

## ***Interactive comment on “Global cotton production under climate change – Implications for yield and water consumption” by Yvonne Jans et al.***

### **Anonymous Referee #1**

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Overall, the manuscript is well-written and easy to follow. The authors' efforts on conducting a gridded cotton modeling study are commendable. However, I think some important elements, pertaining to climate change impacts, are missing. My main concern is that the authors did not account for the adverse effects of temperature rise, especially on growing season length and crop failure. This likely led to underestimation of the negative effects of climate change on yield and crop water consumption.

Specific comments:

Line 15: Please define VWC.

Line 19: Delete (and thus water stress).

Section 2: I did not see any details on model calibration. Did you have a set of parameters you adjusted to match the FAO-yield? Did you follow any protocols for calibration, like changing parameters in sequence, first for yield, then for irrigation? Please explain the steps followed.

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Line 313: “concluded” instead of “conclude”.

Line 324: Please justify simulating climate change impacts without accounting for yield penalty due to temperature increase.

Line 327: I would be careful in stating that “warmer temperatures will increase the length of growing season”. For cotton and other annual crops, increasing temperature is known to increase the rate of development, which causes the crop to mature earlier than it would at a lower temperature. Thus, this rapid development reduces the length of growing period, considering the same maturity-group cultivar is used.

Line 335-340: This section is confusing and I would caution the authors while comparing different studies. Please make sure the same matrix is compared across studies. Was it daily crop water use or seasonal; was it transpiration, evapotranspiration, or transpiration use efficiency? Please revise this section for consistency and technical accuracy.

It is expected that transpiration use efficiency would increase at higher [CO<sub>2</sub>], but the overall increase in biomass due to [CO<sub>2</sub>] enrichment, would trigger higher water consumption compared to the ambient [CO<sub>2</sub>] conditions.

Line 341: “Temperature” is another key driver of climate change impact on crop yield. Considering the crop was irrigated, rainfall likely did not have a major effect. So instead of using “direct climate change impacts”, I would use “temperature rise” effects.

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