion is too general. It has been specified. In the same way, the sentence on page 22 regarding Fig 10 (formerly Fig 9) has been modified and specified.

- Regarding the discussion of climate change scenarios, it has been discussed in the answers to reviewer #2.

- Legend of Fig. 6 has been modified to specify that the GCM-GES-M shown are those that have been selected in this study for Delta Method.

- Legend of Fig. 8 has been modified to distinguish between the two panels

- Legend of Fig. 10 (formerly Fig 9) has been modified to specify the abbreviations used

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 1337, 2007.