

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

M. Guimberteau et al.

matthieu.guimberteau@upmc.fr

Received and published: 21 February 2012

* Referee’s specific comment:Page 11174 Introduction: Recently an interesting modeling effort was introduced by Yamazaki et al. (2011), incorporating semi-explicit flood plain process. Yamazaki D, Kanae S, Kim H, Oki T (2011) A physically based description of floodplain inundation dynamics in a global river routing model. Water Resour. Res. 47:W04501.

-Answer: Added in the text between the two sentences at line 1, page 11175.

* Referee’s specific comment:Page 11175 Line 1 “At the beginning of 20th century” reads “At the beginning of 21st century”

C6150

-Answer: corrected in the text.

* Referee’s specific comment:Page 11178 Line 23 “Both discharge into a third reservoir” reads “Both discharge flows into a third reservoir”

-Answer: corrected in the text.

* Referee’s specific comment:Page 11184 “HYBAM” In this paper, it seems the authors use both “ORE HYBAM” and “HYBAM”, which are identical. This is a little bit confusing.

-Answer: corrected in the whole text, we choose “ORE HYBAM”.

* Referee’s specific comment:Page 11195 Section 5.1 and Section 6. In this study, river discharge simulation has been improved by three steps: improvement in precipitation data, improvement in floodplain/marsh distribution data, and modification of parameter gFd. What is potential applicability of these measures to other basins? For example, the authors pointed out less reliability of NCC global precipitation data in the northern and eastern Amazon basin, but is there any threshold of raingauge density on precipitation reliability? In which quantitative condition, floodplain/marsh process significantly matters? This kind of generalized discussion would further enhance the importance of this paper.

-Answer:

- Concerning the precipitation

We try to use all the rainfall information that is available and of reasonable good quality in the Amazon River basin in order to work with the best data set which is not very dense when comparing to other regions. We do not think that there is a threshold of ORE HYBAM rain gauge density on precipitation reliability in this basin. We consider that the distribution of the stations is more important than their density. However, to give information about ORE HYBAM stations density, we add these sentences to the line 2, page 11185:

C6151

[...] in their series. The density of ORE HYBAM stations is about 125 [10^6 km^2] over the Amazon basin. This density is compared to the minimum rain gauge density requirements to prevent the effect of poor forcing precipitation on runoff simulation. ORE HYBAM density is higher than Oki & al. (1999)'s (30 [10^6 km^2]) and Rudolf & al. (1994)'s (80 [10^6 km^2]) recommendations. Moreover, it is close to WMO (World Meteorological Organization) recommendation (100 to 400 [10^6 km^2], WMO, 1994) for operational purposes. Because a few [...]

The most important task has been to capture the data from very local rainy spots in the Andes or in more extended areas such as the north-western regions, that were not available in NCC. We add this sentence to the line 20, page 11197:

[...] in former simulations. Additionally to a good density of rainfall stations, a distribution that takes into account very rainy spots in the Andes or in the North-West contribute to a better reliability of rainfall input. Indeed, the addition [...]

- Concerning the floodplains/swamps

Two blocks of text are added to point out the importance to represent floodplains/marshes process and the potential applicability of the floodplains extensions measures to other basins:

- Added to the line 7, page 11181:

[...] adjacent lands. Over the Amazon River basin, Richey & al. (1989) estimated that up to 30% of the water in the main stem is derived from water that passed through the floodplain. Thus, as the floodplain storage is significant in relation to the streamflow, it must be taken into account explicitly. Moreover, water [...]

- Modification and addition to the lines 17-18, page 11198:

[...]. The improvements are especially significant over large areas such as the main stem of the Amazon River and the Llanos de Moxos region. A better capture of the streamflow seasonality is also found over small basins such as the Branco River at

C6152

Caracarai. However, for small basins, product quality is probably not sufficient since the spatial resolution of the satellite observation is approximately $25 \times 25 \text{ km}^2$ and the error bar on the product is about 10% (Prigent & al., 2007). Together with [...] (ORCH4), the change in floodplains/swamps maps has improved [...]

* Referee's specific comment: Page 11223, Fig 8 Legend missing.

-Answer: thank you very much for this comment! Added.

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

C6153