

## ***Interactive comment on “Characterisation of ecosystem water-use efficiency of european forests from eddy covariance measurements” by F. G. Kuglitsch et al.***

### **Anonymous Referee #1**

Received and published: 12 January 2009

Understanding how forest ecosystems use water to sequester carbon is important for predicting their responses to climate change which likely includes increased frequency of water stress. Thus the topic of this manuscript is clearly of great interest to the climate change research community. However, water use efficiency at the ecosystem level (WUE<sub>e</sub>) is controlled by a variety of physical, physiological and biogeochemical factors. I feel the authors do not try hard enough to tease out the effects of these different factors. Sure, they use different ways to calculating WUE<sub>e</sub> (GPP and NEP based on half-hourly, daily, and seasonal time scales). But when they try to explain the spatial and temporal variations in these WUE<sub>e</sub>s, they tend to mix all the factors together. Here are some suggestions on how to improve the manuscript:

S2694

[Full Screen / Esc](#)

[Printer-friendly Version](#)

[Interactive Discussion](#)

[Discussion Paper](#)



1. Examine whether there is a value for the concept 'Intrinsic water use efficiency' at the ecosystem scale (IWUE<sub>e</sub>). IWUE<sub>e</sub> could be calculated simply as WUE<sub>e</sub> x VPD. IWUE<sub>e</sub> may help remove the direct effect of VPD on transpiration. Note that VPD could still affect IWUE<sub>e</sub> by affecting stomatal conductance. This 'indirect' effect is not accounted for by IWUE<sub>e</sub> but would reflect a property of the vegetation. 2. Examine how diffuse radiation might affect IWUE<sub>e</sub>. Diffuse radiation could be calculated from available data at eddy flux sites even though sites might not have diffuse radiation measurements. 3. Try to remove the effects of VPD and diffuse radiation on IWUE<sub>e</sub> through some kind of normalization process and then look for general patterns in the 'normalized' IWUE<sub>e</sub> that might depend on vegetation characteristics. 4. There is a need for an uncertainty analysis on how errors in calculating GPP might affect the analysis on GPP-based IWUE<sub>e</sub>. I strongly suspect that the hysteresis shown in Figure 9 is due to inadequate calculation of GPP. 5. Figure 5 is confusing. First, the caption is wrong. Second, how could one compare WUEGPP and mGPP on a 1:1 plot given these variables are on different time scales? Why is WUEGPP larger than mGPP? Why is WUEGPP apparently less than mNEP? 6. All statements should be based on data or on a clear logic. It is ok to make an educated guess but when doing so, please indicate clearly it is a guess. In a few places, I see this tenet is violated. 7. How is a rainfall event defined? Also is the intensity of rain taken into account? This information is important to understanding Figure 4. 8. What is the rationale for identifying the period of 'active canopy during the growing season' based on the criteria of latent heat flux, global radiation and temperature? Do these criteria have to be satisfied at the same time in order for a canopy to be identified as active? 9. The statements on lines 24-27 on page 4494 seem to be in contradiction to these on lines 1- 14 on page 4495 and to Figure 9.

---

Interactive comment on Biogeosciences Discuss., 5, 4481, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)