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Hydrology and Earth System Sciences Discussions

Interactive comment on "Discharge simulation in the sub-basins of the Amazon using ORCHIDEE forced by new datasets" *by* M. Guimberteau et al.

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General comment.

This paper reports results of applying different data sets as input to the ORCHIDEE land surface model, in an attempt to improve predictions of runoff from Amazonian sub-basins. Since using the NCC global meteorological data-set as input had been shown to under-estimate mean annual streamflow at the Obidos gauging site, the first and perhaps the major change reported in the paper was to replace it by precipitation interpolated geostatistically using in-situ measurements recorded by the in-situ HYBAM network. Other incremental changes were also introduced, leading to performance assessments of a succession of models denoted by ORCH2, ORCH3 and ORCH4,

compared (in the case of streamflow) in Table A1 with performance of the original simulation ORCH1. Water-levels predicted by ORCH2, ORCH3 and ORCH4 at eight sites are also compared with observed water-levels (Table 7).

The work reported is the product of an international team of 17 researchers from 5 different countries. The work is remarkable and the team deserves praise for the way in which it has assembled and utilized such a large number of data-sets of different length and different spatial scales, in a region extending to almost six million square kilometres where hydrological records are commonly short and/or fragmented. The results presented in the paper are promising but, as the authors clearly recognise, need further improvement (water levels are severely under-estimated at all eight sites for example, although correlations between observed and simulated levels are satisfactorily high and mostly greater than 0.8; and of nine sub-basins whose simulated results from ORCH4 are reported, two gave Nash-Sutcliffe coefficients of 0.8, whilst four were negative; and there are differences in the timing of hydrograph peaks, and their amplitudes, which need to be resolved). So the paper is a very good progress report constituting a significant step towards the solution of a very complex modelling problem.

Reading the description of the ORCHIDEE model given in the paper, one gets the impression – perhaps wrongly – that it gives greater attention to routing of water between pixels, between soil layers, and between channels and flood-plain, than between vegetation and the atmosphere. The author appear to recognise this; the text says “In order to reduce noise in our simulation of streamïňĆow, no complex scenario such as deforestation, land use or forest ïňĄre are taken into account in this study”, whilst the last paragraph, Summary and final remarks, says “Some extensions of this study can be considered, such as a vegetation map that would introduce the recent extension of deforested areas and ïňĄnally, a better representation of evapotranspiration in the model.” It will be interesting to see whether such extensions, if implemented, significantly improve the ORCHIDEE model performance. The reader would also like to know rather more about what the model will be used for, and by whom, and at what stage

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the model will finally be deemed fit for purpose.

In conclusion, the paper is an impressive account of large amount of work by a highly competent team of researchers who have exploited to the full the information from many different sources. As is always the case when a scientific paper is written in a language other than the authors' mother tongue, there are parts of the text where the English could be improved; rather than list them in full here, they are given in a file of "additional material" with suggestions for improvement.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/8/C5594/2012/hessd-8-C5594-2012-supplement.zip

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 11171, 2011.