

Interactive comment on “Hysteresis response of daytime net ecosystem CO₂ exchange during a drought” by N. Pingintha et al.

Anonymous Referee #2

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The manuscript well documents the hysteresis phenomenon in whole ecosystem day-time NEE that can result from stomatal closure associated with water deficits. The manuscript describes the consequences of this hysteresis for the estimation of net ecosystem carbon balances, a pressing scientific and policy concern. The research was conducted in a rainfed peanut field as a model ecosystem to better understand the phenomenon in a homogeneous environment with well understood plants. The work will make a valuable contribution to an improved understanding of whole ecosystem gas exchanges associated with variable precipitation and also lead to improved estimation of current and likely future net terrestrial-atmospheric exchanges. I recommend only minor revisions to this manuscript.

A general concern was the assertion that no mechanistic understanding of the hystere-

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sis is available. Several authors have identified hysteresis or afternoon depressions in photosynthesis-PAR relationships and have attributed this effect to stomatal closure in response to water deficit in wildland (Tuzet et al. 2003, Wilson et al. 2003, Jenerette et al. 2009) and the effects of water stress has previously been described for peanut (Ferreira et al. 2003) systems. While I still find the present work valuable and interesting, the manuscript overstates the lack of present understanding.

For the EC system can some estimate of measurement uncertainties be assessed? Can energy closure be assessed? This might be difficult without an estimate of ground heat flux. How well does the water balance between precipitation and ET and is there an estimate of runoff or infiltration from this field? How do your estimates compare with previous estimates of peanut leaf physiology, for example (Hammer and Wright 1994)?

Minor Comments

Pg 3 ln 3-5: Citation for recent definitions of NEE (Chapin et al. 2006).

Pg 3 ln 15-20: The use of mechanistic models is left out of this list and combined with inversion procedures, these can also be used to generate integrated measurements (Braswell et al. 2005, Luo et al. 2009).

Pg 6 ln 5: Subject-verb agreement.

Pg 6 ln 24: “DDuring”

Pg 7 ln 3: Subject-verb agreement

Pg 7 ln 14: Was the LAI meter calibrated against other measurements at this site?

Pg 9 ln 11: Check grammar after “due. . .”

Pg 11 ln 25: kPa is more commonly used.

Citations

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