

Review on HESS Discussion paper „Hydrological trade-offs due to different land covers and land uses in the Brazilian Cerrado

By Anache, Wendland et al.

Comments for the authors (anonym):

The paper treat an important topic in the frame of LCLU for the Cerrado of Brazil. Until now only very few studies with experimental site data (see Oliveira, Nobrega) cover the Cerrado Biome in Brazil (most deals with Amazon rainforest). Problem statement is clear and well written. In the space of row 3 – 10 an outlook on the process of further Cerrado conversion should be added and why sugarcane in the study area will be important in this process of LUC. The aim of the study is well written (row 25-28).

Experimental instrumentation is detailed described and adequate for the aim of longterm monitoring between the different land uses and Cerrado sensu stricto. In 2.2 following should be added for understanding the calculations later:

Page 3: Time interval of soil water measurements (daily?)

As basic information were k_{sat} measurements done to understand the importance of infiltration to the groundwater of the Entisols?

Page 4 row 3: it seems better to define surface runoff as Q_{sur} or O_f (overland flow) instead of Q , because in most hydrological studies Q is defined as total discharge (see hydrological terms).

Evapotranspiration was calculated in the standard form on the base of Penman-Monteith (ET_o). Water stress coefficient was calculated on a daily base (implied soil water measurements daily ? see above).

Include in table 3 and text page 5, row 25-28: what was assumed for the rooting zone of the Cerrado plot? Z_f

Statistical data analysis was done well with good uncertainties estimations.

Chapter 3.

With the tables and figures the results are consistent documented and described. Discuss more on page 8, row 20-25: why in table 5 results for Eta differed (because of different sites with different rainfall amounts, because of different methods e.g. Nobrega.

Page 8 row 30 following: discuss more the uncertainty of Cerrado vegetation rooting zone for the evapotranspiration calculation (depth of rooting zone you used is very sensitive for the residual in the water balance

Results for LUC to pasture are well in accordance to other studies, role of soil compaction should be discussed for this land use (see Nobrega 2017 and Meister et al. 2017).

Page 9 row 25 on: the chapter is misunderstanding comparing with Fig 4 (water table changes):

Row 26: water balance residuals represent not only soil water storage, as defined before (includes also deep infiltration – groundwater recharge !); authors argues that cerrado remove water from deeper soil horizons (that's right), but groundwater fluctuation is much higher in pasture and sugarcane (why?).

It will be fine, if table or figure with the soil water content over the measurement period can be added, than it can be seen how the unsaturated soil zone react different between land uses and cerrado. – In Fig. 4b 2015 there is a remarkable water table deepening, but high surplus of dS/dt – why?

Discussion chapter 3.4 (should be enlarged a little with):

Result that pasture and sugarcane increase surface runoff and decrease η are very common (not surprising); but for the residual (increased significantly) it must be discussed more carefull with differentiation in the role of deep infiltration (groundwater recharge relative high, interflow in the slope?, change of soil water content – see the measurements – not used for the discussion; infiltration rates between Cerrado and land use types are comparable? Compare with literature results.

Conclusions: page 12, row8: avoid term change in soil water storage (you mean the residual, much more than soil water storage (see above)

Page 12 row 11,12: no documentation that higher infiltration rates in wooded Cerrado compared to pasture and sugar cane – add this in the paper.

I agree, that such long term monitoring studies must be done, to compare it with often done pure water balance simulation studies. Point out in 4., what for important results in detail are valuable for further studies and water balance modelling for Cerrado Biome.

In total: acceptance with mayor revision

Please add in the references:

PROCESS-BASED MODELLING OF THE IMPACTS OF LAND USE CHANGE ON THE WATER BALANCE IN THE CERRADO BIOME (RIO DAS MORTES, BRAZIL)
Sarina Meister, Rodolfo L. B. Nobrega, Wolfgang Rieger, Ronja Wolf and Gerhard Gerold
ERDKUNDE 2017, 71/3, 241-266

Lamparter, G.; Nóbrega, R. L. B.; Kovacs, K.; Amorim, R. S. and Gerold, G. (2016): Modelling hydrological impacts of agricultural expansion in two macro-catchments in Southern Amazonia, Brazil. In: Regional Environmental Change. <https://doi.org/10.1007/s10113-016-1015-2>