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CPD

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Interactive Comment

Interactive comment on "Detecting vegetation-precipitation feedbacks in mid-Holocene North Africa from two climate models" by Y. Wang et al.

Anonymous Referee #2

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The paper deals with the simulation of the vegetation-precipitation feedback during 6 ka simulated by two different climate models (but using the same vegetation model). The most important result is a negative relation between vegetation and precipitation at (semi)-annual timescales caused by the competition between transpiration and ground evaporation.

Although there are many vegetation studies for 6 ka, it is (to my knowledge) the first time that the influence of transpiration and soil evaporation is separated, which makes the paper innovative. The paper is well written, short, clear and to the point which I like. However, the paper might be too short. I miss some information about the models and



the explanation of the results could be more detailed. Furthermore, the authors could show some more pictures. After these additions I recommend publishing in Climate of the Past.

General comments.

1. Section 2.1. The model description is too short. At least a description of LPJ should be added (vegetation types; how do climate parameters (precipitation, temperature,) determine vegetation types; how does vegetation influence climate etc. etc.). Furthermore, because the results depend on the soil characteristics, a more extensive description of the soil modules should be included. It is not sufficient to say that "CCSM2 has ten soil layers while FOAM only has two layers (P 964, lines 15/16)". More information is needed about the water holding capacity of the soils, the (moisture) transport between the soil layers, how is runoff computed etc. etc.

2. Figures 1B and 1F show quite large differences between CCSM and FOAM although they both use LPJ. I guess this is caused by different temperature and precipitation patterns in both models. This should be explained, especially because the differences between figures 1C and 1G can (partly) be explained by the grass fractions shown in figures 1B and 1F.

3. Runoff is not mentioned throughout the whole text. However, runoff is very important for the moisture availability for vegetation and runoff also (partly) determines soil wetness. Especially soil wetness could strongly influence the main results of the paper. A description of the computation of runoff in both models should be added (see also general comment 1) but also a discussion of the role of runoff should be included.

4. To my knowledge there is no restriction on the number of pictures in CP(D). I suggest that the authors include some additional graphics to support some results mentioned in the text. First of all I think that a picture of soil wetness and albedo for 6 ka and pre-industrial is necessary because they (largely) explain the differences in feedback between 6 ka and pre-industrial (page 967, line 1). Further figure suggestions are:

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temperature and/or precipitation patterns for 6 ka (see also general comment 2); similar pictures as figure 2 but for the pre-industrial runs; inclusion of area-averaged feedback parameters for the pre-industrial runs in figure 3.

5. The authors use annual precipitation (figure 1) and, I guess, annual transpiration/evapotranspiration/ground evaporation (figure 2) to compute the feedbacks. Annual precipitation is largely (even completely) determined by summer precipitation, however I guess that the annual transpiration/evapotranspiration/ground evaporation is determined by both summer and winter. It could be informative to show and/or mention the possible differences between the feedbacks of figure 2 for all seasons.

Specific comments.

1. P 964 lines 4/5. The modelresolutions should (also) be given in degrees.

2. Why is FPAR used in figure 3 instead of total vegetation fraction as in figures 1 c/d/g/h and figures 2a-f?.

3. I do not understand what the authors mean by "we bin individual monthly data into one-month, three-months, six-months, and twelve-month timeseries" (caption figure 3). Do they pick one month (in that case, which month?) to compute the feedback parameter? Or do they use all individual months to obtain an annual range? Some more information is needed.

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