

## ***Interactive comment on “Expansion of global drylands under a warming climate” by S. Feng and Q. Fu***

### **Anonymous Referee #2**

Received and published: 9 August 2013

#### Summary

This paper shows global drylands have increased over the last 60 years, and are projected to continue increasing through the 21st century. Under a high-GHG scenario (RCP8.5), global dry lands are projected to increase by 10%. Such a climate change signal is important for several reasons, most notably because more people will be affected by water scarcity.

Overall, the paper is well-written, the figures are clear and communicate the important results. The main conclusions are important and sufficiently novel.

I recommend publication in ACP pending a few minor edits.

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#### Minor Comments

At first, it is unclear why the precipitation climatologies are adjusted (Section 2.1). Perhaps a sentence can be included to explain why this was done? I assume it is due to the use of different precipitation (CPC/UD) and PET (GLDAS) data sources. If so, why not just use precipitation and PET from GLDAS? GLDAS precipitation is based on observations, correct?

Related to the prior comment, why are the model climatologies adjusted to observations (Section 2.3)? Just to aid with the interpretation of the figures? Such a modification should simply shift the trends up or down, not change the magnitude of the trends (Page 14643, Line 25), correct?

Why is only one realization for each model used (Section 2.3)? Some models have up to 10 realizations, so the authors are not using a lot of the available model data. The projected signal seems pretty clear, so adding the additional runs will likely not change anything.

I'm curious about a natural variability component. At Page 14643, Line 10, the authors mention this point. Is the simulated natural variability of global dry lands large? For example, what does Figure 3 look like if each realization is plotted? Do some realizations show a decreasing trend? Is there significant decadal variability, perhaps related to the PDO or AMO?

I'm also curious if there is a hemispheric asymmetry in the expansion of global dry lands?

#### Grammar

Page 14638, Line 5. “. . .have expanded in THE last sixty years. . .”

Page 14639, Line 8. “. . .have expanded in THE last sixty years. . .”

Page 14641, Line 7. “. . .irregularly with several years behind. . .” is confusing. I assume

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you mean that they are not updated in real-time?

Page 14646, Line 18. Perhaps place Fig. 6 as panel c in Fig. 5, to aid visual comparison?

Page 14649, Line 12. I think you mean "...which IS likely to expand..."

Page 14649, Line 22. I think you mean "...which accentuates the urgent NEED to develop..."

Figures

Please add units to Fig. 3 (percent).

In the caption of Fig. 5, panel c is referenced, but does not exist. I think you mean, "and (b) same as (a) but to..."

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 14637, 2013.

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