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## The greening planet



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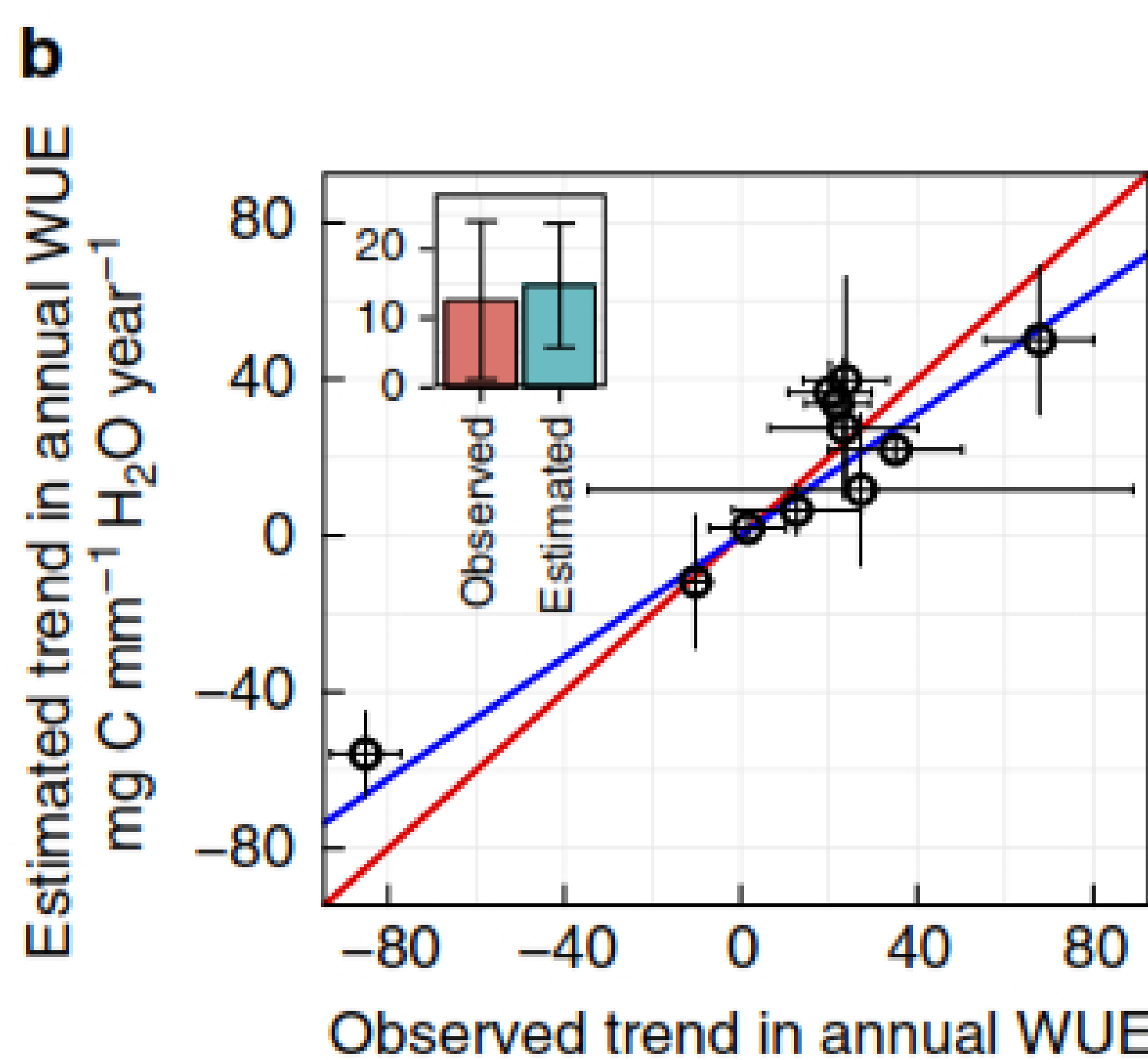
[\(link to picture\)](#)

Reading breathtaking horror stories about rising atmospheric CO<sub>2</sub> levels would make mother Earth lol (laugh out loud), if this was possible. Far away from being a catastrophe, increasing CO<sub>2</sub> has a demonstrably positive influence on the biosphere. A recent paper by Cheng, et al. in Nature Communications shows this again, using a new method. The title is "**Recent increases in terrestrial carbon uptake at little cost to the water cycle**" ([link](#)), and it has been published in June 2017.

### 1. GPP and WUE

The minimum two parameters used to describe the state of the plant biosphere are GPP and WUE. GPP = Gross Primary Production represents the plant-mass growth; it is measured in gC/(m<sup>2</sup>\*year) = gram carbon per square meter and per year. Now all plant life needs water; normally the availability of water and more important, the efficiency in its use are limiting factors. WUE = Water Usage Efficiency quantifies this; the unit is gC/(mmH<sub>2</sub>O) = carbon uptake per unit of water loss (for instance gram carbon produced per mm rainfall).

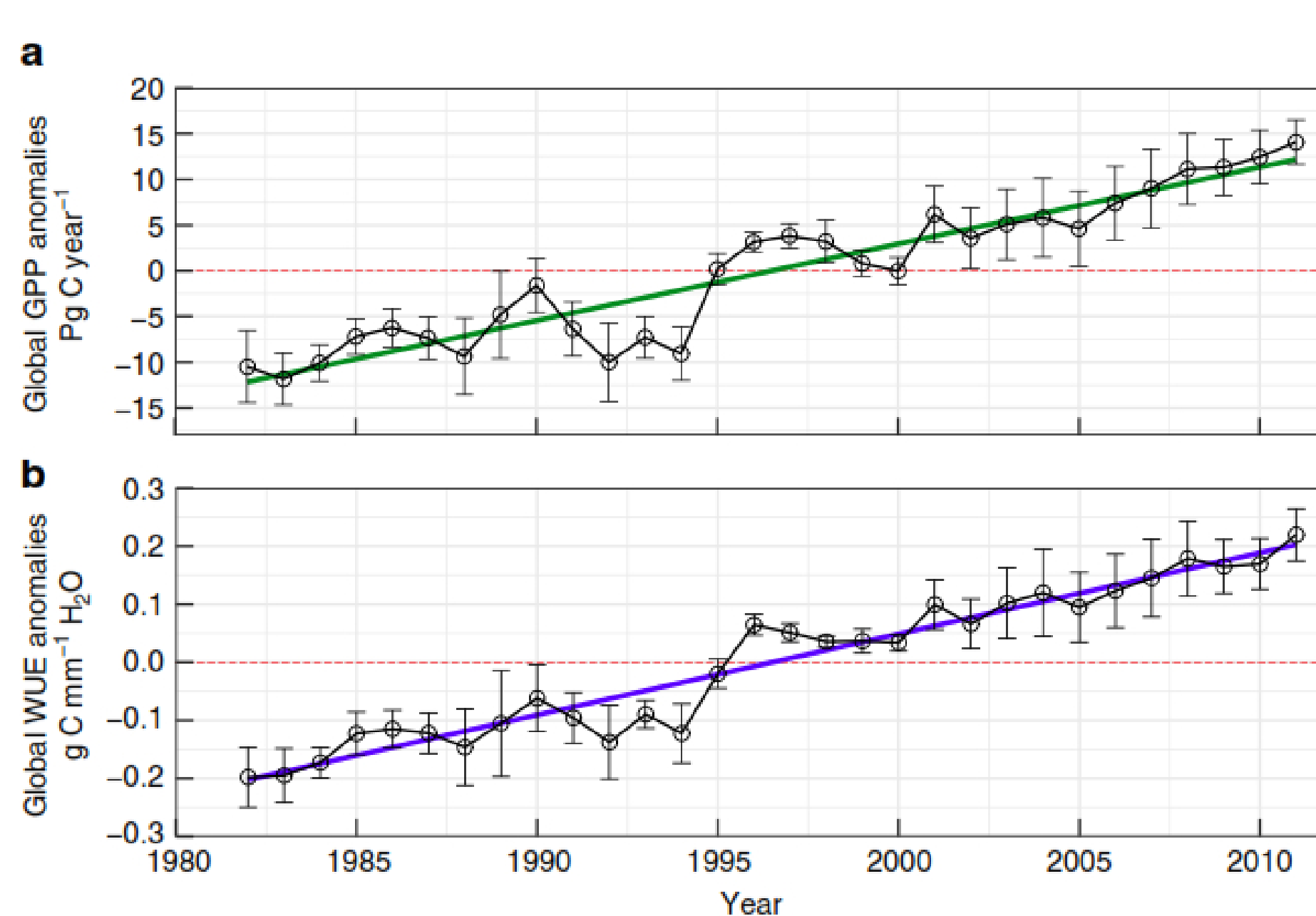
We know since many years that higher CO<sub>2</sub> levels reduce the opening of the leaf stomata and as a consequence the water loss by evaporation. So it really does not come as a surprise that WUE has risen during the period 1982-2011 (a period of increasing atmospheric CO<sub>2</sub>), the basis of the Cheng et al. paper.



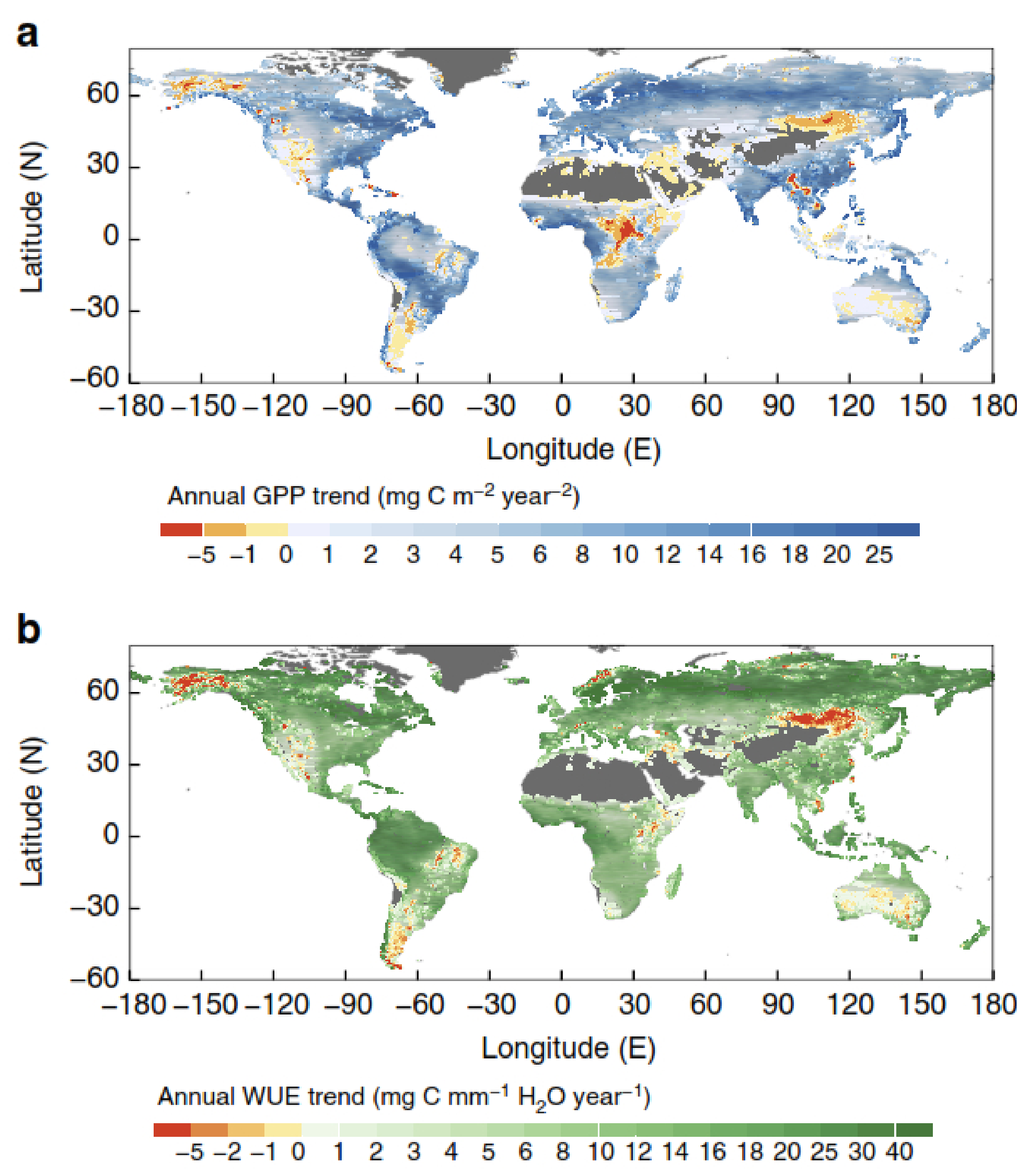
This figure documents this increase, as found by observations (red line) or calculated from a model used by the authors.

### 2. Trends in both GPP and WUE

GPP is not a consequence of WUE, but the next figure shows that both parameters (here given as anomalies) increase in step:



The common cause of these increases is atmospheric CO<sub>2</sub>, and the positive effect is nearly planet-wide, with very few exceptions:



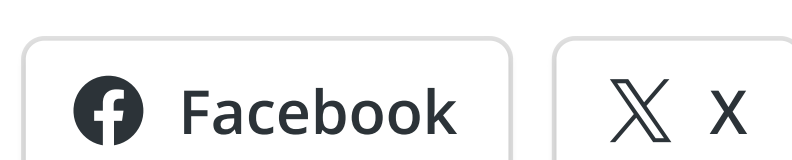
Negative trends correspond to the yellow-red regions, clearly an absolute minority!

### 3. Conclusion

Rising atmospheric CO<sub>2</sub> levels have increased plant production i.e. made the planet greener. On top of this first positive effect, the CO<sub>2</sub> gas (which some imbeciles describe as "poisonous") made the plants more efficient in their water usage: they grow better with less water, the overall ecosystem water use (E) remaining nearly constant!

The authors conclude that "*Our results show that GPP has increased significantly and is primarily associated with an increase in WUE*". **How is it that these positive aspects of changing CO<sub>2</sub> levels are still silenced in the media and the political climate change Zeitgeist?**

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